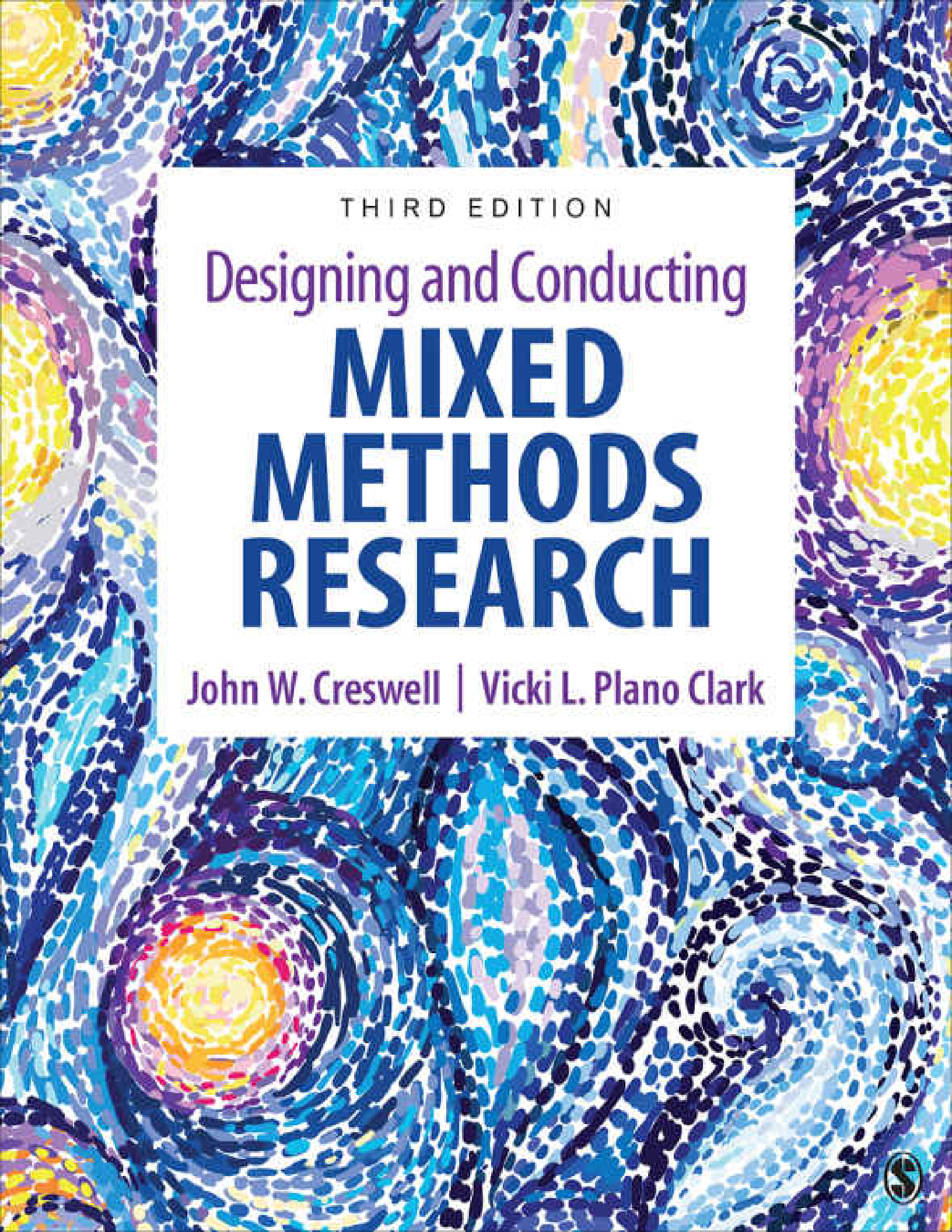
THIRD EDITION
Designing and Conducting
MIXED METHODS RESEARCH
John W. Creswell | Vicki L. Plano Clark

Praise for the Third Edition

"This updated edition provides thoughtful consideration to how the field of mixed methods research has changed, including how the authors' own definitions and typologies have refined. It also provides a discussion of a diverse array of empirical studies from prominent and emerging mixed methods scholars, highlighting the strength and potential of this field for social and behavioral sciences."—**Peggy Shannon-Baker**, Bryn Mawr College

"The authors compellingly described the evolution or adjustment of their thinking about mixed methods design. They achieved their goal of advancing the typology of mixed methods core designs in both a parsimonious and pragmatic manner. Teaching and learning about mixed methods designs will be enhanced by the extraordinary work of these authors!"—**Susan Sweat Gunby**, Mercer University

"This is a powerful volume that assists doctoral students facing the writing of a dissertation and other professionals in the field of research. I would not undertake a major evaluation without first reviewing the steps laid out so clearly in this book."—**Joseph Drew**, Morgan State University

"This is one of the most complete and comprehensive textbooks available on mixed methods research. A must-have for novice to expert researchers."—**Regardt J Ferreira**, Tulane University

"Creswell and Plano Clark do excellent work in showing the evolution of mixed methods research. One of the highlights of this edition is the addition of scaffolds that guide writing sections of a mixed methods study."—**Senay Purzer**, Purdue University

Designing and Conducting Mixed Methods Research

Third Edition

This book is dedicated to all of my students and audience members who have participated in my classes and in my workshops on mixed methods. Thanks for your advice.

—John

This book is dedicated to Mark for all of his support, encouragement, friendship, and love. I thank him to the moon and back.

—Vicki

Designing and Conducting Mixed Methods Research

Third Edition

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SAGE Publications, Inc.

2455 Teller Road

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SAGE Publications Ltd.

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55 City Road

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SAGE Publications India Pvt. Ltd.

B 1/I 1 Mohan Cooperative Industrial Area

Mathura Road, New Delhi 110 044

India

SAGE Publications Asia-Pacific Pte. Ltd.

3 Church Street

#10-04 Samsung Hub

Singapore 049483

Printed in the United States of America

Library of Congress Cataloging-in-Publication Data

Names: Creswell, John W., author. | Plano Clark, Vicki L., author.

Title: Designing and conducting mixed methods research / John W. Creswell, Department of Family Medicine, University of Michigan, Vicki L. Plano Clark, School of Education, University of Cincinnati.

Description: Third Edition. | Los Angeles : SAGE, [2017] | Revised edition of the authors' Designing and conducting mixed methods research, c2011. | Includes bibliographical references and index.

Identifiers: LCCN 2017037536 | ISBN 9781483344379 (Paperback : acid-free paper)

Subjects: LCSH: Social sciences—Research—Methodology. | Research—Evaluation.

Classification: LCC H62 .C6962 2017 | DDC 001.4/2—dc23 LC record available at https://lccn.loc.gov/2017037536

This book is printed on acid-free paper.

17 18 19 20 21 10 9 8 7 6 5 4 3 2 1

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Preface

Purpose of the Book

The basic idea of this book is to provide an introduction to the design and conduct of mixed methods research. In the past 15 years, we have seen a significant increase in interest in this approach to research. Although mixed methods has been employed in some disciplines and fields of study since the 1990s, its use has expanded rapidly to many social, behavioral, and health science fields and arenas for research across several countries. This is in distinct contrast to the state of affairs when we wrote the first edition, which was published in 2007. In earlier times, researchers had little knowledge about this developing approach called *mixed methods*. Today, from our workshops, presentations, and classes, we know that people no longer wonder what this approach is and question whether it is a legitimate model of inquiry. Their interests now have shifted toward the procedures of research—how to conduct a mixed methods study—and to the value mixed methods adds to their knowledge about complex problems. To this end, we have maintained our original premise for this book: Those reading about mixed methods need to know the steps in the process of designing and conducting a study, and they are often curious about the actual procedures involved and the many new techniques and strategies that have unfolded in the mixed methods field.

This book is an introduction as well as a detailed examination of how to conduct a mixed methods study. We fold into our discussion many examples of recently published mixed methods empirical articles as well as methodological discussions. We attempt to highlight the most important steps in mixed methods research through the ample use of bullet points, and we introduce the reader to some of the latest writings in the field. Since the 2007 inception of the *Journal of Mixed Methods Research* (*JMMR*), which we helped to cofound and coedit, we have reviewed hundreds of manuscripts for publication from diverse disciplines, from different parts of the world, and from varied perspectives about this form of inquiry. From these articles and from our personal experiences in mixed methods research teams, classes, and presentations, we present a detailed rendering of how to design and conduct a mixed methods study. We hope that the beginning mixed methods researcher will find useful techniques for designing his or her own study and that the experienced researcher will see applicable summaries of the latest thinking about mixed methods.

Audience for the Book

The primary audience for this book is those who seek to conduct rigorous, systematic mixed methods studies. These individuals may be established researchers or graduate students who have some experience with both qualitative and quantitative research. They may also be writers in the field of mixed methods who hopefully will see this book as including state-of-the-art ideas. Policymakers and practitioners also will find this book a useful introduction to mixed methods as they review published studies or establish their own mixed methods projects. With the discipline expansion of mixed methods application, this text should be applicable across many social, behavioral, and health science fields, and we have attempted to incorporate examples from such diverse areas as sociology, psychology, education, management, marketing, social work, family studies, communication studies, leadership, family medicine, mental health, and nursing. Finally, we see this book as core reading in a mixed methods research course—a type of course that is increasingly being found on college and university campuses. We will use many of the tables and figures in this book in our future workshops on mixed methods both in the United States and abroad.

Book Features

We have maintained many of the book features found in the second edition. The general layout of the book follows the process of conducting a study; it begins with the initial assessment as to whether mixed methods is the best approach to study a research problem, moves to the philosophical assumptions and theoretical stances that guide research, and continues on to developing an introduction, collecting and analyzing data, and writing the proposal and final report for a study. To augment this process approach, we highlight seven popular designs in mixed methods research and provide examples of good illustrations of published studies that portray each of the designs. Each step in the process is considered from the perspective of the different mixed methods designs. This is an approach that we use in our workshops and teaching.

In this work we do not favor either quantitative or qualitative research but instead see a balance between these two approaches. Accordingly, we offer examples of both quantitatively oriented mixed methods studies and qualitatively oriented mixed methods projects throughout the text. We also balance the two approaches by intentionally discussing quantitative approaches first in some chapters and qualitative approaches first in others. We conclude each chapter by providing a summary of the chapter's content as well as suggestions for practical activities to make concrete the major points of the chapter. One activity in particular threads throughout the book: We ask the reader to incorporate the ideas from the chapter into the active development of a mixed methods study. At the end of each chapter, we provide suggested readings so the ideas presented in the chapter might be further studied. We have attempted to define key terms throughout the text and provide a glossary of these terms at the end of the book to help readers understand the unique language of mixed methods research.

We have maintained an emphasis on using examples from the literature to augment our discussion of the steps in the design process. From our experience of reading and reviewing many hundreds of mixed methods studies, we have found great value in examining the practice of other researchers as they implement and report on the mixed methods designs they used in their research studies. It is also helpful for researchers planning to use mixed methods to locate applicable studies published within their discipline in order to identify the language and designs that are common in that discipline. Researchers can also cite these studies as examples of the design in the methods section of their own proposals and reports. In addition, researchers who examine examples of mixed methods designs learn

about different procedures used when conducting mixed methods research and are better able to anticipate challenges that can occur with a specific design. Published studies also provide models for how to write up and report the results of a specific mixed methods design.

In this third edition we have updated and expanded the references to include more websites and resources that readers should find helpful. A new companion website will also be available at https://study.sagepub.com/creswell3e.

The open-access **Student Study Site** includes the following:

- Full-text **SAGE journal articles** that have been carefully selected to expand upon each chapter.
- Exclusive content curated specifically for this text from the **SAGE Research Methods platform**, including case studies and premium video, allows for further exploration into important topics.

Password-protected **Instructor Resources** include the following:

- A sample syllabus assists in planning a course using *Designing and Conducting Mixed Methods Research*, Third Edition.
- Editable, chapter-specific **Microsoft® PowerPoint® slides** offer you complete flexibility in easily creating a multimedia presentation for your course.

New Features Added to the Third Edition

Since the writing of the second edition to this book, we have both authored other mixed methods books that summarize the latest thinking on mixed methods research (Creswell, 2014; Plano Clark & Ivankova, 2016). Thus, we drew on our ever-expanding knowledge of mixed methods as we made revisions in this book.

Specifically, here are the changes you will find in this third edition:

- We updated references to books. Authors in the field of research methods and mixed methods are continually updating editions of their books. We wanted to include the latest versions so the reader can see current thinking from authors writing about research methods today.
- We have included new examples from recent journal articles published since we issued the second edition of this book. These examples have been drawn from diverse disciplines and fields so they will be useful to a broad audience of scholars. New articles are cited throughout the text, and we include four as new appendices.
- A major shift in this book from previous editions involves how we treat mixed methods designs. We now find it most useful to focus on three core designs—the convergent design, the explanatory sequential design, and the exploratory sequential design—that represent the basic forms of mixed methods designs, as discussed in Chapter 3. These core designs have been applied in many fields and methodological approaches. So we have created a new chapter—Chapter 4—that takes these core designs and applies them to additional approaches and frameworks, such as intervention trials, case studies, participatory-social justice studies, and program evaluations. These four approaches certainly do not exhaust the potential applications of mixed methods, but they represent many uses of the core designs apparent in published mixed methods studies today. The research decisions related to these seven designs are now delineated throughout the discussions of the research process (Chapters 5–8).
- Integration, or the bringing together of the quantitative and qualitative data and results, is the centerpiece of mixed methods research. Now, in retrospect, we realize that this aspect of mixed methods is the most confusing and troubling to researchers. Accordingly, we emphasize integration throughout the book. Specifically, we added a passage about integration to the discussion of each type of design in order to make this step

in the research as explicit and practical as possible. We also expanded the discussion of integration considerably within the treatment of data analysis in Chapter 7.

- Another topic we give more attention to in this edition is the use of theory and conceptual frameworks in mixed methods research. To us, the use of a theoretical model or framework can differ depending on the type of design. When we discuss each design, we now reflect on how theory or framework might be used in the design to make the study more useful and practical.
- Mixed methods procedures have expanded considerably in the last ten years, and new ideas continue to emerge. Some scholars may not be aware they are using some of the latest techniques. Other scholars may not know that specific procedures are available that, if used, will add to the rigor and systematic presentation of their mixed methods study. Accordingly, we have deleted the summary and recommendations passage found in the last chapter of the second edition. In its place we have inserted a specific discussion about the current advances within mixed methods research and suggested techniques and strategies that might make a mixed methods study more sophisticated and state of the art.
- We also felt that the last chapter might best conclude by pulling together the key elements and decisions involved in the core designs by incorporating all of the steps in the process of research (from the title to the interpretation). In this way, the reader will be able to see the entire process from beginning to end for each core design. Many chapters provide the segments of the process; the final chapter now summarizes the entire process in one table.

Acknowledgments

Our work and this book have benefited greatly from the contributions of many. We begin by thanking our acquisitions editors at SAGE Publishing, Vicki Knight (first and second editions) and Helen Salmon (third edition), for their encouragement, coordination, and support throughout the project. We are grateful to Chelsea Neve, Kelly DeRosa, and Shannon Kelly for their careful attention to details throughout the production process of this edition. We also thank the entire staff at SAGE for their encouragement of the field of mixed methods research. As the reader can see in our many references, both of us have collaborated extensively with staff and colleagues who worked with our Office of Qualitative and Mixed Methods Research (OQMMR) at the University of Nebraska–Lincoln and who work at our new institutions, the University of Michigan Mixed Methods Research and Scholarship Program in Family Medicine and at the University of Cincinnati. We want to highlight the importance of our collaboration with Ron Shope, Manijeh Badiee, Amanda Garrett, Sherry Wang, Dr. Michael Fetters, Nataliya Ivankova, and Lori Foote. We are also fortunate to have the input of the many individuals whom we have collaborated with in family medicine at the University of Michigan; at the Health Services Research Center of the Department of Veterans Affairs, Ann Arbor, Michigan; and at the University of Nebraska Medical Center. We are also indebted to the many workshop participants and students over the years who have provided useful ideas and questions about mixed methods. These individuals are located in many fields and in many parts of the United States as well as the United Kingdom, South Africa, Australia, Canada, and other countries across the globe.

We are grateful for the feedback from the following SAGE reviewers:

- Mary Shepard Wong, Azusa Pacific University
- Joseph Drew, Morgan State University
- Susan Sweat Gunby, Mercer University
- Mansoo Yu, University of Missouri-Columbia
- Peggy Shannon-Baker, Bryn Mawr College
- Regardt J. Ferreira Tulane University
- Natalie Ellis, The University of Oklahoma
- Senay Purzer, Purdue University
- Kamiar Kouzekanani, Texas A&M University–Corpus Christi
- Charles A. Kramer, University of La Verne

- Barbara Henderson, San Francisco State University

This is an exciting time in the evolution of the field that has become mixed methods research. We hope this book is a useful tool for researchers to use in learning about this approach to research and in conducting their own mixed methods studies.

About the Authors

John W. Creswell, PhD,
is codirector of the Michigan Mixed Methods Research and Scholarship Program and an adjunct professor of family medicine at the University of Michigan. He has authored numerous articles and 28 books (including new editions) on mixed methods research, qualitative research, and research design. While at the University of Nebraska–Lincoln, he held the Clifton Endowed Professor Chair; served as director of a mixed methods research office; founded the SAGE journal, the *Journal of Mixed Methods Research*; and was a consultant to the Veterans Administration health services research center in Ann Arbor, Michigan. He was a senior Fulbright scholar to South Africa in 2008 and to Thailand in 2012. He co-led a national working group on mixed methods practices at the National Institute of Health in 2011, served as a visiting professor at Harvard's School of Public Health in 2013, and received an honorary doctorate from the University of Pretoria, South Africa, in 2014. In 2014 he also served as president of the Mixed Methods International Research Association (MMIRA).

Vicki L. Plano Clark, PhD,
is an associate professor in the research methodologies unit of the University of Cincinnati's School of Education. Her scholarship aims to delineate useful designs for conducting mixed methods research, examine procedural issues associated with achieving meaningful integration within these designs, and consider larger questions about the personal, interpersonal, and social contexts for the adoption and use of mixed methods. She has coauthored several books including most recently the book *Mixed Methods Research: A Guide to the Field* (2016; Sage) with Nataliya V. Ivankova. She is a founding coeditor of the Mixed Methods Research Series for SAGE Publishing. She also currently serves as an associate editor for the *Journal of Mixed Methods Research* (*JMMR*) and as 2017–2019 chair for the Mixed Methods Research Special Interest Group of the American Educational Research Association. In 2011 she co-led the development of *Best Practices for Mixed Methods in the Health Sciences* for the National Institutes of Health Office of Behavioral and Social Sciences Research. She engages in research and evaluation projects on a wide array of topics, such as the management of cancer pain, the effectiveness of school reform initiatives, and the quality of communication between attorneys and their clients.

AUTHORS' NOTE: We selected the cover image to illustrate the artistry

involved in mixed methods research. The many colors represent different methods and the many points represent different data and results. The different colors and points come together to create a powerful artistic picture just as the different methods and results are combined to create new insights and understandings in a mixed methods study.

1 The Nature of Mixed Methods Research

What is it about the nature of mixed methods that draws researchers to its use? Its popularity can be easily documented through journal articles, conference proceedings, books, and the formation of a professional association, a journal, and special interest groups (Creswell, 2011b, 2014; Plano Clark, 2010). It has been called the "third methodological movement" following the developments of first quantitative and then qualitative research (Tashakkori & Teddlie, 2003a, p. 5), the "third research paradigm" (Johnson & Onwuegbuzie, 2004, p. 15), and "a new star in the social science sky" (Mayring, 2007, p. 1). Why does it merit such superlatives? One answer is that mixing methods is an intuitive way of doing research that is constantly being displayed throughout our everyday lives.

Consider for a moment how many professionals go about their practice. Physicians consider quantitative lab results along with a patient's qualitative life history and symptoms when making a diagnosis and treatment plan. Financial consultants analyze market trends along with stories of individual decision making when offering advice. Politicians use both statistical trends from their districts and the personal stories of their constituents when choosing a course of action. Examples of combining quantitative and qualitative information pervade many aspects of professional life. Listen closely to television broadcasters report about hurricanes or about the votes cast in elections. The trends are again supported by individual stories. Or listen to commentators at sporting events. There is often a play-by-play commentator who describes the somewhat linear unfolding of the game (a quantitative perspective) and then the additional commentary by the "color" announcer, who tells us about the individual stories and highlights of the personnel on the playing field (a qualitative perspective). Again, both quantitative and qualitative data come together in these broadcasts.

In these instances, we see mixed methods thinking in ways that Greene (2007) called the "multiple ways of seeing and hearing" (p. 20). Multiple ways are visible in everyday life, and mixed methods research provides multiple ways to address a research problem. Other factors also contribute to this interest in mixed methods. Researchers recognize it as an accessible approach to inquiry. They have research questions (or problems) that can best be answered using mixed methods, and they see the value of using it—as well as the challenges it poses.

Building on one's intuition for mixing quantitative and qualitative information, the first step to using mixed methods in research is to understand the nature of mixed methods research. This chapter reviews several preliminary considerations necessary before a researcher designs a mixed methods study. These considerations include

- defining the nature of mixed methods research,
- examining examples of mixed methods studies,
- recognizing what types of research problems call for a mixed methods study,
- knowing the advantages of using mixed methods, and
- acknowledging the challenges of using mixed methods.

Defining Mixed Methods Research

Several definitions for mixed methods have emerged over the years that incorporate various elements of methods, research processes, research purpose, and philosophy. These different stances are summarized in Table 1.1.

An early definition of mixed methods came from writers in the field of evaluation. Greene, Caracelli, and Graham (1989) emphasized the mixing of methods and the disentanglement of methods and philosophy (i.e., paradigms) when they said,

> In this study, we defined mixed-method designs as those that include at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words), where neither type of method is inherently linked to any particular inquiry paradigm. (p. 256)

Ten years later, the definition shifted from mixing two methods to combining all phases of the research process—a methodological orientation (Tashakkori & Teddlie, 1998). Included within this orientation would be philosophical (i.e., worldview) positions, methods, and the inferences or interpretations of results. Thus, Tashakkori and Teddlie (1998) defined mixed methods as the combination of "qualitative and quantitative approaches in the methodology of a study" (p. ix). These authors reinforced this methodological orientation in their preface to the *SAGE Handbook of Mixed Methods in Social & Behavioral Research* by writing, "Mixed methods research has evolved to the point where it is a separate methodological orientation with its own worldview, vocabulary, and techniques" (Tashakkori & Teddlie, 2003a, p. x).

TABLE 1.1 ■ Authors and the Focus or Orientation of Their Definition of Mixed Methods

Author(s) and Year	Focus of the Definition
Greene, Caracelli, and Graham (1989)	Methods
Tashakkori and Teddlie (1998; 2003a)	Methodology (the process of research)
Johnson, Onwuegbuzie, and Turner (2007)	Viewpoints (philosophy), methods, and research purpose
Tashakkori & Creswell (2007b)	Methodology and methods
Greene (2007)	Multiple ways of seeing, hearing, and making sense of the social world
Creswell and Plano Clark (2007)	Methods, methodology, and philosophy
Creswell (2014)	Methods and core characteristics
Hesse-Biber (2015)	Methods and contested terrain

Source: Adapted from Creswell & Plano Clark (2011).

Source: Adapted from Creswell & Plano Clark (2011).

In a highly cited *Journal of Mixed Methods Research* (*JMMR*) article, Johnson, Onwuegbuzie, and Turner (2007) sought consensus on a definition by suggesting a composite understanding based on 19 different definitions provided by 21 highly published mixed methods researchers. The authors commented about the definitions, citing the variations in them, from what was being mixed (e.g., methods, methodologies, or types of research); the place in the research process in which mixing occurred (e.g., data collection, data analysis); the scope of the mixing (e.g., from data to worldviews); the purpose or rationale for mixing (e.g., breadth, corroboration); and the elements driving the research (e.g., bottom-up, top-down, a core component). Incorporating these diverse perspectives, Johnson et al. (2007) ended with their composite definition:

> Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the purposes of breadth and depth of understanding and corroboration. (p. 123)

In this definition, the authors did not view mixed methods simply as methods but more as a methodology that spanned viewpoints to inferences and that included the combination of qualitative and quantitative research. They incorporated

diverse viewpoints but did not specifically mention paradigms or philosophy. Their purposes for mixed methods—breadth and depth of understanding and corroboration—meant they related the definition of mixed methods to a rationale for conducting it. Most importantly, perhaps, they suggested that there is a common definition that should be used.

When the call for paper submissions to the *JMMR* was first issued, we, as editors, felt that a general definition of mixed methods should be provided. Our approach incorporated both a general qualitative and quantitative research methodological orientation as well as a methods orientation. Our intent was also to cast our definition within accepted approaches to mixed methods, to encourage submissions as broad as possible, and to "keep the discussion open about the definition of mixed methods" (Tashakkori & Creswell, 2007b, p. 3). Hence, the definition announced in the first issue of the journal was as follows:

> [Mixed methods research is defined] as research in which the investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry. (Tashakkori & Creswell, 2007b, p. 4)

Then, Greene (2007) provided a definition of mixed methods that conceptualized this form of inquiry differently as a way of looking at the social world

> that actively invites [us] to participate in dialogue . . . multiple ways of seeing and hearing, multiple ways of making sense of the social world, and multiple standpoints on what is important and to be valued and cherished. (p. 20)

Defining mixed methods as "multiple ways of seeing" opens up broad applications beyond using it as only a research method. It can be used, for example, as an approach to think about designing documentaries (Creswell & McCoy, 2011) or as a means for "seeing" participatory approaches to HIV-infected populations in the Eastern Cape of South Africa (Olivier, de Lange, Creswell, & Wood, 2010).

In *The Oxford Handbook of Multimethod and Mixed Methods Research Inquiry* (Hesse-Biber & Johnson, 2015), Hesse-Biber (2015) takes the position that the

definition of mixed methods continues to be contested both within and outside the mixed methods community. However, she says that

> what most approaches to mixed methods have in common is the mixing of at least one qualitative and one quantitative method in the same research project or set of related projects (e.g., in a longitudinal study). (p. xxxix)

In 2007, in the first edition of this book, we provided a definition that had both a methods and a methodological orientation, while in the 2011 second edition, we included an emphasis on the priority of the quantitative and qualitative data in a study. Today, we are inclined to stress the intent of a study rather than the vague and often confusing priority. We still feel that a definition for mixed methods should incorporate many diverse viewpoints, however. In this spirit, we rely on a **definition of core characteristics of mixed methods research**. It is a definition we suggest in our teaching, workshops, and presentations on mixed methods research (Creswell, 2014). It combines a methods, research design, and philosophy orientation. It also highlights the key components that go into designing and conducting a mixed methods study; thus, it will be the one emphasized in this book. In mixed methods, the researcher

- collects and analyzes both qualitative and quantitative data rigorously in response to research questions and hypotheses,
- integrates (or mixes or combines) the two forms of data and their results,
- organizes these procedures into specific research designs that provide the logic and procedures for conducting the study, and
- frames these procedures within theory and philosophy.

These core characteristics, we believe, adequately describe mixed methods research. They have evolved from many years of reviewing mixed methods articles and determining how researchers use both quantitative and qualitative approaches in their studies.

Examples of Mixed Methods Studies

One way to better understand the nature of mixed methods research beyond a definition is to examine published studies in journal articles. Although philosophical assumptions often exist in the background of published mixed methods studies, the core characteristics of our definition can be seen in the following examples:

- A researcher collects data on quantitative instruments and on qualitative data reports based on focus groups to see if the two types of data show similar results but from different perspectives. (See the study of food safety knowledge, practices, and beliefs in Hispanic families with young children by Stenger, Ritter-Gooder, Perry, and Albrecht, 2014.)
- A researcher collects data using quantitative survey procedures and follows up with interviews of a few individuals who completed the survey to help explain the reasons behind and meaning of the quantitative survey results. (See the study of fear of falling for community-dwelling elderly people who had recently fractured a hip by Jellesmark, Herling, Egerod, and Beyer, 2012.)
- A researcher explores how individuals describe a topic by conducting interviews, analyzing the information, and using the findings to develop a survey instrument. This instrument is then administered to a sample of a population to see if the qualitative findings can be generalized to a population. (See the study of graduate engineering student retention by Crede and Borrego, 2013.)
- A researcher conducts an experiment in which quantitative measures assess the impact of a treatment on an outcome. Before the experiment begins, the researcher collects qualitative data to help design the treatment, to design the standard care condition, and to better design strategies to recruit participants to the trial. (See the study of an acupuncture-based intervention for women experiencing low back pain during pregnancy by Bartlam et al., 2016.)
- A researcher wants to develop several in-depth analyses of cases—for example, small family medicine clinics. It is important to compare how these clinics treat patients' cardiovascular disease. The researcher collects quantitative data on patients from their health records and also gathers qualitative interview data from the doctors, nurses, and medical assistants. When these quantitative and qualitative data are compared, it is apparent that some practices have strong procedures and some weak procedures. Family

medicine case clinics are selected for both categories of procedures, and conclusions are drawn about how they differ in treating patients. (See study by Shaw et al., 2013.)

- A researcher seeks to bring about change in understanding certain issues facing women. The researcher gathers data through instruments and focus groups to explore the meaning of the issues for women. It is a participatory form of inquiry in which the participants—the women—play a major role in helping to understand the problem. The larger understanding of change guides the researcher and informs all aspects of the study, from the issues being studied, to the data collection, to the call for reform at the end of the study. (See the study exploring student–athlete culture and understanding specific rape myths by McMahon, 2007.)
- A researcher seeks to evaluate a program that has been implemented in the community. The first step is to collect qualitative data in a needs assessment to determine what questions should be addressed. This is followed by the design of an instrument to measure the impact of the program. This instrument is then used to compare certain outcomes both before and after the program implementation. Based on this comparison, follow-up interviews are conducted to determine why the program did or did not work. This multiphase mixed methods study is often found in long-term evaluation projects. (See the study of the long-term impacts of interpretive programs at a historical site by Farmer and Knapp, 2008.)

These examples all illustrate the collection and analysis of both quantitative and qualitative data, the integration or mix of the two types of data and results, and an underlying assumption that mixed methods research could be a useful approach to address important research problems.

What Research Problems Require Mixed Methods?

Authors of the example studies crafted their research as mixed methods projects based on their assumption that mixed methods could best address their research problems. An important preliminary consideration is recognizing the types of research problems best suited for mixed methods research. When preparing a research study employing mixed methods, the researcher needs to provide a rationale or justification for why mixed methods best addresses the topic and the research problem.

Not all situations justify the use of mixed methods. There are times when qualitative research may be best because the researcher aims to explore a problem, honor the voices of participants, map the complexity of the situation, and convey multiple perspectives of participants. At other times, quantitative research may be best because the researcher seeks to understand the relationship among variables or determine if one group performs better on an outcome than another group. In our discussion of mixed methods, we do not want to minimize the importance of choosing either a quantitative or qualitative approach when it is merited by the situation. Further, we would not limit mixed methods to certain fields of study or topics. Mixed methods research seems applicable to a wide variety of disciplines in the social, behavioral, and health sciences. Although some disciplinary specialists may select not to use mixed methods because of a lack of interest in qualitative or in quantitative research, most topic area problems can be addressed using mixed methods.

Instead of thinking about fitting different methods to specific content topics, we suggest thinking about fitting methods to different types of research problems (or questions). For example, we find a quantitative survey approach best fits the need to understand the views of participants in an entire population. A quantitative experiment approach best fits the need to determine whether a treatment works better than a control condition. Likewise, a qualitative ethnography approach best fits the need to understand how a culture-sharing group works. What situations, then, warrant an approach that combines quantitative and qualitative research—a mixed methods inquiry? In general, **research problems suited for mixed methods** are those in which one data source may be insufficient. Further, results often need to be explained, exploratory findings need to be generalized, a primary experimental design needs to be expanded or enhanced, multiple cases need to be

compared or contrasted, the participants need to be involved in the research, and/or a program needs to be evaluated. Over the years, authors in the mixed methods field have enumerated multiple reasons (also called rationales) for using mixed methods (Bryman, 2006). We will focus here on the major reasons.

A Need Exists to Obtain More Complete and Corroborated Results

We know that qualitative data provide a detailed understanding of a problem while quantitative data provide a more general understanding. This qualitative understanding arises out of studying a few individuals and exploring their perspectives in great depth, whereas the quantitative understanding arises from examining a large number of people and assessing responses to a few variables. Qualitative research and quantitative research provide different pictures, or perspectives, and each has its limitations. When researchers study a few individuals qualitatively, the ability to generalize the results to many is lost. When researchers quantitatively examine many individuals, the understanding of any one individual is diminished. Hence, the limitations of one method can be offset by the strengths of the other, and the combination of quantitative and qualitative data provides a more complete understanding of the research problem than either approach by itself.

There are several ways in which one data source may be inadequate. One type of evidence may not tell the complete story, or the researcher may lack confidence in the ability of one type of evidence to address the problem. The results from the quantitative and qualitative data may be contradictory, which would not be discovered by collecting only one type of data. Further, the type of evidence gathered from one level in an organization might differ from evidence examined from other levels. These are all situations in which using only one approach to address the research problem would be deficient. A mixed methods design best fits these problems. For example, when Shannon-Baker (2015) studied the experience of culture shock on undergraduate students participating in a short-term study abroad program, she collected both quantitative survey data and qualitative data in the form of reflective journals, self-portraits, and artist statements. Reflecting on the use of both forms of data to understand the problem because a single form alone would have been inadequate, she said,

> The implications of using limited approaches in any line of inquiry result in investigating a problem from only a single angle. As a result, we can only investigate information that is connected to those lines of inquiry. By instead engaging in multiple forms of inquiry, we can explore information that is not accessible through a single approach alone. (Shannon-Baker, 2015, p. 36)

A Need Exists to Explain Initial Results

Sometimes the results of a study may provide an incomplete understanding of a research problem and there is a need for further explanation. In this case, a mixed methods study is used, with the second database helping to explain the first. A typical situation is when quantitative results require an explanation as to what they mean. Quantitative results can net general descriptions of the relationships among variables, but the more detailed understanding of what the statistical tests or effect sizes actually mean is lacking. Qualitative data and results can help build that understanding. For example, Eckert (2013) conducted a mixed methods study investigating the extent to which measures of incoming teacher qualifications predict teacher efficacy and retention in high-poverty urban schools in the United States. The first, quantitative phase of the study tested the relationship among preparation, efficacy, and retention, while the second, qualitative phase consisted of interviews with beginning teachers in urban schools to explain the relationships among the variables. The rationale for using mixed methods to study this situation was stated as:

> To gain a greater understanding of the chain of evidence that links teacher preparation, teacher efficacy, and teacher retention, I conducted a mixed-methods sequential explanatory study, which involved the collection and analysis of quantitative data followed by the collection and analysis of qualitative data. . . . In regard to the chain of evidence, the quantitative phase of research established the linkages, whereas the qualitative phase brought nuance, context, and understanding to each link in the chain. (Eckert, 2013, p. 79)

A Need Exists to First Explore Before Administering Instruments

In some research projects, the investigators may not know the questions that need to be asked, the variables that need to be measured, and the theories that may guide the study. These unknowns may be due to the specific, remote population being studied (e.g., Native Americans in Alaska) or the newness of the research topic. In these situations, it is best to first explore qualitatively to learn what questions, variables, theories, and so forth need to be studied and then follow up with a quantitative study to generalize and test what was learned from the exploration. A mixed methods project is ideal in these situations. The researcher begins with a qualitative phase to explore and then follows up with a quantitative phase to test whether the qualitative results generalize. For example, Mbuagbaw et al. (2014) studied the acceptability and readiness of a text-messaging program to improve adherence to therapy for individuals with the human immunodeficiency virus in Cameroon. Their study began with focus group interviews, and the themes from the focus groups were then used to develop an instrument that was administered to a second sample of clients to test the generalizability of the themes with the larger sample. The authors explained, "This design enhances our ability to generalise qualitative findings, develop questions to measure community acceptability/readiness and to facilitate collaboration between researchers with qualitative and quantitative backgrounds" (p. 3).

A Need Exists to Enhance an Experimental Study With a Qualitative Method

Experimental studies provide quantitative tests of the effectiveness of a treatment for producing certain outcomes. In some situations, a secondary qualitative research method can be added to an experimental study to provide an enhanced understanding of some aspect of the intervention. In this situation, the qualitative method can be embedded within a primary experimental methodology. For example, Donovan et al. (2002) conducted an experimental trial comparing the outcomes for three groups of men with prostate cancer receiving different treatment procedures. When the authors experienced difficulty recruiting participants, they added a qualitative component in which they interviewed the men to determine how best to recruit them into the trial (e.g., how best to organize and present the information). Toward the end of their article, the authors reflected on the value of this preliminary, smaller, qualitative component used to design procedures for recruiting individuals to the trial:

> We showed that the integration of qualitative research methods allowed us to understand the recruitment process and elucidate the changes necessary to the content and delivery of information to maximize recruitment and ensure effective and efficient conduct of the trial. (p. 768)

A Need Exists to Describe and Compare Different Types of Cases

Mixed methods research is being used to develop an in-depth understanding of one or more different types of cases followed by a comparison of the cases in terms of certain criteria. Often both the qualitative and quantitative data are gathered at the same time and then brought together to form distinct cases for analysis. For example, Walton (2014) used a case study approach to examine a cross-sector partnership that was working to lead science education reform. In addition to her qualitative interviews and document analysis, she included a quantitative survey to measure the collaboration occurring among stakeholders within the partnership. She described the rationale for this approach by stating,

> The use of multiple data sources in this study facilitated a holistic understanding of the [partnership's] work and progress toward creating an infrastructure for change. . . . The quantitative findings enhanced the qualitative and promoted the creation of a more comprehensive and nuanced description of the case than would have been possible using qualitative interview data in isolation. (p. 70)

A Need Exists to Involve Participants in the Study

A situation may exist in which participants need to help shape the study so that useful change can occur in their lives. Their involvement may occur in many phases of the research, from identifying the problem to using the results to make changes. The participants are involved because the researchers need to understand the detailed nuances of the problem or need the participants' help to implement the research findings that will impact people or communities. In these cases, the researcher gathers both quantitative and qualitative data to best engage individuals and bring about change. For example, in a study of the transition of care for homeless individuals from the hospital to a shelter, Greysen, Allen, Lucas, Wang, and Rosenthal (2012) presented data to participants in the study and key stakeholders in the community. These individuals became involved in discussing the accuracy of the findings and recommendations for hospitals and shelters. The authors commented, "This feedback process was critical for shaping our interpretations and presentation of data collected from study participants in the context of the community to which they belong" (p. 1486).

A Need Exists to Develop, Implement, and Evaluate a Program

In projects that span several years and have many components, such as evaluation studies, researchers may need to connect several studies to reach an overall objective. These studies may involve projects that gather both quantitative and qualitative data simultaneously and gather the information sequentially. We can consider them multiphase or multiproject types of mixed methods studies. These projects often involve teams of researchers working together over many phases of the project. For example, Peterson et al. (2013) conducted a multiphase evaluation study to develop and implement an intervention aimed at motivating behavior change for individuals with chronic diseases. To understand the individuals' values and beliefs, they started by conducting a qualitative study in the first phase. Based on the qualitative results, they refined and pilot tested the intervention in the next phase. In the final phase the team tested the effect of the intervention for different groups using randomized controlled trials. Peterson et al. (2013) presented a figure of the three phases of their research over 5 years and described the need for this multiphase translational research approach this way: "By integrating qualitative and quantitative methods and findings into the study design, researchers can gain deeper insight into the participant's point of view, explore complex social phenomena, and effectively tailor intervention approaches" (p. 218).

These scenarios illustrate situations in which the problem is best studied using mixed methods. This discussion begins to lay the groundwork for understanding the designs of mixed methods that will be discussed later and the reasons authors cite for undertaking a mixed methods study. Although we cite a single reason for using mixed methods in each illustration, many authors cite multiple reasons, and we recommend that aspiring (and experienced) researchers begin to take note of these many rationales in published studies.

What Are the Advantages of Using Mixed Methods?

Understanding the nature of mixed methods involves more than knowing its definition and when it should be used. In addition, at the outset of selecting a mixed methods approach, researchers need to know the advantages that accrue from using it so they can convince others of these advantages. We now enumerate some of the advantages.

Mixed methods research provides a way to harness strengths that offset the weaknesses of both quantitative and qualitative research. This has been the historical argument for mixed methods research for more than 30 years (e.g., see Jick, 1979). One might argue that quantitative research is weak in understanding the context or setting in which people live. Also, the voices of participants are not directly heard in quantitative research. Further, quantitative researchers are in the background, and their own personal biases and interpretations are seldom discussed. Qualitative research makes up for these weaknesses. On the other hand, qualitative research is seen as deficient because of the personal interpretations made by the researcher, the ensuing bias created by this, and the difficulty in generalizing findings to a large group because of the limited number of participants studied. Quantitative research, it is argued, does not have these weaknesses. Thus, the strengths of one approach make up for the weaknesses of the other.

Mixed methods research provides more evidence for studying a research problem than either quantitative or qualitative research alone. Researchers are able to use all of the tools of data collection available rather than being restricted to those types typically associated with quantitative research or qualitative research.

Mixed methods research helps answer questions that cannot be answered by quantitative or qualitative approaches alone. For example, “Do participant views from interviews and from standardized instruments converge or diverge?” is a mixed methods question. Others would be, “In what ways do qualitative interviews explain the quantitative results of a study?” (using qualitative data to explain the quantitative results) and “How can a treatment be adapted to work with a particular sample in an experiment?” (exploring qualitatively before an experiment begins). To answer these questions, quantitative *or* qualitative

approaches would not provide a satisfactory answer. The array of possible mixed methods questions will be explored further in the discussion in Chapter 5.

Mixed methods research offers new insights that go beyond separate quantitative and qualitative results. By combining the approaches, researchers gain new knowledge that is more than just the sum of the two parts. As Fetters and Freshwater (2015) suggested, mixed methods research provides the research equivalent of the equation 1 + 1 = 3.

Mixed methods research provides a bridge across the often adversarial divide between quantitative and qualitative researchers. We are social, behavioral, and human sciences researchers first, and divisions between quantitative and qualitative research only serve to narrow the approaches and the opportunities for collaboration.

Mixed methods research encourages the use of multiple worldviews, or paradigms (i.e., beliefs and values), rather than the typical association of certain paradigms with quantitative research and others with qualitative research. It also encourages us to think about paradigms that might encompass all of quantitative and qualitative research, such as pragmatism. These paradigm stances will be discussed further in the next chapter.

Mixed methods research is practical in the sense that the researcher is free to use all methods possible to address a research problem. It is also practical because individuals tend to solve problems using both numbers and words; by combining inductive and deductive logic through abductive thinking (Morgan, 2007); and by employing skills in observing people as well as by recording behavior. It is natural, then, for individuals to employ mixed methods research as a preferred mode for understanding the world.

Mixed methods research enables scholars to produce multiple written publications from a single study. These publications may include a quantitative article (from the quantitative strand of the study), a qualitative article (from the qualitative strand), an overview article about the entire mixed methods study, and a methodological article about how the study advances our understanding of mixed methods research. In an era in which faculty (and students) need multiple publications, mixed methods research provides this opportunity.

Mixed methods research also helps researchers develop broader skillsets. Students using mixed methods emerge from their program with some expertise in multiple forms of research methods—quantitative methods, qualitative methods,

and mixed methods. In short, they have enhanced their toolkit of skills to address research questions, to become productive members of mixed methods teams, and to be able to teach using multiple methods.

What Are the Challenges in Using Mixed Methods?

Mixed methods is not the answer for every researcher or every research problem. Its use does not diminish the value of conducting a study that is exclusively either quantitative or qualitative. It does, however, require researchers to have certain skills, time, and resources for extensive data collection and analysis and to be able to educate others who may be less familiar with the basic ideas of mixed methods research.

The Question of Researcher Skills

We believe that mixed methods is a realistic approach if the researcher has the requisite skills. We strongly recommend that researchers first gain experience with both quantitative research and qualitative research separately before undertaking a mixed methods study. At a minimum, researchers should be acquainted with the data collection and data analysis procedures of both quantitative and qualitative research. This point was emphasized in our definition of mixed methods. Researchers also need to be aware of general ethical considerations involved with conducting research with human participants.

In terms of quantitative research skills, mixed methods researchers should be familiar with common methods of collecting quantitative data, such as using measurement instruments and administering closed-ended attitudinal scales. Researchers need an awareness of the logic of hypothesis testing and the ability to use and interpret statistical analyses, including common descriptive and inferential procedures available in statistical software packages. Finally, researchers need to understand essential issues of rigor in quantitative research, including reliability, validity, experimental control, bias, and generalizability. In later chapters we will delve into what constitutes a rigorous quantitative approach.

A similar set of qualitative research skills is necessary. Researchers should be able to identify the central phenomenon they are exploring in their study; to pose exploratory, meaning-oriented research questions; and to value participants as the chief sources of information. Researchers should be familiar with common methods of collecting qualitative data, such as semi-structured or unstructured interviews using open-ended questions and qualitative observations. Researchers need basic skills in analyzing qualitative text data, including coding text and developing themes and descriptions based on these codes, and should be acquainted with a qualitative data analysis software package. Finally, it is important that researchers understand essential issues of quality in qualitative research, including credibility, trustworthiness, and common validation strategies.

Finally, those undertaking this approach to research should have a solid grounding in mixed methods research, including knowledge of procedures for integrating or combining quantitative and qualitative data. This requires reading the literature on mixed methods that has accumulated since the late 1980s and noting the best procedures and the latest techniques for conducting a good

inquiry. It may necessitate taking courses in mixed methods research that are available both online and in residence on many campuses. It may mean also apprenticing with someone familiar with mixed methods who can provide an understanding of the skills involved in conducting this form of research.

The Question of Time and Resources

Even when researchers have basic quantitative and qualitative research skills, they should ask themselves if a mixed methods approach is feasible given time constraints and resources. Mixed methods research involves collecting more types of data and analyzing more types of information than either quantitative or qualitative research alone. Thus, time and resources are important issues to consider early in the planning stage. Researchers might ask themselves the following questions:

- Is there sufficient time to collect and analyze two different types of data?
- Are there sufficient resources to collect and analyze both quantitative and qualitative data?
- Are the skills and personnel available to complete this study?

Mixed methods researchers need to consider the lengthy time required to gain approval for the study, to obtain access to participants, and to complete the data collection, analysis, and integration. Researchers should keep in mind that qualitative data collection and analysis often require more time than what is needed for quantitative data. The length of time required for a mixed methods study is also dependent on whether the study will be using a one-phase, two-phase, or multiple-phase design. Researchers need to think about the expenses that will be part of the study. These expenses may include, for example, printing costs for quantitative instruments, recording and transcription costs for qualitative interviews, and the cost of quantitative and qualitative data analysis software programs.

Researchers need to think carefully about how they can manage the increased demands associated with mixed methods designs. For students who are expected to work independently, this means carefully planning the scope of the study to keep it manageable. Researchers who are working on large projects should consider working in teams to manage the demands, and team research has increasingly become more popular as part of interdisciplinary investigations (O'Cathain, Murphy, & Nicholl, 2008a). A team has the advantage of bringing together individuals with diverse methodological and content expertise, and tasks can be divided according to the quantitative or qualitative skills of individuals. Working with a team can be a challenge, however. It can increase the costs

associated with the research, and individuals with the necessary skills need to be located.

Leadership on these teams is important. Team leaders need to create and maintain successful collaboration among team members and spend time coordinating the project. Important considerations include how leaders will reconcile methodological differences among team members; what the appropriate team membership should be that represents quantitative, qualitative, and mixed methods orientations; what leadership skills are needed by the team leader; how team members can recognize the value of mixed methods; and what the successful outcomes of such a team might be.

The Question of Educating Others About the Value of Mixed Methods

Mixed methods research may be seen as a new methodology by some scholars. These individuals may not know what it is or how it is conducted. Other scholars may feel that they have always been doing mixed methods research. These other scholars may have collected both quantitative and qualitative data but not systematically combined or integrated the two databases as is discussed in this book. Some individuals may hold misconceptions about mixed methods research —for example, they may collect only qualitative data and then analyze it quantitatively, such as in content analysis (Krippendorff, 2004), and believe this constitutes mixed methods. Some scholars may not have utilized many of the advances in mixed methods that we will discuss, such as the use of mixed methods research questions, the diagrams of designs, the identification of the validity issues that often arise in different designs, the use of joint displays to show integration, and so forth. A simple analogy can help to clarify their understanding. Consider the field of quantitative research. Many researchers have been conducting simple correlations and regressions, but the field has advanced to sophisticated levels where researchers now are using structural equation modeling and hierarchical linear modeling. While researchers may have been using the basic ideas of correlations, the field has advanced to new techniques and procedures so that the regression analysis of today looks very different than the simple correlations of yesterday. A similar analogy could be made between the observations and interviews used by anthropologists in the early 20th century and the more sophisticated techniques used by grounded theorists and ethnographers today. Interviews and observations are still used, but the methodologies have advanced into more sophisticated and elaborate approaches.

Therefore, an important consideration is how to educate individuals about what mixed methods now constitutes. A good way we can accomplish this is by locating exemplary mixed methods studies in the literature and sharing these studies with others. These studies can be selected from prestigious journals with a national and international reputation. But how does a researcher find these mixed methods studies?

Mixed methods studies can be difficult to locate in the literature because not all researchers use the term *mixed methods* in their titles or in the discussion of their methods. Based on our extensive work with the literature, we have developed a

short list of terms that we use to search for mixed methods studies within electronic databases and journal archives. These terms include

- mixed method* (where * is a wildcard that will allow hits for *mixed method*, *mixed methods*, and *mixed methodology*) and
- quantitative AND qualitative.

Note that the second search term uses the logic operator AND. This requires that both words appear in the document to satisfy the search criteria. If too many articles are found, a researcher can limit the search so that the terms must appear within the abstract or restrict the search to recent years. If not enough articles result, researchers can try searching for combinations of common data collection techniques, such as “survey AND interview.” By using these strategies, researchers may locate a few good examples of mixed methods research that illustrate the core characteristics introduced in this chapter. Sharing these examples with stakeholders can be helpful when educating them about the utility and feasibility of a mixed methods approach.

Summary

Before deciding on a mixed methods approach, the researcher needs to consider several preliminary considerations. First, the researcher needs some understanding as to what constitutes a mixed methods study. We have provided a definition of mixed methods that includes collecting and analyzing both qualitative and quantitative data, integrating the two forms of data and their results, using specific mixed methods designs, and framing the study within theory and philosophy. Most important in this list is the utilization of two sets of data, one quantitative and one qualitative, and the integration of these data.

The researcher also needs to determine if the problem can best be addressed using mixed methods. Mixed methods is not dependent on a specific issue or topic of study, and it can be used to examine a vast array of problems when one type of data is insufficient. Some problems are best studied by using two data sources, and collecting only one may provide an incomplete understanding. One study may need a second database to help explain the first, and yet another may require the researcher first explore a topic qualitatively before undertaking a quantitative study. Mixed methods has many applications, such as inserting qualitative data into an experiment, comparing different cases, using to support participatory-stakeholder involvement, or for evaluating the success of a program.

These situations all illustrate the value of using multiple data sources to understand research problems. Another advantage is that the strength of one method may offset the weaknesses of the other. Using multiple sources of data simply provides more evidence for studying a problem than a single method. Oftentimes research questions are posed that require both an exploration and an explanation that draw from different data sources, and new insights may be gained because of the combination. Mixed methods also is well suited for interdisciplinary research that brings scholars together from different fields of study in teams, and it enables researchers to employ multiple philosophical perspectives that guide their research. Finally, mixed methods is both practical and intuitive in that it helps offer multiple ways of viewing problems—something found in everyday living.

This does not mean that using mixed methods is easy. It requires that the researchers have skills in several areas: quantitative research, qualitative research, and mixed methods research. It takes time to gather the extensive data from both quantitative and qualitative sources, and it takes resources to fund these data

collection (and data analysis) efforts. Further, individuals planning a mixed methods study need to educate others about the value of mixed methods. It is a relatively new approach to inquiry, and it requires an openness by others to using multiple perspectives in research. A search through the literature will yield good examples of mixed methods studies today, and these can be shared with important stakeholders to help educate them about such studies.

Activities

1. Locate a mixed methods study in your field or discipline. Engage in these steps:
    1. Suspend your interest in the content of the articles and focus instead on the research methods used.
    2. Review the core characteristics of mixed methods research in our definition and identify how the study addresses each of the core characteristics.
2. Consider the value of mixed methods research for different audiences, such as policymakers, graduate advisors, individuals in the workplace, and graduate students. Discuss the value for each audience.
3. Consider whether a mixed methods approach is feasible for your study. List the skills, resources, and time that you have available for the project.
4. Consider designing a mixed methods project. State in your own words how you will define mixed methods research, mention why mixed methods is well suited to address your research problem, and cite both the advantages and challenges of using mixed methods as an approach to research.

Additional Resources to Examine

For definitions of mixed methods, consult the following resources:

- Creswell, J. W. (2014). *A concise introduction to mixed methods research*. Thousand Oaks, CA: Sage.
- Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco, CA: Jossey-Bass.
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, *1*(2), 112–133.

For the rationale or purpose for using mixed methods to address problems, see the following resources:

- Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, *6*(1), 97–113.
- Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, *11*(3), 255–274.
- Mayring, P. (2007). Introduction: Arguments for mixed methodology. In P. Mayring, G. L. Huber, L. Gurtler, & M. Kiegelmann (Eds.), *Mixed methodology in psychological research* (pp. 1–4). Rotterdam/Taipei: Sense Publishers.

For the advantages and value of mixed methods research, see the following resources:

- Farquhar, M. C., Ewing, G., & Booth, S. (2011). Using mixed methods to develop and evaluate complex interventions in palliative care research. *Palliative Medicine, 25*(8), 748–757.
- Molina-Azorín, J. F. (2011). The use and added value of mixed methods in management research. *Journal of Mixed Methods Research, 5*(1), 7–24.

For the skills needed to conduct mixed methods research, see the following resources:

- Creswell, J. W., Tashakkori, A., Jensen, K. D., & Shapley, K. L. (2003). Teaching mixed methods research: Practices, dilemmas, and challenges. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 619–637). Thousand Oaks, CA: Sage.
- Curry, L. A., O'Cathain, A., Plano Clark, V. L., Aroni, R., Fetters, M., & Berg, D. (2012). The role of group dynamics in mixed methods health sciences research teams. *Journal of Mixed Methods Research, 6*(1), 5–20.
- Guetterman, T. C. (2015). *The development, design, and test of a self-assessment instrument of mixed methods research proficiency*. Available from ProQuest Dissertations and Theses database (UMI No. 3707829).

2 The Foundations of Mixed Methods Research

Prior to designing a mixed methods study, researchers need to consider more than whether their research problems or questions are best suited for mixed methods. They also should develop a deep understanding of mixed methods so they can not only define and justify mixed methods and recognize its core characteristics, they can also reference important works that have established this approach. This means understanding some of the history of mixed methods and being familiar with key writings that have informed its development. Another step prior to designing a study is to reflect on the different beliefs about knowledge and the acquisition of knowledge that a researcher might assume when selecting mixed methods. This reflection requires knowledge about philosophical assumptions. Finally, mixed methods researchers today often select a theory to use as a lens that shapes the entire study. Thus, an initial step in planning a mixed methods study is to give some consideration to whether a theory will be used in a study and, if so, how the theory will be incorporated into the project.

This chapter reviews historical, philosophical, and theoretical foundations for planning and conducting a mixed methods study. In this chapter, we will address

- the historical foundations of mixed methods,
- the philosophical assumptions that inform the choice of a mixed methods study, and
- theoretical lenses that may be used in mixed methods research.

Historical Foundations

In planning a mixed methods project, researchers need to know something about the history of mixed methods, how it has evolved, and the current interest in it. As well as providing a definition for mixed methods, a mixed methods plan or study should include references to the literature, a justification for its use, and documentation about its acceptance in a particular field of study. This all requires some knowledge of the historical foundations of mixed methods research, such as knowing when it began, who has been writing about it, and what recent controversies and developments have occurred.

When Mixed Methods Began

We often date the beginnings of mixed methods back to the late 1980s with the coming together of several publications all focused on describing and defining what is now known as mixed methods. Several writers working in different disciplines and countries all came to the same idea at roughly the same time. Writers from sociology in the United States (Brewer & Hunter, 1989) and in the United Kingdom (Fielding & Fielding, 1986); from evaluation in the United States (Greene, Caracelli, & Graham, 1989); from management in the United Kingdom (Bryman, 1988); from nursing in Canada (Morse, 1991); from medicine in the United States (Crabtree & Miller, 1992); and from education in the United States (Creswell, 1994) were all sketching out the concept of mixed methods from the late 1980s to the early 1990s. All of these individuals were writing books, book chapters, and articles on an approach to research that moved beyond simply using quantitative and qualitative methods as distinct, separate strands in a study. They were giving serious thought to ways to link or combine these methods. The authors began a discussion about how to integrate, or mix, the data and their reasons for it; Bryman (2006) would pull these integrative approaches together several years later. The authors also discussed the possible research designs and the names for designs; Creswell and Plano Clark (2007) would later assemble a list of the classifications of types of design. A shorthand notation system was developed to convey these designs; Morse (1991) gave specific attention to the notation. Debates emerged about the philosophy behind this form of inquiry; Reichardt and Rallis (1994) would make explicit the debate forming in the United States.

Antecedents to these procedural and philosophical developments in mixed methods had taken form much earlier than the late 1980s (Creswell, 2011b). As early as 1959, Campbell and Fiske discussed the inclusion of multiple sources of quantitative information in the validation of psychological traits. Others had advocated the use of multiple data sources—both quantitative and qualitative—to conduct scholarly studies (Denzin, 1978), and several well-known figures in quantitative research, such as Campbell (1974) and Cronbach (1975), advocated for the inclusion of qualitative data in quantitative experimental studies. The combination and interplay of survey research and fieldwork was a central feature in the writings of Sieber in 1973. In the field of evaluation, Patton in 1980 suggested “methodological mixes” for experimental and naturalistic designs, and he advanced several diagrams to illustrate different combinations of these mixes. In short, these developments signaled key beginnings to what would later be more

systematic attempts to forge mixed methods into a complete research design and to create a distinct approach to research (Creswell, 2011b).

Why Mixed Methods Emerged

A number of factors have contributed to the evolution of mixed methods research from the late 1980s to how we know it today. The complexity of our research problems calls for answers beyond simple numbers in a quantitative sense or words in a qualitative sense. A combination of both forms of data provides the most complete analysis of complex problems. Researchers situate numbers in the contexts and words of participants, and they frame the words of participants with numbers, trends, and statistical results. Both forms of data are necessary today. In addition, qualitative research has evolved to a point where writers consider it a legitimate form of inquiry in the social and human sciences (see Denzin & Lincoln, 2005, 2011). Quantitative researchers, we believe, recognize that qualitative data can play an important role in quantitative research. Qualitative researchers, in turn, realize that reporting only the participant views of a few individuals may not permit generalizing the findings to many individuals. Audiences such as policymakers, practitioners, and others in applied areas need multiple forms of evidence to document and inform research problems. A call for increased sophistication of evidence leads to the collection of both quantitative and qualitative data. Further, the potential for publishing multiple papers from a mixed methods project creates an incentive to do this form of research for faculty that today are often under demands to increase their publications. Also, mixed methods research is intuitive for many because it mirrors the types of evidence that we collect to make sense of the world. One can look to news broadcasts, for example, to see multiple data sources being used, such as interviews and charts and graphs to depict current events. Finally, Kelle (2015) has noted the mutual alienation between qualitative and quantitative research that has existed since the 1920s and has attributed the rise of the mixed methods movement to strategies to overcome “the speechlessness between both traditions” (p. 603).

The Development of the Name

There has been much discussion about the name for this form of inquiry. During the past 50 years, writers have used different labels, making it difficult to locate specific research studies that we would call "mixed methods" research. It has been called "integrated" or "combined" research, advancing the notion that two forms of data are blended together (Steckler, McLeroy, Goodman, Bird, & McCormick, 1992). It has been called "quantitative and qualitative methods" (Fielding & Fielding, 1986), which acknowledges the approach is actually a combination of methods. It has been called "hybrid" research (Ragin, Nagel, & White, 2004); "combined research" (Creswell, 1994); or "methodological triangulation" (Morse, 1991), which all recognize the convergence of quantitative and qualitative data. It has also been called "mixed methodology" (Tashakkori & Teddlie, 1998), which acknowledges it encompasses the research process stretching from philosophy to interpretation. Along the same line, this approach has recently been called "mixed research" to reinforce the idea that it is more than simply methods and ties into other facets of research, such as philosophical assumptions (Onwuegbuzie, 2012; Onwuegbuzie & Leech, 2009). We believe that the most frequently used name today is "mixed methods research," a name associated with the *SAGE Handbook of Mixed Methods in Social & Behavioral Research* (Tashakkori & Teddlie, 2003a, 2010b), the SAGE *Journal of Mixed Methods Research* (*JMMR*), and *The Oxford Handbook of Multimethod and Mixed Methods Research Inquiry* (Hesse-Biber & Johnson, 2015). The continued use of the term *mixed methods* by a large number of social, behavioral, and human science scholars will encourage researchers to see this approach as a distinct model of inquiry.

Stages in the Evolution of Mixed Methods

Our approach to mixed methods research has grown out of the work of others as well as the historical and philosophical discussions of the last several decades. For those designing and conducting mixed methods studies, a historical overview is not an idle exercise in recapping the past. Knowing this history helps researchers justify their use of this approach and cite leading proponents of it in their discussions about methods.

There have been several stages in the history of mixed methods (e.g., Tashakkori & Teddlie, 1998). Here we will review this history and organize it into five, often overlapping, time periods of development, as shown in Table 2.1.

Formative period.

The **formative period** in the history of mixed methods began in the 1950s and continued up until the 1980s. This period saw the initial interest in using more than one method in a study. It found momentum in psychology in the 1950s through the combination of multiple quantitative methods in a study (Campbell & Fiske, 1959); the use of surveys and fieldwork in sociology (Sieber, 1973); multiple methods in general (Denzin, 1978); the initiatives in triangulating both quantitative and qualitative approaches (Jick, 1979; Patton, 1980); and discussions in psychology about combining quantitative and qualitative data when they arose from different perspectives (see Cook & Reichardt, 1979). These were the early antecedents of mixed methods as it is known today (Creswell, 2011a).

TABLE 2.1 ■ Major Contributions to the Development of Mixed Methods Research and Selected Writings

Stage of Development	Major Contributions	Key Selected Writings
Formative period (before 1980)	Argued for use of multiple quantitative methods	Campbell and Fiske (1959)
	Used both quantitative and qualitative methods	Sieber (1973) Jick (1979)
	Argued for using both quantitative and qualitative methods	Denzin (1978) Cook and Reichardt (1979)
Paradigm debate period (1970s to mid-1990s)	Discussed stances within the debate (purists, situationalists, and pragmatists)	Rossman and Wilson (1985)
	Discussed ways to reconcile the two traditions	Bryman (1988) Reichardt and Rallis (1994)
	Suggested that we move past the paradigm debate	Greene and Caracelli (1997) Tashakkori and Teddlie (1998)
Early procedural development period (late 1980s through 1990s)	Identified reasons and procedures for combining quantitative and qualitative research	Bryman (1988) Greene, Caracelli, and Graham (1989) Brewer and Hunter (1989)
	Identified a typology for types of mixed methods designs	Morse (1991) Creswell (1994) Morgan (1998)
	Presented a topical overview and procedures for mixed methods research	Newman and Benz (1998) Tashakkori and Teddlie (1998) Bamberger (2000)
Expanded procedural development period (ongoing since 2003)	Provided a comprehensive treatment of the current state of the field	Tashakkori and Teddlie (2003a, 2010b) Hesse-Biber and Johnson (2015)
	Positioned mixed methods research as a new methodology and advocated for its acceptance through funding and publications	Johnson and Onwuegbuzie (2004) Creswell (2009b) Creswell, Klassen, Plano Clark, & Smith (2011)
	Provided comprehensive guides for designing and conducting mixed methods research studies	Creswell and Plano Clark (2007, 2011) Greene (2007) Teddlie and Tashakkori (2009) Morgan (2014) Morse and Niehaus (2009)
	Applied mixed methods within specific disciplinary contexts (e.g., health sciences) and intersected with other research approaches (e.g., action research, culturally sensitive program evaluation, and systematic reviews)	Curry and Nunez-Smith (2015) Ivankova (2015) Nastasi and Hitchcock (2016) Heyvaert, Hannes, and Onghena (2017)
Reflection and refinement period (ongoing since 2003)	Identified important issues and controversies in mixed methods	Tashakkori and Teddlie (2003b, 2010a) Creswell (2011a)
	Mapped the mixed methods literature into overarching frameworks	Greene (2008) Creswell (2008, 2009b) Plano Clark and Ivankova (2016)
	Critiqued the marginalized position of qualitative research within some mixed methods	Howe (2004) Giddings (2006)
	Critiqued the assumptions and discourse of mixed methods research	Holmes (2006) Freshwater (2007)
	Presented new and refined paradigms for mixed methods	Mertens (2003, 2009) Johnson and Stefurak (2013)
	Identify major developments in the field	Creswell (2015b)

Source: Adapted from Creswell & Plano Clark (2011).

Source: Adapted from Creswell & Plano Clark (2011).

Paradigm debate period.

The **paradigm debate period** in the history of mixed methods developed during the 1970s and 1980s when qualitative researchers were adamant about different assumptions for quantitative and qualitative research (see Bryman, 1988; Guba & Lincoln, 1988; Smith, 1983). The paradigm debate involved scholars arguing whether or not qualitative and quantitative data could be combined because qualitative data were linked with certain philosophical assumptions and quantitative data were connected to other philosophical assumptions. If this was true, then, as some commented, mixed methods research was untenable (or incommensurable) because it asked for paradigms to be combined (Smith, 1983). Rossman and Wilson (1985) called these individuals who argued that they could not mix paradigms "purists." The discussion came to a head by 1994 with vocal advocates on both sides arguing their points at the American Evaluation Association meeting (Reichardt & Rallis, 1994). Today, however, the links between the methods of data collection and the larger philosophical assumptions are not as tightly drawn as was envisioned in the 1990s. Denzin and Lincoln (2005) and Mertens and Tarsilla (2015), for example, have advanced the idea that different types of methods (and mixed methods) can be associated with different types of worldviews or philosophies. Other perspectives also developed, such as the situationalists, who adapted their methods to the situation, and pragmatists, who believed that multiple paradigms can be used to address research problems (Rossman & Wilson, 1985). Although the issue of reconciling paradigms is still apparent (see the writings of Giddings, 2006; Holmes, 2006; and Mertens & Tarsilla, 2015), the paradigm debate period began to subside as calls were made to embrace pragmatism as a philosophical foundation for mixed methods research (see Tashakkori & Teddlie, 1998) and to use different paradigms in mixed methods research but to honor each and be explicit about when each is used (Greene & Caracelli, 1997).

Early procedural development period.

Although the debate about which paradigms provide a foundation for mixed methods research has not disappeared, attention during the 1980s began to shift toward the **early procedural development period** in the history of mixed methods in which writers focused on methods of data collection, data analysis, research designs, and the purposes for conducting a mixed methods study. In 1989 Greene et al. authored a classic article in the field of evaluation that laid the groundwork for mixed methods research design. In the article they developed a classification system of five types, talked about the design decisions that go into each of the types, and analyzed 57 evaluation studies. Following this article, many authors have identified types of mixed methods designs with distinct names

and procedures. At roughly the same time, two sociologists, Brewer and Hunter (1989), contributed to the discussion by linking multimethod research to the steps in the process of research (e.g., formulating problems, sampling, and collecting data). Bryman (1988) also discussed the reasons for combining quantitative and qualitative data. By 1991 Morse, a nursing researcher, had designed a notation system to convey how the quantitative and qualitative components of a study were implemented. Building on these classifications and notations, writers began discussing specific types of mixed methods designs. For example, Creswell (1994) created a parsimonious set of three types of designs and found studies that illustrated each type. Morgan (1998) provided a decision matrix for determining the type of design to use, and books, such as those of Bamberger (2000), Newman and Benz (1998), and Tashakkori and Teddlie (1998), began to map the contours of mixed methods procedures in policy research and in attending to issues such as validity and inferences.

Expanded procedural development period.

Since the early 2000s, we have moved into an **expanded procedural development period** in the history of mixed methods. In this stage we have seen the formalization of the field through major publications, an expansion of the systematic methods for conducting mixed methods research, increased funding initiatives, expanded journal publications of empirical mixed methods studies, and the extension of the use of mixed methods into diverse disciplines and countries around the world.

The field of mixed methods research became formalized through several comprehensive handbooks that overview the state of the field. This era was initiated in 2003 with the publication of the *Handbook of Mixed Methods in Social & Behavioral Research* (Tashakkori & Teddlie, 2003a), a compendium of writings including 26 chapters devoted to controversies, methodological issues, applications in different discipline fields, and future directions. In the second edition of the handbook (Tashakkori & Teddlie, 2010b), the range of topics expanded to 31 chapters organized by conceptual issues, methodological issues, and contemporary applications. Most recently, *The Oxford Handbook of Multimethod and Mixed Methods Research Inquiry* (Hesse-Biber & Johnson, 2015) includes 40 chapters by a diverse set of international authors that examine the state of mixed methods research in terms of the links between theory and method, approaches for conducting mixed methods research, different disciplinary and applied settings, the use of new technologies, and commentaries and critiques of the field.

Along with the identification of the field of mixed methods research, many efforts occurred during this time period that helped to position and advocate for this approach to research. With regard to funding initiatives, the U.S. National Institutes of Health (NIH) took the lead several years ago in discussing guidelines for combined quantitative and qualitative research (National Institutes of Health, 1999). These guidelines were revised in 2011 by a working group that developed *Best Practices for Mixed Methods Research in the Health Sciences* (Creswell, Klassen, Plano Clark, & Smith, 2011). In 2003 the U.S. National Science Foundation (NSF) held a workshop on the scientific foundations of qualitative research with several papers devoted to the topic of combining quantitative and qualitative methods (Ragin, Nagel, & White, 2004). Private U.S. foundations, such as the Robert Wood Johnson Foundation and the W. T. Grant Foundation, have held workshops on mixed methods research. In the United Kingdom, the Economic and Social Research Council (ESRC) has funded through its Research Methods Programme inquiries into the use of mixed methods research (Bryman, 2007).

Plano Clark (2010) examined funded projects by NIH and their use of the mixed methods terms in the proposal abstracts. Examining only the new funding awards (identified in the first year of funding) and using the search terms of *mixed methods* or *multimethod*, Plano Clark identified 226 mixed methods grants from RePORTER (the National Institutes of Health Expenditures and Results query tool; http://projectreporter.nih.gov/reporter.cfm) during the period of 1997 to 2008. Her review of these projects showed a steady increase in the number of mixed methods projects being funded. Funding for the projects came from 25 different NIH agencies (with the National Institute of Mental Health funding the largest percentage of identified projects at 24%); this provides a good indicator of the widespread interest in this approach. The analysis was recently extended for the years 2008–2014, and the researchers found that the funding trends had continued to increase (Coyle et al., 2016).

Another increase can be found in the number of published mixed methods studies in journals across several disciplines. More than 60 articles in the social and human sciences that employed mixed methods research were published between 1995 and 2005 (Plano Clark, 2005). Mixed methods research is being published in special journal issues, such as in the *Annals of Family Medicine* (e.g., see Creswell, Fetters, & Ivankova, 2004); *Educational Researcher* (Johnson & Onwuegbuzie, 2004); and the *Journal of Family Psychology* (e.g., see Weisner & Fiese, 2011). Calls for increased use of qualitative data in traditional experimental trials in the health sciences have been reported in many prestigious journals, such

as the *Journal of the American Medical Association* (e.g., Flory & Emanuel, 2004); *Lancet* (e.g., Malterud, 2001); *Circulation* (e.g., Curry, Nembhard, & Bradley, 2009); the *Journal of Traumatic Stress* (e.g., Creswell & Zhang, 2009); and *Psychology in the Schools* (e.g., Powell, Mihalas, Onwuegbuzie, Suldo, & Daley, 2008). Several journals are now devoted to publishing both empirical mixed methods studies as well as methodological discussions, such as the *JMMR*, *International Journal of Multiple Research Approaches*, *Quality and Quantity,* and *Field Methods*. In addition, cross-disciplinary reviews of mixed methods research are available in many disciplines, such as evaluation (Greene et al., 1989); higher education (Creswell, Goodchild, & Turner, 1996); various social science disciplines (Bryman, 2006); marketing research (Harrison, 2010); family research (Plano Clark, Huddleston-Casas, Churchill, Green, & Garrett, 2008); multicultural counseling research (Plano Clark & Wang, 2010); business management (Molina-Azorín, 2011); and applied linguistics (Jang, Wagner, and Park, 2014).

Books have been published that provide comprehensive guides to the conduct of mixed methods research (e.g., Creswell, 2009b, 2014; Creswell & Plano Clark, 2007, 2011; Greene, 2007; Morgan, 2014; Morse & Niehaus, 2009; Plano Clark & Creswell, 2008; Teddlie & Tashakkori, 2009). These books initially were general in scope, aimed broadly at the social and health sciences. Chapters on mixed methods also emerged in books from disciplines such as media and communication (Berger, 2000); education and psychology (Mertens, 2005); social work (Engel & Schutt, 2009); and family research (Greenstein, 2006). More recently, disciplinary books about mixed methods research have started to appear. Examples include books in the nursing and health sciences (Andrew & Halcomb, 2009); the broader health sciences (Curry & Nunez-Smith, 2015); policy research (Burch & Heinrich, 2016); and social work (Haight & Bidwell, 2015). Scholars have also examined how mixed methods approaches can be applied to and intersected with other research approaches. Recent examples of these focused treatments of mixed methods research include intersecting mixed methods with an action research framework (Ivankova, 2015); using mixed methods to add cultural context into program design, evaluation, and implementation (Nastasi & Hitchcock, 2016); and developing the mixed methods research synthesis approach to systematic literature reviews (Heyvaert, Hannes, & Onghena, 2017).

On the international scene, interest has grown in mixed methods in many countries around the world. Publications in *JMMR* attest to strong international participation from such countries as Sri Lanka (Nastasi et al., 2007); Germany (Bernardi, Keim, & von der Lippe, 2007); Japan (Fetters, Yoshioka, Greenberg,

Gorenflo, & Yeo, 2007); the United Kingdom (O'Cathain, Murphy, & Nicholl, 2007); Laos (Durham, Tan, & White, 2011); and across five different countries (Santiago-Brown, Jerram, Metcalfe, & Collins, 2015). The Mixed Methods Conference debuted in 2005 in Cambridge, United Kingdom. It is now hosted by the Mixed Methods International Research Association (MMIRA), an interdisciplinary and international organization founded in 2013, and is offered as an international conference every other year and as regional conferences during the off-years. The international conference site rotates to different countries around the world. An international community is also forming around mixed methods through conference groups, such as the Special Interest Group on Mixed Methods Research formed in the American Educational Research Association and the Topical Interest Group on Mixed Methods Research formed in the American Evaluation Association. In addition, SAGE Publishing has started an online network, Methodspace, to link researchers, including mixed methods scholars, worldwide (see http://www.methodspace.com/groups/MixedMethodsresearchers/). In 2015 SAGE also initiated a Mixed Methods Research Series that publishes practical books providing how-to guidance for mixed methods research (www.sagepub.com/mmrs).

Reflection and refinement period.

We feel that since 2003, mixed methods research has entered into a new historical period. This **reflection and refinement period** is characterized by reflective controversies and issues of concern about mixed methods, followed by refinements in methods and perspectives.

Questions and issues have been raised about mixed methods research by writers in several fields. In the field of education, Howe (2004) addressed whether mixed methods privileged postpositivist thinking and marginalized qualitative interpretative approaches. His concern was mainly directed toward the National Research Council (2002) and how their report assigned a prominent role to quantitative experimental research and a lesser role to qualitative interpretive research. Within this schema—which he called mixed methods experimentalism—not only was qualitative research limited to an auxiliary role but the use of qualitative research in an interpretive role that included voices of stakeholders and dialogue was minimized.

From the field of nursing research have come several critiques. New Zealander Giddings (2006) challenged the claims made by mixed methods writers about

inclusiveness and about how qualitative and quantitative methods would produce the "best of both worlds" (p. 195). She also challenged the use in mixed methods of binary terms such as *qualitative* and *quantitative*, which reduced methodological diversity; the use of mixed methods as a "cover" for the continuing hegemony of positivism; and the use of mixed methods as a "quick fix" in response to economic and administrative pressures. Holmes (2006) of Australia, also in nursing, critiqued the way in which mixed methods was being described. Like the others, he was concerned about the marginalization of qualitative interpretive frameworks in mixed methods and recommended that the mixed methods community provide a clearer concept of their terms and include a qualitative interpretive framework.

Another voice from nursing, Freshwater (2007), provided a postmodern critique of mixed methods. She was concerned about how mixed methods was being "read" and the discourse that followed. Discourse was defined as a set of rules or assumptions for organizing and interpreting the subject matter of an academic discipline or field of study in mixed methods. The uncritical acceptance of mixed methods as an emerging dominant discourse ("is nearing becoming a metanarrative," Freshwater, 2007, p. 139) impacts how it is located, positioned, presented, and perpetuated. Freshwater (2007) called on mixed methods writers to make explicit the internal power struggle between the mixed methods text as created by the researcher and the text as seen by the reader or audience. Mixed methods, she felt, was too "focused on fixing meaning" (p. 137). Expanding on this, she stated that mixed methods was mainly about doing away with "indeterminancy and moving toward incontestability" (p. 137), citing as key examples the objective third-person style of writing, the flatness, and the disallowance for competing interpretations to coexist. She requested that mixed methods researchers adopt a "sense of incompleteness" (p. 138) and recommended that they

> need to explore the possibility of hybridization in which a radical intertextuality of mixing forms, genres, conventions, and media is encouraged, where there are no clear rules of representation and where the researcher, who is in reality working with radical undecidability and circumscribed indeterminacy, is able to make this experience freely available to readers and writers. (p. 144)

Creswell (2011a) gave voice and focus to several of these critiques in a summary of controversies in mixed methods research. He discussed 11 controversies,

examined multiple sides to the issues, and posed lingering questions. As shown in Table 2.2, these controversies related to definition, use of terms, philosophical issues, the discourse of mixed methods, the design possibilities, and the value of mixed methods research.

TABLE 2.2 ■ Eleven Key Controversies and Questions Being Raised in Mixed Methods Research

Controversies	Questions Being Raised
1. The changing and expanding definitions of mixed methods research	What is mixed methods research? How should it be defined? What shifts are being seen in its definition?
2. The questionable use of qualitative and quantitative descriptors	Are the terms *quantitative* and *qualitative* useful descriptors? What inferences are made when these terms are used? Is there a binary distinction being made that does not hold in practice?
3. Is mixed methods a "new" approach to research?	When did the conceptualization of mixed methods begin? Does mixed methods predate the period often associated with its beginning (1988–1989)? What initiatives began prior to 1988 and 1989?
4. What drives the interest in mixed methods?	How has mixed methods grown in interest? What is the role of funding agencies in its development?
5. Is the paradigm debate still being discussed?	Can paradigms be mixed? What stances on paradigm use in mixed methods have developed? Should the paradigm for mixed methods be based on scholarly communities?
6. Does mixed methods privilege postpositivism?	In the privileging of postpositivism in mixed methods, does it marginalize qualitative interpretive approaches and relegate it to secondary status?
7. Is there a fixed discourse in mixed methods?	Who controls the discourse about mixed methods? Is mixed methods nearing a "metanarrative"?
8. Should mixed methods adopt a bilingual language for its terms?	What is the language of mixed methods research? Should the language be bilingual or new, or reflect quantitative and qualitative terms?
9. Are there too many confusing design possibilities for mixed methods procedures?	What designs should mixed methods researchers use? Are the present designs complex enough to reflect practice? Should entirely new ways of thinking about designs be adopted?
10. Is mixed methods research misappropriating designs and procedures from other approaches to research?	Are the claims of mixed methods overstated (because of misappropriation of other approaches to research)? Can mixed methods be seen as an approach lodged within a larger framework (e.g., ethnography)?
11. What value is added by mixed methods beyond the value gained through quantitative or qualitative research?	Does mixed methods provide a better understanding of a research problem than either quantitative or qualitative research alone? How could the value of mixed methods research be substantiated through scholarly inquiry?

Source: Creswell (2011a), reprinted with permission of SAGE Publishing, Inc.

Source: Creswell (2011a), reprinted with permission of SAGE Publishing, Inc.

Out of these critiques have arisen reviews of the mixed methods field that seek to map its terrain and new advances in procedures for conducting research. Several key publications discuss the current state of the field of mixed methods, including Creswell (2008, 2009a, 2009b); Greene (2008); and Tashakkori and Teddlie (2003b, 2010b). The first discussion was presented by Tashakkori and Teddlie (2003a) in the beginning and ending chapters of their handbook (and updated in 2010b). In these chapters they detailed major unresolved issues and controversies regarding the use of mixed methods in social and behavioral research. Greene (2008) published an analysis of key domains in mixed methods in *JMMR* based on a keynote address presented to the Mixed Methods Special Interest Group at the American Educational Research Association in 2007. In setting forth her domains, Greene (2008) asked, "What important questions remain to be engaged?" and she raised questions about "priorities for a mixed methods research agenda" (p. 8). Creswell's (2008) mapping of topics in the field of mixed methods was first presented as a keynote address to the 2008 Mixed Methods Conference at Cambridge University in England. He compared papers being presented at the conference with his developing understanding of the field, which was informed by over 300 submissions during 3 years as coeditor and cofounder of *JMMR*. From this conference presentation, he then drafted a shorter version as an editorial for *JMMR* focusing on a few specific issues (Creswell, 2009b). In 2016 Plano Clark and Ivankova advanced a socio-ecological model for describing the field of mixed methods research and discussed the different perspectives and debates concerning the mixed methods research process, different methodological considerations, and multiple layers of contextual influences.

In addition, in response to critiques about the foundations for mixed methods research, new philosophies beyond pragmatism have emerged to draw attention to possible philosophical worldviews underpinning mixed methods research. For example, Mertens (2003, 2009) advanced a **transformative worldview** that gives primacy to the values of human rights as a foundation for mixed methods research. Recently, Johnson and Stefurak (2013) introduced dialectic pluralism as a refined perspective for combining different perspectives within mixed methods research.

Likewise, new methodological advances continue to occur in mixed methods, often in response to noted critiques and limitations in the field. Creswell (2015b) identified 10 scientific developments in mixed methods and suggested that these developments, if implemented in practice, would contribute to an enhanced mixed methods study.

As this brief overview indicates, mixed methods research today is built on a rich history that has developed across disciplines and led to the creation of an international community. Scholars planning to conduct mixed methods research can draw from this history and its writings to both defend the use of this approach and to anticipate potential controversies and needed developments that accompany the use of mixed methods research.

Philosophical Foundations

In addition to the historical foundations for mixed methods research, researchers must also consider the philosophical assumptions that provide a foundation for using mixed methods. All research has a philosophical foundation, and inquirers should be aware of assumptions they make about gaining knowledge during their study. These assumptions shape the processes of research and the conduct of inquiry. Knowledge of these assumptions is especially important for graduate students as they are expected to be able to identify and articulate the assumptions they bring to research. Granted, philosophical assumptions often do not become explicit statements in published journal articles, but they provide a foundation for conducting research, and they do frequently arise at conference presentations or in graduate student committee meetings. As a general rule, we suggest that mixed methods researchers not only be aware of their philosophical assumptions but also clearly mention those assumptions in their mixed methods projects.

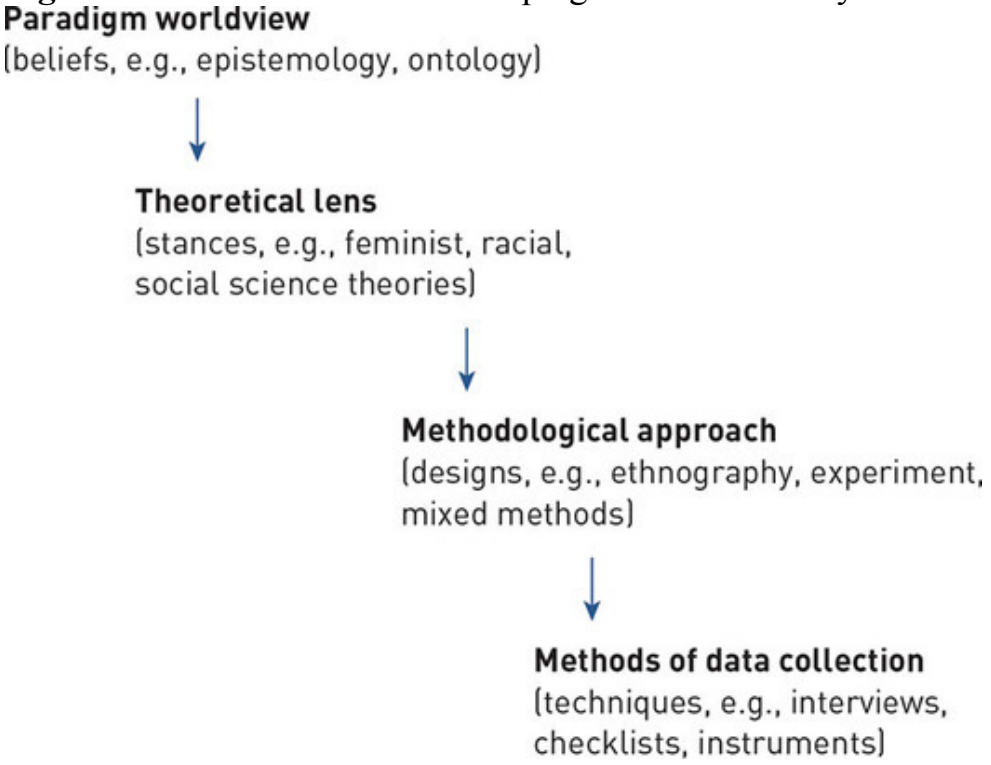
What is involved in articulating philosophical assumptions in a mixed methods study? We believe that it includes acknowledging the worldview that is providing a foundation for the study, describing the elements of the worldview, and relating these elements to specific procedures in the mixed methods project.

Philosophy and Worldviews

A framework is needed for thinking about how philosophy fits into the design of a mixed methods study. We like to use Crotty's (1998) conceptualization (as adapted) to position philosophy within a mixed methods study. As shown in Figure 2.1, Crotty contends that there are four major elements in developing a proposal or designing a study. At the broadest level are the issues of philosophical assumptions, such as the epistemology behind the study or the assumptions regarding how researchers gain knowledge about what they know. These philosophical assumptions, in turn, inform the use of a theoretical stance the researcher might use; later we will refer to these stances as lenses drawn from social science theory or emancipatory theory. This stance then informs the methodology used, which is a strategy, a plan of action, or a research design. Finally, the methodology incorporates the methods, which are techniques or procedures used to gather, analyze, and interpret the data. As we discussed in Chapter 1, mixed methods can be thought of as a method, but it is often thought of as a methodology for conducting research and could therefore be assigned in Crotty's classification at the level of a methodology.

Surrounding a mixed methods project, then, are philosophical assumptions that operate at a broad, abstract level. **Philosophical assumptions** in mixed methods research consist of a basic set of beliefs or assumptions that guide inquiries (see Guba & Lincoln, 2005). A term that we would use to describe these assumptions is ***worldview***, and we say that mixed methods researchers bring to their inquiry a worldview composed of beliefs and assumptions about knowledge that informs their study. A term that is often used synonymously with worldview is *paradigm*. Going back to the original use of the term by Thomas Kuhn (1970), a paradigm is a set of generalizations, beliefs, and values of a community of specialists. Although Kuhn himself pointed out the many definitions of paradigm, the term that we favor is *worldview*, which may or may not be associated with a specific discipline or community of scholars but which suggests the shared beliefs and values of researchers. The most noted work on worldviews is available in qualitative research (Guba & Lincoln, 2005), but philosophical discussions are available for quantitative approaches as well (Phillips & Burbules, 2000). Most of these writings are by authors from the fields of social foundations of research or the philosophy of education (for overviews of many different worldviews in research, see Guba & Lincoln, 2005; Paul, 2005; Slife & Williams, 1995; and Mertens & Tarsilla, 2015).

Figure 2.1 Four Levels for Developing a Research Study



Source: Adapted from Crotty (1998).

What worldviews might inform the practices of mixed methods researchers? Various writers have offered worldview possibilities, but we have found that four worldviews are most useful for informing mixed methods research. As noted by Crotty (1998), who holds that these different stances are not "watertight compartments" (p. 9), these worldviews provide a general philosophical orientation to research and, as we see later, can be combined or used individually.

The four worldviews in Table 2.3 provide a good starting point. **Postpositivism** is often associated with quantitative approaches. Researchers make claims for knowledge based on (1) determinism or cause-and-effect thinking; (2) reductionism, by narrowing and focusing on select variables to interrelate; (3) detailed observations and measures of variables; and (4) the testing of theories that are continually refined (Slife & Williams, 1995). **Constructivism**, typically associated with qualitative approaches, works from a different set of assumptions. The understanding or meaning of phenomena, formed through participants and their subjective views, make up this worldview. When participants provide their understandings, they speak from meanings shaped by social interaction with

others and from their own personal histories. In this form of inquiry, research is shaped "from the bottom up"—from individual perspectives to broad patterns and, ultimately, to broad understandings (Denzin, 2012).

TABLE 2.3 ■ Four Worldviews Used in Mixed Methods Research

Postpositivist Worldview	Constructivist Worldview	Transformative Worldview	Pragmatist Worldview
Determination	Understanding	Political and activist	Consequences of actions
Reductionism	Multiple participant meanings	Empowerment, human rights, social justice oriented	Problem centered
Empirical observation and measurement	Social and historical construction	Collaborative	Pluralistic
Theory verification	Theory generation	Change, emancipatory oriented	Real-world practice oriented

Source: Adapted from Creswell [2013].
Source: Adapted from Creswell (2013).

Transformative worldviews are focused on the need for social justice and the pursuit of human rights. They place central importance on specific communities at the margins of society, such as women, racial/ethnic groups, people with disabilities, and those economically disadvantaged (Mertens, 2009). For these communities, issues such as empowerment, marginalization, hegemony, and patriarchy, among others, need to be addressed, and researchers should respectfully collaborate and interact to conduct research (Mertens & Wilson, 2013; Mertens & Tarsilla, 2015). In the end, the transformative researcher works for the social world to be changed for the better so that individuals will feel less marginalized. A final worldview, **pragmatism**, is typically associated with mixed methods research as an overarching philosophy embraced by a large number of mixed methods scholars (Tashakkori & Teddlie, 2003a). The focus is on the consequences of research, on the primary importance of the question asked rather than the methods, and on the use of multiple methods of data collection to inform the problems under study. Thus, it is pluralistic and oriented toward "what works" and real-world practice.

The way these worldviews are discussed in the literature is to array them (and compare them) in terms of specific philosophical assumptions. Thus, as shown in Table 2.4, worldviews differ in what is considered real in the world (ontology),

how we gain knowledge of what we know (epistemology), the role values play in research (axiology), the process of conducting research (methodology), and the language of research (rhetoric) (Creswell, 2013; Lincoln & Guba, 2000; Mertens & Tarsilla, 2015). Ontology refers to the nature of reality (and what is real) that researchers assume when they conduct their inquiries. The postpositivist researcher tends to view reality as singular and independent from the researcher. An example would be a theory that hovers above the research study and helps to explain (in a single reality) the findings in the study. Another illustration would be the postpositivist tendency to reject or fail to reject a hypothesis. In contrast, the constructivist researcher views reality as multiple and actively looks for multiple perspectives from participants, such as perspectives developed through multiple interviews. The transformative researcher assumes multiple forms of reality constructed on the basis of the social and cultural positions of individuals, such as gender, race, and poverty, while the pragmatist views reality as both singular (e.g., there may be a theory that operates to explain the phenomenon of study) and multiple (e.g., it is important to assess varied individual input into the nature of the phenomenon as well).

As another example of differences among the worldviews as shown in Table 2.4, consider the methodological differences (i.e., the process of research). In postpositivist research, the investigator works from the "top" down, from a theory to hypotheses to data to add to or contradict the theory. In constructivist approaches, the inquirer works more from the "bottom" up, using the participants' views to build broader themes and generate a theory interconnecting the themes. In transformative research, the researcher collaborates with stakeholders and community members and builds trust with them. In pragmatism, the approach may combine deductive and inductive thinking as the researcher mixes both qualitative and quantitative data as the study proceeds.

TABLE 2.4 ■ Elements of Worldviews and Implications for Practice

Philosophical Question	Postpositivism	Constructivism	Transformative	Pragmatism
Ontology (What is the nature of reality?)	Singular reality (e.g., researchers reject or fail to reject hypotheses)	Multiple realities (e.g., researchers provide quotes to illustrate different perspectives)	Multifaceted and based on different social and cultural positions (e.g., researchers recognize different power positionalities in our society)	Singular and multiple realities (e.g., researchers test hypotheses and provide multiple perspectives)
Epistemology (What is the relationship between the researcher and that being researched?)	Distance and impartiality (e.g., researchers objectively collect data on instruments)	Closeness and subjectivity (e.g., researchers visit with participants at their sites to collect data)	Collaboration (e.g., researchers actively involve participants as collaborators, build trust, and honor participant standpoints)	Practicality (e.g., researchers collect data by "what works" to address research question)
Axiology (What is the role of values?)	Unbiased (e.g., researchers use checks to eliminate bias)	Biased (e.g., researchers actively talk about and use their personal biases and interpretations)	Based on human rights and social justice for all (e.g., researchers begin with and advocate for this premise)	Multiple stances (e.g., researchers include both biased and unbiased perspectives)
Methodology (What is the process of research?)	Deductive (e.g., researchers test an a priori theory)	Inductive (e.g., researchers start with participants' views and build "up" to patterns, theories, and interpretations)	Participatory (e.g., researchers involve participants in all stages of the research and engage in cyclical reviews of results)	Combining (e.g., researchers collect both quantitative and qualitative data and mix them)
Rhetoric (What is the language of research?)	Formal style (e.g., researchers use agreed-upon definitions of variables)	Informal style (e.g., researchers write in a literary, informal style)	Advocacy, activist-oriented (e.g., researchers use language that will help bring about change and advocate for human rights and social justice)	Formal or informal (e.g., researchers may employ both formal and informal styles of writing)

Source: Adapted from Creswell (2013).

Source: Adapted from Creswell (2013).

Worldviews Applied to Mixed Methods

Up until this point, we have reviewed four different worldviews and discussed how they might differ in terms of broad philosophical elements of ontology, epistemology, axiology, methodology, and rhetoric. Which worldview(s) best fits a mixed methods study? Answers to this question have occupied the attention of mixed methods researchers for some time (Tashakkori & Teddlie, 1998, 2003a, 2010b), and their responses have varied. In designing and conducting mixed methods research, researchers need to know the alternative stances on worldviews and mixed methods research and to be able to articulate the stance they are using. They might convey their stance in a separate section of a project, titled "philosophical assumptions," or in the methods section of their plan or study. They might first identify their philosophical position, discuss the worldview that typifies their position, and then discuss how their philosophy informs the conduct of their research. We see four broad stances being used within mixed methods research studies that provide good options for researchers. These stances are (1) use one best worldview for mixed methods, (2) use a dialectical perspective that combines multiple worldviews, (3) identify the worldview based on the study context and mixed methods design, or (4) use a worldview shaped by one's research community.

One "best" worldview for mixed methods.

Although some individuals still seek to participate in the paradigm debate, many mixed methods writers have moved on to identify what they believe is the worldview that best provides a foundation for mixed methods research. Tashakkori and Teddlie (2003a) suggested that at least 13 different authors embrace pragmatism as the optimal worldview or paradigm for mixed methods research. Although we have already introduced pragmatism, because of its importance, it merits further discussion.

Pragmatism is a set of ideas that have been articulated by many people throughout the years, from historical figures such as John Dewey, William James, and Charles Sanders Peirce to contemporaries such as Cherryholmes (1992), Murphy (1990), and Morgan (2007). It draws on many ideas, including employing "what works," using diverse approaches, and valuing both objective and subjective knowledge. Tashakkori and Teddlie (2003a) formally linked pragmatism and mixed methods research, arguing the following points:

- Both quantitative and qualitative research methods may be used in a single study.
- The research question should be of primary importance—more important than either the method or the philosophical worldview that underlies the method.
- The forced-choice dichotomy between postpositivism and constructivism should be abandoned.
- The use of metaphysical concepts, such as truth and reality, should also be abandoned.
- A practical and applied research philosophy should guide methodological choices.

Another "best" paradigm approach is the transformative paradigm of Mertens (2003; see also Sweetman, Badiee, & Creswell, 2010). Mertens (2003) provided and continued to elaborate (Mertens, 2009; Mertens & Tarsilla, 2015) an original, insightful contribution to the mixed methods literature by bridging the philosophy of inquiry (i.e., paradigms) with the practice of social justice research, primarily in the field of evaluation. In discussing this perspective, she said,

> Transformative . . . scholars recommend the adoption of an explicit goal for research to serve the ends of creating a more just and democratic society that permeates the entire research process, from the problem formulation to the drawing of conclusions and the use of results. (Mertens, 2003, p. 159)

Indeed, Mertens (2003) has given us a framework with immediate applicability for assessing the inclusion of an emancipatory, participatory perspective in mixed methods studies. As already discussed, she calls it the transformative framework and holds that it includes a person's worldview and implicit value assumptions. These assumptions are that knowledge is not neutral and that it is influenced by human interests. Knowledge reflects the power and social relationships within society, and the purpose of knowledge construction is to aid people to improve society. Issues such as oppression and domination—found in critical theory perspectives—become important to study. She cited several groups that have extended the thinking about the role of values in research, including feminists, members of diverse ethnic and racial groups, and people with disabilities (Mertens, 2003, 2009).

The critical realist perspective is also being discussed as a potential contribution to mixed methods research (Maxwell, 2012; Maxwell & Mittapalli, 2010). It is a

philosophical perspective that validates and supports key aspects of both quantitative and qualitative approaches. While scholars have identified some specific limitations of each approach, they contend that critical realism can constitute a productive stance for mixed methods research and facilitate collaboration between quantitative and qualitative researchers. They discussed **critical realism** as an integration of a realist ontology (there is a real world that exists independently of our perceptions, theories, and constructions) with a constructivist epistemology (our understanding of this world is inevitably a construction built from our own perspectives and standpoint). Although it is a relatively new perspective in mixed methods research, we are beginning to notice a few authors acknowledging an explicit use of critical realist perspectives in mixed methods research, particularly in Europe.

Dialectical perspective for using multiple worldviews in mixed methods.

Another position states that multiple paradigms may be used in mixed methods research; researchers must simply be explicit in their use. This dialectical perspective (Greene, 2007; Greene & Caracelli, 1997; Greene & Hall, 2010) recognizes that different paradigms give rise to contradictory ideas and contested arguments—features of research that are to be honored but cannot be reconciled. These contradictions, tensions, and oppositions reflect different ways of knowing about and valuing the social world, which can contribute to new and different insights. This stance emphasizes using multiple worldviews (e.g., constructivism and postpositivism) in a dialogue during the study instead of using a single worldview, such as pragmatism.

An extension of the dialectical perspective of Greene has been formulated by Johnson (2013) as an encompassing worldview—or metaparadigm (Johnson & Stefurak, 2013)—informing mixed methods: **dialectical pluralism**. Called a process philosophy by Johnson and Stefurak (2013), it has three major characteristics:

1. In conducting mixed methods, a need exists to listen carefully and thoughtfully to different paradigms/worldviews, disciplines, theories, stakeholders, and citizens;
2. the researchers' and stakeholders' values should guide the project; and
3. this collaboration should be conducted with fairness, justice, and equality. (p. 38)

This approach further builds into distinct strategies when conducting a mixed methods project. The project would proceed with a discussion of differences and equal power, trust, openness, honesty, constructive conflict, and role-taking, with the participants essentially working toward a win-win situation (Johnson & Stefurak, 2013).

Worldviews relate to the study context and type of mixed methods design.

In this third stance, a stance we embrace, researchers have the flexibility to use the worldview that best fits the context of their particular study. That is, a researcher may use more than one worldview in a mixed methods study (in contrast to only the "best" worldview) and use one overarching worldview in another study (in contrast to the dialectical perspective). In this stance, the selection of worldviews informs and possibly is informed by the type of mixed methods design. This is more in line with Maxwell's (2011) notion that paradigms can be productively thought of as tools creatively used to fit a certain research situation. We believe multiple paradigms can be used in mixed methods studies and the one(s) used often relates to the type of mixed methods design.

Although a worldview is not always linked to procedures in research, the guiding assumptions of worldviews often shape how mixed methods researchers construct their procedures. Quantitative methods (e.g., surveys, experiments) are typically used within a postpositivist worldview in which some guiding determining theory is advanced at the beginning, and the study is delimited to certain variables that are empirically measured and observed. Therefore, if a study begins with a survey, the researcher may be implicitly using a postpositivist worldview to inform the study, beginning with specific variables and empirical measures framed within an a priori theory that is being tested in the survey project. Then, if the researcher moves to qualitative focus groups in the second phase to follow up on and explain the survey results, it is possible that the worldview shifts to more of a constructivist perspective. In the focus group, the attempt is to elicit multiple meanings from the participants, to build a deeper understanding than the survey yields, and to possibly generate a theory or pattern of responses that explain the survey results. In effect, the researcher has shifted from a postpositivist worldview in the first phase of the research into a constructivist worldview in the second phase. The researcher may then bring in a dialectical perspective when interpreting the two phases together.

If, instead of implementing the different approaches in phases, a mixed methods researcher collects both quantitative and qualitative data in the same phase of the project and merges the two databases, then an all-encompassing worldview might be best for the study. We would look to pragmatism (or a transformative perspective or dialectic pluralism approach) as that worldview because it enables researchers to adopt a pluralistic stance of gathering all types of data to best answer the research questions. Thus, this view holds that worldviews relate to types of designs, the worldview can change during a study, the worldview may be tied to different phases in the project, and researchers need to be aware of and write about their worldview(s) in use. We will make explicit this connection—between the worldview in use and the design in use—for each mixed methods design in Chapters 3 and 4.

Worldviews depend on the scholarly community.

Another approach to considering worldviews in mixed methods occurs when writers turn to Kuhn's (1970) idea of a community of practitioners. Two key writings appeared in 2007 and 2008 in *JMMR* articles by American author David Morgan and British author Martin Descombe. Morgan's (2007) article is a fascinating piece of scholarship, first presented in 2005 as the keynote address at the Mixed Methods Conference in Cambridge, United Kingdom. Morgan (2007) described paradigms as "shared belief systems that influence the kinds of knowledge researchers seek and how they interpret the evidence they collect" (p. 50). He elucidated four views of paradigms that differed in terms of generality: (1) paradigms can be viewed as worldviews, an all-encompassing perspective on the world; (2) they can be seen as epistemologies that incorporate ideas from the philosophy of science, such as ontology, methodology, and epistemology; (3) they can be viewed as the "best" or "typical" solutions to problems; and (4) they may represent shared beliefs of a research field. It is this last perspective that Morgan strongly endorsed. Researchers, he said, share a consensus in specialty areas about what questions are most meaningful and which procedures are most appropriate for answering the questions. In short, many practicing researchers look to worldview perspectives from a "community of scholars" perspective (2007, p. 53). According to Morgan, this was the version of paradigms that Kuhn (1970) most favored when he talked about a community of practitioners.

Denscombe (2008) reinforced Morgan's position and added more details about the nature of a community of practitioners. He outlined how communities work using such ideas as shared identity, common research problems, social networks, knowledge formation, and informal groupings. The mixed methods field is

becoming fragmented by discipline orientation, and subject matter interest will ultimately shape the philosophical orientation. For example, when colleagues in the health sciences at the Veterans Administration Health Services Research Center in Ann Arbor, Michigan, refer to mixed methods from an evaluation perspective of "formative" and "summative" procedures, they are embracing mixed methods from a field orientation that makes sense within the health services research area (Forman & Damschroder, 2007).

Theoretical Foundations

Referring back to Crotty's (1998) model in Figure 2.1, we find theory operating at a narrower perspective than worldview. **Theory (or conceptual framework or theoretical rationale)** is a general explanation of what the researcher expects to find in a study. In quantitative research, it is used deductively to make and test predictions of the results. In qualitative research, it is often used inductively to provide an overall explanation of what will be or was found in the study. Thus, theory holds different meanings in quantitative and qualitative research. In quantitative research, the theory identifies key variables, is translated into hypotheses or questions, and is then tested with the data to determine if the theory is supported or refuted. This is often called a hypo-deductive approach (Kelle, 2015). In qualitative research, the theory is often generated during the research process and positioned at the end of the study (or threaded throughout the study) as a general model or explanation as to what was found. In some qualitative studies, the theory is advanced as a preliminary framework but then modified into a new or newly configured theory as the data are analyzed. We have called this use of theory in qualitative research the inductive interpretive approach (Creswell, 2015c).

With theory operating in two different ways, how is it used in mixed methods research that combines both quantitative and qualitative procedures? We present two general ways that a theory might be used in mixed methods research—the application of a social science theory and the application of an emancipatory theory—and then discuss how the use of theory in mixed methods research needs to be seen as informing the particular type of mixed methods design.

One use of theory in a mixed methods study would be the application of an explanatory framework from the social sciences that predicts and shapes the direction of a research study, as in a hypo-deductive use of theory. A **social science theory** is positioned at the beginning of a mixed methods study and provides a framework, or theory, from the social sciences that guides the nature of the questions asked and answered in a study. The data collected may be either quantitative or qualitative or both. This theory may be a leadership theory, an economic theory, a marketing theory, a theory of behavioral change, a theory of adoption or diffusion, or any number of social science theories. It may be presented as a literature review, as a conceptual model, or as a theory that helps to explain what the researcher seeks to find in a study.

An example of a social science theory can be found in a mixed methods study about chronic pain and its management through learned resourcefulness by Kennett, O'Hagan, and Cezer (2008). In this study, the researchers gathered measures on Rosenbaum's Self-Control Schedule (SCS) and through interviews with patients coping with chronic pain. In the opening paragraph of the study, they advanced its purpose:

> Taking a critical realist perspective informed by Rosenbaum's (1990, 2000) model of self-control, we combine a quantitative measure of learned resourcefulness with a qualitative text-based analysis to characterize the processes that come into play in the self-management of pain for high- and low-resourceful clients following a multimodel treatment-based pain program. (p. 318)

Rosenbaum's model was used because it challenged the status quo about health programs and stimulated the transformation of practice. The authors first introduced the major components of Rosenbaum's model. This was followed by the research literature on resourcefulness as an important predictor of adopting healthy behavior and a discussion of one of Rosenbaum's experiments relating resourcefulness to coping with pain. The authors discussed the factors of the model leading to self-control, such as factors related to process-regulating cognitions (e.g., supporting family and friends); coping strategies (e.g., strategies to cope with pain, such as diverting attention and reinterpreting pain); and staying in (or dropping out of) programs. The authors at this point might have drawn a diagram of these factors as a guiding theoretical framework for their theory. They provided next, however, a series of questions drawn from Rosenbaum's model and the literature that guided their study purpose of examining the impact of a cognitive-behavioral chronic pain management program on self-management and how resourcefulness and a sense of self-directedness influence self-management skills for chronic pain. Toward the end of the article, they revisited the factors leading to self-management and proposed a diagram of the most salient factors.

Stepping back from this discussion, we can see how a mixed methods researcher might incorporate a social science theoretical lens into a mixed methods study (also see Creswell, 2014; Evans, Coon, & Ume, 2011). We recommend the following steps:

- Place the discussion of the theory (model or conceptual framework) at the beginning of the article as an a priori framework to guide the questions in the study.
- Write about the theory by first advancing the name of the theory to be used, followed by a description of the major variables of the theory. Discuss previous studies that have used the theory and end by specifically stating how the theory will inform the questions and procedures of the current mixed methods study.
- Include a diagram of the theory that indicates the direction of the causal links in the theory and the major concepts, or variables, in the theory.
- Use the theory to provide a framework for both the quantitative and the qualitative data collection and integration efforts in the study.

In contrast to a social science theory as a guiding explanation in a mixed methods study, an **emancipatory theory** in mixed methods involves taking a theoretical stance in favor of underrepresented or marginalized groups—such as in a feminist theory, a racial or ethnic theory, a sexual orientation theory, or a disability theory (Mertens, 2009)—and calling for change. These theories can be distinct from a worldview, as Mertens (2009) makes clear. Her transformative worldview operates at the broad philosophical or paradigm level (see also Mertens & Tarsila, 2015), while theories are more specific. Examples of emancipatory theories commensurate with the transformative paradigm include feminist theories, critical race theory, queer theory, and postcolonial and indigenous theories. The emancipatory theories operate inductively in a study and build to the end result of change to improve the lives of the marginalized individuals. With one of the goals of qualitative research being to address issues of social justice and the human condition (Denzin & Lincoln, 2005), this emphasis has come to be expected from some scholars in mixed methods research. Today, mixed methods studies with an emancipatory theory are becoming more frequently reported in the mixed methods literature. For example, recent mixed methods studies have addressed topics such as African American girls' interest in science (Buck, Cook, Quigley, Eastwood, & Lucas, 2009); women's social capital in Australia (Hodgkin, 2008); and women's understanding of community-specific rape myths (McMahon, 2007). Methodological writings about linking feminist standpoint epistemology to mixed methods are found in the mixed methods literature (Hesse-Biber & Leavy, 2006).

Sweetman, Badiee, and Creswell (2010) analyzed 13 mixed methods studies that incorporated an emancipatory theoretical lens; from this review we can see numerous examples as to how to incorporate this lens into a mixed methods

study. Their review showed a wide variety of social science journals had published these studies (e.g., *Women and Health*, *Families in Society*, *Social Work Research*, and *Urban Studies*), and six different theoretical lenses were used by the authors. Feminism was the most common (six studies), with socioeconomic theories as the next most common (two studies), followed by disability, human ecology, and general gender theories. Some articles spanned multiple social categorizations, such as income, ethnicity, and gender. From reviewing these studies, the authors made recommendations for incorporating an emancipatory lens into a mixed methods study:

- Introduce the emancipatory lens at the beginning of the study.
- Apply it when discussing the literature.
- Make it explicit in discussing the research problem.
- Write it into the research questions using emancipatory advocacy language.
- Discuss collecting data in a way that will not further marginalize the community.
- Position the researchers in the study.
- Suggest a plan of action or change to end the study.

Even with these suggestions, more work needs to be done to establish how the procedures of mixed methods might change depending on the type of emancipatory lens used. As more mixed methods studies begin incorporating an emancipatory lens, we can learn more about how to effectively include such a lens and about the variety of studies for which researchers choose to use such a lens.

Whether a hypo-deductive approach or an inductive interpretative approach to theory is used in a mixed methods study, there is a need to further refine our understanding of the use and application of theory in mixed methods research. One approach is that we can conceptualize theory use as related to types of mixed methods designs (Kelle, 2015; Morse & Niehaus, 2009). Kelle (2015) introduces this idea in his chapter under the heading of "functions of theory in different mixed methods designs" (p. 600). It is in the discussion of specific types of designs that we can best see the application of theory in a mixed methods study. For example, a project that starts with a qualitative orientation can be used to inductively develop empirically grounded theoretical concepts and hypotheses, which are then followed by a quantitative examination of the applicability of the concepts to other or similar domains. Alternatively, quantitative research may help define problem areas and theory-based research questions that are further

explored during a follow-up qualitative part of the study (Kelle, 2015). The different types of designs will occupy our attention in Chapters 3 and 4, and potential theory use will be advanced for each type of design.

Summary

In planning a mixed methods study, researchers need to cite references to the latest literature, justify the use of mixed methods, and recognize how their study fits into the evolving field of mixed methods research. Although some of the elements of mixed methods approaches were evident prior to the 1980s, several writers from different disciplines and different countries came to the idea of mixed methods at roughly the same time—the late 1980s. Thus, the field is over 25 years old, and it has evolved because of the complexity of research problems, the legitimatization of qualitative inquiry, the need for more evidence in applied settings, the multiple publications possible from a study, and its intuitive story and numbers perspective.

The evolution of mixed methods has gone through several phases: (1) the formative period of considering multiple forms of data, (2) the paradigm debate period in which heated discussions occurred about whether mixed methods inappropriately integrated different philosophical perspectives, (3) the early procedural phase in which writers pushed for increased understanding about conducting a mixed methods study, (4) the expanded procedural development phase in which writers began to suggest mixed methods is a distinct methodology and its popularity spread to diverse disciplines and different countries around the world, and (5) the reflective and refinement phase in which writers are discussing the issues and controversies in mixed methods research and identifying advances in the field.

Further, researchers bring to their mixed methods studies philosophical foundations that need to be made explicit and discussed. Researchers need to acknowledge the philosophical worldview they bring to a project, identify the assumptions of their worldview, and relate the assumptions to the specific elements of their mixed methods studies. Worldviews are beliefs and values that researchers bring to studies, and researchers may draw from one or more worldviews, such as postpositivism, constructivism, transformative worldview, and pragmatism. The elements for each worldview differ, and they are reflected in different philosophical assumptions in terms of ontology, epistemology, axiology, methodology, and rhetoric.

In response to these philosophical ideas, mixed methods researchers have taken different stances on the use of worldviews in their research. Some believe there is a single worldview that informs mixed methods, such as pragmatism,

transformative approaches, or critical realism. Others hold that multiple worldviews can inform a mixed methods study, and the dialectical pluralism worldview embraces this perspective. A third stance is that researchers can choose from among the above stances for their study and the choice is related to the type of mixed methods design being used. Yet another stance is that worldviews form within scholarly communities and may vary from community to community. Regardless of worldview, the assumptions behind a mixed methods study need to be identified and stated in mixed methods projects to provide a basis for combining quantitative and qualitative approaches.

Mixed methods researchers may also use theory in their study, and this use can reflect a hypo-deductive testing framework, an inductive-interpretative approach, or both. Theories may be generally grouped into social science or emancipatory theories. Social science theories are often positioned at the beginning of a mixed methods study, and they inform the questions asked and the interpretation of the results. Emancipatory theories are often threaded throughout a project, and they inform the lens being used, the types of research questions asked, the procedures used in data collection, and especially the call for action advanced at the end of a study. Recent thinking has advanced a close connection between theory use and type of mixed methods design, which provides a more nuanced understanding of the application of theory in a mixed methods project.

Activities

1. The history of mixed methods now spans more than 30 years and has undergone several stages of development. Many author perspectives have emerged during this time about the status and procedures of mixed methods research. Locate a published discussion of mixed methods that interests you (such as one of those cited in Table 2.1). Based on the topic, year, and author perspective, explain how this discussion fits within the larger development of mixed methods research and discuss how the ideas would be applied to your study.
2. What philosophical worldview(s) will inform your mixed methods study? Identify one or more worldviews, discuss the elements that comprise the worldview(s), and state specifically how the worldview(s) will inform the conduct of your mixed methods research study.
3. Select a mixed methods study that used a feminist lens and analyze its use of theory. One good example is the article by McMahon (2007) on understanding community-specific rape myths. Identify how the author(s) incorporated a feminist lens into the research problem, the research questions, the data collection, and in the call for change or action at the end of the article.

Additional Resources to Examine

For a historical analysis of mixed methods research, consult the following resources:

- Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco, CA: Jossey-Bass.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.
- Tashakkori, A., & Teddlie, C. (Eds.). (2010). *SAGE handbook of mixed methods in social & behavioral research* (2nd ed.). Thousand Oaks, CA: Sage.

For a discussion of philosophical worldviews related to mixed methods research, see the following resources:

- Denscombe, M. (2008). Communities of practice: A research paradigm for the mixed methods approach. *Journal of Mixed Methods Research*, *2*, 270–283.
- Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, *1*(1), 48–76.
- Johnson, R. B., & Stefurak, T. (2013). Considering the evidence-and-credibility discussion in evaluation through the lens of dialectical pluralism. *New Directions for Evaluation, 138*, 37–48.
- Mertens, D. M. (2009). *Transformative research and evaluation*. New York, NY: Guilford Press.

For discussions of the use of a theoretical lens in mixed methods research, see the following resources:

- Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage.
- Evans, B. C., Coon, D. W., & Ume, E. (2011). Use of theoretical frameworks as a pragmatic guide for mixed methods studies: A methodological necessity? *Journal of Mixed Methods Research, 5*(4), 276–292.
- Sweetman, D., Badiee, M., & Creswell, J. W. (2010). Use of the transformative framework in mixed methods studies. *Qualitative Inquiry*, *16*(6), 441–454.

3 Core Mixed Methods Designs

Research designs are procedures for collecting, analyzing, interpreting, and reporting data in research studies. They represent different models for doing research, and these models have distinct names and procedures associated with them. Research designs are useful because they help guide the methods decisions that researchers must make during their studies and set the logic by which researchers make interpretations at the end of their projects. Once the researcher has identified that the research problem calls for a mixed methods approach and reflected on the philosophical and theoretical foundations of the study, the next step is to choose the specific design that best fits the problem and the research questions in the study. What designs are available, and how do researchers decide which one is appropriate for their studies? Mixed methods researchers need to be acquainted with the core types of mixed methods designs and the key decisions behind these designs to adequately consider available options. Each core design has its own history, intent, philosophical assumptions and theory, procedures, integration, strengths, challenges, and variants. With an understanding of the core mixed methods designs in hand, researchers are equipped to choose and describe the one best suited to address a stated problem.

This chapter introduces the core designs available to the researcher planning to engage in mixed methods research. It will address

- key concepts that inform the design, description, and visualization of mixed methods designs;
- three core mixed methods designs;
- choosing a core design; and
- writing about the design in a written report.

Key Concepts That Inform Mixed Methods Designs

Designing research studies is a challenging process in both quantitative and qualitative research. This process can become even more challenging when the researcher has decided to use mixed methods because of the added complexity of the approach. No other topic in the field of mixed methods has been as widely debated and discussed as the research designs. We acknowledge these discussions and suggest that every mixed methods study ultimately has its own unique design. Still, there are several key concepts to consider in selecting, visualizing, and conducting a mixed methods design. These concepts are not fixed in time but are being discussed and debated. We acknowledge our own thinking has evolved with regard to describing mixed methods designs, and we first turn our attention to our emerging understanding of these key concepts.

Fixed and Emergent Designs

Mixed methods core desings may be fixed or emergent, and researchers need to be cognizant of the approach they are using and open to considering the best alternative for their circumstances. **Fixed mixed methods designs** are mixed methods studies in which the use of quantitative and qualitative methods is predetermined and planned at the start of the research process and the procedures are implemented as planned. **Emergent mixed methods designs** are found in mixed methods studies in which the use of mixed methods arises due to issues that develop during the process of conducting the research. Emergent mixed methods designs generally occur when a second approach (quantitative or qualitative) is added after the study is underway because one method has been found to be inadequate (Morse & Niehaus, 2009). For example, Ras (2009) described how she found the need to add a quantitative component to her qualitative case study of self-imposed curricular change at one elementary school. She used this quantitative component to address emergent concerns with the trustworthiness of her interpretations of what she learned from her participants. In this way, her qualitative case study became a mixed methods study during her process of implementing the research project.

We view these two categories—fixed and emergent—not as a clear dichotomy but as end points along a continuum. Many mixed methods designs actually fall somewhere in the middle and involve both fixed and emergent aspects. For example, the researcher may plan to conduct a study in two phases from the start, such as beginning with a quantitative phase and then following up with a qualitative phase. The details of the design of the subsequent qualitative phase, however, may emerge based on the researcher's interpretation of the results from the initial quantitative phase. Therefore, the study becomes an example of combining both fixed and emergent elements. We recognize the importance and value of emergent mixed methods approaches. Although the emergent aspect is not always easy to convey in writing, we believe most of the design elements we address in this book apply whether the use of mixed methods is planned from the start or emerges due to the needs of a study.

Typology and Interactive Approaches to Design

In addition to using fixed and emergent mixed methods designs, researchers also use different approaches for designing their mixed methods studies. There are several approaches to design that have been discussed in the literature, and researchers can benefit from considering their personal approach to their mixed methods study. These design approaches fall into two categories: typology-based and interactive.

A **typology-based approach** emphasizes the classification of different mixed methods designs into a typology and the adaptation of a selected design from the typology to a study's purpose and questions. Unquestionably, this design approach has been the most discussed in the mixed methods literature, as shown by the amount of effort that has been spent on classifying mixed methods designs into different typologies. A wide range of classifications of types of mixed methods designs have been advanced by methodologists. Creswell, Plano Clark, Gutmann, and Hanson summarized the range of these classifications in 2003, and we have updated that summary with a list of classifications in Table 3.1. These classifications represent diverse disciplines, including evaluation, health sciences, and education, and span scholarly writings about mixed methods approaches since the late 1980s. They also tend to use different terminology and emphasize different features of mixed methods designs. The different types and various classifications speak to the evolving nature of mixed methods research and the utility of considering designs as a framework for thinking about mixed methods. It is the typology-based approach that we will emphasize in this book.

As the different scholars listed in Table 3.1 developed their typologies, they focused on different types of decisions and features of mixed methods designs. It is helpful to notice these differences to understand why we have the different typologies. For example, some authors emphasized the purpose (or intent) for mixing methods by using design names such as "triangulation" and "instrument design model" (e.g., Creswell et al., 2004; Greene et al., 1989). Some authors focused on the relative **timing** (or sequencing) of when the quantitative and qualitative **strands** are implemented relative to each other and used names such as "simultaneous" and "sequential" (e.g., Morse, 1991; Sandelowski, 2000). Some authors emphasized the relative **priority** (or weighting or importance) of the quantitative and qualitative strands in addressing the study's purpose by using names such as "qualitatively driven" (Morse & Niehaus, 2009) and "equivalent status" (Tashakkori & Teddlie, 1998). Some authors emphasized the **level of**

interaction (or independence or dependence) that occurs between the quantitative and qualitative strands by using design names such as “component” or “fully integrated” (e.g., Greene, 2007; Teddlie & Tashakkori, 2009). Most authors used at least a couple of these considerations in developing their typology of mixed methods designs. Therefore, the different typologies available not only represent different discipline orientations of the authors, they also represent different ways that researchers think about mixing methods.

TABLE 3.1 ■ Selected Typologies of Mixed Methods Design Classifications

Typology Authors	Discipline Orientation of Authors	Mixed Methods Designs in the Typology
Greene, Caracelli, and Graham (1989)	Evaluation	Triangulation Complementarity Development Initiation Expansion
Morse (1991)	Nursing	Simultaneous triangulation Sequential triangulation
Steckler, McLeroy, Goodman, Bird, and McCormick (1992)	Public health education	Model 1: Qualitative methods to develop quantitative measures Model 2: Qualitative methods to explain quantitative findings Model 3: Quantitative methods to embellish qualitative findings Model 4: Qualitative and quantitative methods used equally and in parallel
Greene and Caracelli (1997)	Evaluation	Component designs Triangulation Complementarity Expansion Integrated designs Iterative Embedded or nested Holistic Transformative
Morgan (1998)	Health research	Complementary designs Qualitative preliminary Quantitative preliminary Qualitative follow-up Quantitative follow-up
Tashakkori and Teddlie (1998)	Educational research	Mixed methods designs Equivalent status (sequential or parallel) Dominant–less dominant (sequential or parallel) Multilevel use Mixed model designs I. Confirmatory, qualitative data, statistical analysis, and inference II. Confirmatory, qualitative data, qualitative analysis, and inference III. Exploratory, quantitative data, statistical analysis, and inference IV. Exploratory, qualitative data, statistical analysis, and inference V. Confirmatory, quantitative data, qualitative analysis, and inference VI. Exploratory, quantitative data, qualitative analysis, and inference VII. Parallel mixed model VIII. Sequential mixed model
Sandelowski (2000)	Nursing	Sequential Concurrent Iterative Sandwich
Creswell, Plano Clark, Gutmann, and Hanson (2003)	Educational research	Sequential explanatory Sequential exploratory Sequential transformative Concurrent triangulation Concurrent nested Concurrent transformative
Creswell, Fetters, and Ivankova (2004)	Primary medical care	Instrument design model Triangulation design model Data transformation design model
Tashakkori and Teddlie (2003b)	Social and behavioral research	Concurrent mixed designs Concurrent mixed method design Concurrent mixed model design Sequential mixed designs Sequential mixed method design Sequential mixed model design Multistrand conversion mixed designs Multistrand conversion mixed method design Multistrand conversion mixed model design Fully integrated mixed model designs
Greene (2007)	Evaluation	Component designs Convergence Extension Integrated designs Iteration Blending Nesting or embedding Mixing for reasons of substance or values
Teddlie and Tashakkori (2009)	Educational research	Mixed methods multistrand designs Parallel mixed designs Sequential mixed designs Conversion mixed designs Multilevel mixed designs Fully integrated mixed designs
Morse and Niehaus (2009)	Nursing	Simultaneous mixed method designs Sequential mixed method designs Complex mixed method designs Qualitatively driven complex mixed method design Quantitatively driven complex mixed method design Multiple method research program
Creswell and Plano Clark (2011)	Social sciences	Convergent parallel design Explanatory sequential design Exploratory sequential design Embedded design Transformative design Multiphase design
Plano Clark and Ivankova (2016)	Education and health sciences	Basic designs Concurrent Quan + Qual design Sequential Quan → Qual design Sequential Qual → Quan design Intersecting basic designs with other approaches Mixed methods experiment Mixed methods case study Mixed methods evaluation Mixed methods action research Transformative mixed methods research

Source: Adapted from Creswell & Plano Clark (2011) and Plano Clark & Ivankova (2016).

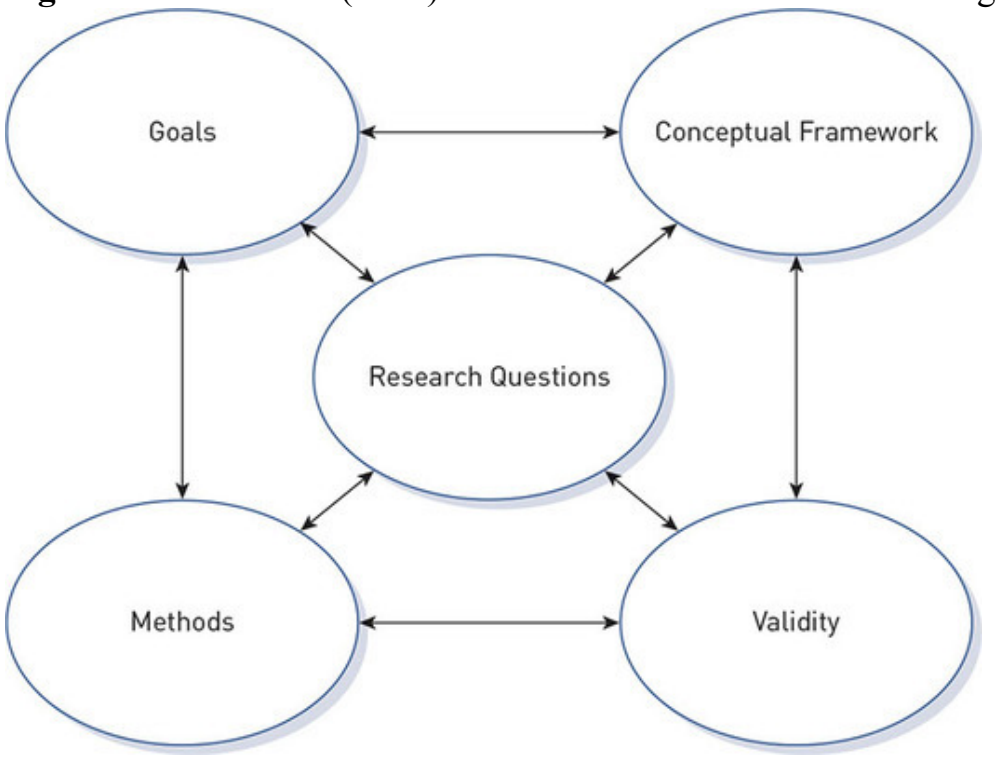
Source: Adapted from Creswell & Plano Clark (2011) and Plano Clark & Ivankova (2016).

In contrast to the typology-based approach, there is the interactive approach for thinking about the process of designing a mixed methods study. This approach focuses on the parts and processes of a research study as opposed to the focus on methods found with the typology-based approach. Maxwell and colleagues have advocated for an **interactive, system-based approach** to mixed methods design (Maxwell, 2012; Maxwell, Chmiel, & Rogers, 2015; Maxwell & Loomis, 2003). They argue the researcher should weigh five interconnected components when designing a mixed methods study: the study's goals, conceptual framework, research questions, methods, and validity considerations. They also acknowledge these considerations are shaped by external influences, such as the researcher's skills, situational constraints, ethical standards, funding agendas, and prior research. All these factors interact to influence the mixed methods design and how it may change during a research study. A visual of this interactive approach is shown in Figure 3.1.

Hall and Howard (2008) described a dynamic approach similar to the interactive approach, which they called the *synergistic approach*. They suggested the synergistic approach provides a way to combine a typological approach with an interactive approach. In a synergistic approach, two or more options interact so their combined effect is greater than the sum of the individual parts. Translated into mixed methods, this means the sum of quantitative and qualitative research is greater than either approach alone. They defined this approach through a set of core principles: the concept of synergy, the position of equal value, the ideology of difference, and the relationship between the researcher(s) and the study design. They argued that this approach's effective combination of structure and flexibility helped them consider how epistemology, theory, methods, and analysis could work together within a mixed methods design.

We suggest that researchers, particularly those new to designing and conducting mixed methods studies, consider starting with a typology-based approach to mixed methods design. Typologies provide the researcher with a range of available options to consider that are well defined, facilitate a solid approach for addressing the research problem, and help the investigator anticipate and resolve challenging issues. Typologies also cast focus on the data collection and analysis along with the **point of interface**, the point where the mixing or integration occurs—a feature that we feel is central to mixed methods. That said, we do not advocate that researchers adopt a typology-based design like a cookbook recipe but instead use it as a guiding framework to help inform design choices. As researchers gain more expertise with mixing methods, they are better able to effectively design their studies using an interactive or dynamic approach.

Figure 3.1 Maxwell's (2012) Interactive Model of Research Design



Source: Maxwell (2012), with permission of SAGE Publishing, Inc.

The Evolution of Our Typology

Due to the numerous classifications available and the maturation of the mixed methods field, we have changed the names and our approaches to the designs over the years. This has led to some confusion about what designs we actually support. Table 3.2 shows how we have adjusted our thinking about designs from our early typology in 2003 (Creswell et al., 2003) through the first and second editions of this book (Creswell & Plano Clark, 2007, 2011) and into this current third edition. In the table we have listed the design names from our writings that are most closely associated with our original typology in 2003. As the table illustrates, we have changed the number and names of the designs, and we have eliminated some of them. Our goal all along has been to advance a typology of core designs that is both parsimonious and practical so as to best assist researchers in understanding the major design options available. With these changes, we feel we are in a better position to suggest the type of design when people come to us for advice.

TABLE 3.2 ■ Our Changing Typologies

Our 2003 Typology (Creswell, Plano Clark, Gutmann, & Hanson, 2003)	Our 2007 Typology (Creswell & Plano Clark, 2007)	Our 2011 Typology (Creswell & Plano Clark, 2011)	Our Present Typology of Core Designs
Sequential explanatory	Explanatory design	Explanatory sequential design	Explanatory sequential design
Sequential exploratory	Exploratory design	Exploratory sequential design	Exploratory sequential design
Sequential transformative		Transformative design	
Concurrent triangulation	Triangulation design	Convergent parallel design	Convergent design
Concurrent nested	Embedded design	Embedded design	
Concurrent transformative		Transformative design	
		Multiphase design	

As indicated in Table 3.2, the number of designs have fluctuated over the years. Our current typology of three core designs reflects our most parsimonious statement of designs. We now see that at the heart of a mixed methods study is

one or more of the three core designs (convergent, explanatory sequential, and exploratory sequential). Individuals may engage in a study that uses one or more of the core designs, and sometimes they apply the core designs within larger frameworks or approaches (such as in experiments or evaluation projects). In this chapter we discuss the three core designs; in Chapter 4 we explore how these designs have been applied (or intersected) in larger frameworks or approaches, such as in intervention or experimental trials, case studies, participatory or social justice perspectives, and program evaluations. In other recent writings (Creswell, 2014), these larger frameworks or approaches were discussed as "advanced" designs, but we recognized this label raised perplexing questions as to what was meant by "advanced" and whether a researcher should only use an advanced design to have a rigorous mixed methods study. Therefore, we have avoided that language in this book.

Table 3.2 also shows that the names of the designs have changed over time to labels that reflect the primary emphasis of the researcher's general intent for using and integrating the quantitative and qualitative databases. Our names for the designs initially focused on the "timing" of the quantitative and qualitative components of a mixed methods study (e.g., *sequential* explanatory or *concurrent* triangulation), but timing is a difficult standard to apply in practice because both databases may be collected at roughly the same time. In contrast, the **intent of a design** is the outcome that the researcher hopes to attain by mixing the two databases. Thus, the intent of the design, whether it is to explain, explore, or converge, becomes the first word in our design names (e.g., *convergent* design). The idea of sequentially ordering the qualitative and quantitative methods becomes the second word in our label (e.g., explanatory *sequential* design). Furthermore, instead of focusing on the triangulation of data sources, we now emphasize what the researcher does with the data sources within the intent of the study (e.g., to *converge* the results for enhanced understanding). Granted, these are subtle wording changes, but together they shift the conceptualization of the design from a question of timing or sequence to the purpose or intent of the design. The design names also deemphasize the question of the priority or emphasis of one of the databases over the other. Like timing, priority is a difficult standard to apply, and we believe that the intent provides a more useful scheme for helping researchers understand and communicate the design being used.

As shown in Table 3.2, we have eliminated some designs in our current typology. We now see embedding as one of several possible ways that researchers may intersect the core mixed methods designs with another approach, such as in the mixed methods experiment application that we will discuss in Chapter 4. We also

now see transformative not as a unique design but as a worldview or philosophy that can provide the foundation for the use of mixed methods, as discussed in Chapter 2 and as several reviewers have told us over the years. In Chapter 4 we discuss how researchers use this worldview within the social justice application. The term *multiphase design*, as used in previous discussions (Creswell & Plano Clark, 2011), has become much too general, although it can be argued that most mixed methods studies have multiple phases. We have found it useful to think about researchers applying the three core designs within multiple stages of procedures. In Chapter 4 we examine the application of the core designs within multiple stages of a program evaluation. We find these changes help to focus researchers' attention on the core mixed methods designs as well as leaving open the wide range of possible applications of these core designs.

This last point leads to one further change in our thinking about designs. Over the years individuals have come to us with projects asking what design they are using. They tell us that they have multiple core designs operating in a single study. This may be the case, but, when we look closely at their projects, we see one of the core designs weighs more heavily in the study than the others. We ask, "What is the intent for you to collect and integrate both quantitative and qualitative data?" Their answer to this question then helps to focus on the *primary* intent for gathering both types of data. We see the primary intent then leading to a labeling of their core design. This concept holds true as well for the complex designs we will discuss in Chapter 4. For example, in a mixed methods experimental study, multiple core designs may be used, but typically one of the core designs is central to the intent for employing quantitative and qualitative data in the project (e.g., in a mixed methods experimental study the qualitative data flows into the study after the experiment concludes in order to explain the experimental results).

A Notation System for Drawing Diagrams of Designs

Although our design names focus attention on the intent of different designs, researchers still need to clearly convey the flow of the quantitative and qualitative methods within their particular study. To facilitate the discussion of mixed methods design features, a notation system, first used by Morse (1991), has been expanded and appears in the discussion of designs throughout the mixed methods literature. The common notations used from this system are summarized in Table 3.3. Morse's initial notation system used "quan" to indicate the quantitative methods of a study and "qual" to indicate the qualitative methods. This shorthand aims to convey an equal status of the two methods (i.e., both abbreviations have the same number of letters and same format). The relative priority (or importance) of the two methods within a particular study is indicated through the use of uppercase and lowercase letters—that is, prioritized methods are indicated with uppercase letters (i.e., QUAN and QUAL) and secondary methods with lowercase letters (i.e., quan and qual). In addition, the notation uses a plus (+) to indicate methods that occur at the same time and an arrow (→) to indicate methods that occur in a sequence. As shown in Table 3.3, several authors have expanded the notations beyond these basic elements. Plano Clark (2005) added the use of parentheses to indicate methods that are embedded (or intersected) within a larger framework. Nastasi et al. (2007) added double arrows (→←) to indicate methods that are implemented in a recursive fashion. More recently, Morse and Niehaus (2009) suggested the use of brackets ([ ]) to distinguish mixed methods projects in a series of studies and an equal sign (=) as a shorthand way to indicate the intent (or justification) for combining the methods. The shorthand notation using an equal sign can be helpful for describing the overall design of a study.

TABLE 3.3 ■ Summary of Notations Used to Describe Mixed Methods Designs

Notation	Example	What the Example Notation Indicates	Key Citations
Shorthand: Quan, Qual	Quan strand	Quantitative methods for data collection, analysis, and interpretation	Morse (1991, 2003)
Uppercase letters: QUAN, QUAL	QUAL priority	The qualitative methods are prioritized or emphasized in the design.	Morse (1991, 2003)
Lowercase letters: quan, qual	qual supplement	The qualitative methods have a lesser priority in the design.	Morse (1991, 2003)
Plus: +	QUAN + QUAL	The QUAN and QUAL methods occur concurrently.	Morse (1991, 2003)
Arrow: →	QUAN → qual	The methods occur in a sequence of QUAN followed by qual.	Morse (1991, 2003)
Parentheses: ( )	Intervention (QUAN + qual)	The methods are embedded (or intersected) within a larger intervention design.	Plano Clark (2005)
Double arrows: →←	QUAL →← QUAN	The methods are implemented in a recursive process (QUAL → QUAN → QUAL → QUAN → etc.).	Nastasi et al. (2007)
Brackets: [ ]	QUAL → QUAN → [QUAN + qual]	A core mixed methods design [QUAN + qual] is used within a series of studies.	Morse & Niehaus (2009)
Equal sign: =	QUAN → qual = explain quantitative results	The intent for mixing (or integrating) methods	Morse & Niehaus (2009)

Source: Adapted from Creswell & Plano Clark (2011).

Source: Adapted from Creswell & Plano Clark (2011).

Consider the following examples of using this notation system for the three core mixed methods designs:

- QUAN + QUAL = converge results: This notation indicates a convergent design in which the researcher implemented the quantitative and qualitative strands at the same time, both strands had equal emphasis, and the results of the separate strands were converged. It is possible for the two parts to be unequal and notated as QUAN + qual or as quan + QUAL. Regardless of the emphasis being placed on each of the two strands, the overall intent of the researcher is to converge or compare the results from the two databases.
- QUAN → qual = explain quantitative results: This notation indicates an explanatory sequential design in which the researcher implemented the two strands in a sequence, the quantitative methods occurred first and had a greater emphasis in addressing the study's purpose, and the qualitative methods followed to help explain the quantitative results. It is also possible for the emphasis to be given to the second, qualitative strand, which would be notated as quan → QUAL.
- QUAL → quan = explore and generalize findings: This notation indicates an exploratory sequential design in which the researcher implemented the two strands in a sequence, the qualitative methods occurred first to explore a phenomenon and had a greater emphasis in addressing the study's purpose, and the quantitative methods followed to assess the extent to which the initial qualitative findings generalize to a population. It is also possible for the emphasis to be given to the second, quantitative strand, which would be notated as qual → QUAN.

Elements for Drawing Diagrams of Designs

Building from this notation system, procedural diagrams have been used to convey the complexity of mixed methods designs. Such diagrams were introduced by Steckler, McLeroy, Goodman, Bird, and McCormick (1992) and have been adopted by many other authors (e.g., Morse & Niehaus, 2009; Tashakkori & Teddlie, 2003b). These diagrams use geometric shapes (boxes and ovals) to illustrate the steps in the research process (i.e., data collection, data analysis, interpretation) and arrows made with solid lines to show the progression through these steps. They incorporate details about specific procedures and products (e.g., specific reports that might go to a funding agency) that go beyond the level of information conveyed by the mixed methods notation system. Ivankova, Creswell, and Stick (2006) studied the use of procedural diagrams and suggested 10 guidelines for drawing diagrams for mixed methods designs so that they could be easily and conveniently constructed. These guidelines are listed in Figure 3.2 and are applied in the diagrams that appear throughout the remainder of this chapter.

Figure 3.2 Ten Guidelines for Drawing Procedural Diagrams for Mixed Methods Studies

1. Give a title to the diagram.
2. Choose either a horizontal or a vertical layout for the diagram.
3. Draw boxes for the quantitative and qualitative stages of data collection, data analysis, and interpretation of the study results.
4. Use uppercase or lowercase letters to designate the relative priority of the quantitative and qualitative data collection and analysis.
5. Use single-headed arrows to show the flow of procedures in the design.
6. Specify procedures for each stage of quantitative and qualitative data collection and analysis.
7. Specify expected products or outcomes of each procedure in quantitative and qualitative data collection and analysis.
8. Use concise language for describing the procedures and products.
9. Make your diagram simple.
10. Limit your diagram to a single page.

Source: Adapted from Ivankova et al. (2006, p. 15) with permission of Sage Publishing, Inc.

The Three Core Mixed Methods Designs

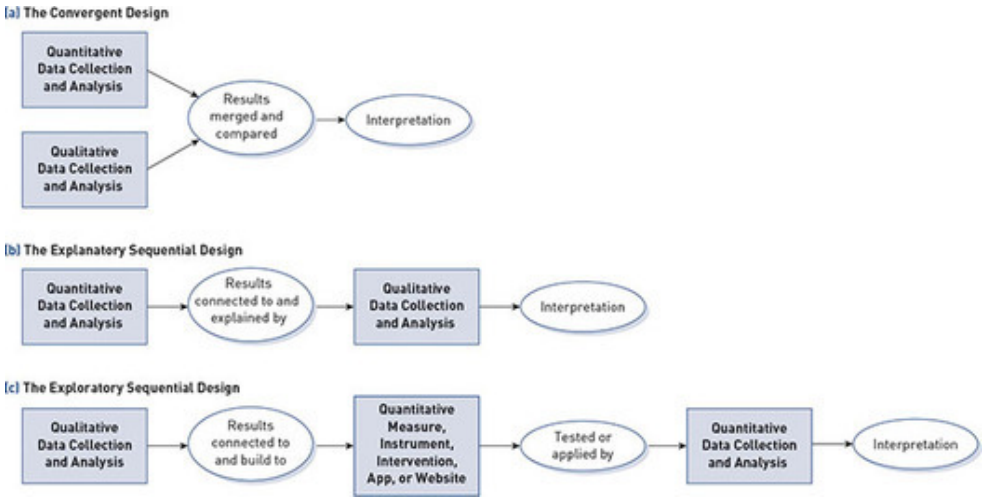
We recommend three core mixed methods designs that provide a useful framework for researchers working to plan their own studies. We urge researchers to carefully select a core design that best matches the research problem and reasons for mixing in order to make the study manageable and straightforward to implement and describe. In addition, by selecting a typology-based design, the researcher is provided with a framework and logic to guide the implementation of the research methods to ensure that the resulting design is rigorous and of high quality. The three core mixed methods designs are the convergent design, the explanatory sequential design, and the exploratory sequential design, as shown in a general form in Figure 3.3.

General Diagrams of the Three Core Designs

We start with a brief introduction to the core designs, including simple examples of studies that used them to explore the topic of adolescent tobacco use. After this introduction, we provide a more detailed overview of each design in the sections that follow.

- **The convergent design**. The **convergent design** (Figure 3.3a; previously referred to as the concurrent or parallel design) occurs when the researcher intends to bring together the results of the quantitative and the qualitative data analysis so they can be compared or combined. The basic idea is to compare the two results with the intent of obtaining a more complete understanding of a problem, to validate one set of findings with the other, or to determine if participants respond in a similar way if they check quantitative predetermined scales and if they are asked open-ended qualitative questions. The two databases are essentially combined. An example of a comparison approach to the convergent design would be if the researcher during one semester surveys high school students about their attitudes toward tobacco use and also conducts focus group interviews on the same topic with students. The researcher analyzes the survey data quantitatively and the focus group qualitatively and then compares the two sets of results to assess in what ways the results about adolescent attitudes converge and diverge.
- **The explanatory sequential design**. The **explanatory sequential design** (also referred to as the explanatory design) occurs in two distinct interactive phases (see Figure 3.3b). This design starts with the collection and analysis of quantitative data. This first phase is followed by the collection and analysis of qualitative data in order to explain or expand on the first-phase quantitative results. The subsequent qualitative phase of the study is designed so that it follows from the results of the quantitative phase. For example, the researcher collects and analyzes quantitative survey data to identify significant predictors of adolescent tobacco use. Finding a surprising association between participation in extracurricular activities and tobacco use, the researcher conducts qualitative focus group interviews with adolescents who are actively involved in extracurricular activities to attempt to explain the unexpected result.

Figure 3.3 General Diagrams of the Three Core Designs



Source: Adapted from Creswell & Plano Clark (2011).

- **The exploratory sequential design**. As shown in Figure 3.3c, the **exploratory sequential design** (also referred to as the exploratory design) also uses sequential timing. In contrast to the explanatory design, the exploratory sequential design begins with and typically prioritizes the collection and analysis of qualitative data in the first phase. Building from the exploratory results, the researcher conducts a development phase by designing a quantitative feature based on the qualitative results. This feature may be the generation of new variables, the design of an instrument, the development of activities for an intervention, or a digital product, such as an app or website. Finally, in the third phase the investigator quantitatively tests the new feature. The researcher then interprets how the quantitative results build on the initial qualitative results or how the quantitative results provide a clear understanding because they are grounded in the initial qualitative perspectives of participants. For example, the researcher collects qualitative stories about adolescents' attempts to quit smoking and analyzes the stories to identify the conditions, contexts, strategies, and consequences of adolescent quit attempts. Considering the resulting categories as variables, the researcher develops a quantitative survey instrument and then uses it to assess the overall prevalence of these variables for a large number of adolescent smokers.

To facilitate our discussion of the core mixed methods designs, we have included three complete studies in this book (see Appendixes A, B, and C). These studies

represent examples of mixed methods research from health, education, and the social sciences. In addition, each study illustrates the application of one of the three core mixed methods designs.

The three articles included in the appendixes are:

- Convergent design: Wittink, M. N., Barg, F. K., & Gallo, J. J. (2006). Unwritten rules of talking to doctors about depression: Integrating qualitative and quantitative methods. *Annals of Family Medicine*, *4*(4), 302–309. (See Appendix A.)
- Explanatory sequential design: Ivankova, N. V., & Stick, S. L. (2007). Students' persistence in a distributed doctoral program in educational leadership in higher education: A mixed methods study. *Research in Higher Education*, *48*(1), 93–135. (See Appendix B.)
- Exploratory sequential design: Enosh, G., Tzafrir, S. S., & Stolovy, T. (2015). The development of Client Violence Questionnaire (CVQ). *Journal of Mixed Methods Research, 9*(3), 273–290. (See Appendix C.)

The Convergent Design

A popular approach to mixing methods is the convergent design. Scholars began discussing this design as early as the 1970s (e.g., Jick, 1979), and it is often the first design that comes to mind when a researcher hears *mixed methods*. The convergent design was initially conceptualized as a triangulation design in which the two different methods were used to obtain triangulated (quantitative and qualitative) results about a single topic, but it often became confused with the use of triangulation in qualitative research, and mixed methods researchers use this design for purposes other than to produce triangulated findings. Since the 1970s, this design has gone by many names, including simultaneous triangulation (Morse, 1991); parallel study (Tashakkori & Teddlie, 1998); convergence model (Creswell, 1999); and concurrent triangulation (Creswell et al., 2003). Regardless of the name, the convergent design is a mixed methods design in which the researcher collects and analyses two separate databases—quantitative and qualitative—and then merges the two databases for the purpose of comparing or combining the results.

Intent of the convergent design.

The intent of the convergent design is "to obtain different but complementary data on the same topic" (Morse, 1991, p. 122) in order to best understand the research problem. The intent in using this design is to bring together the strengths and weaknesses of quantitative and qualitative methods (e.g., quantitatively, a large sample size, objective measures, trends, and generalization combined with, qualitatively, a small sample, subjective interpretation, details, and depth) (Patton, 1990). This design is used when the researcher wants to compare quantitative statistical results with qualitative findings for a complete understanding of the research problem. Other purposes for this design include corroboration and validation purposes, illustrating quantitative results with qualitative findings (or vice versa), or examining relationships among variables by adding new variables based on transformed qualitative data into the relationships.

Choice of the convergent design.

In addition to the intent of comparing results to best understand a problem, there are other compelling reasons for using the convergent design. It is useful when

- the researcher has limited time for collecting data in the field and must gather both types of data in one visit,
- the researcher needs both quantitative and qualitative forms of information from every participant,
- the researcher has skills in both quantitative and qualitative methods of research, and
- the mixed methods team has individuals skilled in both quantitative and qualitative research.

Philosophical assumptions and theory use in the convergent design.

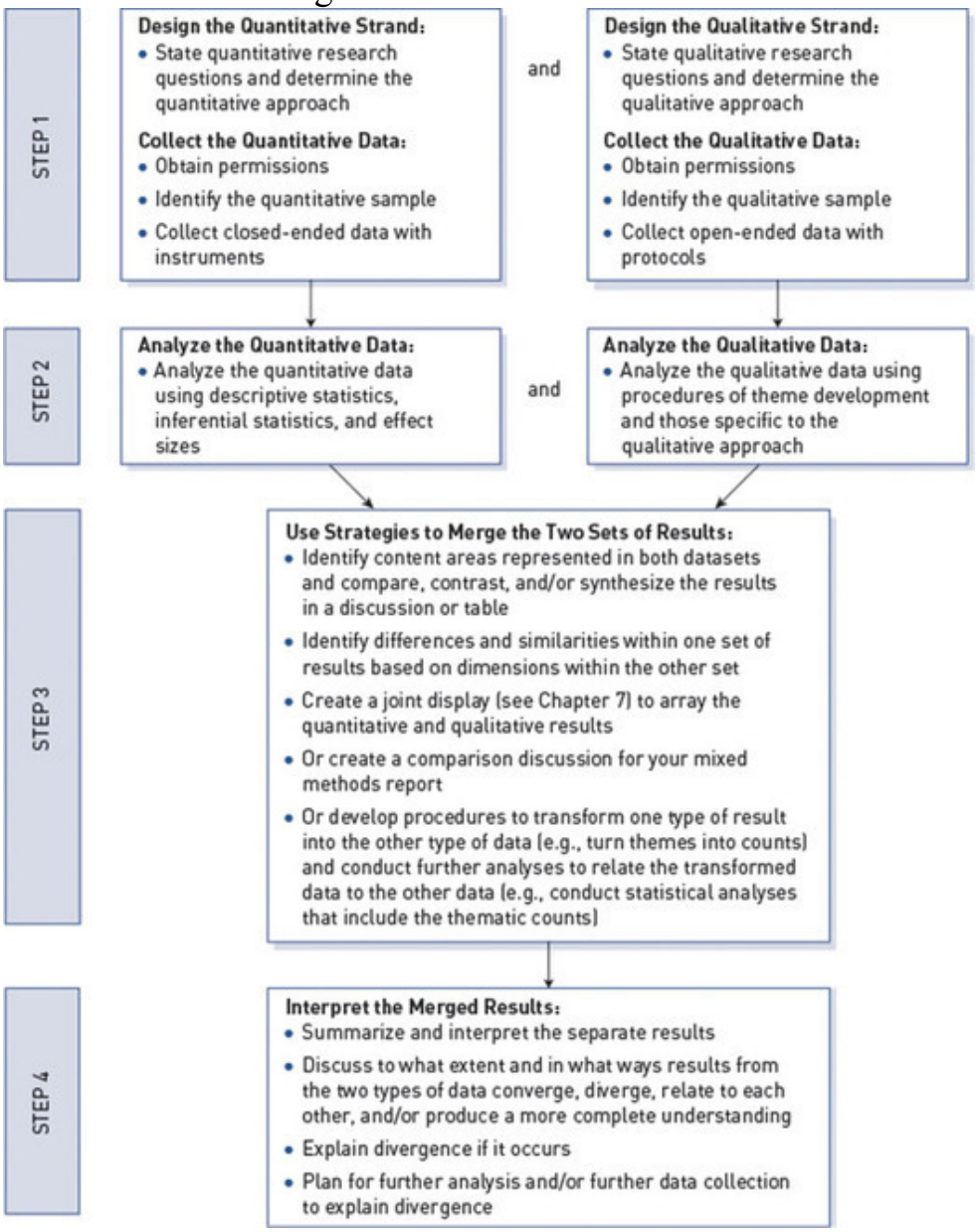
Since the convergent design involves collecting, analyzing, and merging quantitative and qualitative data and results at one time, it can raise issues regarding the philosophical assumptions behind the research. Instead of trying to mix different paradigms, we recommend that researchers who use this design work from a paradigm such as pragmatism, which provides an umbrella worldview for the research study. The assumptions of pragmatism (as discussed earlier in Chapter 2) are well suited for guiding the work of merging the two approaches into a larger understanding. Alternatively, those who choose to mix paradigms, such as in a dialectical framework, can advance multiple philosophical perspectives in the study and report these various philosophies. When using a theory orientation, the theory may operate in the convergent design by providing an umbrella theoretical or conceptual model that informs both the quantitative and qualitative data collection and analysis as well as the researcher's approach to integrating the two sets of results.

The convergent design procedures.

The procedures for implementing a convergent design are outlined in the procedural flowchart in Figure 3.4. As indicated in the figure, there are four major steps in the convergent design. First, the researcher collects both quantitative data and qualitative data about the topic of interest. These two types of data collection are concurrent but typically separate—that is, one does not depend on the results of the other. They also typically have equal importance for addressing the study's research questions. Second, the researcher analyzes the two data sets separately and independently from each other using quantitative and qualitative analytic procedures. Once the two sets of initial results are in hand, the researcher reaches the point of interface and works to merge the results of the two data sets in the third step. This merging step may include directly comparing the separate results in a table or a discussion, or it may involve transforming results to facilitate

relating the two data types during additional analysis. In the final step, the researcher interprets to what extent and in what ways the two sets of results converge or diverge from each other, relate to each other, and/or combine to create a better understanding in response to the study's overall purpose. If the results diverge, then the researcher takes further steps to explain this difference through reexamining the results, collecting more data, or reflecting on the quality of the databases.

Figure 3.4 Flowchart of the Basic Procedures in Implementing a Convergent Mixed Methods Design



Source: Adapted from Creswell & Plano Clark (2011).

Integration in the convergent design.

Integration in a convergent design involves merging or bringing together the quantitative results with the qualitative results. This comparison can be done with a table in which the results are included from both the quantitative and qualitative data. This is called a joint display table (as discussed further in Chapter 7 on data analysis). An alternative strategy would be to place the results in a graphical joint display, as is the case in geocoding where results are displayed according to spatial location with qualitative themes, codes, or quotes tied to different locations. The comparison can also be made when presenting the results of a study in passages organized by major topics. For example, a paragraph describing the results for a particular topic might be organized by presenting the quantitative results first and the qualitative results second (or vice versa). Further, the researcher would make statements about what is learned from making this comparison (were the results similar, different, contradictory, and so forth). Integration can also be accomplished by transforming the data. This typically involves transforming the qualitative results into counts and then merging the transformed qualitative database into the quantitative database. The counted qualitative results (e.g., counts of codes or themes) can then be used to create new quantitative variables (or measures) grounded in the qualitative views of participants. In this situation, the integration occurs when the new transformed variables based on qualitative results are added to the quantitative database and analyzed. No matter which strategies the researcher used to merge the two databases, a convergent design should include a discussion of the conclusions (also referred to as inferences) that the researcher draws based on the combined results.

In convergent design studies, it is helpful to have scripts for wording the integration statement in projects. In this design, the wording might be as follows: "The integration involved merging the results from the quantitative and qualitative data so that a comparison can be made and a more complete understanding emerge than that provided by the quantitative or the qualitative results alone." If the data are merged by data transformation, the wording might be as follows: "The integration involved merging the two databases by transforming the qualitative results (codes, themes) into quantitative variables (count, constructs, scales) and statistically analyzing these emergent variables

with the quantitative database so that variables arising from the personal experiences of participants can be included in the analysis."

Strengths of the convergent design.

This design has a number of strengths and advantages:

- The design makes intuitive sense. Researchers new to mixed methods often choose this design. It was the design first discussed in the literature (Jick, 1979), and it has become a popular approach for thinking about mixed methods research.
- It is an efficient design in which both types of data are collected during one phase of the research at roughly the same time.
- Each type of data can be collected and analyzed separately and independently, using the techniques traditionally associated with each. This lends itself to team research in which the team can include individuals with both quantitative and qualitative expertise.
- The design facilitates the direct comparison of participants' perspectives gathered in an open-ended questioning format (e.g., semi-structured interview) with the perspectives drawn from the researchers' standpoint (e.g., on an instrument such as a survey chosen by the researcher) in close-ended questioning. Researchers are able to give voice to participants as well as report statistical trends.

Challenges in using the convergent design.

Although this design is popular in mixed methods, it is a challenging one to use. Here are some of the challenges facing researchers using the convergent design as well as options for addressing them:

- Issues of different sample sizes—Researchers need to consider the consequences of having different samples and different sample sizes when merging the two data sets. Different sample sizes may arise because the quantitative and qualitative data are usually collected for different purposes (i.e. quantitative generalization vs. qualitative in-depth description). Effective strategies, such as collecting large qualitative samples or using unequal sample sizes, are discussed in Chapter 6.
- The need to merge a text and a numeric database—It can be challenging to merge two sets of very different data (i.e., often one data set is text and the

other is numbers) and their results in a meaningful way. It is best if researchers design their studies so that the quantitative and qualitative data address the same concepts. This strategy facilitates merging the data sets. In addition, Chapter 7 provides techniques for designing a discussion, building joint displays, and using data transformation.

- The need to explain divergence when comparing results—Researchers may face the question of what to do if the quantitative and qualitative results do not agree. Contradictions may provide new insights into the topic, but these differences can be difficult to resolve and may require the collection of additional data. The question then develops as to what type of additional data to collect or to reanalyze: quantitative data, qualitative data, or both. Chapter 7 discusses the collection of additional data or the reexamination of existing data to address this challenge.

Convergent design variants.

Design variants convey the variation found in researchers' use of the major designs. There are four common variants of the convergent design found in the literature:

- The **parallel-databases variant** is the common approach in which two parallel strands of data are collected and analyzed independently and are only brought together during the interpretation. The researcher uses the two types of data to examine facets of the same phenomenon, and the two sets of independent results are then synthesized or compared during the discussion. For example, Feldon and Kafai (2008) gathered qualitative ethnographic interviews along with quantitative survey responses and computer server logs and discussed how the two sets of results developed a more complete picture of youth activities within online virtual communities.
- The **data-transformation variant** occurs when researchers implement the convergent design using an unequal priority, often placing greater emphasis on the quantitative strand, and use a merging process of data transformation. That is, after the initial collection and analysis of the two data sets, the researcher uses procedures to quantify the qualitative findings (e.g., creating a new variable based on qualitative themes). The transformation allows the results from the qualitative data set to be combined with the quantitative data. The study comparing two approaches to rating English foreign language (EFL) student essays in Tunisia by Barkaoui (2007) represents the data-transformation model of mixed methods research. Barkaoui tested two

methods of scoring essays—multitrait scoring and holistic scoring—by collecting quantitative scores from four teachers as they examined essay samples. They also collected qualitative reports based on "think aloud" data in which the teachers verbalized their thoughts and feelings about the essays and about their process of scoring. During analysis the qualitative reports were divided into decision-making statements and quantitatively counted, and then they were compared for the two scoring methods. In this way, a quantitative table emerged combining the quantitative assessment of teachers' verbalized thoughts and the quantitative scoring methods.

- The **questionnaire variant** is used when the researcher includes both open- and closed-ended questions on a questionnaire and the results from the open-ended questions are used to confirm or validate the results from the closed-ended questions. Because the qualitative items are an add-on to a quantitative instrument, the items generally do not result in a rigorous context-based qualitative data set (in the last addition of this book, we called this approach "mixed methods light.") However, the qualitative database does provide the researcher with emergent themes and interesting quotes that can be used to validate and embellish the quantitative survey findings. For example, Bryanton and Weeks (2014) studied the support needs for older adults approaching the transition to becoming nondrivers. The researchers collected data on a survey instrument administered to Canadian adults over the age of 70 with a current driver's license. This instrument contained both multiple choice questions and open-ended questions to gain multiple perspectives on the transition issue and individuals' support needs.
- The **fully integrated variant** occurs when the quantitative and qualitative strands of a study interact with each other during the implementation instead of the researcher keeping them separate and independent. For example, the researcher may ask qualitative interview questions to a respondent based on that person's response to a survey item, and information gathered in the interviews may suggest new constructs to add to the quantitative data collection. In this variant the researcher often is gathering data at multiple points, and the intent is to gather more complete information about the complexity of a topic; the interactions occurring between the different forms of data provide insight into that complexity. Sammons, Davis, Day, and Gu (2014) used a fully integrated variant in their study of school improvement in England. They discussed how they combined data gathered from national surveys with data from several different surveys of school personnel and students, school documents, and stakeholder interviews to gain a more complete understanding of what helps schools be effective.

Example of the convergent design.

The convergent design involves collecting and analyzing two independent strands of qualitative and quantitative data in a single phase, merging the results of the two strands, and then looking for convergence, divergence, contradictions, or relationships between the two databases. The Wittink et al. (2006) study (see Appendix A) illustrates the major features of this design.

Wittink et al. (2006) were interested in the contexts surrounding the determination of patients' depression status by primary care physicians with a focus on the patients' views of the interactions with their physicians. The purpose of their study was to develop a better understanding of concordance and discordance between patient and physician assessments of a patient's depression status for older adults.

To address their study's purpose, the researchers selected a sample made up of all participants in a larger research study (the Spectrum Study) who self-identified as depressed ($N = 48$). The databases assembled for this study then included quantitative and qualitative data collected for each of these 48 individuals. In terms of the quantitative data, the researchers gathered three measures of participant depression status: a physician's rating, a patient's self-rating, and the participant's score on a standardized measure of depressive symptoms (known as the CES-D). The researchers also gathered several other measures from each participant, including demographic characteristics and assessments of anxiety, hopelessness, health status, and cognitive functioning. When analyzing the quantitative data, the researchers identified whether the patient and physician ratings were concordant (agreed with each other) or discordant (disagreed with each other) for each participant and then calculated descriptive statistics and group comparisons to see whether significant differences existed for the concordant and discordant groups in terms of the other variables of interest.

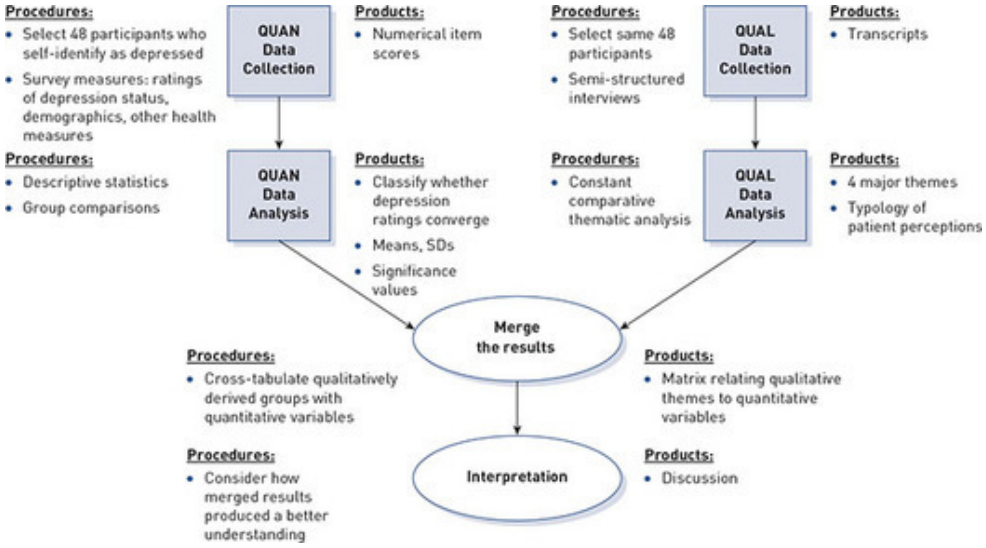
The researchers also included qualitative semi-structured interviews about patient perceptions of their encounters with their physicians. The interviews were transcribed, and the research team analyzed the texts using constant comparative strategies for theme development. This analysis was independent from the quantitative analysis, as the researchers purposefully did not have access to the quantitative information as they completed the qualitative analysis. Four major themes emerged to describe the patients' interactions with their physicians: (1) My doctor just picked it up, (2) I'm a good patient, (3) They just check out your heart and things, and (4) They'll just send you to a psychiatrist. These themes

provided a typology for classifying participants based on how they discussed the interactions.

Wittink et al. (2006) stated they needed both types of data in order to develop a more complete understanding. When explaining their mixed methods approach, they wrote, “This design allowed us to link the themes regarding how patients talk to their physicians with personal characteristics and standard measures of distress” (p. 303). Therefore, in order to relate these two different types of information, they selected and analyzed their quantitative and qualitative data sets concurrently and separately from each other. Both types of data appeared equally important for addressing the study’s purpose. After the initial separate analyses, they merged the two sets of results in an interactive way so that the point of interface occurred during the analysis and the interpretation. They further analyzed the data to develop a matrix (see Table A.3 in Appendix A, which we refer to in Chapter 7 as a joint display) that brought together the qualitative findings (four groups derived from the qualitative themes) with the quantitative results (concordance of depression ratings and other important variables). The information contained within the cells of the table shows the descriptive statistics of the variables for each of the qualitatively derived groups for purposes of comparison among the different qualitative perspectives. The researchers concluded with a brief discussion of how the comparisons across the two data sets provided a better understanding of the study’s topic.

This study is an example of a convergent mixed methods design. The notation of the study’s design can be written as QUAN + QUAL = complete understanding. Although the authors did not provide a diagram of their procedures, we developed one, and it is presented in Figure 3.5. The quantitative data collection and analysis appear on the left side of the figure, and the qualitative data collection and analysis appear on the right side. As shown in this diagram, the quantitative and qualitative strands were implemented during the same phase of the research process and appeared to have an equal emphasis within the study. These two data types and their results were then merged with a comparison matrix and into one overall interpretation, as depicted in the two ovals, which indicate these points of interface between the strands.

Figure 3.5 Diagram for a Study That Used the Convergent Design



Source: Diagram based on Wittink et al. (2006).

Note: SDs indicates standard deviations.

The Explanatory Sequential Design

For several years, writings about mixed methods designs have emphasized sequential approaches, using design names such as sequential model (Tashakkori & Teddlie, 1998), sequential triangulation (Morse, 1991), a qualitative follow-up approach (Morgan, 1998), and the iteration design (Greene, 2007). Although these names apply to any sequential two-phase approach, we introduced specific names to distinguish whether the sequence begins quantitatively or qualitatively (Creswell et al., 2003). The explanatory sequential design is a mixed methods design in which the researcher begins by conducting a quantitative phase and follows up on specific results with a subsequent qualitative phase to help explain the quantitative results (refer back to Figure 3.3b). The qualitative phase is implemented for the purpose of explaining the initial results in more depth, and the name of the design—explanatory—reflects how the qualitative data help explain the quantitative results.

Intent of the explanatory sequential design.

The primary intent of this design is to use a qualitative strand to explain initial quantitative results. For example, the explanatory design is well suited when the researcher needs qualitative data to explain quantitative significant (or nonsignificant) results, positive-performing exemplars, outlier results, or surprising or confusing results (Bradley et al., 2009; Morgan, 2014; Morse, 1991). This design can also be used when the researcher wants to form groups based on quantitative results and follow up with the groups through subsequent qualitative research or to use quantitative results about participant characteristics to guide purposeful sampling for a qualitative phase (Morgan, 1998, 2014; Tashakkori & Teddlie, 1998). It also can be used to explain the mechanisms through qualitative data that shed light on why the quantitative results occurred and how they might be explained.

Choice of the explanatory sequential design.

In addition to considering if the intent of an explanatory design best fits a particular study, there are other factors researchers may want to take into account when choosing this design. The explanatory sequential design is most useful when

- the researcher and the research problem are more quantitatively oriented and thus it makes sense to start the procedures with a quantitative phase,
- the researcher knows the important variables and has access to quantitative instruments for measuring the constructs of primary interest,
- the researcher has the ability to return to participants for a second round of qualitative data collection,
- the researcher has the time to conduct the research in two phases, and
- the researcher has limited resources (perhaps the researcher is the sole investigator) and needs a design in which only one type of data is being collected and analyzed at a time.

Philosophical assumptions and theory use in an explanatory sequential design.

As introduced in Chapter 2, different philosophical assumptions are possible to guide the use of an explanatory design. Since this design begins quantitatively, the research problem and purpose often call for a greater importance to be placed on the quantitative aspects. Although this may encourage researchers to use a postpositivist orientation to the study, we encourage researchers to consider using different assumptions within each phase—that is, since the study begins quantitatively, the researcher may begin from the perspective of postpositivism to select instruments, measure variables, and assess statistical results. When the researcher moves to the qualitative phase that values multiple perspectives and in-depth description, there is a shift to using the assumptions of constructivism. In this way, the overall philosophical assumptions in the design can change and shift from postpositivist to constructivist as researchers use multiple philosophical positions. The final interpretation of the two sets of results could then be based on one set of assumptions or on a dialectic involving both sets of assumptions.

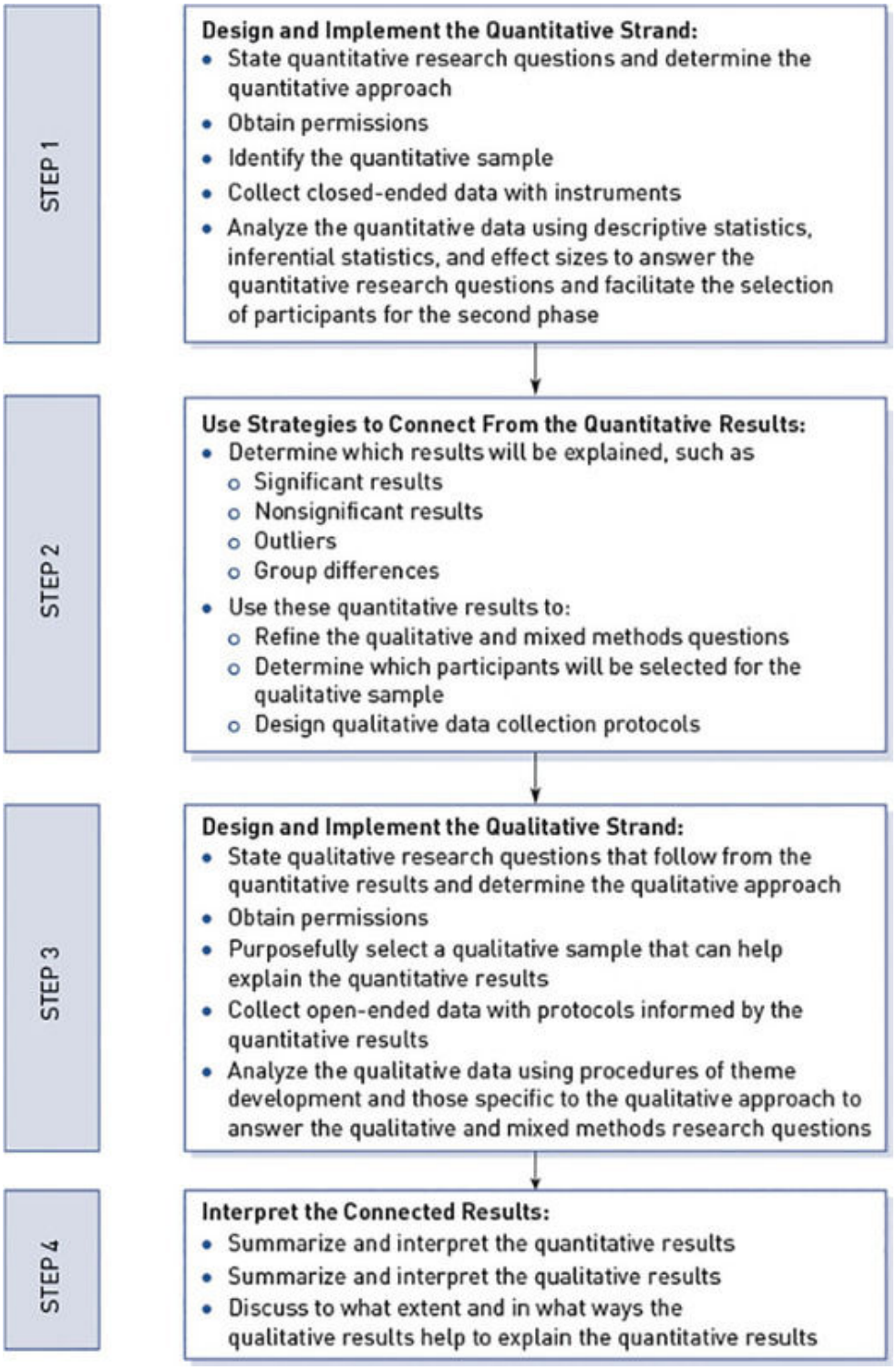
Further, following the postpostivist logic, theory (or a conceptual framework) often informs the first phase of the design—the quantitative phase. The theory can help to identify the questions that need to be asked, the variables and measures to be collected, and the potential relationships that should emerge when the first phase is completed. The theory use follows closely a quantitative approach to theory as an explanation, prediction, or hypothesis about what the researcher will likely find in the initial quantitative phase of the study. The application of theory can also be useful as an orienting stance for how the researcher approaches the qualitative phase, such as using the theory to focus the researcher's attention during coding, and for interpreting the combined results at

the end of the study, such as by using the theory to organize the quantitative results and corresponding qualitative explanations.

The explanatory sequential design procedures.

The explanatory sequential design is probably the most straightforward of the mixed methods designs. Figure 3.6 provides an overview of the procedural steps used to implement a typical two-phase explanatory design. During the first step, the researcher designs and implements a quantitative phase that includes collecting and analyzing quantitative data. In the second step, the researcher connects to a second phase—the point of integration for mixing—by identifying specific quantitative results that call for additional explanation and using these results to guide the development of the qualitative strand. Specifically, the researcher develops or refines the qualitative research questions, purposeful sampling procedures, and data collection protocols so they follow from the quantitative results. As such, the qualitative phase is connected to and depends on the quantitative results. In the third step, the researcher implements the qualitative phase by collecting and analyzing qualitative data. Finally, the researcher interprets to what extent and in what ways the qualitative results explain and add insight into the quantitative results and what overall is learned in response to the study's purpose.

Figure 3.6 Flowchart of the Basic Procedures in Implementing an Explanatory Sequential Mixed Methods Design



Source: Adapted from Creswell & Plano Clark (2011).

Integration in the explanatory sequential design.

There are two points where integration occurs in an explanatory sequential design. First, integration occurs between the quantitative data analysis in the first phase of the research and the qualitative data collection in the second phase. The researcher analyzes the quantitative data and comes up with results. Some of these results need further explanation, so the researcher launches a qualitative phase to explore the results in more depth with a few individuals. The integration occurs by connecting the quantitative results to the qualitative data collection. The quantitative results point toward specific results that need to be further explained through qualitative questioning and suggest which individuals will best be able to explain the results. A script for an integration statement in an explanatory mixed methods project might read: "Integration in this explanatory sequential study involved connecting the results from the initial quantitative phase to help plan the follow-up qualitative data collection phase. This plan includes what questions need to be further probed and what individuals can be sampled to best help explain the quantitative results." Second, once the qualitative phase is complete, the researcher then integrates the two sets of connected results and draws integrated conclusions about how the qualitative results explain and extend specific quantitative results.

Strengths of the explanatory sequential design.

The many advantages of the explanatory design make it the most straightforward of the mixed methods designs. These advantages include the following:

- This design appeals to quantitative researchers because it often begins with a strong quantitative orientation.
- Its structure makes it straightforward to implement because the researcher conducts the two phases—quantitative, then qualitative—separately and collects only one type of data at a time. This means single researchers can find this to be a manageable design to conduct.
- The final report can be written with a quantitative section followed by a qualitative section, making it straightforward to write and providing a clear delineation for readers.
- This design lends itself to emergent approaches in which the second phase can be designed based on what is learned from the initial quantitative phase.

Challenges in using the explanatory sequential design.

Although the explanatory design is straightforward, researchers choosing this approach still need to anticipate challenges specific to it. These challenges include the following:

- Extended time needed for completion—This design requires a lengthy amount of time for implementing the two phases, and participants must be accessible over an extended period. Researchers should also recognize that the qualitative phase takes more time to implement than the quantitative phase. Although the qualitative phase can be limited to a few participants, adequate time must still be budgeted for it.
- The qualitative phase cannot be fully specified in advance—It can be difficult to secure institutional review board (IRB) approval for studies using this design because the researcher cannot specify with precision the participants to be selected for the second phase or the questions that will be asked in the follow-up qualitative phase until the initial quantitative findings are obtained. This issue can be addressed by tentatively framing the qualitative phase of participant selection and the questions to be asked for the IRB while acknowledging the potential need to revise these decisions and possibly submit an addendum once the quantitative phase has been completed.
- Quantitative results to follow up on must be identified—The researcher must decide which quantitative results need to be further explained. Although this cannot be determined precisely until after the quantitative phase is complete, options such as selecting significant results and strong predictors can be considered as the study is being planned, as will be discussed in Chapters 6 and 7.
- The need to specify who can best provide the explanation—The researcher must decide who to sample in the second phase and what criteria to use for participant selection. Chapter 6 explores approaches to using individuals from the same sample to provide the best explanations and criteria options, including the use of demographic characteristics, using groups in comparisons during the quantitative phase, and using individuals who vary on select predictors.

Explanatory sequential design variants.

There are two variants of the explanatory sequential design:

- The prototypical **follow-up explanations variant** is the most common approach for using the explanatory sequential design. The researcher places priority on the initial quantitative phase and uses the subsequent qualitative phase to help explain the quantitative results. For example, Igo, Riccomini, Bruning, and Pope (2006) started by quantitatively studying the effect of different modes of note-taking on test performance for middle school students with learning disabilities. Based on the quantitative results, the researchers conducted a qualitative phase that included gathering interviews and documents from the students to understand their note-taking attitudes and behaviors to help explain the quantitative results.
- Although less common, the **case-selection variant** arises when the researcher places priority on the second, qualitative phase instead of the initial quantitative phase. This variant has also been called a preliminary quantitative input design (Morgan, 2014). This variant is used when the researcher is focused on qualitatively examining a phenomenon but needs initial quantitative results to identify and purposefully select the best participants. For example, Bradley et al. (2012) collected quantitative data to identify primary care health units in rural Ethiopia that had demonstrated different types of performance over time (i.e., consistently high performance, improved performance, and consistently low performance). They then completed an in-depth qualitative comparison study of how these three types of units functioned.

Example of the explanatory sequential design.

The explanatory sequential design is implemented in two distinct phases. The first phase involves collecting and analyzing quantitative data. Based on a need to further understand the quantitative results, the researcher implements a subsequent qualitative phase that is designed to help explain the initial quantitative results. The study by Ivankova and Stick (2007) (see Appendix B) illustrates the major features of the explanatory sequential design.

Ivankova and Stick (2007) studied the issue of student persistence within the field of higher education. Building on three major theories about student persistence, they chose to study doctoral students in one distributed doctoral program in educational leadership. Specifically, their purpose was to identify factors that contributed to student persistence in the program and to explore participant views about these factors.

The researchers implemented their study in two phases, starting with a quantitative strand. First, they approached all 278 students who had been or were currently enrolled in the program, and 207 agreed to participate in the study. Using a cross-sectional survey design, the researchers developed and administered an online questionnaire to the participants that measured nine predictor variables suggested by theories of student persistence. The responding students represented four groups related to persistence in the program: beginning, matriculated, graduated, and withdrawn or inactive. The analysis of the quantitative data resulted in descriptions of the demographic characteristics of the four groups and identified five variables that significantly discriminated the four different groups defined by their level of persistence.

The researchers conducted a subsequent qualitative phase after completing the quantitative phase. Using the quantitative results, they identified individuals within the sample that had scores typical of the average scores for each group. They purposefully selected four "typical" individuals (one per group) and conducted an in-depth case study of each person's experiences in and perceptions of the program. The primary form of data collection was one-on-one interviews using a protocol developed to explore the factors found to be significant in the quantitative phase. Other forms of qualitative data gathered included electronic interview transcriptions, written responses, and documents. The analysis first examined the data for descriptions and themes within each case, and this was followed by a cross-case analysis to identify important themes about persistence across the four cases.

Ivankova and Stick (2007) noted that one method alone is not sufficient to capture the trends and details of complex situations such as student persistence in this program. They went on to describe the purpose for their mixing in the following statement: "The quantitative data and results provided a general picture of the research problem, while the qualitative data and its analysis refined and explained those statistical results by exploring the participants' views regarding their persistence in more depth" (p. 97).

The researchers needed to first identify the general picture and statistically significant results before they knew what quantitative results needed to be further explored with a qualitative strand. As such, the study used sequential timing, with the quantitative methods being implemented in the first phase and the qualitative methods following in a second phase. The authors noted the qualitative phase was prioritized because "it focused on in-depth explanations of the results obtained in the first, quantitative, phase, and involved extensive data collection from multiple

sources and two-level case analysis" (p. 97). The primary point of interface occurred with the qualitative data collection during the second phase. The authors connected the phases by using the results of the quantitative phase to inform the sampling plan and interview protocol used in the qualitative phase. They also connected the results during the interpretation by discussing a major quantitative result and then how a follow-up qualitative result helped to explain the quantitative result in more depth.

Based on the implemented design features, the notation for the study can be written as quan → QUAL = explain significant factors. Since the study was conducted in two phases with the qualitative phase dependent on the results of the initial quantitative phase, this study is an example of the explanatory sequential mixed methods design. Its two-phase timing and points of mixing are highlighted in the diagram developed by the authors and reproduced in Figure 3.7. The data collection and analysis procedures of the initial quantitative phase are described in the first two rectangular boxes. The connections to the qualitative phase through case selection and interview protocol development are shown in the oval (the first point of interface). Then, the procedures in the second, qualitative phase are described in the next two rectangular boxes. The diagram concludes with another oval indicating the second point of interface and how the authors interpreted the overall mixed methods results.

The Exploratory Sequential Design

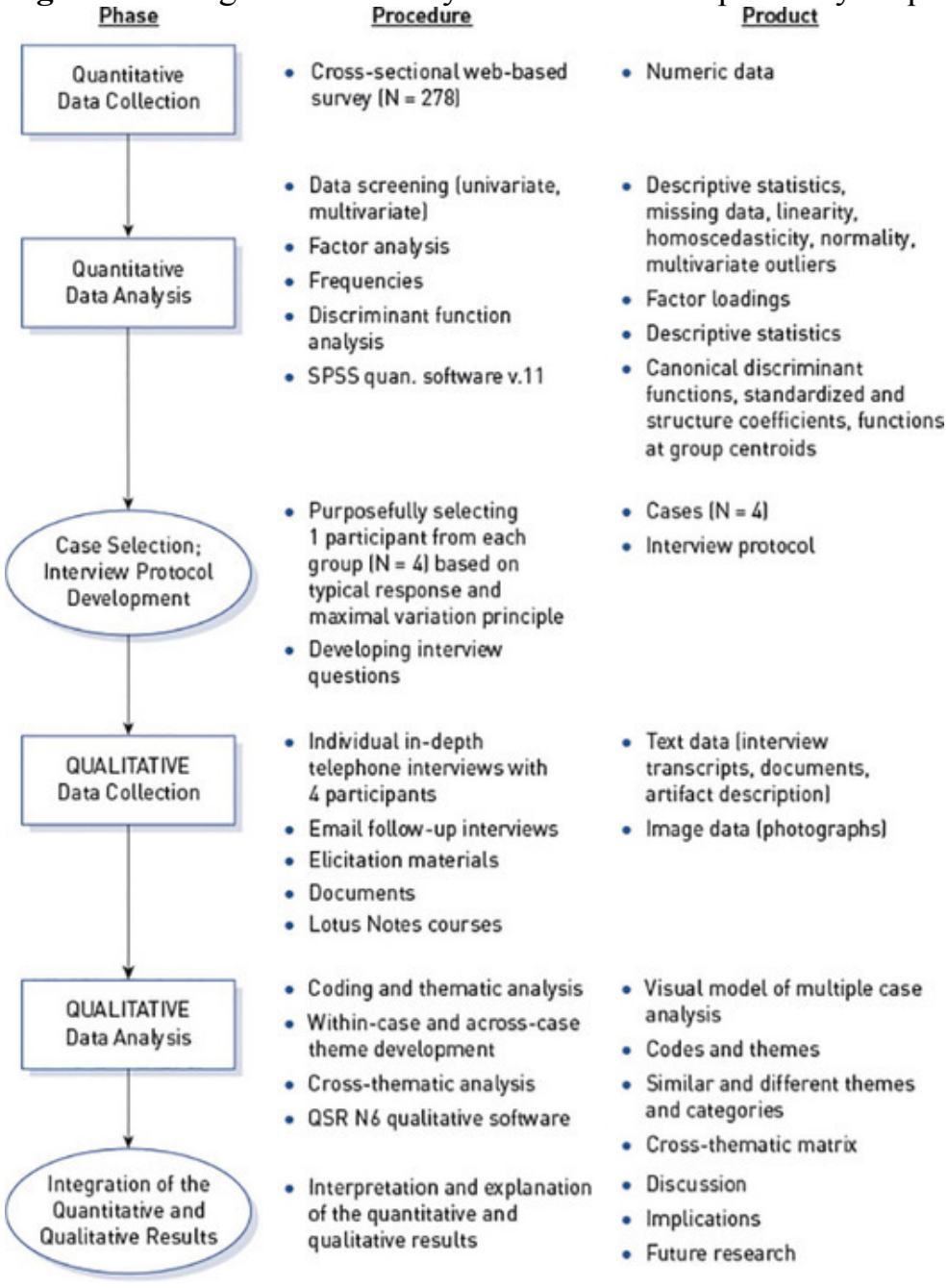
As depicted in Figure 3.3c, the exploratory sequential design is a three-phase mixed methods design in which the researcher starts with the collection and analysis of qualitative data that is then followed by a development phase of translating the qualitative findings into an approach or tool that is tested quantitatively. This means that the approach or tool will be grounded in the views of participants. This emphasis on exploring before the development phase is reflected in the design name. In many applications of this iterative design, the researcher develops an instrument as an intermediate step between the phases that builds on the qualitative results and is used in the subsequent quantitative data collection. Alternatively, researchers may design new variables, new measures (or a survey), new experimental activities, or an app or digital tool during the development phase. When used to develop an instrument, this design has been referred to as the instrument development design (Creswell, Fetters, & Ivankova, 2004).

Intent of the exploratory sequential design.

As with the explanatory design, the intent of the exploratory sequential design is that the results of the first, qualitative method can help develop or inform the second, quantitative method (Greene et al., 1989). Specifically, the primary intent of the exploratory design is to develop and apply a quantitative measure, survey, intervention, digital tool, or new variables that are grounded in the qualitative data. By this we mean that the quantitative feature is based on the culture or setting of participants rather than pulled "off the shelf" for use. With the culture-specific development of the measure or instrument, the likelihood increases that it will be seen as relevant to the group being studied. Because this design begins qualitatively, it is best suited for exploring a phenomenon. Such an exploration is needed for one of several reasons: (1) measures, instruments, or experimental activities are not available; (2) the variables are unknown; (3) there is no guiding framework or theory; or (4) there is a need to make an existing quantitative measure or instrument as specific to the participants or culture as possible. This design is particularly useful when the researcher needs to develop and test an instrument because one is not available (Creswell, 1999; Creswell et al., 2004) or to identify important variables to study quantitatively when the variables are unknown. It is also appropriate when the researcher wants to assess the generalizability of qualitative results to different groups (Morgan, 2014); to test

aspects of an emergent theory or classification (Morgan, 1998); or to explore a phenomenon in depth and measure the prevalence of its dimensions.

Figure 3.7 Diagram for a Study That Used the Explanatory Sequential Design



Source: Reprinted from Ivankova and Stick (2007, p. 98). Reprinted with permission of Springer.

Choice of the exploratory sequential design.

In addition to considering if the intent of an exploratory design best fits a particular study, there are other factors researchers may want to take into account when choosing this design. It is most useful when

- the researcher and the research problem are more qualitatively oriented and therefore it makes sense to start with a more inductive approach;
- the researcher needs to develop a product (e.g., an instrument, intervention materials, or a digital tool) that is substantively relevant and culturally sensitive;
- the researcher has the necessary time to conduct the research in three phases: qualitative, development, and quantitative;
- the researcher is interested in the transferability and generalizability of a newly developed product; and
- the researcher identifies new emergent research questions based on small-sample qualitative results that can be best tested with a large quantitative sample.

Philosophical assumptions and theory use in the exploratory sequential design.

Since the exploratory design begins qualitatively, the research problem and purpose often call for the qualitative strand to have greater emphasis within the design. Therefore, researchers often work from constructivist principles during the first phase of the study to value multiple perspectives and obtain deep understanding. When the researcher moves to the quantitative phase, the underlying assumptions may shift to those of a postpositivist philosophical stance to guide the need for identifying and measuring variables and statistical trends. Thus, multiple worldviews are used in this design, and the worldviews shift from one phase to the other. The final interpretation of the two sets of connected results may be based on one set of assumptions or a dialectical perspective involving both stances.

Theory (or conceptual framework) in an exploratory design may be inductively developed in the initial phase of the study where qualitative data results may lead to a theoretical model, as in grounded theory. This model, grounded in the views of participants, can then contribute to the variables assessed and the relationships examined in the follow-up quantitative phase of the study. Alternatively, the

theory may come into the study in the phase of developing an instrument, a new measure, or a specific application to be tested (e.g., a website). In this case, the qualitative results may be combined with a theory from the literature to inform this study phase of the project.

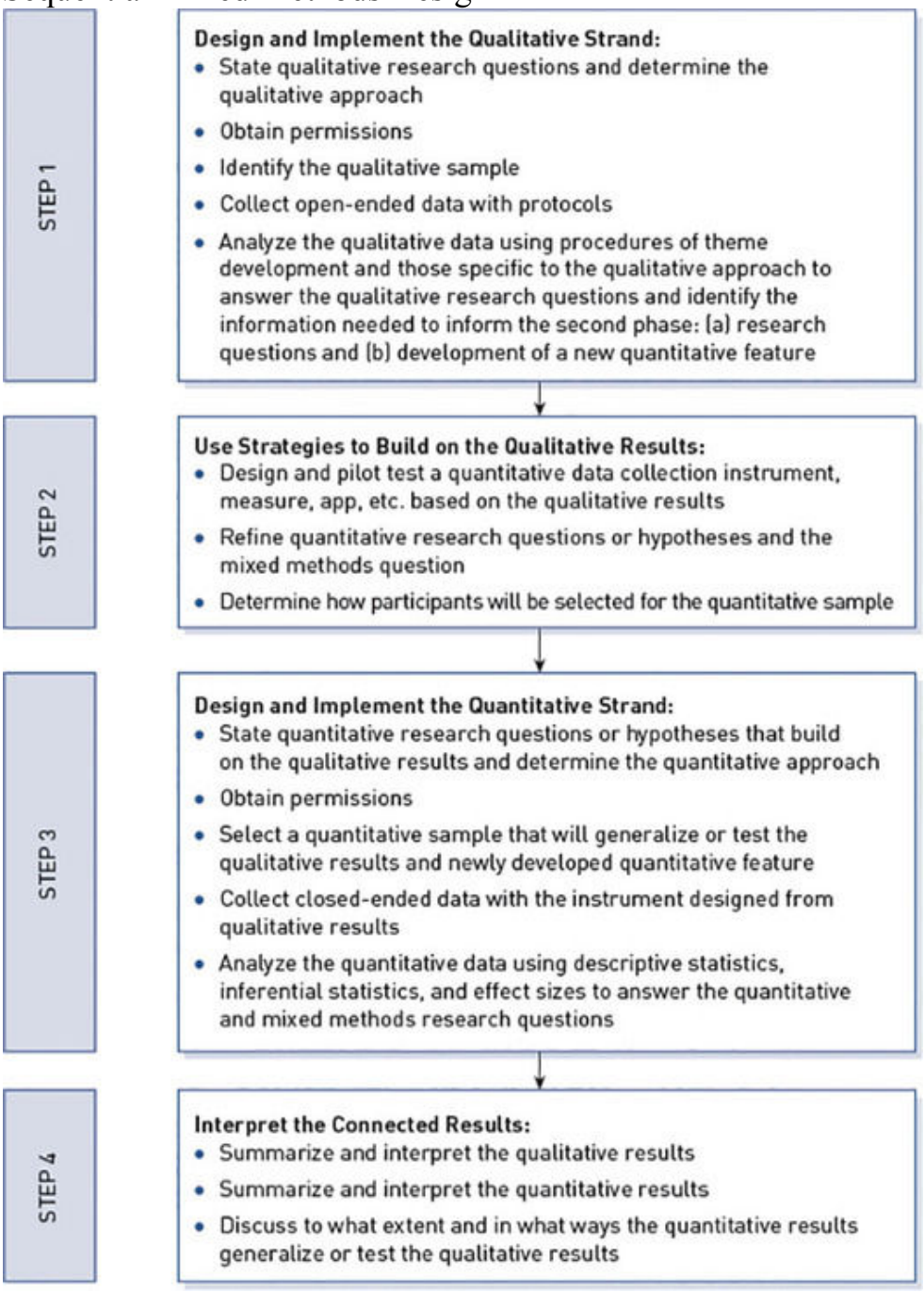
The exploratory sequential design procedures.

The four major steps of the exploratory design are summarized in Figure 3.8. As this figure shows, this design starts with the collection and analysis of qualitative data to explore a phenomenon. In the next step, which represents the point of integration in mixing, the researcher identifies the results on which the quantitative feature will be built. The researcher undertakes a development phase by developing an instrument, identifying variables, designing intervention (experimental) activities, or coming up with an app or website intervention to test. These developments connect the initial qualitative phase to the subsequent quantitative strand of the study. In the third step, the researcher implements the quantitative strand of the study to examine the salient variables using the developed instrument or intervention with a new sample of participants. Finally, the researcher interprets in what ways and to what extent the quantitative results generalize or extend the initial qualitative findings.

Integration in the exploratory sequential design.

Integration in an exploratory design involves using the initial qualitative results to build a new quantitative feature—for example, an instrument, new intervention, new measure, or new web-based application—that will be tested quantitatively. The actual integration is from the qualitative results to the development of the quantitative entity that will follow the initial qualitative phase. In this process of building or connecting, the researcher needs to make key decisions about what aspect of the qualitative findings to build on and the nature of the quantitative entity to be built (e.g., if a new, contextualized instrument is to be built, then this process will involve several stages of work). When stating the integration for this design, the researcher might use this script: “Integration involves using the qualitative results (e.g., themes and significant statements) to build a new quantitative feature that is grounded in the culture and perspectives of participants. This new feature is then quantitatively tested.” Once the final quantitative phase is complete, the researcher integrates the two sets of connected results and draws integrated conclusions about how the quantitative results built on the qualitatively informed instrument or materials.

Figure 3.8 Flowchart of the Basic Procedures in Implementing an Exploratory Sequential Mixed Methods Design



Source: Adapted from Creswell & Plano Clark (2011).

Strengths of the exploratory sequential design.

Due to the fact that only one type of data is collected at a time, the exploratory design has several of the same advantages as the explanatory design. Its specific advantages include the following:

- Separate phases make the exploratory sequential design straightforward to describe, implement, and report.
- Although this design typically emphasizes the qualitative aspect, the inclusion of a quantitative component can make the qualitative approach more acceptable to quantitative-biased audiences.
- This design is useful when the need for a second, quantitative phase emerges based on what is learned from the first, qualitative phase.
- The researcher can produce a new instrument (or measure, variable, set of intervention activities, or digital tool) as one of the potential products of the research process.

Challenges in using the exploratory sequential design.

There are a number of challenges associated with using the exploratory design:

- The researcher must plan for extended time to complete—This sequential approach requires considerable time to implement, potentially including time for a third phase to develop a feature (e.g., new instrument). Researchers need to recognize this factor and build time into their study's plan.
- The quantitative phase must be tentatively specified in advance—It is difficult to specify the procedures of the quantitative phase when applying for initial IRB approval for the study. Providing some tentative direction in a project plan or planning to submit two separate applications for the IRB will be discussed further in Chapter 6.
- Two different samples might need to be identified—Researchers should consider using a small, purposeful sample in the first phase and a large sample of different participants in the second phase to enhance the generalization of the quantitative results (see the discussion of sampling in Chapter 6). Thus, ideally both samples should be from the same population, but the number of individuals in the quantitative phase would typically be much larger than the individuals in the qualitative phase and include different individuals.
- The researcher must determine which qualitative results to use—When developing a new feature after the qualitative phase, the researcher needs to decide which results to use from the qualitative phase to build the

quantitative feature and how to use these results to generate quantitative measures or materials. In Chapter 6 we will discuss procedures for using qualitative themes, codes, and quotes to generate aspects of quantitative instruments.

- The researcher must be skilled—This design requires expanded skills on the part of the researcher because proficiency in qualitative research, quantitative research, mixed methods research, and instrument development (or digital tool development) will be needed. Procedures need to be undertaken to ensure that the scores developed on the instrument or intervention materials developed are high quality. In Chapter 6 we will review rigorous steps of instrument and scale development for this process.

Exploratory sequential design variants.

In contrast to the explanatory sequential design, in an exploratory project there are three phases: a qualitative phase; a quantitative feature phase (developing a variable, instrument, intervention, digital tool); and a final quantitative test phase. Therefore, the variants are often distinguished by what is developed in the middle phase of the design.

- In the **new variable development variant**, the researcher identifies new variables or a new conceptual or theoretical framework in the initial qualitative phase of the research. This new variable is then used in a subsequent quantitative analysis. Writers have identified this process as developing an emergent theory or a taxonomy or classification system, and the researcher examines the prevalence of the findings and/or tests the theory with a larger sample (Morgan, 1998; Morse, 1991). This model is used when the researcher formulates quantitative research questions or hypotheses based on qualitative findings and proceeds to conduct a quantitative phase to answer the questions. For example, Goldenberg, Gallimore, and Reese (2005) described how they identified new variables and hypotheses about predictors of family literacy practices based on their qualitative case study. They then conducted a quantitative path analysis study to test these qualitatively identified variables and relationships.
- In the **survey-development variant**, the initial qualitative phase plays a role in helping to define the measures and the questions on a survey instrument. Then, after development of the instrument, it is administered to a representative sample. In a mixed methods study examining participant reaction to research on violence in Jordan, Clark et al. (2012) first gathered

qualitative focus group data, next constructed a survey instrument with dichotomous questions, and then administered the survey to a large sample.

- Researchers can also develop intervention activities for a second-phase trial or experiment based on the qualitative results. In the **intervention-development variant**, the researcher collects qualitative data to help develop an intervention (or an experiment) that would work with the participants and be meaningful to them. To this end, qualitative data collection focuses on activities or pre- and posttest measures that might be included in the intervention and potentially make a difference in the outcome. In a mixed methods study of war-affected youth in Sierra Leone in Africa, Betancourt et al. (2014) conducted key informant interviews with war-affected youth, caregivers, and experts from youth-serving organizations. Using the qualitative data key themes, they designed a group-based mental health intervention and then conducted a qualitative assessment of satisfaction with the intervention.
- Researchers can use this design to help develop digital tools and test them out. In the **digital tool development variant**, a project begins with a qualitative exploration to understand what questions and measures need to be asked of participants. Then this qualitative data is used to help design a digital tool that will hopefully work. Finally the tool is tested in practice. This approach was used in a video game study in medical education reported by Kron, Gjerde, Sen, and Fetters (2010). The authors first developed a prototype of the video game using virtual reality environments and qualitative interviews and then administered and tested the use of the game with a survey instrument. A table indicating their qualitative to quantitative procedures can be seen at the NIH best practices website (https://obssr.od.nih.gov/training/mixed-methods-research/).

Example of the exploratory sequential design.

The exploratory design is a three-phase mixed methods project in which the researcher begins by collecting and analyzing qualitative data. From the initial exploratory results, the researcher builds to a second development phase in which the qualitative results are used to inform the development of a specific feature. In the third phase, the researcher collects and analyzes quantitative data to test or generalize the initial qualitative findings. Enosh, Tzafrir, and Stolovy's (2015) study (see Appendix C) is an example of applying the phases of the exploratory design to study a research problem.

Enosh and colleagues are researchers in the discipline of social work and human services. The topic of their 2015 study was social workers' exposure to different forms of violence perpetrated by clients. The authors stated that client violence is important to study because it can lead to numerous negative effects on social workers and noted the inadequacy of current instruments to study this issue. Therefore, the overall purpose of their study was to explore social workers' experiences with client violence, develop an instrument for measuring client violence, and obtain generalized information about client violence for social workers across different contexts.

Regarding study design, Enosh et al. (2015) reported that their exploratory sequential mixed methods study unfolded in "distinct stages of research" (p. 283). They began their study with a qualitative exploration of social workers' experiences with client violence. During this phase, they conducted one-on-one, semi-structured interviews with 38 participants who had experienced client violence on the job in the past year. The researchers transcribed the interviews and used thematic analytic procedures to identify and describe four distinct experiences of violence from the qualitative data set.

In the second stage of the study, the researchers developed the Client Violence Questionnaire (CVQ). They developed a set of 32 items that represented the four thematically defined dimensions, based directly on the content of the interview data. Using an expert review process, they gathered information on the fit and relevance of the items from social workers and used the expert feedback to reduce the number of items to the 14 most relevant.

Once the instrument was developed, Enosh and colleagues initiated the final quantitative phase of the exploratory design. They implemented two different survey procedures to apply and test the developed instrument. The first survey was aimed at ensuring the validity of the instrument. They administered the CVQ along with additional measures hypothesized as being related to exposure to client violence (e.g., Brief Symptoms Inventory). This survey was administered to 189 social workers across diverse settings. The questionnaire responses were analyzed in two different ways: analyzing scale internal reliability and testing of convergent validity by correlating items with measures of psychological distress. The authors administered a second survey to 645 participants across 34 agencies in order to further test the quality of the scale. Using this quantitative data set, they examined the factor structure of the instrument using confirmatory factor analysis and tested divergent validity by relating the instrument scores to other measures of general aggression.

The authors explained no instrument existed that provided a measure of exposure to client violence that could be applied across different types of social workers' settings. They needed to first explore this phenomenon with qualitative data before they could measure it quantitatively to validate the findings with a larger sample. Therefore, they needed both types of data to create and subsequently test an instrument. The researchers conducted the study in three sequential phases: first to explore a phenomenon, second to develop an instrument for the phenomenon, and third to measure the phenomenon. The development and quantitative phases were dependent on the results of the initial qualitative phase. A point of interface occurred when the authors connected their initial qualitative phase to the quantitative phase by developing an instrument to measure client violence. Building from their qualitative findings, the authors developed 14 survey items to represent the four dimensions of client violence. This instrument was then implemented in the final phase. In the article, the authors noted that their use of this design made it possible for them to achieve both depth of understanding about social workers' experiences and breadth of understanding in generalized, quantitative outcomes. Because of the authors' emphasis on developing and validating a quantitative instrument, this study emphasized the quantitative aspects, thus demonstrating the overall priority of the quantitative data in this study.

The notation for this study can be written as qual → development → QUAN = validate exploratory dimensions by developing and testing an instrument. The authors used three connected phases to implement this study's methods in an exploratory mixed methods design. As depicted in Figure 3.9, the design began with qualitative data collection and analysis to explore a phenomenon (the first two boxes of the diagram). From this initial phase, an instrument was developed at a point of interface (note the "develop an instrument" oval in Figure 3.9). The researchers used this instrument to collect quantitative data in a third phase (the next two boxes in the diagram) and concluded by interpreting what was learned across the phases.

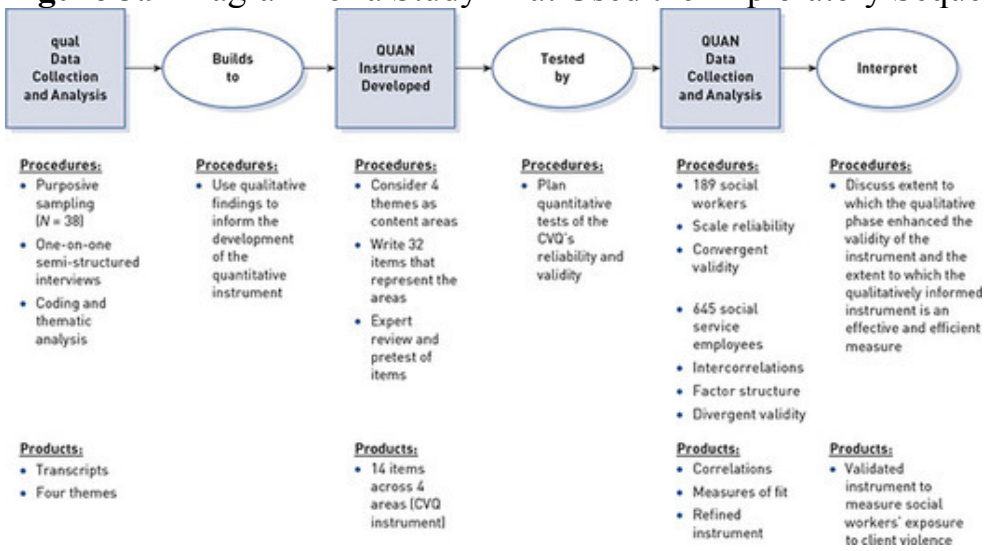
Additional Considerations in Choosing a Core Design

How does a person decide which one of the three core designs to use? As we have already discussed, the most important consideration in choosing a mixed methods design is the *intent* for mixing, which differs among the three designs. However, there are additional considerations for choosing a design that reflect the contexts of the study (Plano Clark & Ivankova, 2016). One such consideration is the researcher's familiarity with the designs used in his or her field of study. A related concept would be the expertise possessed by the individual researchers or the teams in conducting a mixed methods study. Another important consideration is the amount of time available for accessing participants as the core designs vary in the time required to conduct the research. Finally, we will consider the complexity of the designs because they vary in terms of the number of phases and the number of procedures used to conduct them.

Intent of the Design

In discussing intent it is important to establish the difference between the intent to use mixed methods research and the intent of choosing one of the three basic designs. In this passage we will discuss the intent for choosing a design and reserve for Chapter 5 the discussion about justifying the uses of mixed methods.

Figure 3.9 Diagram for a Study That Used the Exploratory Sequential Design



Source: Diagram based on Enosh, Tzafrir, and Stolovy (2015).

Note: CVQ indicates Client Violence Questionnaire.

We have already pointed out the different intents for using the convergent, explanatory sequential, and exploratory sequential designs. The reason for using each of these designs differs and becomes the overarching decision factor in the choice of a core design. Clearly the intent to compare or validate quantitative and qualitative responses pushes a researcher in the direction of a convergent design. When explanation of specific quantitative results becomes necessary, an explanatory sequential design will work well because the researcher can follow up with individuals (through the qualitative phase) to explore further important or surprising results. When the intent is to explore an issue with some participants (e.g., through qualitative interviews) before engaging a larger number of participants in a quantitative phase, such as having those participants take part in

an experiment, complete a survey, or use a digital tool, an exploratory sequential design makes sense. This design is ideal because it allows for the in-depth probing of participant perspectives, a necessary antecedent to conducting the follow-up quantitative phase.

Familiarity of the Designs Used Within the Field

As interest in mixed methods has grown, numerous fields have adopted mixed methods practices that can be seen in books and articles and even in federal policy statements. This means mixed methods has developed in different ways across subdisciplines in the social, behavioral, and health sciences. The choice of a core design may be influenced by which ones are used frequently in the discipline literature and which ones are embraced by authors of major mixed methods studies in the field. For example, in global health, the exploratory sequential design is popular because of the need to explore an issue first so the researcher can develop an understanding of the culture of the study participants. This will allow the researcher to choose an instrument available in the literature that is suitable for a specific population. As another example, in the field of trauma research, the emphasis has been on explanatory sequential designs (Creswell & Zhang, 2009). In family medicine many designs are used, but in researching change in primary care practices, the design of choice is often a convergent design within a comparative case study (Crabtree et al., 2011; Shaw et al., 2013).

Expertise of the Researcher

Another consideration is the skills possessed by the researcher. Even if they meet the basic requirements of having both quantitative skills and qualitative skills, researchers vary in their levels of expertise when it comes to different mixed methods designs. The explanatory sequential design, for example, starts with a strong quantitative phase, which suggests giving primacy to quantitative research and its skill set. The exploratory sequential design begins with a qualitative exploratory phase, which calls for individuals with strong qualitative skills. One solution to a lack of skills in either quantitative or qualitative research would be to join a mixed methods team in conducting the project; a substantial literature has emerged in the mixed methods field about the optimal composition of such a team, how projects might be organized, and the leadership required for effective team organization (e.g., Curry et al., 2012; Johnson, Onwuegbuzie, Tucker, & Icenogle, 2014).

Amount of Time to Conduct the Study

The core designs also vary in the length of time needed to conduct their procedures. The sequential designs—explanatory and exploratory—take more time because multiple phases are involved. The explanatory design generally uses the same participants in both phases, which means that the researcher needs to be able to access those participants over an extended time period. The exploratory design requires the most time because of its three phases and the necessary interim phase of developing or designing a quantitative feature, such as a website, a set of intervention activities, or new measures or variables. Some researchers (e.g., busy health providers or students wanting to graduate by a certain date) simply do not have adequate time to gather and analyze both quantitative and qualitative data over phases, and it is more convenient for them to gather all of the necessary data in one field outing. These individuals often use a convergent design.

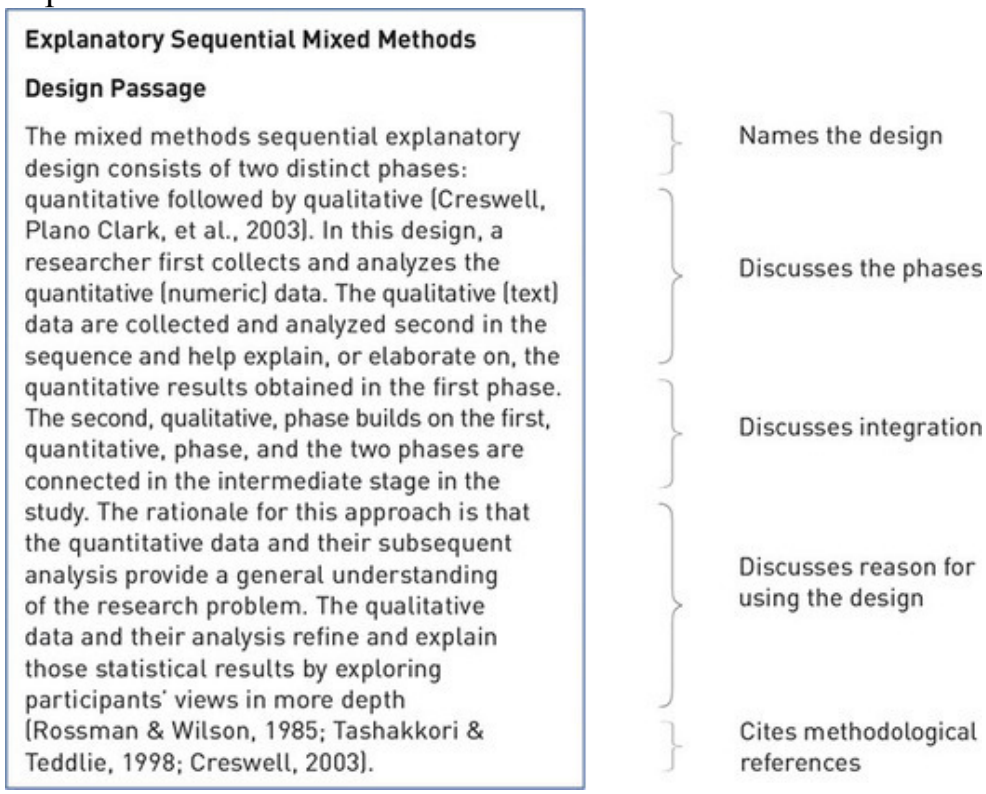
Complexity of the Design

Finally, due to the varied phases of the three core designs, some are more complex to conduct than others. Graduate students often lean toward the explanatory sequential design because it evolves in two distinct phases with clear-cut data collection in each phase, usually involving the same individuals, which is manageable for single researchers. On the other hand, because of the skills required and the multiple phases, the exploratory sequential design is one of the more complex designs. Although it is a single-phase approach, the convergent design can be complex because of the number of data collection and analysis activities occurring concurrently and because it may require follow-up procedures to understand divergence in results when they occur. Added complexity is also introduced when these core designs are applied within frameworks (e.g., an experiment or a participatory approach); these complexities will be addressed in Chapter 4.

Describing a Design in a Written Report

Because many researchers and reviewers are currently unfamiliar with the different types of mixed methods designs, it is important to include a paragraph that introduces the design when writing about a study in a proposal or research report. This overview paragraph generally is placed at the beginning of the methods discussion and should address several topics. The paragraph should identify the type of mixed methods design and provide its definition and variant, the design's intent, the reason for choosing that particular design, and how the design relates to theory or conceptual framework. The paragraph should also note the basic procedures in conducting the study, including where integration occurs, and the challenges in using the chosen design. An example of such a paragraph for an explanatory sequential design is available in Figure 3.10. Note that this overview paragraph includes many of these components: it names the design, identifies the phases, discusses the integration, provides a reason for using the design, and cites methodological references.

Figure 3.10 A Sample Paragraph for Writing a Mixed Methods Design Into a Report



Source: Ivankova, Creswell, and Stick (2006, p. 5).

Summary

Research designs represent an organizing logic for collecting, analyzing, interpreting, and reporting data in mixed methods projects. Like quantitative and qualitative research approaches, mixed methods research encompasses several different designs. Mixed methods designs can be fixed from the start and/or emerge as the study is underway. The researcher's approach to designs can be methods focused—based on types (or a typology) of designs—or it can be research-process focused where the methods become part of an interactive process of goals, conceptual framework, research questions, validity considerations, and larger contextual factors. The approach taken in this book is the typology approach because we find that researchers new to mixing methods benefit from having a range of basic methods options from which to plan their studies. The typology that we advance here is a set of three core designs that represent the state-of-the-art considerations for mixing methods followed by more complex uses of the core designs within a series of approaches and frameworks (as discussed in Chapter 4).

Researchers can choose among three core mixed methods designs: convergent, explanatory sequential, and exploratory sequential. The convergent design is a mixed methods design in which the researcher collects and analyzes two separate databases—quantitative and qualitative—and then merges the two databases for the purpose of comparing the results or adding transformed qualitative data as numeric variables into the quantitative database. The explanatory sequential design is a mixed methods design in which the researcher begins by conducting a quantitative phase and follows up on specific results with a second, qualitative phase to help explain the initial quantitative results. The exploratory sequential design is a three-phase design in which the researcher starts by qualitatively exploring a topic. The design then builds to a second, quantitative development phase, and the final phase involves testing the quantitatively the feature designed in the second phase. These three core designs can be differentiated in terms of intent of the design, reasons for choosing the design, philosophical assumptions and theory use, procedures, points of integration in the procedures, strengths and challenges, and the variants of each type of design.

The choice of one of the three core designs is based on the intent of the study but also on factors related to the popularity of a specific design within a field or discipline, the research skills of the investigator, the time allocated for the mixed methods project, and the investigator's understanding of the complexity of the

design. Regardless of the design chosen, it needs to be described in some detail in the written mixed methods project. This requires naming the design, identifying the phases in the design, noting the integration of the data, and describing the reasons for choosing the design.

Activities

1. Reflect on whether your mixed methods project is fixed or emergent. Also consider whether your approach is based more on types of designs or on the process of research. Briefly describe how these principles will be applied in your study.
2. Identify a substantive topic of interest to you. Describe how this topic could be studied using each of the three core designs discussed in this chapter.
3. Which of the core design types will you use in your study? Write a one-paragraph overview that names this design, defines the design, indicates how the data will be integrated, and specifies why this design was chosen for your particular project.
4. What challenges are associated with your design choice? Write a paragraph that discusses the challenges that you anticipate occurring with your design and how you might address them.

Additional Resources to Examine

For additional discussions on the major types of mixed methods designs, consult the following resources:

- Creswell, J. W., Plano Clark, V. L., Gutmann, M., & Hanson, W. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 209–240). Thousand Oaks, CA: Sage.
- Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco, CA: Jossey-Bass.
- Maxwell, J. A., Chmiel, M., & Rogers, S. E. (2015). Designing integration in multimethod and mixed methods research. In S. N. Hesse-Biber & R. B. Johnson (Eds.), *The Oxford handbook of multimethod and mixed methods research inquiry* (pp. 223–229). Oxford, UK: Oxford University Press.
- Morgan, D. L. (2014). *Integrating qualitative & quantitative methods: A pragmatic approach*. Thousand Oaks, CA: Sage.
- Morse, J. M., & Niehaus, L. (2009). *Mixed method design: Principles and procedures*. Walnut Creek, CA: Left Coast Press.
- Plano Clark, V. L., & Ivankova, N. V. (2016). *Mixed methods research: A guide to the field.* Thousand Oaks, CA: Sage.
- Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks, CA: Sage.

4 Complex Applications of Core Mixed Methods Designs

The core designs introduced in Chapter 3 provide the basic designs used in mixed methods research. Each core design can stand alone as the basis of a study's design and be a sufficient mixed methods study. They are popular and frequently found in the literature as design examples of this form of inquiry. However, in many situations, such as large, multi-investigator mixed methods studies, the mixed methods designs are more complex. Applications are added to a study's design that shape the mixed methods study beyond the three core designs. In this chapter we introduce several different applications of mixed methods designs that go beyond the core designs. The complex applications that we describe do not exhaust the current possibilities, and new ones emerge all the time. However, we focus on the most prominent complex applications of the core designs we find in the literature today.

This chapter introduces several complex applications of using the core designs introduced in Chapter 3. It will address

- frameworks for considering how core designs intersect with other designs, methodologies, and theories to form complex applications;
- four types of complex applications of mixed methods designs; and
- how to draw diagrams of these complex applications.

Intersecting Core Mixed Methods Designs With Other Research Approaches or Frameworks

We urge researchers using mixed methods to carefully select a core design that best matches the research problem and reasons for mixing data in order to make the study manageable to implement and describe. However, in some projects the research problem and procedures for mixing call for applications of mixed methods that go beyond the core designs. When projects have many phases or elements, we often find the core mixed methods designs have been intersected with other research approaches in a study. Our thinking on these applications and how we write about them has evolved over time.

From our earliest writing on designs (Creswell, Plano Clark, Gutmann, & Hanson, 2003), we were aware of the use of mixed methods in applications such as experiments or intervention trials and in evaluation studies. We came to embrace the idea that our core designs were too basic for some projects but could be applied within larger complex designs (Nastasi & Hitchcock, 2016), advanced applications (Plano Clark & Ivankova, 2016), or advanced designs (Creswell, 2015b). In our discussion here, we will refer to these applications as *complex designs*, which is not to suggest they are more rigorous than the core designs; they are only more complex because they contain more components than the core designs. However, with complex designs, a need exists to describe what they are and detail how they are applied in studies. For example, what are the steps involved in conducting an experiment, and where would mixing the quantitative and qualitative data fit in those steps? How would mixed methods fit into a project in which an investigator seeks to derive multiple cases and then compare the cases? Where in the process of program evaluation, which consists of identifying a need for a program, using theory to design the program, implementing the program, and assessing program outcomes and impacts (Rossi, Lipsey, & Freeman, 2004), would a researcher mix the quantitative and qualitative data? Would it occur at multiple points or at a single point in the evaluation process? In considering questions such as these, we concluded that in some research projects the core designs did not tell the full story, and we began to think in terms of more complex mixed methods applications.

Another point in our thinking emerged through the incisive book by Natasi and Hitchcock (2016). In this book they argued for program evaluation and design within a mixed methods context. Although they advanced thinking about how to incorporate evaluation and mixed methods research, it was most instructive for us to consider the conditions under which one might move beyond a core mixed methods design into a complex one. They argue complex mixed methods designs flourish because of the complexity and feasibility of adding a core design into a larger application. In articulating their conceptualization, Natasi and Hitchcock suggest that complex mixed methods designs

- have multiple research phases,
- are conducted over several years,
- have substantial funding for the investigation, and
- include mixed methods core designs within different phases of the research.

Granted, not all mixed methods projects that apply a complex design meet the conditions set forth by Natasi and Hitchcock. For example, some mixed methods case studies and social justice projects are undertaken by single researchers with limited funds and short time frames. These projects may be dissertation-scope studies or small-scale exploratory studies carried out as researchers are launching their scholarly careers and relying on local, institutional funds for support.

The next step in our thinking came from the recent book by Plano Clark and Ivankova (2016). Their book was helpful in conceptualizing the many types of applications of complex designs. For an entire chapter they discussed the intersection of mixed methods with other approaches to form advanced applications. They recommend a framework for considering the possibilities of these advanced applications:

- **Embedding a secondary method (qualitative or quantitative) within a primary quantitative or qualitative research design.** A research design is a set of formal procedures for collecting, analyzing, and interpreting data such as that found in a quantitative experiment or qualitative case study. In this framework, a mixed methods core design is formed by embedding a secondary (or supportive) method within a primary quantitative or qualitative design. The typical form of this application is to embed qualitative data collection and analysis within a quantitative experimental or intervention design.

- **Intersecting mixed methods with another methodology.** A methodology is an overall approach that guides the conduct of research. These procedures exist at a more conceptual level than the design. In this framework, a mixed methods core design could be added to another methodological approach. For example, a core design could be added to a case study, an evaluation approach, action research, social network analysis, longitudinal research, Q methodology, phenomenology, or grounded theory.
- **Intersecting mixed methods with a theoretical framework.** A theoretical framework advances an abstract and formalized set of assumptions to guide the design and conduct of the research. In this framework, a mixed methods core design could be intersected with an established theory. This theoretical lens could be drawn from perspectives such as social justice, feminism, critical theory, participatory involvement, or other conceptual frameworks advancing the needs and involvement of special populations and often calling for action or change.

Although our early writings emphasized the idea of embedding, today we focus on the idea of intersecting mixed methods within other methodologies and frameworks. The key idea as we think about these complex applications is that a core mixed methods design (convergent, explanatory sequential, exploratory sequential) is being *added* to a design, a methodology, or a theoretical framework. It is not that a design, methodology, or theory is being added to mixed methods. This shift in our thinking about design is further elaborated upon in Chapter 9. Our thinking further reflects that rather than considering adding quantitative and/or qualitative methods to a design, methodology, or theory, we now consider how the core mixed methods designs are added. This simplifies thinking about the designs available in mixed methods and how core designs flow into complex projects.

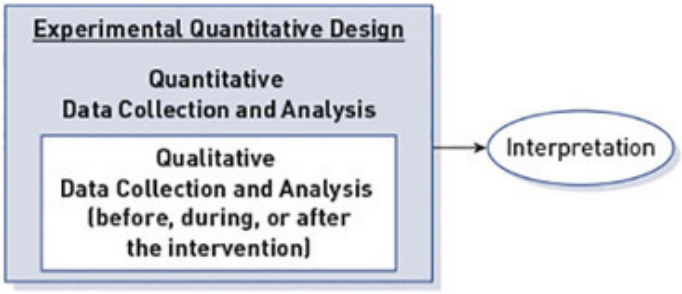
Four Prominent Types of Complex Mixed Methods Designs

We cannot cover all complex designs, and, indeed, new applications of mixed methods continually arise. Therefore, we chose to focus on four complex applications for the core designs. We chose these four examples because we had good discussions of these approaches and illustrative studies to highlight the procedures of the applications. They also illustrate the complexity and creativity with which researchers make use of the core mixed methods designs. We present these four complex designs in Figure 4.1. Keep in mind, as the designs become more complex, there is potential for overlap among the different approaches, but our discussion provides more prototypical descriptions of the overall logic of the approaches that people can use.

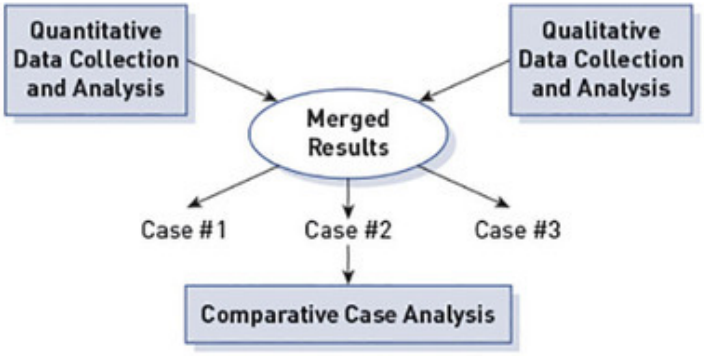
- **The mixed methods experimental (or intervention) design**. The **mixed methods experimental (or intervention) design** occurs when the researcher collects and analyzes both quantitative and qualitative data and integrates the information within an experiment or intervention trial (see Figure 4.1a). The primary design in this type of study is a quantitative experiment (or intervention trial). Researchers add qualitative data as a secondary component to this design before, during, or after the experiment to enrich the experimental results. The addition of the qualitative data to the quantitative experiment then embeds a core design— exploratory sequential (before), convergent (during), or explanatory sequential (after)—into the intervention. This is an example of implementing a complex design by adding a secondary method (i.e., qualitative) to a primary design (i.e., quantitative experiment).

  Figure 4.1 Four Examples of Types of Complex Mixed Methods Designs

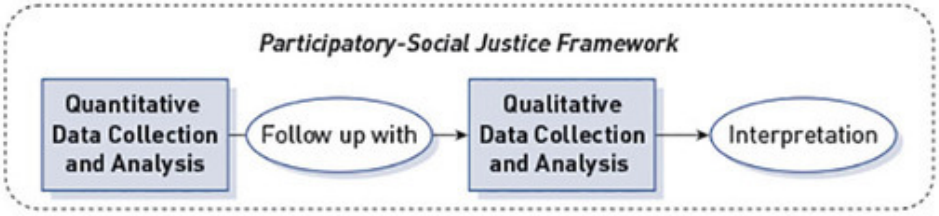
(a) The Mixed Methods Experimental (Intervention) Design



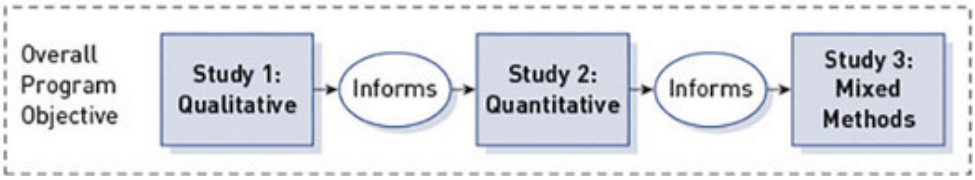
(b) The Mixed Methods Case Study Design



(c) The Mixed Methods Participatory-Social Justice Design



(d) The Mixed Methods Program Evaluation Design



- **The mixed methods case study design.** The **mixed methods case study design** is the use of a core design (convergent, explanatory sequential, exploratory sequential) within the framework of a single or multiple case study. This approach illustrates the intersection of the core design within another methodology (case study). Both quantitative and qualitative data are collected within this type of design, and the end product is the generation of a case or multiple cases (see Figure 4.1b). These cases are more detailed and contextualized than a case that contains only quantitative data or qualitative

data. The typical mixed methods case study design is one in which both types of data are gathered concurrently in a convergent design and the results merged together to examine a case and/or compare multiple cases.

- **The mixed methods participatory-social justice design**. The **mixed methods participatory-social justice design** is a mixed methods design in which the researcher adds a core design within a participatory and/or social justice theoretical or conceptual framework. As a complex design, these frameworks span the entire mixed methods study. The framework can be, for example, a feminist theory or a racial theory. It might also be a participatory theory of the involvement of stakeholders in many aspects of the mixed methods study. It could be debated as to whether participatory action research exists in a study as a conceptual framework or methodological procedure. This aside, in addition to seeing the strong placement of this theory in the study, we can also identify one or more of the core designs operating. Within a feminist mixed methods study, for example, we can see both the flow of the theory into many aspects of the project (e.g., informing the problem, shaping the research questions, highlighting the outcomes) and a core design, such as an explanatory sequential design in which an initial survey is followed by one-on-one interviews. In Figure 4.1c we see the intersection of this type of core design with a participatory-social justice framework.
- **The mixed methods evaluation design**. The **mixed methods evaluation design** consists of one or more core designs added to the steps in an evaluation procedure typically focused on evaluating the success of an intervention or a program (see Figure 4.1d). This complex design illustrates a core design within another methodology. This approach is typically used in program evaluation in which quantitative and qualitative approaches are used over time to support the development, adaptation, and evaluation of specific programs. In these applications we often find multiple core designs occurring throughout. For example, researchers might first start by conducting a qualitative needs assessment study to understand the meaning of smoking and health from the perspective of adolescents in a community. Using these results, the researchers might develop an instrument and quantitatively assess the prevalence of different attitudes across the community. In a third phase, the researchers might develop a program based on what they have learned and then examine both the process and outcomes of the intervention program. Across these phases the researchers would make use of exploratory (phase 1 to phase 2), explanatory (phase 2 to phase 3), and convergent (phase 3) core designs.

To facilitate our discussion of these four complex designs, we have included four published journal articles illustrating these different mixed methods approaches (see Appendixes D, E, F, and G). These studies represent examples of mixed methods research from the health, education, social, and evaluation sciences. The articles include the following:

- Wiart, L., Rosychuk, R. J., & Wright, F. V. (2016). Evaluation of the effectiveness of robotic gait training and gait-focused physical therapy programs for children and youth with cerebral palsy: A mixed methods RCT. *BMC Neurology, 16*(86). doi:10.1186/s12883-016-0582-7. (See Appendix D for the mixed methods experimental design.)
- Smith, T. M., Cannata, M., & Haynes, K. T. (2016). Reconciling data from different sources: Practical realities of using mixed methods to identify effective high school practices. *Teachers College Record, 118*, 1–34. (See Appendix E for the mixed methods comparative case study design.)
- Greysen, S. R., Allen, R., Lucas, G. I., Wang, E. A., & Rosenthal, M. S. (2012). Understanding transitions in care from hospital to homeless shelter: A mixed-methods, community-based participatory approach. *Journal of General Internal Medicine, 11*, 1484–1491. (See Appendix F for the mixed methods participatory-social justice design.)
- Nastasi, B. K., Hitchcock, J., Sarkar, S., Burkholder, G., Varjas, K., & Jayasena, A. (2007). Mixed methods in intervention research: Theory to adaptation. *Journal of Mixed Methods Research*, *1*(2), 164–182. (See Appendix G for the mixed methods evaluation design.)

Mixed Methods Experimental (or Intervention) Designs

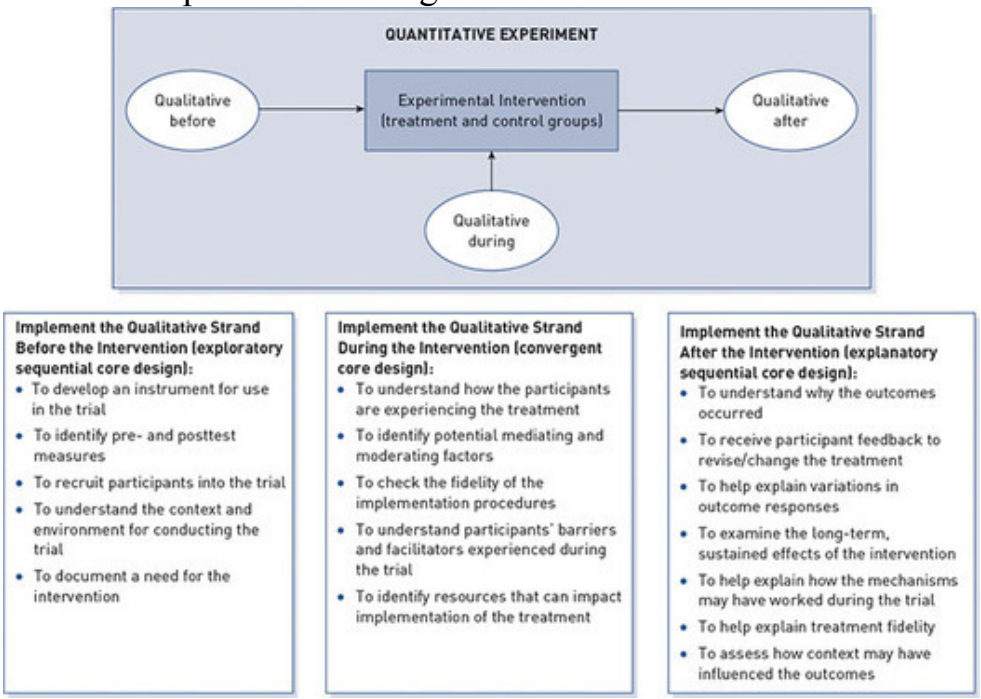
An experimental design is a quantitative research design in which investigators control the conditions experienced by participants, administer an intervention, and then test whether the intervention affects the outcome (Shadish, Cook, & Campbell, 2002). Researchers assess this impact by providing a specific treatment to one or more groups (experimental group) and withholding it from another group (the control group) (Creswell, 2014). It is hypothesized that the experimental group will differ from the control group because the experimental group experienced the treatment. The mixed methods experimental (or intervention) design is a mixed methods approach in which the researcher embeds the collection, analysis, and integration of both quantitative and qualitative data within an experimental quantitative research design (Caracelli & Greene, 1997; Greene, 2007). Sandelowski (1996) first introduced the notion of the supplemental qualitative strand occurring before (an exploratory sequential core design), during (a convergent core design), or after (an explanatory sequential core design) the primary experimental strand (or some combination of these), and we find this to be a useful framework for thinking about the mixed methods experimental design (as shown in Figure 4.2). For example, researchers embed a qualitative strand within quantitative experiments to support aspects of the experimental design, such as informing the recruitment procedures (Creswell, Fetters, Plano Clark, & Morales, 2009).

The intent of the mixed methods experimental design.

The intent of adding qualitative data into an experiment is to provide personal, contextual, qualitative experiences drawn from the setting or culture of the participants along with the quantitative outcome measures. As shown in Figure 4.2, many reasons exist for adding in the qualitative data. For example, when researchers collect qualitative data prior to an experiment, they can use that information to plan specific intervention activities that will be appealing or useful to the participants. When investigators gather qualitative data during the experiment, they often ask process questions to identify how participants experience the intervention. These data complement the outcome data in a trial. When researchers collect qualitative data after the intervention, such information helps explore in more detail the outcome results and explain why the intervention may or may not have worked. These are but a few of the reasons for adding

qualitative data into an experiment. Authors have delineated dozens of reasons for using qualitative data in mixed methods intervention trials (e.g., Creswell, Fetters, Plano Clark, & Morales, 2009; Drabble, O'Cathain, Thomas, Rudolph, & Hewison, 2014; Song, Sandelowski, & Happ, 2010). Examples of empirical mixed methods studies illustrate these uses of qualitative data, such as before an intervention to improve recruitment procedures (e.g., Donovan et al., 2002); during an intervention by embedding qualitative practices into a randomized clinical trial (Plano Clark et al., 2013); and after an intervention trial to evaluate a complex intervention in palliative care research (Farquhar, Ewing, & Booth, 2011).

Figure 4.2 Adding Qualitative Data Into an Experiment to Form a Mixed Methods Experimental Design



Source: Adapted from Creswell, Fetters, Plano Clark, & Morales (2009).

Choice of the mixed methods experimental design.

The choice of this type of mixed methods application is based on the need to add personal experiences and a cultural understanding into an experimental trial aimed at testing the effectiveness of a treatment. It is popular in the health sciences, where the randomized controlled trial is considered by many as the

"gold standard" for conducting inquiry. Further, this complex mixed methods design is appealing when

- researchers have expertise in experimental (or intervention) designs,
- researchers are not satisfied to only know whether a treatment works but want to better understand how it works,
- researchers have sufficient resources to both implement an experiment and gather secondary qualitative data,
- researchers view experimental (intervention) designs as a primary source of information and are willing to relegate qualitative research to secondary (or supplemental) status, and
- researchers are situated in a disciplinary area that has traditionally valued objective quantitative approaches to research.

Philosophical assumptions and theory use in the mixed methods experimental design.

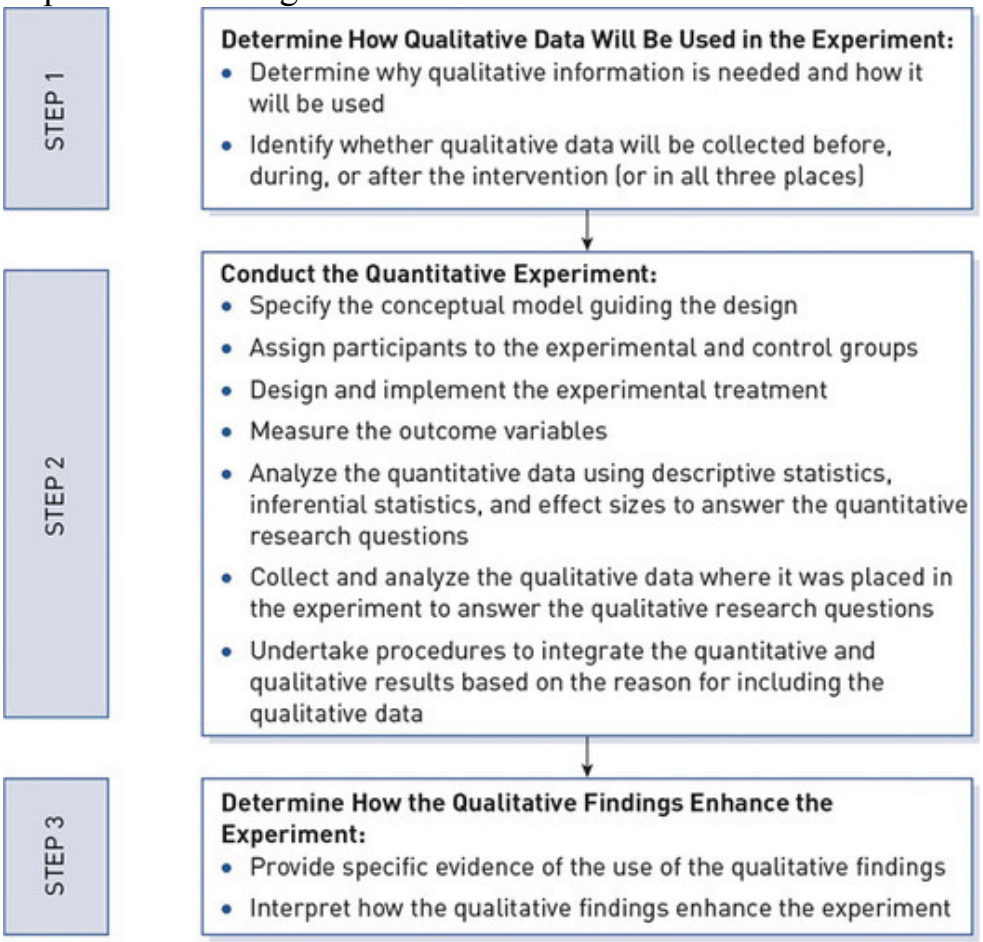
Philosophically, this design application is driven by a postpositivist orientation in which the primary aim of the study (as a quantitative experiment) dominates the design. This means that investigators using this design place emphasis on the intervention trial, use a theoretical or conceptual model (e.g., a model of adaptation or a model of health behaviors) to guide the experiment; and draw important deductive conclusions from the study. This postpositivist orientation often shapes the qualitative component as well, particularly when it occurs during the intervention, when the emphasis is on maintaining the integrity of the experiment. When the qualitative component occurs before or after the intervention, other philosophies are more likely and may be emphasized if the investigator builds a conceptual model around the qualitative findings as well as the quantitative results.

The mixed methods experimental design procedures.

The procedures for conducting a mixed methods experiment are shown in Figure 4.3. In planning the mixed methods project, first identify why the qualitative component is needed to enhance the experiment and how and where within the experiment the qualitative data will be used. This decision also requires understanding the resources and time available for personnel to collect and analyze the qualitative data. Then the procedure involves conducting the experiment and collecting and analyzing the qualitative data where it fits into the

experiment. Finally, in mixed methods projects, the last stage is to determine how the qualitative findings add to the experimental results; this can be done by, for example, helping to design the intervention activities or the quantitative measures (before), exploring the process of experiences of individual participants in the study (during), or helping to explain the experimental outcomes (after), or some combination of these aspects.

Figure 4.3 Flowchart of the Basic Procedures in Implementing a Mixed Methods Experimental Design



Integration in the mixed methods experimental design.

To locate integration in the mixed methods experimental design, look into the experiment and see where the qualitative and quantitative data intersect and add to or enhance the experiment. Integration in this complex design occurs when the results from the qualitative phase connect to or merge with the experimental trial procedures or results. Connecting to the experiment means integration may occur early in the study when the qualitative findings help to shape the planning of the

experimental procedures. Merging means the integration may come during the experiment as separate procedures examining the process experienced by the experimental group. The integration may come after the experiment concludes as a follow-up to help explain the experimental outcomes. When investigators introduce qualitative data at multiple points in the experiment, integration will occur at multiple points in the study. Investigators ideally draw integrated conclusions at the end of the study based on the combined results.

Strengths of the mixed methods experimental design.

There are several advantages specific to adding qualitative data into an intervention trial to form a mixed methods experimental design:

- By adding qualitative data, the research team is able to improve the larger design. The reasons mentioned in Figure 4.2 provide strong rationales for adding qualitative data into an experiment.
- Because the different methods typically address different questions (i.e., process versus outcome questions), this design fits a team approach well, as team members can focus their work on the quantitative experiment, the qualitative data collection and analysis, or on the integration of the quantitative and qualitative data.
- This design may be appealing to funding agencies less familiar with mixed methods research because the primary focus of the approach is on conducting an experimental (or intervention) trial.

Challenges in using the mixed methods experimental design.

There are many challenges associated with the mixed methods experimental design. Some of these are listed below, along with potential strategies for dealing with them:

- Having the necessary expertise—Researchers need expertise in experimental research as well as qualitative research.
- Specifying the purpose for collecting qualitative data as part of the larger experimental study—Researchers can state both primary (quantitative) and secondary (qualitative) purposes for the study. See Chapter 5 for examples of writing these different purpose or study aim statements.
- Determining the appropriate point in the experimental study to collect the qualitative data—Researchers should specify the intent for including the

qualitative data (e.g., to shape the intervention, to explain the process of participants during treatment, or to follow up on results of the experimental trial) to determine when to gather the qualitative data in relation to the implementation of the intervention (before, during, after, or some combination of these).

- Maintaining the integrity of the experimental controls—When researchers implement the qualitative data collection during the intervention, there is the potential to introduce bias that affects the outcomes of the experiment. Suggestions for addressing this potential bias by collecting unobtrusive data are discussed further in Chapter 6.
- Maintaining the value of the qualitative component—For some qualitative researchers, using this design may seem like relegating qualitative research to a secondary role and minimizing its value. However, serving a secondary role in the design does not mean that the value of the approach is less. In response to this concern, the research team should implement high-quality qualitative methods and highlight the important role of the use of qualitative research in the study.
- Ensuring that integration occurs—Because this complex design often involves different research questions and team members for the qualitative and experimental components, achieving meaningful integration is a challenge. Researchers should ensure that all team members are kept informed about the implementation of results from the different strands so that possibilities for employing integration strategies, such as those discussed in Chapter 7, are realized.

Mixed methods experimental design variants.

As with all complex mixed methods designs, there is a range of variation possible in researchers' use of mixed methods experimental designs. As we previously discussed, one important dimension that distinguishes applications of this approach is the timing of the qualitative component in relation to the conduct of the intervention: before, during, or after. Another important variant dimension is the type of experimental design being used (e.g., a randomized controlled trial, a stepped wedge trial, an implementation trial, or an adaptive trial). Also, mixed methods experimental designs may be applied within quasi-experiments, repeated measures experiments, and single-subject experimental designs. Each of these designs has its own methodological requirements that need to be considered in a mixed methods experiment. Variants may also be considered in terms of the researcher's intent for adding the qualitative strand to the experimental design. For example, Drabble et al. (2014) identified 19 categories of intents related to

different aspects of an experiment, such as informing the content and delivery of the intervention, understanding the implementation of the study, and explaining the outcomes of interest.

Example of a mixed methods experimental design.

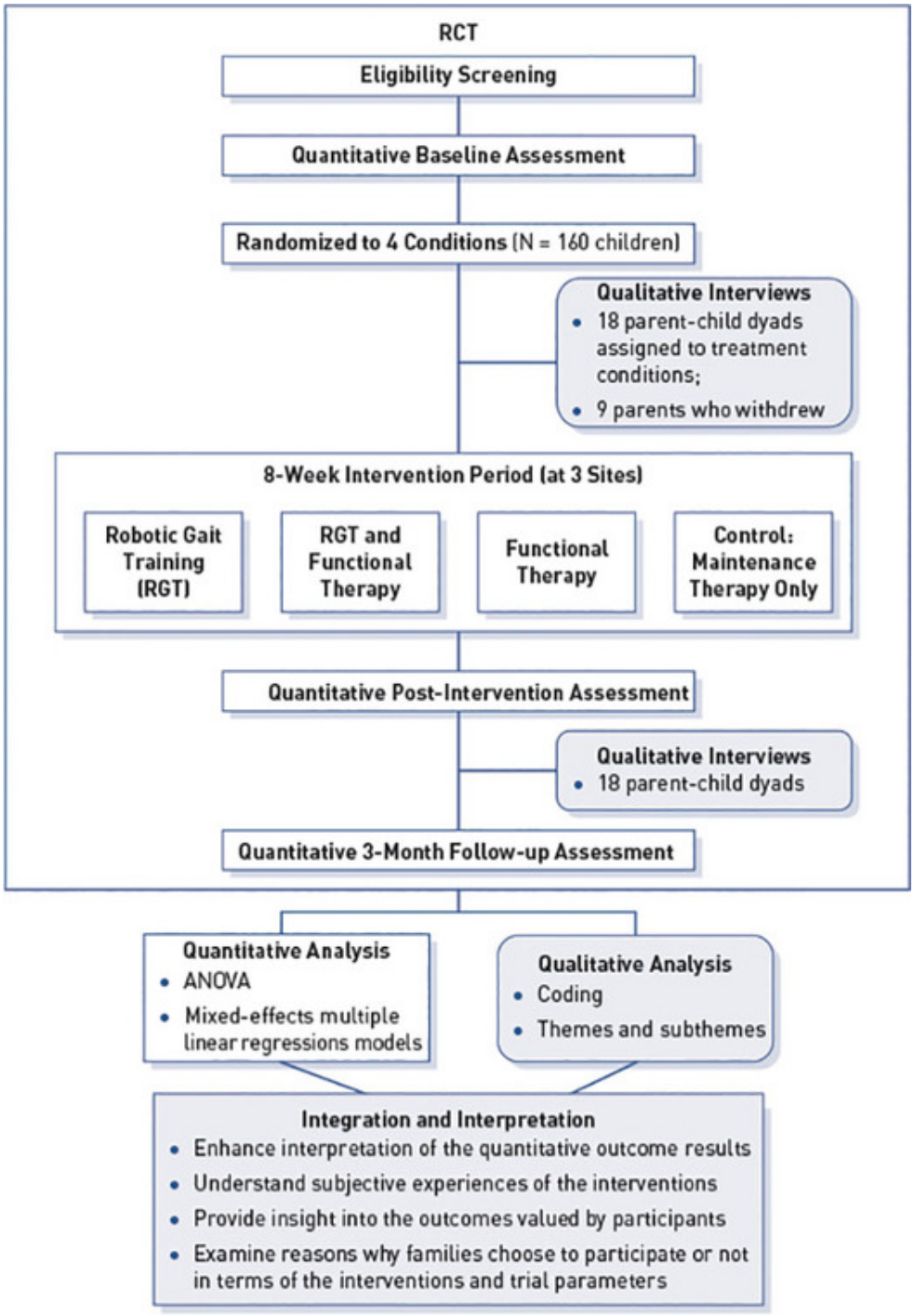
Appendix D presents an example study protocol that illustrates the major features of the mixed methods experimental design. A study protocol is an article that describes the planned methods to be used in the implementation of a study. Wiart, Rosychuk, and Wright (2016) reported on the planned use of this design to study the outcomes of three physical therapy treatment conditions compared to maintenance therapy only for children and youth with cerebral palsy. This study protocol is an example of a complex design because the authors explicitly embedded a qualitative component within the larger randomized controlled trial (RCT) experimental design. That is, the authors implemented a convergent core design within an overarching experimental design framework. The key features of this mixed methods study have been organized into a diagram found in Figure 4.4. This figure is based on the one found in the article (see Figure D.1 in Appendix D) but further highlights the study's mixed methods components.

Wiart and colleagues designed their study using an RCT framework, as indicated by the large rectangle in Figure 4.4. In total, 160 participants across three sites were recruited to the study and randomly assigned to either one of the intervention groups or the control group. Participants assigned to the intervention groups received 8 weeks of the prescribed therapy (robotic gait training, functional therapy, or a combination of the two). Participants in the control group received maintenance therapy only. Quantitative measures related to the outcomes of interest were assessed for all participants at baseline before the intervention, at the completion of the intervention, and at 3 months after the intervention. In addition to the quantitative outcome data, the researchers planned a supportive qualitative component embedded within the RCT design. The team used maximum variation sampling to purposefully identify 18 parent-child dyads (6 per site) who were assigned to one of the intervention groups. The researchers then conducted one-on-one interviews with each parent and child to learn about their goals for and experiences with the intervention and the meaning they found in those experiences. These interviews occurred at two time points: before and after the intervention (see shaded ovals within the RCT rectangle of Figure 4.4). In addition, the researchers planned to interview 9 parents (3 per site) who chose to withdraw from the study before the intervention to explore factors that affected their participation. According to the researchers, the purpose for including the

embedded qualitative component was to “explicate child and parent experiences with the interventions, provide insight into the values that underlie their therapy goals, and assist with interpretation of the results of the RCT” (p. 1).

Once the quantitative and qualitative datasets were gathered, the team planned to analyze the two sets independently to address the different study objectives. These analyses are indicated by the separate rectangle and shaded oval in the middle of Figure 4.4. The quantitative analyses included descriptions of the major variables and tests for treatment effects using ANOVA and multiple linear regression techniques. The qualitative analyses used inductive strategies to code the data and develop themes and subthemes from the codes.

Figure 4.4 Diagram of a Mixed Methods Experimental Study



Source: Diagram based on Wiart et al. (2016).

As a final component of the mixed methods experimental design, the authors planned to merge the quantitative results and qualitative findings to provide

additional insight and information about the quantitative intervention results. This integration element is depicted in the lower-most box of Figure 4.4. The authors described how they planned to triangulate the different results so that the qualitative findings "provide essential context and meaning to the interpretation of the change scores from the RCT" (p. 7). They concluded that the combination of the quantitative results and qualitative findings provided useful insights for interpreting the trial outcomes and for understanding the feasibility of implementing the interventions in clinical practice. This embedding of qualitative data within an intervention trial to assist in the examination of both outcome and process information is a common approach found within complex mixed methods experimental designs.

Mixed Methods Case Study Designs

An example of intersecting a core mixed methods design with another type of methodology is the mixed methods case study or mixed methods comparative case study approach. This design has gained popularity recently because of researcher interest in forming cases, such as medical clinics, schools, or families, in a study. A mixed methods case study design is a type of mixed methods study in which the quantitative and qualitative data collection, results, and integration are used to provide in-depth evidence for a case(s) or develop cases for comparative analysis. The case or multiple cases provide the culminating or ending activity of the mixed methods study. A case may be an individual, an organization, or an activity that is bounded by certain criteria (Stake, 1995; Yin, 2014). This complex mixed methods design is consistent with the basic idea of a case study that focuses on developing a detailed understanding of a case (or multiple cases) through gathering diverse sources of data. When applying this complex design, the study typically begins or ends with the identification, description, and interpretation of the cases based on multiple sources of quantitative and qualitative data. Thus, the core design for mixed methods case study development can be any of the three basic designs, but the most prominent approach is to use a convergent design to build or interpret the cases (Curry & Nunez-Smith, 2015).

Intent of the mixed methods case study design.

The intent of a mixed methods case study design is to develop an enhanced description and analysis of a case or multiple cases through the use of both quantitative and qualitative data. The case or cases of interest are often identified by the researcher at the start of the study. For example, Walton (2014) identified a specific education reform partnership as the case she planned to examine in her convergent mixed methods case study. Her intent was to develop a more nuanced and complete understanding of the case by including both quantitative and qualitative data sources. In other applications, the intent focuses on identifying cases after the convergence of both quantitative and qualitative data. This means that from the merged analysis of the quantitative and qualitative databases, the researcher identifies criteria for specifying a case or cases. Examples also exist of researchers using both explanatory sequential and convergent core designs in mixed methods case studies. For example, Crabtree et al. (2005) used quantitative results to inform the purposeful selection of a variety of family practices for a comparative study about the deliverance of clinical preventive services.

Choice of the mixed methods case study design.

The choice of this complex mixed methods design is based on the researchers needing to use both quantitative and qualitative information to best describe a case or to compare cases. It is popular in health sciences and education where there is an interest in understanding complex systems like clinics, schools, or policy decisions as cases. The choice of a mixed methods case study also makes sense when

- researchers have expertise in qualitative case study procedures;
- researchers are drawn to understanding and comparing the complexity within and between cases using mixed methods data;
- researchers have access to data to support the development of diverse profiles of different situations to illustrate the variety of possibilities of cases to help understand the research problem (e.g., high and low performance on leadership by different themes of leadership); and
- researchers are situated in a disciplinary area that has traditionally valued descriptive qualitative approaches to research.

Philosophical assumptions and theory use in the mixed methods case study design.

When the end goal of a mixed methods case study design is to generate and describe a case or multiple cases, the philosophical assumption tends to be an evolving, constructivist approach. The cases evolve throughout the study. This philosophy holds that many perspectives are available and that they need to emerge during the research process to fully describe the complexity of a case. Thus, this type of design has a strong qualitative orientation to research, and although much case study work is done across different philosophical approaches often associated with quantitative and qualitative research, the preponderance of philosophy operating tends to align more with a qualitative perspective, such as constructivism (see Stake, 1995). Theory can play into a mixed methods case study design in several ways, such as informing both the quantitative and qualitative strands of research, informing the types of cases identified through both databases, or framing the case description. Theories often provide a guiding perspective for considering the case as a complex system and integrating the different data sources. An example would be the use of complexity theory to examine the improvement of health-care systems (Leykum et al., 2014).

The mixed methods case study design procedures.

The procedures for implementing a mixed methods case study design are outlined in Figure 4.5. The core design used for this procedural guide is based on the mixed methods convergent design because this is often the most popular core design for case study projects. Hence, this design figure closely resembles Figure 3.4 on the procedures for implementing a convergent mixed methods design, but it has the added feature of building toward the identification and description of a case—or, as in Figure 4.5, multiple cases. The procedures begin by collecting and analyzing both quantitative and qualitative data. Then strategies are used to merge or analyze the two sets of results (as discussed later in Chapter 7), such as using joint displays, employing a comparison discussion, or by transforming the qualitative data into quantitative counts (or variables). Then an interpretation is made of the merged results, leading to criteria for identifying focal cases that are then compared in terms of similarities and differences as well as the enhanced understanding of the integrated conclusions.

Integration in the mixed methods case study design.

Integration in a mixed methods case study involves the researchers bringing together quantitative and qualitative sources of information to describe each case and compare multiple cases. With a convergent design at the core, the integration occurs at the point in the procedures when the researcher brings the results from the two databases together in mixed methods analysis to form and interpret the cases. This complex design can also make use of a sequential core design, such as an explanatory connected approach in which the researchers start with quantitative data, select cases for comparison, and then gather both quantitative and qualitative data to provide an in-depth understanding of the cases.

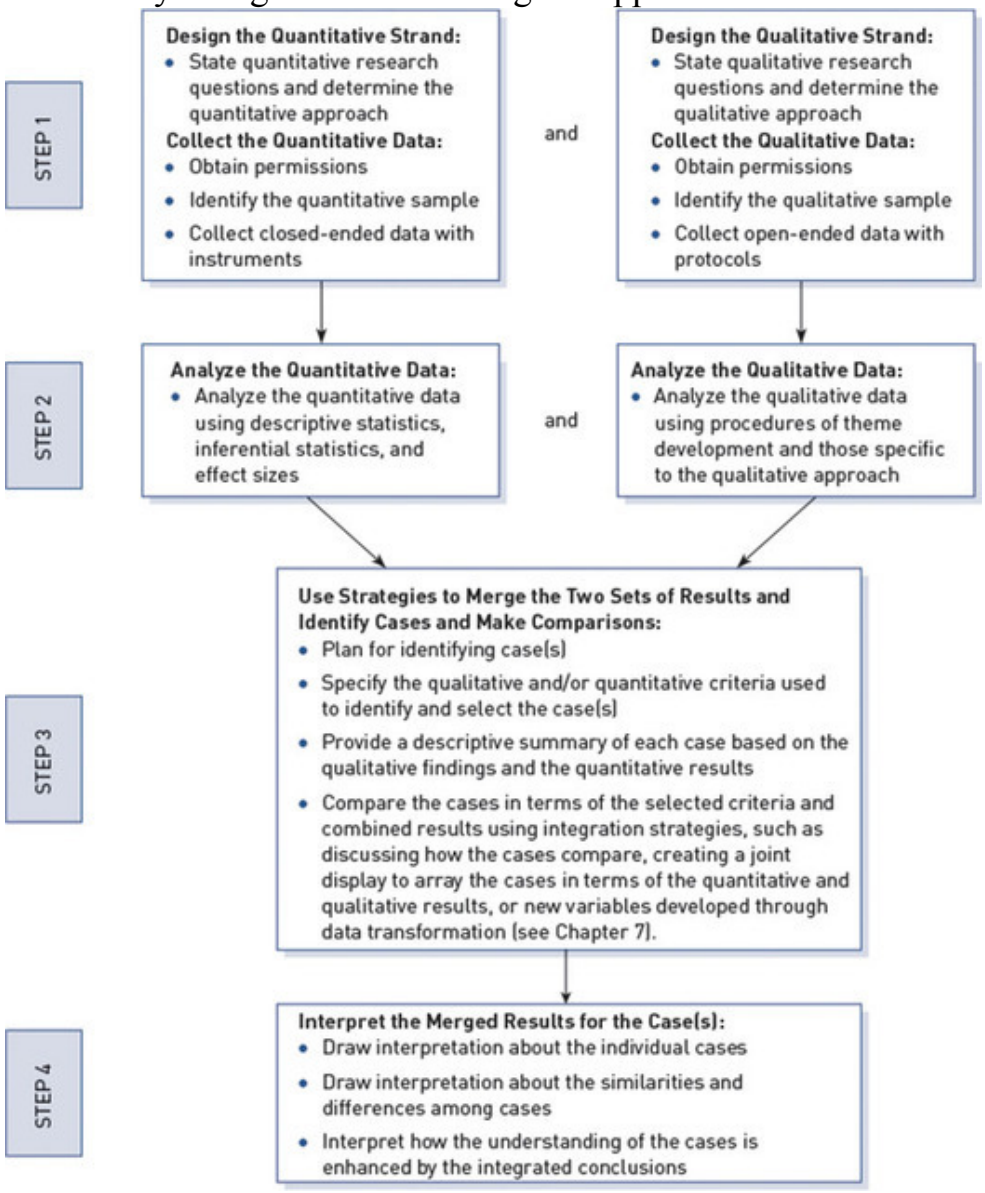
Strengths of the mixed methods case study design.

There are several strengths associated with using this complex design beyond those associated with the core mixed methods design:

- The advantages commonly associated with case study designs, such as developing in-depth, practical understandings and conclusions that are particularized and transferable, are realized in the use of a complex mixed methods case study design.

- Mixed methods case study designs are useful for understanding the complexity of a case (see Plano Clark & Ivankova, 2016; also Luck, Jackson, & Usher, 2006).

Figure 4.5 Flowchart of the Basic Procedures in Implementing a Mixed Methods Case Study Design With a Convergent Approach



- When multiple cases develop, researchers can compare the cases along quantitative or qualitative dimensions to portray variation in how the cases provide insights about the problem in a study.
- Descriptive profiles of the case(s) can provide a detailed level of information about the case(s) that offers a realistic picture.

- The design can be appealing to researchers undaunted by the complexity of a system and comfortable with emergent approaches within a research study.

Challenges in using the mixed methods case study design.

There are several challenges that researchers encounter when using the mixed methods case study design:

- Having the necessary expertise—Researchers need to understand good case study research procedures involved in this type of methodology.
- Deciding when and how to identify cases—Researchers need to know the core design that will best help to generate the cases in this type of study. The researcher needs to identify the criteria for selection of cases and what criteria will best differentiate among the cases.
- Deciding on the number of cases—Decisions need to be made by the researcher as to whether to generate a single case or multiple cases and how many cases might best portray the diversity of cases possible.
- Representing the cases in written reports—Writing case study descriptions in detail, particularly within journal article page limits, also presents a challenge.

Mixed methods case study design variants.

There are several different types of mixed methods case study design. Variation along mixed methods dimensions include considering which core design is applied (i.e., a convergent or a sequential core design) and which data forms (quantitative and qualitative) are used to identify cases and generate the case descriptions and findings. A mixed methods case study design can focus on a single case or multiple cases for comparison. Further, this design can vary in terms of the types of cases examined, such as an instrumental case study that aims to examine cases to gain insight into a larger issue or an intrinsic case study that aims to examine intrinsically interesting cases for their own sake (Creswell, 2013). There is also variation in the criteria for selecting cases of interest. For example, some researchers use a positive deviance approach in which high-performing cases are purposefully identified and studied to identify good practices (Bradley et al., 2009). Finally, mixed methods case studies vary as to whether researchers deductively use quantitative and qualitative data to generate case profiles (Kerrigan, 2014) or inductively use the data to generate cases for comparisons (Shaw et al., 2013).

Example of a mixed methods case study design.

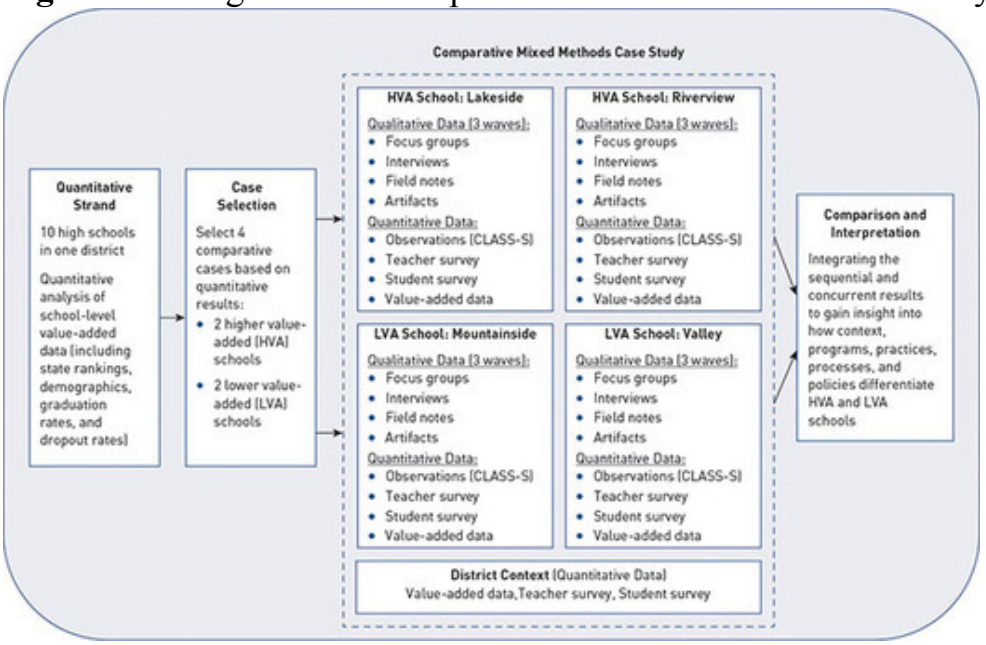
A description of a study that used a mixed methods case study design is found in Appendix E. The educational research study of Smith, Cannata, and Taylor Haynes (2016) examined the policies, practices, and contexts that give insight into why some schools are particularly effective at educating low-income students, minority students, and English language learners. It is a complex study because it contains several important features: the generation of four case studies within the study, the gathering of multiple forms of quantitative and qualitative data about each case, the comparison of the data forms within and across the cases, and the use of both explanatory sequential and convergent core designs within the case study framework. All of these features are important, and they can be organized into an overview of this mixed methods study, as can be seen in Figure 4.6, which we constructed based on the content of the article.

This study can be divided into four phases. It began with a quantitative examination of the performance of the schools within one district. Based on the quantitative results, the research team selected cases for comparative study. The research team then conducted an in-depth study of the four cases, gathering extensive qualitative and quantitative data for each case during one school year. From the analysis, the researchers merged the quantitative and qualitative results to describe the cases and facilitate the comparisons across the cases in order to make interpretations about the features that distinguished the cases.

With this flow of the research in mind, we can see in Figure 4.6 more of the details of the study. The large, outside oval indicates the overall mixed methods case study framework that shaped the study approach. Since the study purpose was to understand why some schools are more effective at educating certain students, the researchers began by characterizing the relative effectiveness of 10 district high schools using a quantitative value-added modeling approach. The team selected four of the schools to study: two characterized as higher value-added schools (Lakeside and Riverview) and two characterized as lower value-added schools (Mountainside and Valley). An in-depth case study bounded by one school year was completed for each of the four selected schools. The examination included a variety of qualitative and quantitative data forms gathered from different levels within the school system (i.e., students, teachers, school personnel, administrators, and district personnel) and district-wide data to further contextualize the selected schools. The data sources were analyzed by case and across cases using a team-based approach. Several important constructs emerged from the merging of the different data sources to differentiate the schools,

including student ownership and responsibility, quality instruction, and personalized learning connections. In the article, the researchers focus on describing in detail how merging the quantitative and qualitative results provided new and more nuanced insights about what makes schools effective.

Figure 4.6 Diagram of a Comparative Mixed Methods Case Study



Source: Figure based on Cannata, Taylor Haynes, and Smith (2013) and Smith, Cannata, and Taylor Haynes (2016).

Smith et al. (2016) report how they used a complex mixed methods case study design to "[draw] out the complexity of phenomena to paint a more comprehensive picture of what makes high schools effective" (p. 6). The researchers implemented several features of good case study research, including identifying important cases, bounding the cases for study, extensive data collection over time for each case, gathering multiple forms of data for each case, and analyzing the data within and across the cases. Likewise, the researchers implemented several features of good mixed methods research, including rigorous quantitative and qualitative methods, the use of both sequential and concurrent strategies, meaningful sequential integration through a case selection process, and meaningful convergent integration by comparing results from the different databases and examining both convergence and divergence for insights. In sum, this study represents a complex mixed methods design. The researchers combined a comparative case study design with sequential and convergent components

where the described focal cases emerged in the process of the study based on the combined results.

Mixed Methods Participatory-Social Justice Designs

Another family of complex mixed methods designs is found when researchers apply the core designs within a theoretical framework using a participatory or social justice perspective. Participatory research and social justice mixed methods studies have been independently discussed in the literature as distinct applications (see Plano Clark & Ivankova, 2016). However, they both require collaboration with participants and call for changes in society or in communities as a result of the research. Therefore, we have chosen to combine them here as one type of design. Participatory research, also called participatory action research, action research, or community-based participatory research (CBPR), involves participants actively in the research process, often with an overall intent to solve a practical problem in one's own situation or community. Whether participatory research should be called a theoretical framework, perspective, or procedure is open to debate. However, it can be linked to mixed methods in effective ways (e.g., Badiee, Wang, & Creswell, 2012). One leading writer has clearly drawn the connection between mixed methods and action research (Ivankova, 2015). In her book, Ivankova advanced a methodological framework for incorporating quantitative and qualitative data in the cyclical process action research stages, such as planning, acting, monitoring, and reflecting. In their study of community-based approaches, Badiee, Wang, and Creswell (2012) discussed community involvement through the stages of diagnosis, prescribing, implementing, and evaluating. More specifically, mixed methods has been linked to CBPR. In this approach, community involvement moves beyond simply engaging the community members as participants in a study (Israel, Eng, Schulz, & Parker, 2013). Community stakeholders become involved in many phases of the research process, including identifying the study questions, developing intervention or data collection procedures, recruiting participants, interpreting the research findings, and disseminating the results (De Las Nueces, Hacker, DiGirolamo, & Hicks, 2012; Horowitz, Robinson, & Seifer, 2009; Israel, Eng, Schulz, & Parker, 2005; Wallerstein & Duran, 2010). Through collaboration with participants and stakeholders, CBPR enhances the search for important community issues, improves the population's participation, and increases the investment in the research by the community. Also, the CBPR approach provides an emphasis on bringing about change and involving participants—essential aspects of social justice research as well.

Social justice mixed methods studies have similar collaborative components. The intent of social justice mixed methods research is to promote human development

and common good through addressing challenges to individuals and society using the integration of quantitative and qualitative research (Ponterotto, Mathew, & Raughley, 2013). It employs a theoretical perspective (or lens) based in human rights, racial or ethnic thinking, social class, disability, or lifestyle, or some combination of these. A number of mixed methods studies have been published that use a social justice approach, such as feminist theory, racial or ethnic theory, sexual orientation, or disability theory, or some combination of these (Ponterotto et al., 2013; Mertens, 2009). Early writings about this mixed methods approach referred to it as a transformative design in which researchers place primary consideration on the value-based and action perspective of the research (Caracelli & Greene, 1997; Mertens, 2003). Mertens (2003, 2009) specifically discussed ways in which these perspectives influence every stage of the research and design process.

A good place to start to learn about the application of social justice perspectives to mixed methods is the book by Hesse-Biber (2010) and the journal article by Ponterotto et al. (2013). Hesse-Biber's comprehensive view of mixed methods takes the position that philosophy (e.g., assumptions about the nature of reality and how knowledge builds) informs questions and problems, and this, in turn, impacts the mixed methods designs chosen. Further, she elaborates on feminist approaches to mixed methods research as a methodology that focuses on the lives of women and probes questions of empowering women, exploring differences, respecting silence, and acknowledging oppression. This research then leads to "moving toward a more just society for women and other oppressed groups." (p. 129). Hesse-Biber's (2010) work cites several feminist mixed methods studies to illustrate the application of feminist thinking to mixed methods research. Further evidence that mixed methods studies using social justice frameworks are being conducted can be found in a review of published studies. Sweetman, Badiee, and Creswell (2010) identified social justice mixed methods studies that used different theoretical lenses, including a feminist lens (e.g., Cartwright, Schow, & Herrera, 2006); a disability lens (e.g., Boland, Daly, & Staines, 2008); and a socioeconomic class lens (e.g., Newman & Wyly, 2006).

The intent of the mixed methods participatory-social justice design.

This design adds a core mixed methods design to a participatory or social justice perspective for the purpose of involving participants actively in the research and bringing about change for individuals or communities. This complex design brings explicit value-based and ideological perspectives into mixed methods (Greene, 2007). From this perspective, the different methods are needed in order

to identify and describe oppression and inequalities, include the voice of and be sensitive to the culture of marginalized groups, and generate evidence that is useful and persuasive to different stakeholder groups. Therefore, the intent is to identify, understand, and take action against problems by involving the people who are most affected by the problem throughout the research process. This collaborative intent provides a framework for conducting many aspects of a mixed methods study, and the core design within this framework can be a convergent, explanatory sequential, or exploratory sequential approach.

Choice of the mixed methods participatory-social justice design.

In line with the intent of participatory-social justice mixed methods research, this design is used by research teams who

- seek to address issues of social justice, such as the disempowerment and historical silencing of minority groups, and call for change;
- want to address the needs of underrepresented or marginalized populations and examine the dynamics of privilege in society;
- want to actively involve individuals or community stakeholders throughout the research process;
- have a good working knowledge of social justice perspectives (e.g., feminist theory or CBPR) used to study underrepresented or marginalized populations and community stakeholders; and
- want to impact communities.

Philosophical assumptions and theory use in the mixed methods participatory-social justice design.

The transformative worldview often provides the overarching assumptions behind the application of mixed methods to participatory and social justice research (Mertens, 2003, 2007). The transformative paradigm in use by the researcher has a “pervasive influence throughout the research process” (Mertens, 2003, p. 142). Mertens described ways in which this perspective influences five steps of the research process; these steps include (1) defining the problem and searching the literature, (2) identifying the research design, (3) locating data sources and selecting participants, (4) identifying or constructing data-collection instruments and methods, and (5) analyzing, interpreting, reporting, and using results. This worldview, as an advocacy and participatory one, provides an umbrella paradigm for projects and includes political action, stakeholder involvement,

empowerment, collaborative approaches, and change-oriented research perspectives. Further, this application of mixed methods may draw closely on a related set of assumptions: the critical-ideological paradigm. This philosophy suggests a reality based on social and political forces that create power imbalances in our society, such as subjugation, and perpetually result in politically, socially, and economically less empowered societal groups (Ponterotto et al., 2013). Researchers may use a particular theoretical lens that reflects the needs of specific groups or individuals, such as feminist theory or critical race theory.

The mixed methods participatory-social justice design procedures.

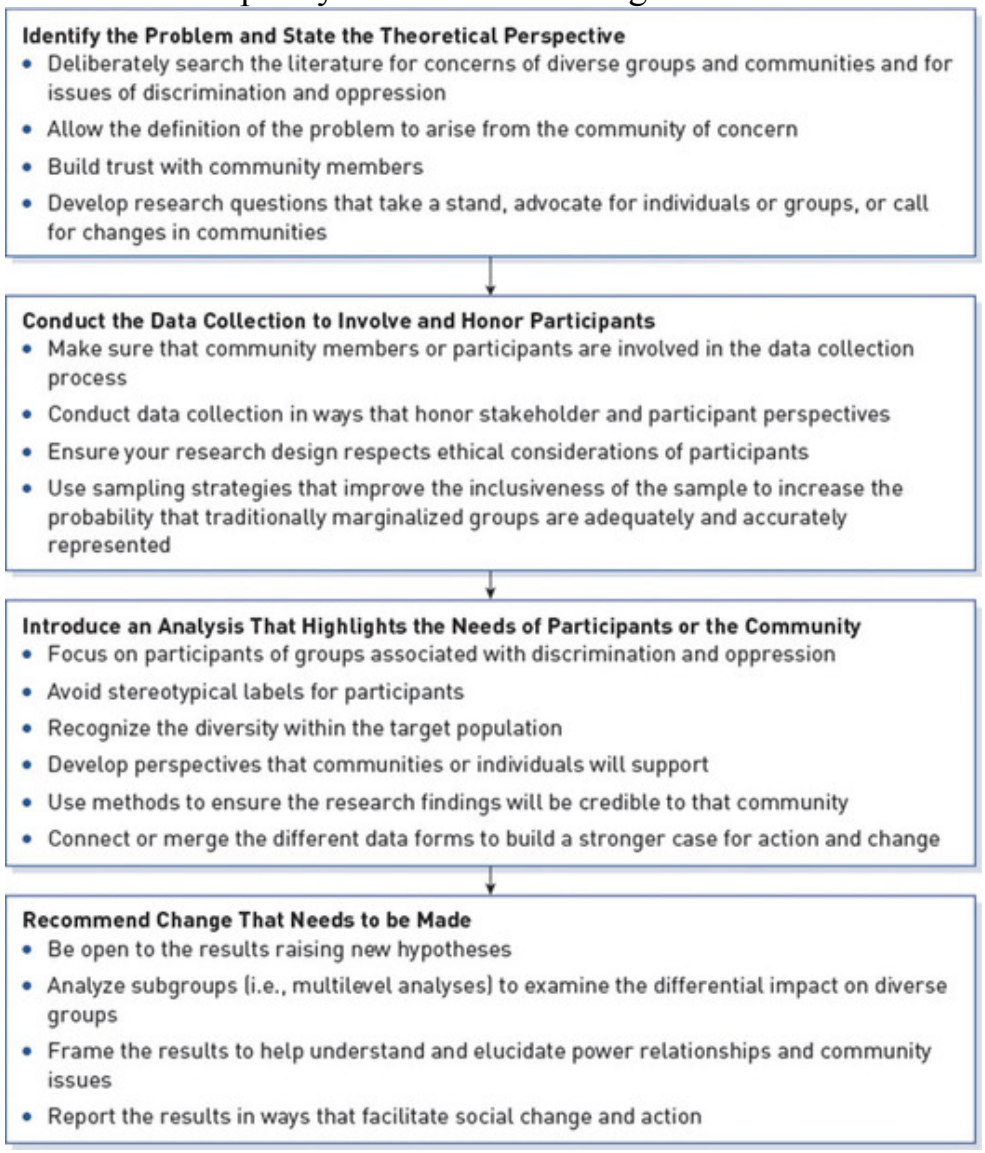
Depending on the specific contexts of an individual mixed methods study, the researcher may end up using procedures that are consistent with any of the three core mixed methods designs, but he or she adds the use of these designs to a participatory-social justice perspective, as shown in Figure 4.7. The procedures in Figure 4.7 reflect the "threading" of the participatory or social justice framework throughout the research procedures of the study. It appears in the problem identification section of the study. It flows into the types of research questions asked, particularly questions with an advocacy perspective in mind and ones that are driven by participant concerns. It continues on in the data collection where individual participants and how they look at research are honored. It extends into the data analysis section where themes and results come together to reflect further the theoretical perspective. It plays out in the final section of a mixed methods study where calls for action and change as a result of the research are found.

Integration in the mixed methods participatory-social justice design.

Integration in the mixed methods participatory-social justice design is related to the type of core design involved. The integration occurs within the core design (convergent, explanatory sequential, exploratory sequential), and this design is surrounded by a social justice perspective or framed by a participatory involvement of stakeholders at various steps in the process of research. Therefore, the quantitative and qualitative data and results are merged or connected depending on the type of core design to achieve the participatory-social justice goals of the study. We could say that the core design is also integrated with the participatory or social justice perspective, but this would not be the integration of databases; rather, it would be the encasing or enshrouding of the core design within a theoretical or participatory framework. No matter which core designs are used, research teams using this complex design go beyond simply generating

conclusions by focusing on how the combination of different databases adds to a study's specific participatory-social justice intent.

Figure 4.7 Flowchart of the Basic Considerations for Implementing a Mixed Methods Participatory-Social Justice Design



Source: Adapted from Mertens (2003) and Creswell (2009c, pp. 67–68). Adapted with permission of Sage Publishing.

Strengths of the mixed methods participatory-social justice design.

Researchers may implement procedures consistent with any of the core mixed methods designs within the participatory-social justice framework and therefore benefit from the strengths of those designs. In addition, this complex design has the following advantages:

- By using mixed methods core designs within a participatory and social justice framework, the researchers may find that mixed methods is more acceptable to important stakeholder groups.
- The researchers can help foster change because participants and communities are involved in helping to design the study.
- The researchers help to empower individuals and bring about change and action.
- Participants often play an active, participatory role in the research and thus they are engaged and invested in the project.
- The researchers are able to produce results that are useful to community members and viewed as credible by stakeholders and policymakers.
- Researchers have guidance for thinking about how the participatory and social justice perspectives are at the forefront of the methods decisions.

Challenges in using the mixed methods participatory-social justice design.

As with the strengths, this application shares the procedural challenges associated with the corresponding core mixed methods designs. In addition it has these further challenges:

- Having the necessary expertise—Researchers need to identify a theoretical lens, be familiar with it, and be able to apply it to a research problem. This requires an understanding of the theoretical perspectives available to use, the literature about the chosen perspective, and how the perspective has been applied in other research projects.
- Communicating the framework with others—The researchers need to educate readers who may not be familiar with this approach about the participatory and social justice framework in the study report.
- Using the framework throughout the study—The researchers need to be explicit about how the guiding participatory or social justice perspective is informing aspects of the study. We recommend “threading” the framework

throughout the study (e.g., in the problem, the questions, the data collection, the results, and the implications).
- Using participatory approaches—The researchers must develop trust with participants, be willing to let participant perspectives shape the study as it unfolds, and be able to conduct the research in a culturally sensitive way.

Mixed methods participatory-social justice design variants.

The variations for this complex design are not yet well defined. However, several of the dimensions we have already discussed are useful in thinking about variations. There is variation in terms of the core mixed methods design that is used. Variation also exists in the diverse theoretical perspectives used, which may include feminist theory, Marxist theory, or critical race theory, to name only a few possibilities. These designs also vary in terms of the extent to which the researchers incorporate a participatory element; this can range from including community representatives as participants to having them be active members of the research team. These designs can also vary in terms of the extent of the specific participatory procedures used. For example, participatory approaches such as group level assessment (Vaughn & Lohmueller, 2014) and photovoice (Wang & Burris, 1997) can be usefully applied as variants within mixed methods participatory-social justice designs.

Example of a mixed methods participatory-social justice design.

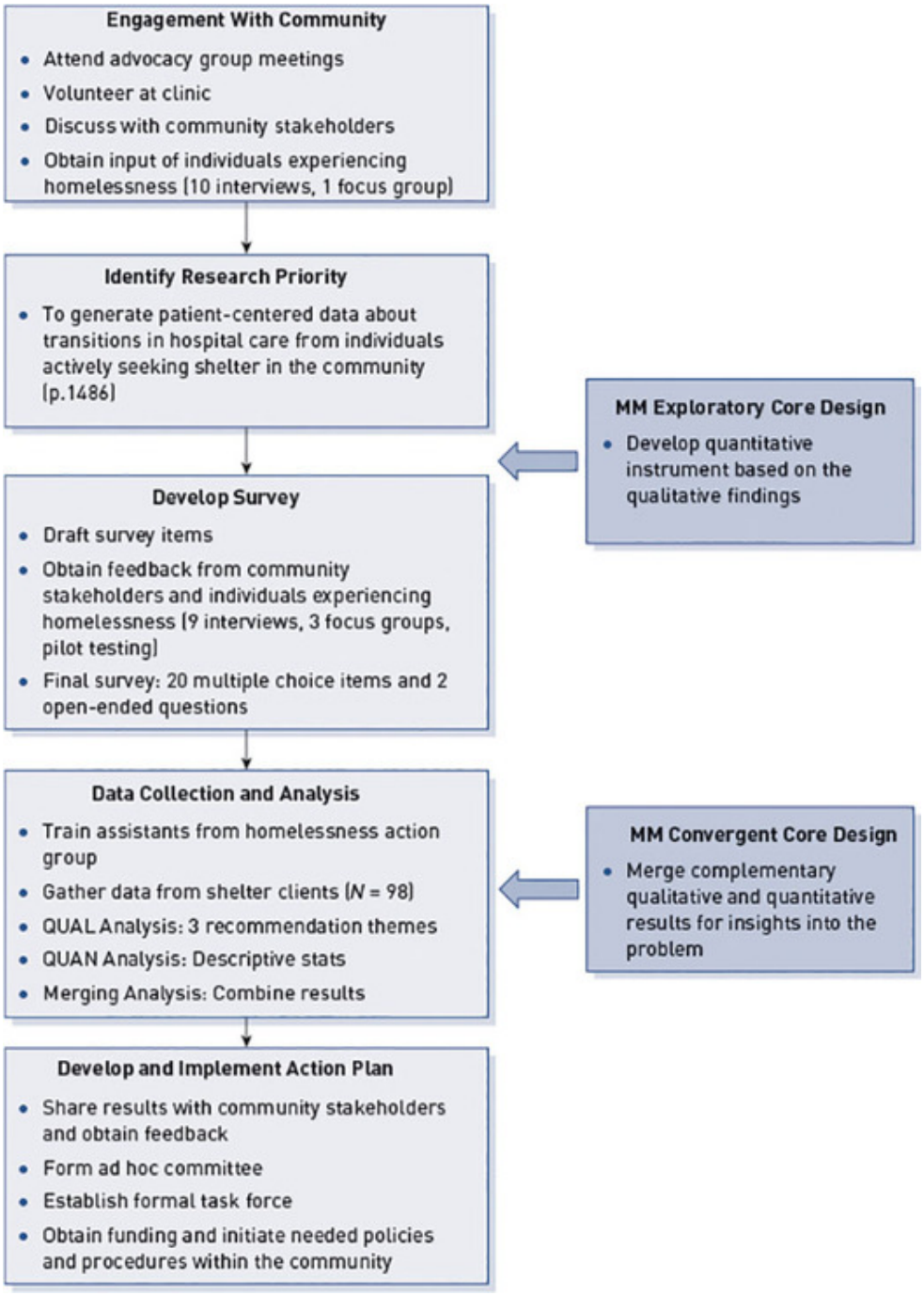
The participatory-social justice design is used to bring about change through stakeholder involvement in the research process. An example of this complex design is found in Appendix F. Greysen, Allen, Lucas, Wang, and Rosenthal (2012) used a mixed methods participatory-social justice design to improve the transitions from hospital care to shelters for people experiencing homelessness within their communities. It is a complex mixed methods design because it intersects mixed methods with a CBPR framework and incorporates strategies from both the exploratory and convergent mixed methods core designs. We developed the diagram in Figure 4.8 based on the description of the study's procedures to highlight the participatory and mixed methods features of this study's design.

As depicted in the diagram, this study can be considered in terms of five stages. Consistent with the study's CBPR framework, the authors describe an initial stage of engaging with the community in order to better understand the problem of homelessness within the community. This engagement included the first author

attending meetings of different advocacy groups and volunteering at a weekly clinic held at the largest homeless shelter in the community. He also discussed concerns with case managers, social workers, and shelter staff and obtained the input of individuals staying at the shelter through 10 brief interviews and one focus group discussion. From this initial engagement, the community-based team identified the priority for the research as the second stage. Based on the community members' collective concerns, the researchers described this priority as "to generate patient-centered data about transitions in hospital care from individuals actively seeking shelter in our community" (p. 1486).

In the third stage, pictured in Figure 4.8, the team developed a survey to gather the patient-centered data. Using a mixed methods exploratory sequential design, they connected from the initial fieldwork and qualitative interviews to develop the survey items. They shared the item drafts with community members and gathered further qualitative feedback in the form of interviews and focus groups with the different community stakeholders, and they pilot tested the final survey with different stakeholders. Once the survey was finalized, they gathered data from 98 shelter clients in the fourth stage of the study. The team analyzed the qualitative data to uncover one overarching theme and three recommendation themes. They analyzed the quantitative data to identify trends in the responses and related those trends to the qualitatively derived theme and recommendations by merging the two sets of results consistent with a convergent core design.

Figure 4.8 Diagram of a Mixed Methods Participatory-Social Justice Study



Source: Diagram based on Greysen et al. (2012).

Consistent with the study's CBPR framework, the research team did not stop their work after obtaining the merged results. In the final stage, they shared these results with the community stakeholders in order to develop and begin the

implementation of an action plan in response to the results. The article described several steps that occurred based on the combined qualitative and quantitative results, including the formation of an ad hoc committee, the establishment of a formal task force, and steps to obtain funding to implement needed policy and procedural changes. In this way the researchers demonstrated how a complex design that combines participatory, qualitative, and quantitative approaches can bring about change within a community.

Mixed Methods Evaluation Designs

The core mixed methods designs can also intersect and be added into the methodological approach of evaluation. Programs, organizations, processes, and experimental trials can all be evaluated. They might be called impact evaluations (Onwuegbuzie & Hitchcock, 2015); program evaluations (Bolton et al., 2007); a multiphase or multistage evaluation design (Plano Clark & Ivankova, 2016); or a mixed methods multistrand design (Natasi & Hitchcock, 2016). Evaluation includes a broad class of applied research approaches with a distinct body of literature (e.g., Rossi, Lipsey, & Freeman, 2004). In large-scale evaluation projects, there are multiple objectives, numerous phases, and multiple investigators, all of which push the use of core mixed methods designs into a complex application. Typical phases include needs assessment, theory development and adaptation, program development and testing, and assessment of the program's impact through outcomes and processes. Researchers using these multiple evaluation phases need to consider where mixed methods embeds into the many evaluation procedures and how the data collection and integration process feeds into the larger evaluation plan. One common application of this design in the United States are large-scale funded mixed methods projects that address multiple study aims over several years—for example, projects funded by the National Institutes of Health (NIH) or National Science Foundation (NSF). Another application would be statewide evaluation studies involving multiple levels of data collection and analysis, as well as multiple studies over several years. This design is also used in global international studies, such as evaluations of humanitarian programs. For example, Bolton et al. (2007) adapted a mixed qualitative and quantitative assessment methodology to study the implementation of a humanitarian program in Kenya. Their methodology called for pre-intervention quantitative assessments, postintervention qualitative free-listing interviews, and postintervention quantitative assessments. In this study they were interested in both the positive and negative impacts of a humanitarian program.

The intent of the mixed methods evaluation design.

In evaluations, the overall objective is to evaluate some entity (e.g., a program, process, activity, or intervention) through a series of steps. Mixed methods core research designs provide evidence that can be used in multiple steps. Mixed methods may fit into a single phase in the evaluation process or into multiple phases. Sometimes the quantitative and qualitative results are merged in a specific phase of the project. For example, the evaluators might collect both quantitative

and qualitative indicators of the success of a program and merge them to get a more complete picture of the positive outcomes achieved. In addition, the quantitative and qualitative data can be linked together across phases. For example, an exploration in a needs assessment of a program through qualitative data can point toward context-specific instruments and measures (i.e., using an exploratory sequential design) that might be used to assess the later impact of the program. The intent for a mixed methods evaluation design adheres to four key principles identified by Hall and Howard (2008): (1) the synergy of having a richer source of evidence for the evaluation than what would have been provided by either the quantitative or qualitative data alone, (2) the equal importance of both quantitative and qualitative data, (3) the dialectic position of new insights growing out of differences, and (4) the advantage of having multiple researchers on a team to bring, share, and discuss methodological differences as the evaluation proceeds.

Choice of the mixed methods evaluation design.

Researchers choose the mixed methods evaluation design when their intent is to evaluate a program, an intervention, an organization, or a series of processes and activities. Furthermore, the choice of this complex design is appropriate for

- researchers willing to take on a long-term project with multiple objectives,
- researchers with sufficient resources and funding to implement the study over multiple years,
- researchers interested in evaluating the process of the entity of interest and assessing the outcomes of the entity,
- researchers interested in understanding the cultural contexts in which the entity is situated, and
- researchers willing to engage in several iterations of data collection, analysis, integration, and program implementation.

Philosophical assumptions and theory use in the mixed methods evaluation design.

The philosophical assumptions that provide the foundation for an evaluation design will vary depending on the specifics of the approach. As a general framework, we suggest that researchers use pragmatism as an umbrella foundation if strands are implemented concurrently and use constructivism for the qualitative component and postpositivism for the quantitative component if the

strands are used sequentially. Since teams often implement this approach, it is common for different subgroups within a team to be working from different philosophical assumptions based in their home discipline and focusing on different aspects of the overall design. In addition to this, evaluation designs also benefit from a strong theoretical perspective that provides a guiding framework for thinking about the substantive aspects of the study across the multiple phases. Some form of theory should play an important role in the program evaluation process, such as evaluation theory (i.e., criteria for an appropriate evaluation); social science theory (i.e., to understand the desired or undesired outcomes and strategies influencing the outcomes); or program theory (i.e., how the program brings about change) (Onwuegbuzie & Hitchcock, 2015).

The mixed methods evaluation design procedures.

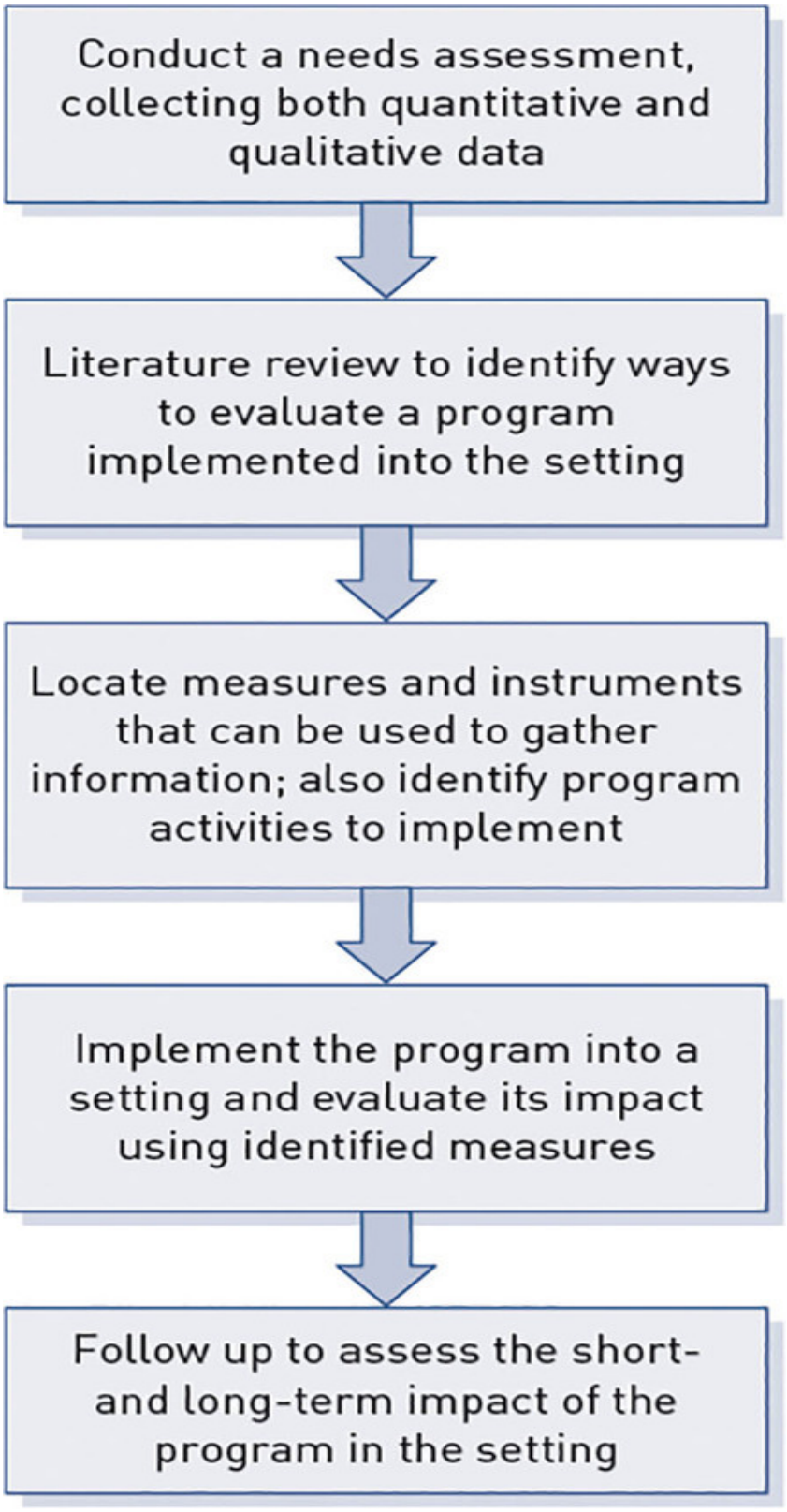
The general procedures of an evaluation can be divided into as many as ten different phases (see Nastasi & Hitchcock, 2016). As shown in Figure 4.9, we have chosen to adapt and highlight a version with a reduced number of phases that explicitly incorporates mixed methods research (Onwuegbuzie & Hitchcock, 2015). In this approach the procedure begins with conceptualizing the evaluation process and the role of mixed methods within the process. This calls for developing the evaluation questions, clarifying the philosophical stance being used, and stating the value assumptions brought to the study. This phase is followed by the evaluation design phase, which entails sampling, the evaluation process, and possibly involving stakeholders in the evaluation. In the next step, the researchers implement the evaluation by collecting, analyzing, and integrating both quantitative and qualitative data, validating the results, and drawing inferences from the results. Finally, the results are utilized to address the issues through disseminating findings to stakeholders and consumers and organizing a continual review to determine if the new knowledge addresses the program implementation.

Integration in the mixed methods evaluation design.

With the multiple phases and studies found in many mixed methods evaluation designs, the integration aspects can often be missed among the details. However, meaningful integration is essential for achieving the benefits of the use of mixed methods in this complex design. Typically the integration of the quantitative and qualitative data in the evaluation design occurs both within single phases and between multiple phases. Using the core designs as a framework, the evaluation may apply a convergent design by merging the quantitative and qualitative results

within a single phase, such as an initial needs assessment. Likewise, the evaluation may integrate by connecting the results from one phase to planning the next using the framework of an explanatory or exploratory sequential design (e.g., needs assessment builds into program design). As the multiple phases of the study unfold, the researchers might also be actively building integrated conclusions about the implementation and outcomes of the program based on the previous results obtained.

Figure 4.9 Flowchart of the Basic Procedures in Implementing a Mixed Methods Evaluation Design



Strengths of the mixed methods evaluation design.

This complex design has a number of strengths:

- The evaluation design incorporates the flexibility needed to use whatever mixed methods design elements are required to address a set of interconnected research questions.
- Researchers can publish the results from individual studies while at the same time still contributing to the overall evaluation or research program.
- Researchers can use this design to provide an overall framework for conducting multiple iterative studies over multiple years.
- The mixed methods evaluation design is an appealing approach to evaluation that provides different types of results to achieve multiple program objectives and provide evidence about practices useful for a range of different stakeholders.

Challenges in using the mixed methods evaluation design.

While the multifaceted nature and flexibility of the evaluation design are its main strengths, they also represent its primary challenges:

- Numerous challenges arising from use of multiple core mixed methods designs—The researchers must anticipate the challenges generally associated with each of the different core designs, as enumerated earlier. In addition, the researchers need to consider how to meaningfully connect the individual studies in addition to mixing quantitative and qualitative strands within phases.
- Extensive resources required—The researchers need sufficient resources, time, and effort to successfully implement several phases over multiple years.
- Team dynamics need to be established and maintained—The researchers need to effectively collaborate over the scope of the project and accommodate the potential addition and loss of team members.
- Participant involvement requires special attention—The researcher may need to submit new or modified protocols to the IRB for each phase of the project. If the same participants are involved across multiple phases, then the researchers need to attend to issues of burden and attrition.
- Applying results from the evaluation—Due to the practical focus of many evaluation designs for program development, the investigators need to consider how to translate research findings into practice through developing materials and programs.

Mixed methods evaluation design variants.

Variations of the mixed methods evaluation design reflect the different contexts in which researchers work. For example, variants of this design appear in program evaluations in the United States; in global health studies, such as the implementation of a humanitarian aid program and the need to evaluate its success (Bolton et al., 2007); and in evaluating the success of intervention trials (see Levitt et al., in press). Variations can also be discussed in terms of the number and order of phases that are employed. For example, Morgan (2014) described several different complex combinations of multipart designs, including process evaluations, that implement alternating tracks of quantitative and qualitative studies. Variations of this design can also be considered in terms of the different phases of evaluation that may be present within the design, such as needs assessment, formative evaluation, process evaluation, outcome evaluation, and impact evaluation.

Example of a mixed methods evaluation study.

The evaluation design combines both sequential and concurrent strands over a period of time in a program of study. Often the strands are implemented as multiple projects within a larger program of inquiry. An example of the mixed methods evaluation design is found in Appendix G. In this article, Nastasi et al. (2007) described their use of this design and the major features of its implementation, presented here as Figure 4.10.

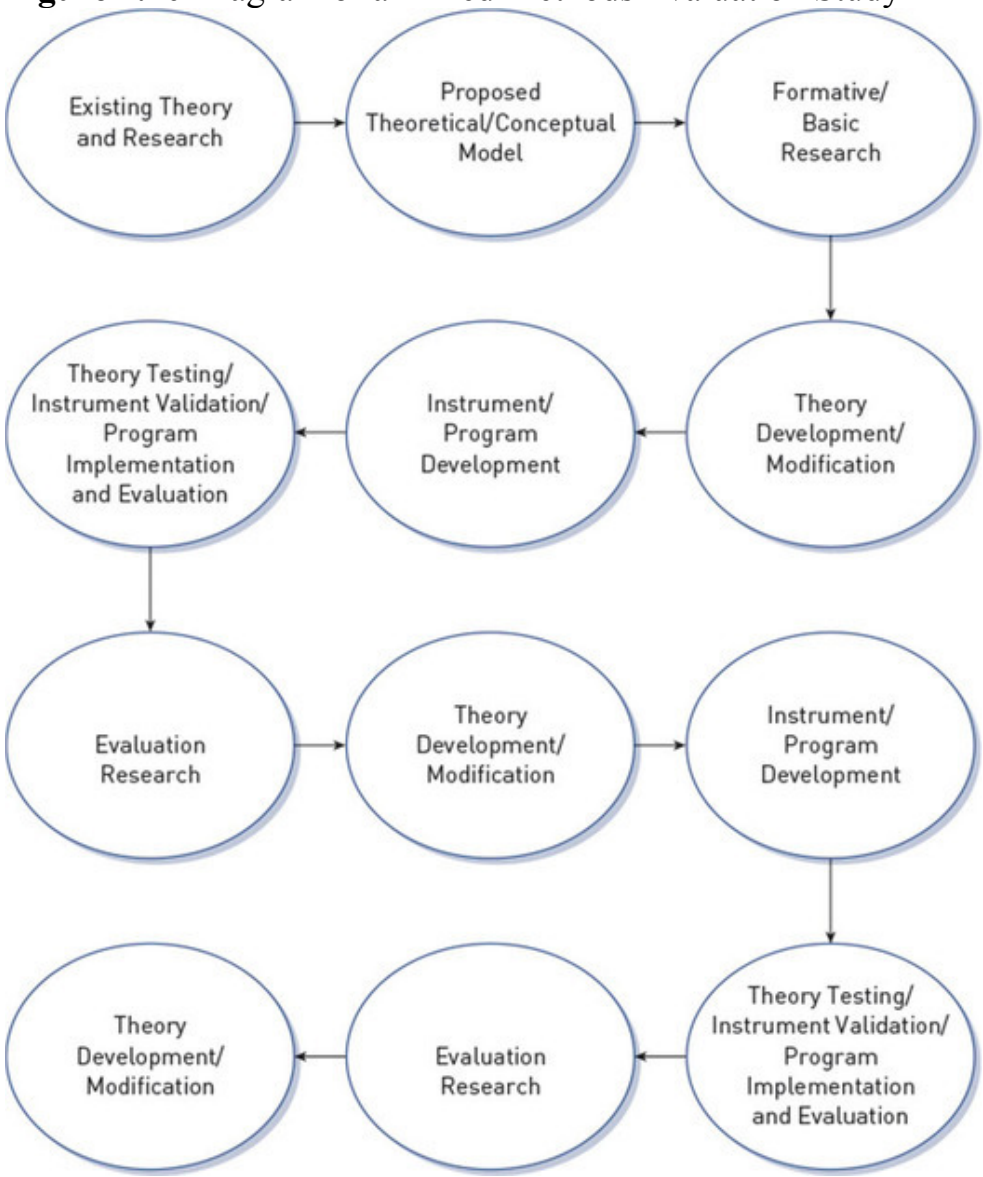
Nastasi et al. (2007) engaged in multiyear programmatic research and development projects related to mental health promotion of youth in Sri Lanka. The guiding frameworks for this study included the participatory culture-specific intervention model and a model of mental health based in ecological developmental theory. Their overall objective was to develop culturally appropriate evidence-based mental health practices for the school-aged population in Sri Lanka. To meet this objective, the research team pursued a wide range of interrelated purposes that called for conducting formative research, developing and testing culture-specific theory, developing and validating culture-specific instruments, and developing and evaluating culture-specific intervention programs.

The research team described several approaches for implementing quantitative methods within their project. Although the specific details of data collection and analysis were detailed elsewhere, the authors discussed the general quantitative

approaches they implemented. These approaches included validating developed psychological measures, confirming formative results by surveying large representative samples, and testing the effectiveness of specific developed programs using true and quasi-experimental designs.

The research team also implemented a wide range of qualitative data collection and analysis activities in their multiyear study. Because of the importance of understanding the cultural contexts of mental health within the Sri Lanka setting, much of qualitative research used an ethnographic design. Specific data collection activities included focus group interviews, individual interviews, participant observations, documents, and field notes.

Figure 4.10 Diagram of a Mixed Methods Evaluation Study



Source: Reprinted from Nastasi et al. (2007, p. 166) with permission of Sage Publishing.

Nastasi et al. (2007) argued that their goal of developing culturally appropriate evidence-based mental health practices required a recursive and integrative combination of quantitative and qualitative methods, which is an example of mixing within a program objective framework. They needed qualitative methods to identify cultural contexts that helped guide program development and the adaptation of programs to new contexts, and this required quantitative methods to test cultural models and program effectiveness. At times these methods were interactive, such as when quantitative methods were used to validate a psychological measure developed based on qualitative results. This dependent relationship was most strongly seen as the program moved from one sequential phase to the next. In addition, it is likely there were times the methods were independent when they were implemented concurrently, such as when the authors merged the two types of information to understand the acceptability, integrity, and effectiveness of intervention methods. Although it is possible that an individual phase could have one method prioritized over the other, it is clear from looking over the full research process that the two methods played equally important roles in addressing the study's objective. The authors described many ways they mixed the quantitative and qualitative strands throughout the project, such as designing a quantitative strand to test the effectiveness of a program adapted based on a qualitative strand (i.e., connecting) and combining both methods to examine acceptability of a program (i.e., merging).

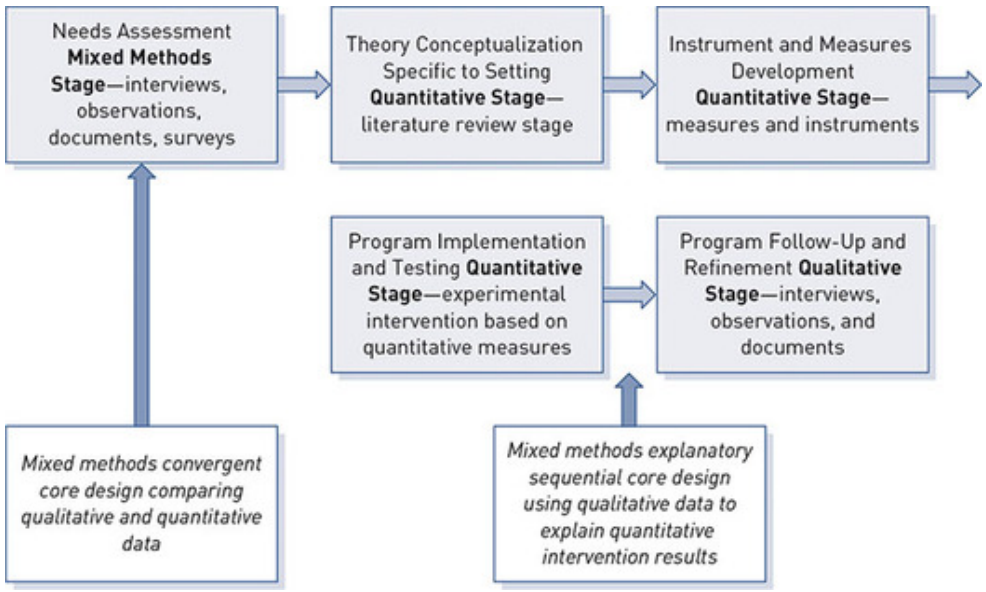
This large-scale, multiyear evaluation project was an example of a mixed methods evaluation design. The study was implemented over multiple phases, and the quantitative and qualitative methods were conducted sequentially across phases and also concurrently within some phases. The authors' diagram of the process, shown in Figure 4.10, outlines the many phases involved in the program development process, with each circle representing the use of at least one qualitative and/or quantitative strand. In addition to this figure, the authors also provided a table detailing the concurrent and sequential interactions of data at different phases in the project. (See Table G.1 in Appendix G.)

Drawing Diagrams of Complex Applications

As shown in the figures in this chapter, applications of the core designs can be configured differently depending on the complex application. For several years, we attempted to draw diagrams of complex applications based on our core designs using the strategies introduced in Chapter 3. We would start by diagramming the core design's procedures and then work to add the additional design elements onto the core designs. Today we have switched our process for drawing these complex applications. Now we focus on drawing the procedural steps of the complex application and, once drawn, we highlight the type or types of core designs found within these steps. Essentially, we map the mixed methods core designs onto these procedural steps at the points where the qualitative and quantitative data intersect (or combine or mix). This intersection may be in one place or several places within the complex procedures. Furthermore, the core designs may be multiple (e.g., both convergent and explanatory/exploratory) in a large-scale project. Thus, once we draw the procedures for the experimental design, the case study, the participatory or social justice framework, or the evaluation process, we consider the core designs being used that reflect the combination of quantitative and qualitative data methods.

We can illustrate how this procedure might work for diagramming a complex mixed methods design. First, examine Figure 4.11. In it we indicate two places where a mixed methods core design might be mapped onto this program evaluation. In the first instance, the mapping is a convergent design in which the researchers are collecting both quantitative and qualitative data to compare the results. In the second instance, the mapping consists of an explanatory sequential design in which the qualitative data collection builds on the quantitative phase in order to explain the quantitative results in more depth. In both instances in the procedures, we clearly indicate where the mixed methods core designs fit into the evaluation steps by using arrows to indicate this intersection. This procedure—first drawing the steps in the application (the five shaded boxes in Figure 4.11), then mapping the mixed methods core design into the steps (the two clear boxes in Figure 4.11)—has helped us understand and portray the role of mixed methods within large, complex applications.

Figure 4.11 A Complex Diagram Indicating the Steps in Implementing a Program Evaluation Procedure With Mixed Methods Core Designs Added


Needs Assessment **Mixed Methods Stage**—interviews, observations, documents, surveys
Theory Conceptualization Specific to Setting **Quantitative Stage**—literature review stage
Instrument and Measures Development **Quantitative Stage**—measures and instruments
Program Implementation and Testing **Quantitative Stage**—experimental intervention based on quantitative measures
Program Follow-Up and Refinement **Qualitative Stage**—interviews, observations, and documents
Mixed methods convergent core design comparing qualitative and quantitative data
Mixed methods explanatory sequential core design using qualitative data to explain quantitative intervention results

Summary

The core designs of Chapter 3 can be intersected within other applications in research. When this occurs, we refer to them as complex designs, although writers identify them by varied names. For many years we have been tracking these complex designs, and now we are taking a stand that our thinking has evolved and perhaps improved. Overall, we see complex designs as typically large projects with multiple phases that span several years and are supported by extensive funding. Smaller projects, such as dissertation studies, may also be complex in that they involve more steps, phases, or procedures than our core designs. A useful classification of these complex designs is found in Plano Clark and Ivankova (2016). They suggest that these complex (or, as they call them, intersecting) designs continue to emerge (and may overlap at times) but that they might be organized into three categories: (1) those in which the core design is formed when a secondary method is embedded within a primary *design*, (2) those in which the core design is added to another *methodology*, and (3) those in which the core design is framed within a larger *theoretical* framework. They give numerous illustrations of emerging complex designs within the field of mixed methods.

In this chapter we emphasize four complex designs: (1) the mixed method experimental design (i.e., a secondary qualitative method is embedded within a larger design) (2) the mixed methods case study design (i.e., a core mixed methods design is applied within a larger methodology); (3) the mixed methods participatory-social justice design (i.e., a core mixed methods design is embedded within a theoretical framework), and (4) the mixed methods evaluation design (i.e., a core mixed methods design is encased within an evaluation process). In the mixed methods experimental design, researchers add qualitative data into a quantitative experiment before, during, or after the experiment. Mixed methods case study designs involve adding a core design, such as a convergent design, into a project aimed at the development of distinct cases and often a comparison among the cases. The mixed methods participatory-social justice design uses a participatory approach involving participants and stakeholders in a project or a theoretical lens that surrounds the use of a mixed methods core design. A mixed methods evaluation project embeds a core design into an evaluation framework that has distinct qualitative (e.g., assessing community needs) and quantitative components (e.g., testing the implementation of a program). For each of these complex designs, we have (1) illustrated a general definition for it, (2) indicated the intent for using the design, (3) listed conditions for choosing the design, (4)

examined philosophical assumptions and theories that may underpin the design, (5) indicated the specific procedures for conducting the design, (6) specified where integration occurs within the design, (7) noted the strengths and challenges in using the complex design, and (8) highlighted variants of the design. We have also provided in this chapter examples of published journal articles that illustrate each of the four complex designs.

Further, learning how to draw diagrams of complex designs is also important. Our recommended procedure is to have a researcher (or team of researchers) first draw the steps or phases in their project, noting the flow of quantitative and qualitative data into the project. Then we highlight one or more core mixed methods designs within these steps or phases, noting whether the core design is a convergent design, an explanatory sequential design, or an exploratory sequential design, or some combination of these.

Activities

1. Locate a journal article in which the authors report using the same complex mixed methods design you are planning for your own study. Make a list of different ways that you can learn from and use this study in your work.
2. Draw a diagram of this study's complex design by first drawing the stages in the research process. Indicate within your diagram the place(s) where integration of the quantitative and qualitative data will occur. Use an arrow to point to each place where integration occurs. Use the guidelines advanced in Figure 3.2 for drawing your diagram as well as the advice offered in this chapter.
3. Discuss the intent of this complex design and specify in what ways its procedures go beyond simply a core mixed methods design. Also, provide a rationale for why the authors might have chosen this type of mixed methods design for a project.

Additional Resources to Examine

For examples of mixed methods studies using different complex designs, see the following resources:

- Plano Clark, V. L., & Creswell, J. W. (Eds.). (2008). *The mixed methods reader*. Thousand Oaks, CA: Sage.
- Weisner, T. S. (Ed.). (2005). *Discovering successful pathways in children's development: Mixed methods in the study of childhood and family life*. Chicago, IL: University of Chicago Press.

For discussions about complex applications of the core designs, see the following resources:

- Creswell, J. W. (2015). *A concise introduction to mixed methods research*. Thousand Oaks, CA: Sage.
- Curry, L. A., & Nunez-Smith, M. (2015). *Mixed methods in health sciences research: A practical primer.* Thousand Oaks, CA: Sage.
- Ivankova, N. V. (2015). *Mixed methods applications in action research: From methods to community action*. Thousand Oaks, CA: Sage.
- Nastasi, B. K., & Hitchcock, J. H. (2016). *Mixed methods research and culture-specific interventions: Program design and evaluation.* Thousand Oaks, CA: Sage.
- Plano Clark, V. L., & Ivankova, N. V. (2016). *Mixed methods research: A guide to the field.* Thousand Oaks, CA: Sage.

5 Introducing a mixed methods study

After we learn the characteristics of mixed methods research, assess the preliminary considerations, and select a research design, we may begin the more detailed process of designing and conducting a mixed methods study. This chapter discusses how the beginning of a mixed methods study might be shaped. It starts with designing a title for your mixed methods study. We realize this may be an unusual place to begin, but the title becomes a focusing device to help shape the study; it can be stated in draft form and then revised as the project proceeds. The next step is writing an introduction to the study. This includes discussing the research problem that led to the need for the study, which is followed by a purpose statement and research questions. The title, as well as the introductory sections that follow, are embedded with mixed methods features. We expect the idea of mixed methods purpose statements and research questions (or study aims) will catch some off guard since these specific mixed methods adaptations are not traditionally included in research methods texts. However, crafting these items is an important step in good mixed methods research because they tie together the overall purpose of the study and the methods that follow.

To assist researchers with applying the ideas in this chapter, we provide templates and scripts to illustrate how we would design certain features of an introduction. Although these writing aids may seem formulaic, we intend them to be general guidelines for writing mixed methods research rather than rigid standards. We use them because the components of mixed methods design we advance in this chapter are essential features that need to be absolutely clear in a study and because mixed methods introduces new language and ideas in the field of research methods that may be unfamiliar to those writing in the social and health sciences. The templates and scripts therefore provide a starting point for drafting these essential components.

This chapter addresses four steps needed for introducing a mixed methods study. These steps are

- writing a mixed methods title that reflects a type of mixed methods design,
- developing an introductory section that highlights the research problem that led to the study,
- scripting a purpose statement that includes the appropriate mixed methods elements and that relates to a type of mixed methods design, and

- writing a mixed methods research question (as well as quantitative and qualitative research questions) that aligns with the type of design being used in the study.

Writing a Mixed Methods Title

Many researchers do not pay much attention to titles or simply draft them late in a study when one is needed. In contrast, our approach is to emphasize the significance of titles. They serve as important signposts in a research study and help to keep researchers focused on the primary aim of their study. We see a preliminary title as a work in progress that can be shaped and revised as the project proceeds.

In general, titles need to convey basic information about a study so that other researchers can easily grasp the meaning of the study when it is referenced in the literature. Typically, titles are short, often containing 12 words or less. Good titles reflect four major components: the major subject area or topic being researched, the study participants, the site or place where the research takes place, and the general research approach. We recommend the content of the title follow this order, if possible. The participants and site are often combined, especially if the site is implied in the description of the participants, as with a study on high school science teachers' social interaction.

Qualitative and Quantitative Titles

Before discussing recommended mixed methods titles, we consider the aspects that differentiate good qualitative and quantitative titles. For **qualitative study titles**, researchers may state a question or use literary words or phrases, such as quotes, metaphors, or analogies. Qualitative titles include several components: the central phenomenon (or concept) being examined, the study participants, and the site at which the study will occur. In addition, a qualitative title might include the type of qualitative research being used, such as ethnography or grounded theory. Qualitative titles do not suggest a comparison of groups or a relationship among variables. Instead, they explore one idea (the central phenomenon) to achieve an in-depth understanding (Creswell, 2015c). These sample titles illustrate these components:

- "'If I Feel Something Wrong, Then I Will Get a Mammogram': Understanding Barriers and Facilitators for Mammography Screening Among Chilean Women" (Püschel, Thompson, et al., 2010)
- "Waiting for a Liver Transplant" (Brown, Sorrell, McClaren, & Creswell, 2006)
- "How Rural Low-Income Families Have Fun: A Grounded Theory Study" (Churchill, Plano Clark, Prochaska-Cue, Creswell, & Ontai-Grzebik, 2007)

For **quantitative study titles**, investigators typically compare groups or relate variables. In fact, the primary variables are evident in the title, as are the participants and possibly the site for the research study. Certain phrases in a title, such as *a comparison of*, or *the relationship between*, or *prediction of*, signal quantitative studies. Sometimes researchers mention the theory being tested, the quantitative approach, the prediction being made in the study, or the foreshadowed results. As with qualitative titles, quantitative titles are short and concise. Three examples of quantitative titles are listed here:

- "Strategies for Increasing Mammography Screening in Primary Care in Chile: Results of a Randomized Clinical Trial" (Püschel, Coronado, et al., 2010)
- "Affirmation of Personal Values Buffers Neuroendocrine and Psychological Stress Responses" (Creswell et al., 2005)

- “Academic Performance Gap Between Summer-Birthday and Fall-Birthday Children in Grades K–8” (Oshima & Domaleski, 2006)

Clearly, the titles for qualitative and quantitative studies reflect some basic differences between qualitative and quantitative research, such as the study of a single phenomenon versus multiple variables, the language of exploration versus explanation and relationships, and a clinical trial predicting outcomes rather than a qualitative exploration. Given these differences, how would one write a mixed methods title that combines elements of both qualitative and quantitative research?

Mixed Methods Titles

It is important to write a specifically worded title that conveys the use of mixed methods in the study. **Mixed methods study titles** provide reviewers with an introduction to this form of research. They foreshadow the use of mixed methods and the type of mixed methods design the researcher will use. They also give increased visibility to mixed methods as a distinct approach in the social and human sciences. Since many see mixed methods as an emerging approach to research, we can highlight its use by incorporating words that denote this form of inquiry in the title.

Here are some basic components of a good mixed methods title:

- It is short and succinct.
- It mentions the major topic being addressed, the participants in the study, and the location or site of the project (if not identified by the participant identification).
- It includes the words *mixed methods* to highlight the overall approach being used.
- It is often neutral in that it does not include terms associated with either quantitative or qualitative research. An exception to this is when there is a priority given to either the quantitative or the qualitative approach. The best practice is to first write the title in a neutral form and then revise it later when the type of mixed methods design is firmly in place and the relative emphasis given to quantitative or qualitative research is known.
- It contains words that suggest the specific type of mixed methods design used in the study. If the type of design is still emerging at the time of drafting the title, the title can later be revised after the decision is made.

In addition to this general guidance, further considerations come into play for each major type of mixed methods design. For a convergent design, we recommend writing a title that is neutral in its orientation toward either quantitative or qualitative forms of research. Because the basic feature of this design is to merge both quantitative and qualitative data, we do not want the title to lean in one direction or the other. The leaning comes through in the words used that denote either a qualitative or quantitative orientation. For example, examples of qualitative words might be *explore, meaning, discover, generate*, or *understanding*. Quantitative words might include *predict, relationship,*

comparison, correlates, and *factors*. These words should be left out of the titles, or, alternatively, both qualitative and quantitative words might be included.

The following example of a title for a study using a convergent design conveys how a title may be neutral. In this example, there is one topic being studied: food safety behavior. In addition, the words *mixed methods* were included to designate it as a mixed methods study:

- "A Mixed Methods Approach to Investigating Food Safety Behavior in a Sample of Native American and Hispanic Caregivers of Young Children" (Siebert et al., 2014)

In the next examples of titles of studies using a convergent design, the authors neutralized the qualitative and quantitative words by inserting both. They also included the words *mixed methods*. In the first example, the reader is introduced to both the quantitative and qualitative orientation through words such as *closed* and *open-ended* in the title, and, in the second example, through the words *own words* and *numbers*:

- "Closed and Open-Ended Question Tools in a Telephone Survey About 'The Good Teacher': An Example of a Mixed Methods Study" (Arnon & Reichel, 2009)
- "In Their Own Words and by the Numbers: A Mixed-Methods Study of Latina Community College Presidents" (Muñoz, 2010)

Another approach would be to specify both *quantitative* and *qualitative* approaches in the title:

- "Unwritten Rules of Talking to Doctors About Depression: Integrating Qualitative and Quantitative Methods" (Wittink, Barg, & Gallo, 2006)

In an explanatory sequential design, with its focus on explaining the initial quantitative phase with qualitative data, the emphasis in the title is often placed on the quantitative phase and the variables studied. The following examples illustrate this approach. They make explicit the quantitative component first in the title:

- “Multimethod Measurement of High-Risk Drinking Locations: Extending the Portal Survey Method With Follow-Up Telephone Interviews” (Kelley-Baker, Voas, Johnson, Furr-Holden, & Compton, 2007)
- “Grit Within the Context of Career Success: A Mixed Methods Study” (Clark, 2016)

In an exploratory sequential design, different models exist for how to design the title. One is to begin with qualitative words because the study starts with a qualitative exploration. Another is to emphasize what the study leads up to, such as the development of a quantitative survey comparing groups, as in the case of the instrument development type of design. An example of starting with a qualitative exploration using the word *perceptions* is illustrated in the first and second examples below. In the first example, the initial qualitative phase led to the development of an online quantitative survey. The second example illustrates the study’s use of initial qualitative data to build a conceptual model that was tested using quantitative data. Another strategy is to identify the study steps (i.e., develop and validate) in the title, as can be seen in the third example:

- “Perceptions of Leadership: An Examination of College Students’ Understanding of the Concept of Leadership” (Haber, 2012)
- “Perceptions and Receptivity of Nonspousal Family Support: A Mixed Methods Study of Psychological Distress Among Older, Church-Going African American Men” (Watkins, Wharton, Mitchell, Matusko, & Kales, 2015)
- “Development and Validation of a Racial Discrimination Measure for Cambodian American Adolescents” (Sangalang, Chen, Kulis, & Yabiku, 2015)

In a mixed methods experimental design, we also suggest that the words *mixed methods* be included in the title. The title should reflect the use of embedded qualitative data and possibly the reason for the use of that data. In the two examples that follow, both of the studies were intervention trials with a qualitative component:

- “Improving Design and Conduct of Randomised Trials by Embedding Them in Qualitative Research: ProtecT (Prostate Testing for Cancer and Treatment) Study” (Donovan et al., 2002)
- “Group Music Therapy for Patients With Persistent Post-Traumatic Stress Disorder—An Exploratory Randomized Controlled Trial With Mixed

Methods Evaluation" (Carr, d'Ardenne, Sloboda, Scott, Wang, & Priebe, 2012)

In a mixed methods case study design, it is important to mention the case or cases being examined and to frame this case analysis within a mixed methods core design. In the following examples, the researchers identified the cases studied using a convergent core design to compare the quantitative and qualitative results:

- "Community Resilience in Southern Appalachia: A Theoretical Framework and Three Case Studies" (Smith, Moore, Anderson & Siderelis, 2012)
- "Privacy, Security and the National Health Information Network: A Mixed Methods Case Study of State-Level Stakeholder Awareness" (Galt et al., 2008)

In a mixed methods participatory-social justice design, we would expect to see the theoretical framework being advanced in the title as a major topic of interest and wording incorporated to suggest an injustice or a need of a specific group. In the first example, black feminist theory is emphasized, and in the second, the injustice of "myths" in college student–athlete cultures is the study focus:

- "African American Women's Infant Feeding Choices: Prenatal Breast-Feeding Self-Efficacy and Narratives From a Black Feminist Perspective" (Robinson & VandeVusse, 2011)
- "Understanding Community-Specific Rape Myths: Exploring Student Athlete Culture" (McMahon, 2007)

In a mixed methods evaluation design, the title needs to capture the spirit of the many phases of an evaluation project. The title could also emphasize the evaluation of a program consisting of many phases. These illustrations suggest such an orientation:

- "Expanding the Scope of Humanitarian Program Evaluation" (Bolton et al., 2007)
- "Research in Action: Using Positive Deviance to Improve Quality of Health Care" (Bradley et al., 2009)

Stating the Research Problem in the Introduction

After the researcher writes the title, framing it within both mixed methods research and the type of design, the next section to be developed is the **statement of the problem**, which introduces a study and presents the researcher's argument for studying the research problem and the need for use of mixed methods. This introduction is important whether the study is a proposal, a journal article, a manuscript for conference presentation, or a dissertation or thesis. The statement of the problem conveys a specific problem or issue that needs to be addressed and the reasons why the problem is important to study. We will first review the basic components that go into a statement of the problem section and then discuss how elements of mixed methods research can be included in this statement.

Topics in a Statement of the Problem Section

The structure for writing an effective introduction for a research study as a statement of the problem includes several components: the topic, the research problem, the literature, the deficiencies of the literature, and the targeted audiences (see Creswell, 2013). These components provide a guide to use when writing the statement of the problem:

- **Introduce the topic.** Begin with a paragraph that identifies the topic of the study in a way that will appeal to a wide readership. This paragraph might begin with statistics about the problem, a call for more research about the topic, or a thought-provoking question.
- **Identify the problem.** Discuss the issue that led to the need for the study. To write this component, consider beginning with the words *an issue faced by* or *a current problem is*. Further, consider drafting the description of the problem from more than one standpoint. The first standpoint would look at the problem from the perspective of an issue that exists in the day-to-day real world or in the lives of individuals. For example, students are at risk today because of crime in the schools, or senior citizens feel disempowered because of health issues. These are real-world problems, and they deserve to be studied. The second standpoint would consider a problem related to a need for further research on a topic. This need may arise because of a gap in the existing body of knowledge or a need to extend the current research to a new population or to new variables. A strong problem statement might include several statements that describe both a real-world problem in our society and a weakness or gap in the literature.
- **Discuss the research that has addressed this problem.** In this component of the introduction, indicate the published literature on the problem. Think in terms of reviewing the literature in broad themes surrounding entire groups of studies rather than focusing on individual studies (that are discussed in a literature review section). How could the present literature be organized and summarized? Identify the major themes of each group of studies to give readers a general understanding of existing trends. In this review, draw on quantitative, qualitative, and mixed methods research studies.
- **Indicate deficiencies in the literature and what knowledge is needed to fill this gap.** A good statement of the problem explicitly identifies existing gaps in the literature. These gaps may be content areas not addressed or flaws in the research methods that have been used (e.g., all of the studies

have been quantitative studies, so we have not heard the voices of participants through qualitative studies). If the discussion of the problem addresses these gaps, there is no need to repeat information; instead focus on how the missing knowledge that is needed will add to the literature and make an important contribution.

- **Identify audiences that will benefit from addressing this gap or deficiency.** Several audiences might be specifically identified that will benefit from having the missing knowledge, such as researchers, policymakers, administrators, teachers, providers, and others. It is useful to name several audiences that could make use of the missing knowledge and enumerate the ways each might benefit by having it.

Taken together, these five components should lead to an effective argument that the study is needed. The introduction (statement of the problem) should then end with the study's purpose statement and possibly some research questions or hypotheses. These topics will be addressed later in this chapter.

Integrate Mixed Methods Into the Statement of the Problem

How does mixed methods research fit into the introduction? Although the components included in an introduction do not necessarily relate to the methods or design used in a study, it is useful to *foreshadow* the type of mixed methods design as early as the opening passages of the introduction. One way to do this is to suggest the type of mixed methods design to be used within the literature deficiencies passage in the introduction. This is because the choice of a mixed methods design is partly based on a need arising out of gaps in the literature. Examine Table 5.1. Here we identify examples of the needs in the literature that call for each of the mixed methods designs. You could include the arguments for the chosen mixed methods design with the other deficiencies in the literature mentioned in your introduction and effectively foreshadow the type of design that will be developed later in your study.

An example of how a literature deficiency addressed by a type of mixed methods design can be integrated into an introductory statement for a study of leadership styles follows:

> The literature has examined transformational leadership, trait-based leadership, and person–situation leadership. These studies have all been quantitative investigations that describe differences in leadership behaviors but do not incorporate the voices of participants to describe the meaning behind the differences. One issue that arises, then, is that quantitative results alone are inadequate to describe and fully explain leaders' behaviors. (This issue implies that a need exists for an explanatory sequential design.)

TABLE 5.1 ■ Deficiencies in the Literature Related to the Different Mixed Methods Designs

Type of Mixed Methods Design	Example Deficiencies and Needs Existing in the Literature
Convergent design	A gap exists because past research has only provided a partial view by using either quantitative or qualitative approaches. There is a need for a more complete understanding through comparing and synthesizing both quantitative and qualitative data.
Explanatory sequential design	A gap exists because past research has not adequately explained the mechanisms or contexts behind quantitative relationships/differences/trends. There is a need to not only obtain quantitative results but to explain such results in more detail, especially in terms of detailed voices and participant perspectives.
Exploratory sequential design	A gap exists because past research has not identified the key variables or because appropriate instruments/materials are not available. There is a need to explore a topic and develop quantitative instruments/materials that are sensitive to participants and sites being studied.
Mixed methods experimental design	A gap exists because past research has not adequately captured personal views and participants' context when testing outcomes of an intervention. There is a need to add qualitative data into a quantitative experimental (intervention) trial to enrich the trial.
Mixed methods case study design	A gap exists because past research has not adequately examined/described/compared cases in terms of important dimensions. There is a need to use both qualitative and quantitative data to describe or form cases and then to compare the cases to highlight differences on some criteria.
Mixed methods participatory-social justice design	A gap exists because past research has not adequately involved participants and considered inequities from a specific theoretical perspective. There is a need to use both qualitative and quantitative data to incorporate the measured indicators and personal experiences of stakeholders in the process of research and to challenge oppression and advocate for theoretically oriented change.
Mixed methods evaluation design	A gap exists because past research has not resulted in an adequate program. There is a need to use qualitative process data and quantitative outcome data within an evaluation procedure to best develop, test, and refine the program within the settings of interest.

Source: Adapted from Creswell & Plano Clark (2011).

Source: Adapted from Creswell & Plano Clark (2011).

Developing the Purpose Statement

A mixed methods purpose statement can also include language to suggest a mixed methods design. In some projects, the purpose statement is called a study aim. However, in our discussion to follow, we will refer to *purpose statements* to suggest the overall intent and objectives of a study. Before we turn to useful scripts for writing such a statement, it might be helpful to review the key elements of both quantitative and qualitative purpose statements (see Creswell, 2013).

Qualitative and Quantitative Purpose Statements

A **qualitative purpose statement** conveys the overall purpose of the qualitative study and identifies a central phenomenon, the study participants, the research site for the study, and the type of qualitative design in the study. It begins with phrases such as *the purpose of this study*, or *the intent of this study*, or *the aim of this study*. The statement also contains words denoting the one concept being explored in the qualitative study. This concept is called the central phenomenon. The writer includes action verbs to indicate an exploration of this central phenomenon. Words such as *describe*, *understand*, *explore*, and *develop* convey this exploration and the emerging understanding of the central phenomenon that will develop during the study. Because a qualitative study conveys multiple perspectives of participants, its purpose statement should not contain leading or directional words that convey a stance, such as *positive, useful*, or *predicts*. The qualitative inquirer takes a nondirectional stance. Also, some reference might be made to the type of qualitative design or methods used in the study, such as an ethnography, a case study, or a grounded theory study. Finally, the qualitative purpose statement can also contain information about the individuals or sites that will be involved in the project.

An example of a qualitative purpose statement follows. It begins with the purpose, identifies the type of qualitative design, uses an action verb phrase, specifies the central phenomenon, and mentions the participants and the location for the study. This statement also demonstrates the lack of directional words and words relating variables or comparing groups:

> The purpose of this ethnographic study is to explore the culture-sharing behaviors and language of the homeless in a soup kitchen in a large Eastern city.

In a **quantitative purpose statement**, the researcher conveys the overall quantitative purpose of the study and presents the variables in the study, the study participants, and the site for the research. The use of directional language and variables are central features. Writers specify their independent and dependent variables and typically order them left to right from independent to dependent. They begin with phrases such as *the purpose of the study,* or *the intent of the study,* or *the aim of the study* and may identify the theory being tested in the

study. Phrases that connect the variables, such as *the relationship between* or *a comparison of*, reflect the relationship among the variables in the study. As with qualitative research, the quantitative purpose statement might include the type of methods that will be employed and refer to the participants and the site for the study. This example illustrates these elements in a good quantitative purpose statement:

> The purpose of this correlational study will be to test sex-role theory, which predicts that males will be more conditioned than females to aggressive roles in college.

Mixed Methods Purpose Statements

A mixed methods purpose statement builds upon both qualitative and quantitative research aims but assumes a different form because it needs to address both types of research as well as the integration of the data. A mixed methods purpose statement can be fully developed with many components or abbreviated depending on the audience for a study. In a journal article, the purpose statement (or study aim) is often abbreviated to conserve space, whereas for a dissertation project or an application for funding, a more complete version with all of the elements needs to be included. For our discussion, we will emphasize the longer version. Also, we have found it useful to provide specific scripts for writing mixed methods purpose statements because this statement is the most important one in a research project. If this statement is not clear at the outset of a study, a reader often has difficulty understanding the remainder of the study. Clear purpose statements are important in all types of research, but the need for clarity is especially important in a mixed methods project in which many elements of qualitative and quantitative research need to be combined.

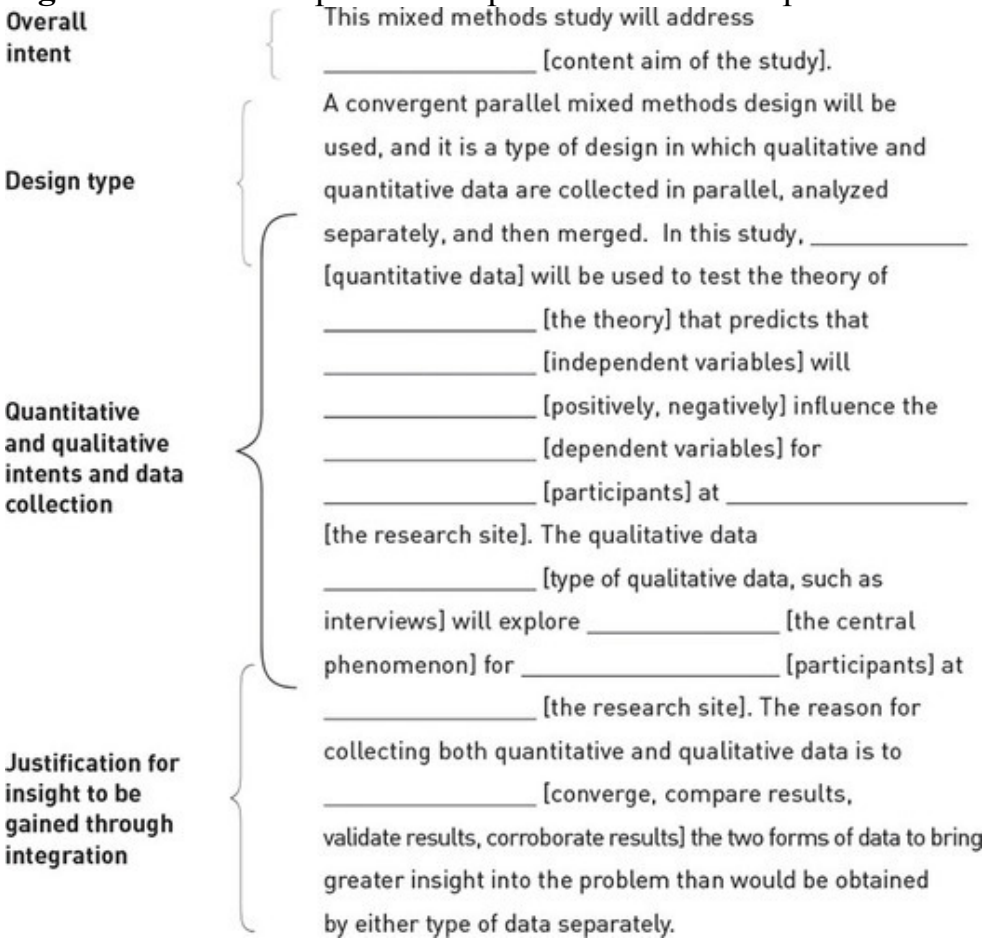
A **mixed methods purpose statement** conveys the overall purpose of the mixed methods study, and it includes the intent of the study, the type of mixed methods design, quantitative and qualitative purpose statements, and the justification for integrating the quantitative and qualitative data. The specific elements are as follows:

- Include the overall intent (the content aim) of the project in the first sentence. Begin with phrases such as *the purpose of this study is*, *the study aim is, the intent of this study is,* or *this study addresses*.
- Identify the type of mixed methods design using the design's full name (e.g., explanatory sequential design) so the reader is introduced to the specific type of methods that will be used. Provide a brief definition of the type of design.
- Identify the specific quantitative and qualitative types of data to be collected as well as the intent, the study participants, and the site for the two strands of the study.
- State the justification for the additional insight that will result from integrating both forms of data (see Chapters 3 and 4).

An example of a script that illustrates these points is presented in Figure 5.1. This example presents a model script for a convergent design, and it includes the major

components we would place in a detailed, fully developed mixed methods purpose statement: the intent of the study, the type of design and a brief description of it, the quantitative and qualitative data collection and intents, and a justification for integrating both sets of data to result in additional insight. To use this script, researchers fill in the blanks with information from their own study and keep the elements of the script in order. In this way, it provides a complete, detailed mixed methods purpose statement.

Figure 5.1 An Example of a Purpose Statement Script for a Convergent Design



Source: Adapted from Creswell & Plano Clark (2011).

A completed example of this convergent design script is the statement we designed in collaboration with workshop participants at the Qualitative International Conference at Edmonton, Canada, in February 2005. Here is the script that we developed, with slight changes to fit our model:

> The intent of this study is to learn about the food choices of First Nations women with Type 2 diabetes. A convergent mixed methods study will be used to compare and discuss similarities and differences of both quantitative (numeric) and qualitative (text or image) data. In this approach, survey data will be used to measure the relationship between the factors (e.g., family backgrounds) and food choices. At the same time in the study, individual food choices will be explored using interviews and participant observations with First Nations women with Type 2 diabetes in northern Manitoba. The reason for collecting both quantitative and qualitative data is to determine whether literature-based survey responses differ from individual perspectives and, if so, to identify why these responses and perspectives might differ.

In an explanatory sequential design, the order of phases—from quantitative to qualitative—highlights the sequence of procedures used in this design. Also, the second, qualitative phase is tentatively stated because the central phenomenon and perhaps the participants and site cannot be clearly specified until after the initial quantitative phase of the study has been completed. The justification for this design—the explanation of the quantitative results with qualitative data—comes toward the beginning of the script. This justification explains that a need exists to probe the quantitative results in more detail in order to explain surprising findings, contrary information, and unusual findings.

> The purpose of this study is _____ [content aim of the study]. An explanatory sequential mixed methods design will be used that involves collecting quantitative data first and then explaining the quantitative results with in-depth qualitative data. In the first, quantitative phase of the study, _____ [quantitative instrument] data will be collected from _____ [participants] at _____ [the research site] to test _____ [name of theory] to assess whether _____ [independent variables] relate to _____ [dependent variables]. The second, qualitative phase will be conducted as a follow-up to the quantitative results to help explain _____ [an aspect of the quantitative results]. In this exploratory follow-up, the tentative plan is to explore _____ [the anticipated central phenomenon] with _____ [participants] at _____ [the research site].

A student in one of our mixed methods classes provided an example of this purpose statement as a class project:

> The intent of this study is to examine Latino adolescents' perspectives on family conflict. This two-phase, explanatory mixed methods study will obtain statistical quantitative results from a sample and then follow up with a few individuals to probe or explain those results in more depth. In the first phase, quantitative hypotheses will address the relationship of acculturation and family conflict with Latino adolescents at their respective middle school and/or high school in Southern California. In the second phase, qualitative semi-structured interviews will be used in a multiple case study to explore aspects of family conflict with 4 individuals representing different combinations (from the quantitative results) at a Middle School and a High School. (Cerda, 2005)

In an exploratory sequential design purpose statement, the justification for integrating the qualitative and quantitative data is introduced in the beginning where the rationale for the initial qualitative strand is introduced. Although the details of the second, quantitative phase may not be able to be specified because the qualitative phase builds into the quantitative phase, it is important to convey the general intent for this two-phase design within the purpose statement. If readers need to specify quantitative research questions and hypotheses at the planning stage (as is often the case in dissertation or funding proposals), they can be stated as tentative statements.

> The purpose of this study is _____ [content aim of the study]. An exploratory sequential design will be used to first explore qualitatively to develop a context-specific and sensitive quantitative _____ [a survey, a new measurement instrument, a set of intervention activities, a website to be used, etc.] that will be quantitatively tested. The first phase of the study will be a qualitative exploration of _____ [the central phenomenon] in which _____ [types of data] will be collected from _____ [participants] at _____ [the research site]. From this initial exploration, the qualitative findings will be used to develop _____ [a survey, a new measurement instrument, a set of intervention activities, a website to be used, etc.] that can be administered to a large sample. In the tentatively planned quantitative phase, _____ [survey, etc.] will be collected from _____

> [participants] at _____ [the research site] to _____ [quantitative intent, such as test effectiveness, measure prevalence, or assess validity of an instrument].

An example of this purpose statement is drawn from another student paper in one of our mixed methods classes:

> This study will address language brokering (children serving in the role of interpreters) among immigrant families. The purpose of this two-phase, exploratory mixed methods study will be to explore participant views with the intent of using this information to develop and test an instrument with a Latino sample from a Midwestern city. The first phase will be a qualitative exploration of what it means for Latino parents to have their son or daughter serve in the role of the language broker or interpreter/translator by collecting interview data from a sample of 20 Latino parents from a mentoring program at a Midwestern university. Because there are no existing instruments to assess language brokering, an instrument needs to be developed based on the qualitative views of participants. Statements and/or quotes from this qualitative data will then be developed into an instrument so that a series of hypotheses can be tested that relate to parents' views about language brokering for a group of 60 Latino parents whose children participate in an after school program for Latino students (elementary to high school) at the Hispanic Community Center at a Midwestern city. (Morales, 2005)

In a mixed methods experimental (intervention) design purpose statement, the basic components need to be in place: the intent of the study, a description of the design, the quantitative and qualitative data collection, and the justification for the design. In particular, the statement needs to address how and in what way the qualitative data will be added into the intervention design.

> The purpose of this study is _____ [content aim of the study]. A mixed methods experimental design will be used in which _____ [qualitative data] are embedded within an intervention trial. The _____ [intervention design type: e.g., single-subject, randomized control trial, quasi-experimental] will be used to test the _____ [treatment condition] compared to _____ [control condition] in terms of the impact on _____ [dependent variable] for _____

> [participants] at _____ [the research site]. The _____ [type of qualitative data] will be embedded in this larger design _____ [before, during, or after] for the purpose of _____ [justification for the use of qualitative data]. The qualitative data will explore _____ [the central phenomenon] for _____ [participants] at _____ [the research site]. The qualitative results will be combined with the quantitative outcome results to _____ [the additional insight anticipated from combining the two sets of results within the intervention trial].

An example of the use of this script is found in this purpose statement designed in a mixed methods workshop:

> The primary intent of this investigation will be to test a case management intervention enhanced by automated pharmacy and clinical information to improve blood pressure control in Veterans' Affairs hospitals. The objectives will be to improve blood pressure control among patients with hypertension through more appropriate use of medication, and to augment case management through the use of electronic pharmacy and clinical data for more effective treatment of uncontrolled hypertension. The research design of the study will be an embedded mixed methods intervention design, and it will involve collecting qualitative data before and during the intervention phases of the study. In the initial qualitative phase of the study, the investigators will collect qualitative data to explore potential barriers to the intervention before the intervention begins. Then during the trial, qualitative data will be collected to understand the patient experiences with the intervention. At the baseline, at multiple points during the trial, and at the conclusion, quantitative data will be collected on several survey and patient clinical data outcomes. (Creswell, 2005)

In a mixed methods case study, the intent is to cover the major features of a good purpose statement and also include information about the case or case(s). It is important to be specific about the case and its boundaries and scope.

> The purpose of this study is _____ [content aim of the study]. A mixed methods case [or comparative case] study design will be used in which qualitative and quantitative data will be collected and analyzed

> concurrently to _____ [support or generate case(s)]. These case(s) represent _____ [the bounding or description of the case(s)]. Qualitative data will be gathered examining _____ [the central phenomenon] from _____ [participants] at _____ [the research site]. In addition, quantitative data will consist of _____ [surveys, measures, instruments] from _____ [participants] at _____ [the research site] based on _____ [major variables]. The reasons for using both forms of data to _____ [support or generate] cases is to develop an in-depth understanding of the cases and to make a comparison among the cases.

An example of a multiple or comparative case study comes from Kerrigan (2014). First we will reproduce the exact brief purpose statement that she advanced in her journal article, and then we will slightly reframe and expand it to reflect our template with all of the components of a mixed methods case study:

> This article advances our understanding of DDDM (data-driven decision making) capacity to explore the relationship between organizational capacity and implementation of DDDM at four community colleges participating in an initiative to improve student success. (Kerrigan, 2014, p. 341)

This is an example of a short purpose statement that might have included additional elements. It states the intent (or content) for the study, mentions the quantitative relationship being explored, and situates the study in four cases—four community colleges participating in an initiative to improve student success. The title of the article does convey the type of core design being used (a convergent design), and this element could have been included in the purpose statement. Further, the type of qualitative data being collected and how it was integrated into the design might also have been mentioned. Our rewrite, using the above script for a mixed methods case study, would be as follows:

> This study addressed data-driven decision making (DDDM) as applied to improving student success in community colleges. For this study, replication logic was used to identify four community college cases and the four cases were compared using a mixed methods case study design. In this design, qualitative and quantitative data were collected and analyzed concurrently to support the analysis of the cases. The researcher collected both the

> quantitative and qualitative data in the same phase, merged the data for each college, and then compared the cases. Quantitative data consisted of survey data from selected administrators and randomly selected faculty at the four colleges. Qualitative data consisted of interviewing purposefully selected faculty at the four community colleges. The qualitative interview data were quantitized, and within- and between-cases analyses were performed. The justification for using mixed methods was to better explain the differences in data-driven decision making at the four colleges.

In a mixed methods participatory-social justice design, several basic features of a purpose statement need to be included: the intent of the study, the participatory approach or the theoretical/conceptual lens being used in the study, the type of core design, the quantitative and qualitative data collection, and the justification for using the design. The mixed methods core design procedures can be either convergent or sequential. In the following example, we advance a purpose statement script for a mixed methods social justice project.

> The purpose of this study is _____ [content aim of the study]. A mixed methods social justice design will be used in which _____ [type of theoretical lens] will provide an overarching framework for the study and lead to empowering individuals. This lens is being used for _____ [state reason], and it has the following elements _____ [aspects of the lens]. The study will include both quantitative and qualitative data gathered _____ [concurrently or sequentially] because _____ [provide justification for core design]. The quantitative data will be used to test the theory that predicts that _____ [independent variable] will influence _____ [positively, negatively] the _____ [dependent variable] for _____ [participants] at _____ [the research site]. The qualitative data will explore _____ [the central phenomenon] for _____ [participants] at _____ [the research site]. The two forms of data will be combined to _____ [explain how the data forms will be integrated to challenge oppression and lead to action].

The following example from a published journal article illustrates a good participatory-social justice purpose statement. This example illustrates many features of a good purpose statement for this design, including identifying the

social justice lens being used (feminist principles), the core design (explanatory sequential with quantitative followed by qualitative methods), and a justification for using mixed methods (to explain the quantitative results with women's voices and lived experiences):

> To accomplish the aims of our study, we embraced a pragmatist orientation characterized by a mixed-methods approach, rather than choosing between positivism and constructivism with regard to methodology, logic, and epistemology (Marecek, 2011; Tashakkori & Teddlie, 1998). First, we quantitatively examined the links among land ownership, relationship power, and women's receipt of violence. We connected multiple levels of analysis to decenter any one aspect as primary (institutional structures or relationship dynamics) and focused instead on the processes linking power to violence. We included a qualitative component to look beyond the numbers; in other words, to gain a fuller understanding of how the social context and actual lived experience of women could help to explain the role of land ownership in reducing violence against women (Marecek, 2012). Integrating the qualitative component with quantitative analysis aligns with feminist principles that value the excavation of key voices and perspectives that have been kept silent, powerless, or subordinated (Stewart & Cole, 2007). (Grabe, Grose, & Dutt, 2015, p. 9)

In a mixed methods evaluation research design, the purpose statement needs to advance the idea that there are multiple phases (or multiple projects or multiple steps) in the evaluation procedure being used, that they unfold over time, and that they often involve multiple types of core designs (convergent and sequential). It also needs to include the convergent and sequential components in the order in which they will be undertaken in the study, as well as the basic elements of intent, type of design, types of data, and the justification for the design.

> The purpose of this mixed methods study is _____ [the intent or program objective of the study]. In this _____ [type of evaluation] design, there will be several evaluation phases (projects/steps) conducted over time. These phases (projects/steps) are _____. In the overall evaluation of these phases, the core mixed methods designs will be _____ [convergent, sequential, or both] designs and both quantitative and qualitative data will be collected and analysed in _____ phases of the evaluation. The qualitative type(s) of data will consist of

_____ [mention data types] and the quantitative type of data will be _____ [mention data types]. The justification for using mixed methods is to _____ [e.g., best understand distinct steps, add process and outcome data] in the evaluation process and determine the success of the _____ [program, trial, or evaluation activity].

The following example from an application for funding illustrates a mixed methods evaluation purpose statement:

> The purpose of this 5-year, mixed-methods international study is to explore enacted stigma behaviors among indigenous, Asian-ancestry, and European-ancestry adolescents in school environments in Canada, New Zealand, and the U.S., to develop cross-cultural measures of enacted stigma for adolescent health surveys, and to examine the association of types of stigma and HIV risk behaviors among adolescents. The specific aims are: I. To compare the prevalence of HIV risk behaviors associated with sexual orientation and other stigmatized identities among youth in existing large-scale school-based surveys, and to identify both the existing indirect measures of stigma that are risk factors plus the protective factors significantly associated with the HIV risk behaviors. II. To identify the prevalence of HIV risk behaviors and associated risk and protective factors among indigenous adolescents—American Indian (U.S.), First Nations (Canada), Maori (New Zealand)—as well as youth of Asian ancestry in each country, and to compare the patterns among adolescents of similar ethnic backgrounds in the 3 countries. III. To explore among adolescent and adult key informants the ways stigma is understood, assigned, and enforced in the school environment, and to compare the patterns within the three countries. This exploration will be focused primarily on stigma based on sexual orientation status, but other types of stigmatized identities will be examined to understand the similarities and differences of how stigma is enacted, and the potential utility of generic stigma measures. IV. Within each country, to elicit explanatory models from adolescents and youth workers on the survey findings of HIV risk behaviors and stigma, and to tap suggested strategies for reducing stigma and addressing sexual risk behaviors in culturally appropriate ways among GLBQ youth. V. Incorporating the findings of aims I-IV, to develop, pilot, and psychometrically evaluate universal and country-specific culturally competent items and scales, for population-based adolescent health surveys, that measure perceived and enacted stigma in school, to

allow cross-cultural comparisons of the effects of stigma among adolescents. (Saewye, 2003)

Writing Research Questions and Hypotheses

Research questions and hypotheses narrow the purpose statement into specific questions and predictions that will be examined in the study. In a mixed methods study, three types of questions—qualitative, quantitative, and mixed methods—are useful to present. First we will review the basic components of qualitative and quantitative questions.

Qualitative Questions and Quantitative Questions and Hypotheses

Qualitative research questions focus and narrow the qualitative purpose statement and are stated as questions, not hypotheses. They typically include a central question and several subquestions. The subquestions ask questions related to a small number of aspects of the central question topic. Subquestions usually involve no more than five to seven questions.

The central question and subquestions are concise, open-ended questions that begin with words such as *what* or *how* to suggest an exploration of the central phenomenon. Although the beginning word *why* can be found in published studies, this word implies a quantitative orientation of probable cause and effect —an explanation of why something occurred. Such an explanation is contrary to the nature of qualitative research, which looks for an in-depth understanding of a central phenomenon, not for general explanations. As with the qualitative purpose statement, the qualitative research questions focus on a single concept or phenomenon. There may be no need to include information about the participants and the research site for the study because that is already included in the qualitative purpose statement. Here is an example of a qualitative central question and subquestions from an article about a campus response to a gunman incident:

- What happened? (central question)
- Who was involved in response to the incident? (subquestion)
- What themes of response emerged during the 8-month period that followed the incident? (subquestion)
- What theoretical constructs helped us understand the campus response, and what constructs were unique to this case? (subquestion) (Asmussen & Creswell, 1995, p. 576)

Quantitative research questions and hypotheses narrow the purpose statement through research questions (that relate variables) or through hypotheses (that make predictions about the results of relating variables). Hypotheses are typically chosen when the literature or past research provides some indication about the predicted relationship among the variables (e.g., men will display more aggression than women when considered in terms of sex-role stereotypes). If predictions are made, then the researcher has the additional consideration of whether to write the prediction as a null hypothesis (“There is no significant

difference") or as a directional hypothesis ("Men display more aggression than women"). Directional hypotheses seem more popular today, and they are more definitive about the anticipated results than a null hypothesis.

Whether the researcher writes hypotheses or research questions (typically, there will not be both in the same quantitative study), he or she narrows the purpose statement so that it indicates specific variables to test. These variables are then related to each other or compared for one or more groups. The most rigorous hypotheses and questions follow from a theory in which other researchers have previously tested the relationships among variables. Here are examples of quantitative research hypotheses and a research question:

- There is no significant difference between the effects of verbal instructions, rewards, and a lack of reinforcement on learning spelling among fourth-grade children. (a null hypothesis)
- Fourth-grade children perform better on spelling tests when they receive verbal instructions than when they receive rewards or no reinforcement. (directional hypothesis)
- What is the relationship between instructional approach and spelling achievement for fourth-grade students? (research question)

Mixed Methods Research Questions

What are mixed methods questions? You will not find these questions presented in research methods books or frequently specified in empirical mixed methods studies reported in the literature. They have found their way into mixed methods discussion in the past 10 years (Onwuegbuzie & Leech, 2006; Plano Clark & Badiee, 2010; Tashakkori & Creswell, 2007a). The intent of a mixed methods question is to highlight and specify the integration of the quantitative and qualitative data in the study. Similar to other research questions, mixed methods questions should lead to the methods employed in a study and be answered in a study.

Thus, in a mixed methods project, we would recommend that researchers advance three types of research questions: (1) a quantitative research question, (2) a qualitative research question, and (3) a mixed methods research question. The reason for three questions is that this subdivision highlights that results from the quantitative and qualitative datasets are both important and that the two datasets will be combined or integrated in a study. Policy-development questions, implementation questions, or future research questions might also be added to these three. It is important to note that the particular order of these questions needs to follow the flow of phases in a particular design. For example, in an explanatory sequential design, the quantitative questions/hypotheses would be followed by a mixed methods question about integration and the qualitative questions. Alternatively, in a convergent design, either the quantitative or qualitative questions could be posed first. In complex designs, the question order would reflect the sequence in which the quantitative and qualitative questions were being answered, and the mixed methods question would come where the researchers integrated the databases.

Mixed methods research questions are questions in a mixed methods study that describe the mixing or integration of the quantitative and qualitative data. They are necessary in a mixed methods study because this form of inquiry involves the integration of the two databases. As they are research questions, mixed methods questions need to be answered (just as quantitative hypotheses or qualitative research questions need to be answered), and the mixed methods researcher needs to provide those answers in a results and discussion section. As a new type of question, mixed methods questions are rarely explicitly stated in articles and proposals, but they are implicit within the integration analyses that are conducted

in the study. Our recommendation, however, is that these questions be made explicit and clearly stated.

Plano Clark and Badiee (2010) have provided some guidance as to how researchers might state questions in a mixed methods study. They address three dimensions: (1) when to generate the mixed methods questions during the process of conducting a study, (2) whether the multiple questions in a mixed methods study might be linked or kept separate, and (3) how to write research questions. First, in terms of when the research questions are generated in a mixed methods study, the authors note that the questions might be predetermined and based on the literature, practice, personal tendencies, or disciplinary considerations. This approach may be used in a convergent design in which the data collection is set in advance. We recommend this procedure in the case of graduate students designing a mixed method study who have committee members (and human subjects ethics review board committees) requiring the specific statement of questions before the study begins. However, the questions might also be emergent and occur during the design, data collection, data analysis, or interpretation of the study. The emerging approach is consistent with traditional qualitative approaches, and this form of questioning may occur in sequential and large-scale designs. Christ (2007) illustrated how new questions emerged within an exploratory, longitudinal mixed methods study. Taking advantage of unforeseen circumstances of a budget reduction at one of his study sites, he added new questions to a third phase of his study.

Research questions in mixed methods can be linked conceptually or framed so that they are independent of each other (Plano Clark & Badiee, 2010). As an example of the latter approach, the researcher may write two or more research questions wherein one question does not depend on the results of the other. Or, conversely, one question might depend on the other. The independent type of questioning often occurs in a convergent design in which two separate and distinct strands of data (qualitative and quantitative) are collected. Intervention, case study, and participatory-social justice designs with convergent approaches also would fit this model. For example, Brady and O'Regan (2009) provided a good example of independent questions when they asked, "What is the impact of the BBBS [Big Brothers Big Sisters] program on participating youth? How is the program experienced by stakeholders?" (p. 273). The first question—a quantitative question—was addressed through surveys of youth that related to the impact of the mentoring program, while the second question—a qualitative question—was answered through interviews with stakeholders. The dependent type of questioning often occurs in sequential types of designs, such as the

explanatory design or the exploratory design, or in sequential procedures in the experimental, case study, participatory-social justice, and evaluation designs. Biddix (2009) provided a useful example of the dependent type of questions when he asked, "(1) What career paths for women lead to the community college SSAO [senior student affairs officer]? (2) What influences path decisions to change jobs or institutions?" (p. 3). The first question is a quantitative question, while the second is qualitative and depended on the results of the first question. In the first phase of the study, SSAO résumés were the primary source of data for a network analysis to identify different career paths, while the second phase consisted of interviews with SSAOs to explore influences on certain paths identified by the quantitative results.

The style of writing research questions into a mixed methods study might assume several forms (Plano Clark & Badiee, 2010). The researcher could provide an overarching mixed methods question that does not indicate a specific quantitative or qualitative approach. For example, Igo, Kiewra, and Bruning (2008) asked this question: "How do different copy-and-paste note-taking interventions affect college students' learning of Web-based text ideas?" (p. 150). In this example, the word *how* calls attention to the qualitative component of the study, and the words *do*, *affect,* and *interventions* relate to the quantitative component.

The researcher could pose a double-barreled question with two specific parts and use the quantitative approach to address one part and the qualitative approach to address the other part. For example, in a federally funded project, Kruger (2006) posed a doubled-barreled purpose statement that might have been phrased as a mixed methods question: "The purpose of the R21 mixed-methods exploratory study is to develop and test a family-nurse care coordination intervention for families" (Abstract, para.1). In this statement, the word *develop* was more open ended and thus more implicitly qualitative, whereas the word *test* indicated a quantitative approach.

The researcher could also pose separate quantitative and qualitative questions for the quantitative and qualitative strands of the study. For example, Webster (2009) had two quantitative and two qualitative questions, and his approach can be illustrated by the two questions below:

> Is there a statistically significant difference in nursing student empathy, as measured by the Interpersonal Reactivity Index (IRI), after a psychiatric nursing clinical experience? (a quantitative question)

> What are student perceptions of working with mentally ill clients during a psychiatric nursing clinical experience? (a qualitative question) (pp. 6–7)

Ideally, the mixed methods question can convey the integration of the databases. Mixed methods questions that relate to the integration or mixing of the databases can be written in several ways: with a methods focus, a content focus, or some combination of content and methods focus. A **methods-focused mixed methods research question** is a research question about mixing the quantitative and qualitative data in a mixed methods study in which the researcher focuses on the methods of the mixed methods design. For example:

- To what extent do the qualitative results confirm the quantitative results?

On the other hand, a **content-focused mixed methods research question** is a research question about mixing the quantitative and qualitative data in a mixed methods study in which the researcher makes explicit the content of the study and implies the research methods. For example:

- How do the perspectives of adolescent boys support the results that their self-esteem changes during the middle school years?

A final example is a **combination mixed methods question**, which is a research question about mixing the quantitative and qualitative data in a mixed methods study in which the researcher makes explicit both the methods and the content of the study. In this model, we see that the content of the study is included as well as the methods of the design. For example:

- What results emerge from comparing the exploratory qualitative data about boys' self-esteem with outcome quantitative data measured on a self-esteem instrument?

Of these three models for writing a mixed methods research question, we would recommend the combination model because it is most complete. However, we would not rule out the methods- or content-focused models given the inclinations of certain researchers or reviewers to emphasize more methods or more content in their studies. Also, writing a methods-focused question helps researchers to think about how the methods will be combined or linked in a mixed methods study.

Because mixed methods research questions—whether methods focused, content focused, or some combination of the two—relate specifically to the integration of the two databases, we recommend that they also relate directly to the type of design being used. This point needs further elaboration because it builds directly on our discussion about types of research designs.

Table 5.2 provides examples of the different mixed methods question forms (i.e., methods-focused, content-focused, and combination forms) for each type of design (the core designs in Chapter 3 and the complex designs in Chapter 4). We have chosen the content area of self-esteem for boys in middle school as the common topic of all of these hypothetical questions so that comparisons among them might be easily made. The convergent design mixed methods question needs to convey that the two databases are being merged, while the explanatory sequential design question addresses the use of the qualitative data to help explain the quantitative results. The exploratory sequential design question illustrates how the initial qualitative findings will be generalized to a larger sample through the quantitative data collection and analysis. The mixed methods experimental design question indicates how the embedded qualitative data will add to the intervention or experiment, such as by aiding in recruiting participants or by explaining the outcome results in more detail. The mixed methods case study design includes a mixed methods question addressing how the quantitative and qualitative data helped to generate cases for comparison or to document differences among diverse cases. The mixed methods participatory-social justice design examples show that the mixed methods question can be written from an explanatory, exploratory, or a convergent design model, but it needs to include some of the language intended by this design to address inequities, to bring about transformation, to combat injustices in our society, or to involve participants or stakeholders in the research process. The mixed methods evaluation design mixed methods question speaks to those phases of the evaluation in which the researcher combines the quantitative and qualitative data. Several mixed methods questions might be used in an evaluation design to convey a convergent design, a sequential design, or both.

TABLE 5.2 ■ Type of Design and Examples of Methods-Focused, Content-Focused, and Combination Mixed Methods Research Questions

Type of Design	Methods-Focused Mixed Methods Questions	Content-Focused Mixed Methods Questions	Combination Mixed Methods Questions (Methods and Content)
Convergent design	To what extent do the quantitative and qualitative results converge?	To what extent do self-esteem ratings agree with the views of self-esteem by middle school boys?	To what extent do the quantitative results on self-esteem agree with the focus group findings on self-esteem for middle school boys?
Explanatory sequential design	In what ways do the qualitative data help to explain the quantitative results?	In what ways do the views of middle school boys about their self-esteem explain their reported levels of self-esteem?	In what ways do the interview data reporting the views of middle school boys about their self-esteem help to explain the quantitative results about self-esteem reported on the surveys?
Exploratory sequential design	In what ways do the quantitative results generalize the qualitative findings?	Are the middle school boys' views about their self-esteem generalizable to many middle school boys?	Are the themes about self-esteem from middle school boys generalizable to a population of middle school boys?
Mixed methods experimental design	How do the qualitative findings provide an enhanced understanding of the quantitative experimental results?	How do individual experiences help to explain the results of a treatment program designed to improve self-esteem?	How do the interview data with middle school boys about their self-esteem help explain the outcomes of a treatment program implemented to bring about changes in how boys view themselves?
Mixed methods case study design	How do the qualitative and quantitative findings converge to provide an enhanced case description or generate cases for comparison?	How do individual perspectives about self-esteem converge with self-reported ratings to generate different profiles (cases) of types of students in the school?	How are the different profiles of cases (based on qualitative descriptions and quantitative ratings of self-esteem) both similar and distinct?
Mixed methods participatory-social justice design	How do the qualitative findings and quantitative results combine to provide an enhanced understanding of inequalities?	How do the views of middle school boys and outcomes of a program designated to improve self-esteem provide an enhanced understanding of how the middle school marginalizes boys?	How do the interview data with middle school boys and quantitative outcome results of the self-esteem program combine to challenge the school's culture?
Mixed methods evaluation design	How does the qualitative and quantitative data inform the design, implementation, and impact of a self-esteem enhancement program?	What is the impact of a program promoting self-esteem designed and implemented for boys in a middle school?	How does the gathering of qualitative interviews and collecting survey data substantiate the impact of a self-esteem enhancement program designed for boys in the school?

Source: Adapted from Creswell & Plano Clark (2011).

Source: Adapted from Creswell & Plano Clark (2011).

Finally, when designing mixed methods questions, we offer several overall recommendations as first suggested by Plano Clark and Badiee (2010, p. 298):

- When writing mixed methods research questions, select the format (questions, aims, and/or hypotheses) that matches the norms of your audience. If there is a choice of format, use the question format to highlight their importance within the conduct of mixed methods research.
- Use consistent terms to refer to variables/phenomena examined across multiple questions.
- Use a combination of question types to (1) convey the larger question guiding the study (i.e., an overarching question), (2) state the specific subquestions associated with quantitative and qualitative methods, and (3) include a mixed methods research question that directs and foreshadows how and why the strands will be mixed (i.e., the integration component).
- Relate the question style and content to the specific mixed methods design being used. For example, dependent questions should be associated with sequential procedures and independent questions should be associated with convergent procedures.
- If the questions are independent (i.e., one question does not depend on the results of another question), list them in their order of importance. If the questions are dependent (i.e., one question depends on the results of another), list them in order of what has to be answered first.
- Determine whether the study aim is best addressed with predetermined and/or emergent questions. Even if starting with predetermined questions, be open to the possibility of emergent questions. When questions emerge, explicitly discuss the process by which they emerged and the considerations that led to posing new questions.

Summary

A mixed methods study begins with a mixed methods title. In the study's introduction section, the researcher first highlights the research problem, then narrows the problem to a purpose statement, and finally, narrows the purpose statement into research questions or hypotheses. In each component of this introduction, the researcher foreshadows a mixed methods approach and a type of mixed methods design so that the study is rigorous, interconnected, and evaluated as a mixed methods project.

The title of a mixed methods study should contain the words *mixed methods* to signal the type of approach that will be used. The title needs to be framed as neutral or nondirectional if the study gives equal priority to both quantitative and qualitative data, or it can lean toward either quantitative or qualitative if the priority of the study is weighted in one direction or the other. The introduction to a study can also foreshadow mixed methods research. In the model provided in this chapter, in which the researcher begins with a topic, the problem, the literature, the literature deficiencies, and the audience, the reason or reasons for conducting mixed methods research can be foreshadowed in the deficiencies section as a shortcoming in the existing literature. The mixed methods purpose statement needs to be crafted to highlight the type of mixed methods design to be used, the forms of data to be collected, and the basic reason(s) for gathering the forms of data. Scripts have been provided in this chapter to help design purpose statements that relate to the designs in Chapters 3 and 4. Finally, in mixed methods research, the investigator states quantitative questions or hypotheses, qualitative questions, and mixed methods questions. We provide examples of qualitative and quantitative research questions and add specifically worded mixed methods questions. A mixed methods question is important to include in the introduction because it highlights the mixing (or integration) of data and promotes the view of mixed methods as an integral part of the research rather than as an add-on. Several options are available for writing research questions into a mixed methods study, and we recommend including a mixed methods question framed from a combination of methods and content.

Activities

1. Look at the titles of published mixed methods studies and evaluate them in terms of (a) the inclusion of terms that refer to mixed methods research (e.g., quantitative and qualitative, integrated, mixed methods) and (b) whether the wording in the title accurately reflects the type of design.
2. Do the introductions presented in mixed methods studies published in the journal literature reflect the need to use mixed methods research? Take one or two mixed methods studies and look closely at their introductions. Label the parts: (a) the topic, (b) the research problem, (c) the literature, (d) the deficiencies in the literature, and (e) the audience. Also label the section (possibly the deficiencies) in which the authors suggest a need for a mixed methods study.
3. Write a good mixed methods purpose statement. First decide on the type of design best suited for your study (see Chapters 3 and 4). Then, using the sample script provided in this chapter, fill in the blanks. Did the script work for you? For others reviewing your study?
4. Write a mixed methods research question. Again, for the type of design best suited for your study, examine Table 5.2 and select the mixed methods question that needs to be written. Consider a methods-focused, a content-focused, or a combination mixed methods question. Adapt the wording to fit your particular study.

Additional Resources to Examine

For more information on the elements that go into formulating introductions, writing purpose statements, and posing research questions, see the following resource:

- Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.) Thousand Oaks, CA: Sage.

For more information on the importance of creative, tentative titles that are continually revised as the research proceeds, see the following resource:

- Glesne, C., & Peshkin, A. (1992). *Becoming qualitative researchers: An introduction*. White Plains, NY: Longman.

For a good overview of the importance of writing purpose statements, see the following resource:

- Locke, L. F., Spirduso, W. W., & Silverman, S. J. (2013). *Proposals that work: A guide for planning dissertations and grant proposals* (6th ed.). Thousand Oaks, CA: Sage.

For additional resources on developing and writing mixed methods research questions, see the following resources:

- Onwuegbuzie, A. J., & Leech, N. L. (2006). Linking research questions to mixed methods data analysis procedures. *The Qualitative Report*, *11*(3), 474–498. Retrieved from http://www.nova.edu/ssss/QR/QR11–3/onwuegbuzie.pdf
- Plano Clark, V. L., & Badiee, M. (2010). Research questions in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *SAGE handbook of mixed methods in social & behavioral research* (2nd ed., pp. 275–304). Thousand Oaks, CA: Sage.
- Tashakkori, A., & Creswell, J. W. (2007). Exploring the nature of research questions in mixed methods research [Editorial]. *Journal of Mixed Methods Research*, *1*(3), 207–211.

6 Collecting Data in Mixed Methods Research

The basic idea of collecting data in any research study is to gather information to address the questions being asked in the study. The data collection procedures consist of several interconnected steps: sampling, gaining permissions and recruiting participants, identifying data sources, recording the data, and administering the data collection procedures. Moreover, in mixed methods research, the data collection needs to proceed along two strands: qualitative and quantitative. Each strand needs to be fully executed with rigorous approaches. Mixed methods research also involves procedures that reflect the core and complex designs. This chapter, therefore, first turns to the more general procedures of data collection found in both qualitative and quantitative research and then considers mixed methods data collection within each of the core and complex research designs.

This chapter will address

- the procedures for quantitative and qualitative data collection in a research study,
- general considerations for mixed methods data collection, and
- the specific decisions that arise in data collection for each of the core and complex mixed methods designs.

Procedures in Collecting Qualitative and Quantitative Data

As mentioned in our definition of mixed methods in Chapter 1, a mixed methods study calls for complete and rigorous qualitative and quantitative research methods, which includes the process of collecting data. As Axinn and Pearce (2006) cautioned in their review of the use of mixed methods procedures in the Tamang Family Research Project in Nepal, "An integration of ethnographic and survey techniques must not be an excuse for doing less than a complete job with each of the components" (p. 73). In designing a mixed methods study, we recommend researchers advance a qualitative strand that includes rigorous qualitative data collection procedures and a quantitative strand that incorporates rigorous quantitative data collection procedures. What would these procedures entail? Table 6.1 provides a template for identifying data collection procedures organized into five key steps: use sampling procedures, obtain permissions and recruit participants, identify data sources, record the data, and administer the procedures.

TABLE 6.1 ■ Recommended Qualitative and Quantitative Data Collection Procedures for Designing Mixed Methods Studies

Qualitative Data Collection Procedures	Steps in Data Collection	Quantitative Data Collection Procedures
• Identify the site(s) to be studied • Identify the participants for the study • Note the target sample size and why it is appropriate • Identify the purposeful sampling strategy to enroll participants and why it was chosen (inclusion criteria)	Use sampling procedures	• Identify the site(s) to be studied • Identify the participants for the study • Note the sample size, the way it was determined, and how it provides sufficient power • Identify the probabilistic or nonprobabilistic sampling strategy
• Discuss permissions needed to study the site(s) and participants • Obtain institutional review board approvals • Discuss recruitment strategies for participants	Obtain permissions and recruit participants	• Discuss permissions needed to study the site(s) and participants • Obtain institutional review board approvals • Discuss recruitment strategies for participants
• Discuss the types of data to be collected (e.g., open-ended interviews, open-ended observations, documents, audiovisual materials) • Indicate the extent of data collection	Identify data sources	• Discuss the types of data to be collected (e.g., instruments, observations, quantifiable records)
• Mention what protocols will be used (e.g., interview protocols, observational protocols) • State the interview questions to be asked • Identify recording methods (e.g., audio recordings, field notes)	Record the data	• State what instruments or checklists will be used and provide examples • Discuss reported scores for validity and reliability for instruments used
• Describe the who, what, when, where, and how long of data collection • State how procedures will be emergent • Identify anticipated data collection issues (e.g., ethical, logistical)	Administer the procedures	• Describe the who, what, when, where, and how long of data collection • State how procedures will be standardized • Identify anticipated ethical issues

Source: Adapted from Creswell & Plano Clark (2011).

Source: Adapted from Creswell & Plano Clark (2011).

The discussion that follows outlines the major procedures in each of these data collection steps. It is not meant to replace the more detailed information available in many research methods texts, such as those recommended as additional reading at the end of this chapter. But as researchers need the skills of qualitative and quantitative data collection to conduct mixed methods research, it is important to review those skills at this time. In this discussion, we highlight specific components that need to be addressed in order to have a complete mixed methods study. They have been gleaned from reviewing many mixed methods studies and writing about the detailed procedures in both quantitative and qualitative research (e.g., Creswell, 2013, 2015a; Plano Clark & Creswell, 2015).

Use Sampling Procedures

To address a research question or hypothesis, the researcher engages in a sampling procedure that involves determining the location or site for the research, the participants who will provide data in the study and how they will be selected, and the number of participants needed to answer the research questions. These steps in data collection apply both to qualitative and quantitative research, although there are fundamental differences in how they are typically addressed—especially in terms of the sampling approach and the sample size.

In qualitative research, the inquirer uses purposeful sampling procedures to select individuals and sites that can provide the necessary information to understand the central phenomenon. **Purposeful sampling** (also referred to as purposive sampling) means that researchers intentionally select (or recruit) participants who have experienced the central phenomenon or key concept being explored in the study. A number of purposeful sampling strategies are available, each with a different purpose (see Creswell, 2012). One of the more common strategies is *maximal variation sampling*, in which diverse individuals are chosen who are expected to hold different perspectives on the central phenomenon. The criteria for maximizing differences depends on the study, but it might be race, gender, level of schooling, or any number of factors that would differentiate participants. The central idea is that if participants are purposefully chosen to be different in the first place, then their views will reflect this difference and provide a good qualitative study with a complex picture of the phenomenon. Another approach is to use *extreme case sampling*, which involves the inquirer selecting individuals who provide especially unusual, troublesome, or enlightened cases. In contrast, a researcher might use *homogeneous sampling* by selecting individuals who have membership in a subgroup with distinctive characteristics. As a qualitative study develops, the researcher may use multiple sampling strategies, including strategies that emerge during initial data collection.

In terms of the number of participants in a qualitative study, the qualitative researcher identifies and recruits a small number that will provide in-depth information about the central phenomenon or concept being explored in the study. The qualitative idea is to develop an in-depth understanding of a few people because the larger the number of people, the less detail that typically can emerge from any one individual. Many qualitative researchers do not like to constrain research by giving definitive sizes of samples, but the numbers may range from 1 or 2 people in a narrative study, to 4 to 10 cases in a case study, to 20 or 30 in a

grounded theory project (for sample sizes for different qualitative approaches, see Creswell & Poth, 2017, and Collins, 2010). The sample size relates to the question and the type of qualitative approach used, such as narrative, phenomenology, grounded theory, ethnography, or case study research (Creswell & Poth, 2017). Often the final sample size is not determined until the study is conducted to ensure that a sufficient database has been collected to develop an in-depth understanding (a point often referred to as reaching saturation).

In quantitative research, the researcher uses sampling procedures to select individuals from a population of interest. A preferred strategy in quantitative research is **probabilistic sampling**, or *random sampling*, in which the intent is to select a large number of individuals who are representative of the population or who represent a segment of the population. *Simple random sampling* involves randomly choosing individuals based on a systematic procedure, such as the use of a random numbers table, so that each person in the identified population has a known chance of being selected. Probabilistic sampling can also proceed on the basis of *multistage random sampling*, in which the researcher chooses multiple samples in various stages (e.g., first school districts, then schools, then classrooms). In addition, the investigator may want certain characteristics represented in the sample that may be out of proportion in the larger population and choose to use *stratified random sampling*. For example, more females than males may be in the population, and so a random sampling procedure would, logically, oversample females. In this situation, the researcher first stratifies the population (e.g., females and males) and then randomly samples within each stratum. In this way, an equal number of participants on the stratification characteristic can be represented in the final sample chosen for data collection. Another option is *cluster sampling*, in which the investigator first identifies clusters (i.e., intact groups of individuals, such as schools or clinics) and then randomly selects clusters and studies the individuals within those clusters.

In contrast to probabilistic sampling, **nonprobabilistic sampling** involves selecting individuals who are available and can be studied. For example, a researcher may need to select all students in one classroom because they are available, recognizing that the sample is not representative of the population of all students in classrooms or even of the students in other classrooms in the one school being studied. Examples of nonprobabilistic sampling forms include *convenience sampling* and *volunteer sampling*.

The sample size needed for a rigorous quantitative study is typically quite large. The sample needs to be sizeable enough to meet the requirements of the planned

statistical tests and provide a good estimate for the parameters of the population (reducing sampling error and providing adequate power). Although rules of thumb exist for quantitative samples (e.g., at least 30 participants for a correlational analysis and 350 participants for a population survey), the best procedure is to determine the adequate sample size using sample size formulas available in research methods textbooks, such as power analysis formulas for experiments (e.g., Lipsey, 1990) or sampling error formulas for surveys (e.g., Fowler, 2008).

Obtain Permissions and Recruit Participants

Researchers require permission to collect data from individuals and sites. This permission often needs to be sought from multiple individuals and levels in organizations, such as from individuals who are in charge of sites; from people providing the data (and, in some cases, their representatives, such as parents); and from human subjects review boards, such as campus-based institutional review boards (IRBs) in the United States.

Gaining access to people and sites requires obtaining permissions from individuals in charge of sites. Sometimes this involves individuals at different levels, such as the hospital administrator, the medical director, and the staff participating in the study. These levels of permissions are required regardless of whether the study is qualitative or quantitative. However, because qualitative data collection involves spending time at sites and the sites may be places not typically visited by the public or researchers (e.g., soup kitchens for the homeless), researchers need to find a *gatekeeper*—an individual in the organization supportive of the proposed research who will, essentially, "open up" the organization. Qualitative research is well known for the collaborative stance of its researchers, who seek to involve participants in many aspects of research. The opening up of an organization may also be necessary for quantitative studies in hard-to-visit organizations, such as the Federal Bureau of Investigation or other governmental agencies.

To conduct research sponsored by a university or college, researchers must seek and obtain approvals from campus-based human subjects review boards. These boards have been established to protect the rights of individuals participating in research studies and to assess the risk and potential harm of the research to these individuals. Researchers need to obtain the permission of the appropriate board and guarantee that the rights of participants will be protected. Failure to do so can have negative consequences for the university or college, such as the withdrawal of federal funds. Typically, obtaining permission from a review board involves filing an application before the study starts, presenting information about the level of risk and harm, and guaranteeing that rights will be protected. The researcher guarantees protection of rights by ensuring participants can comprehend the information about the study, fully informing participants about the study, and obtaining participants' voluntary agreement to take part. This process often includes describing the study in writing and having a participant (or a responsible adult, if the participant is a minor) sign an informed consent form before he or she

provides data. Researchers may not present or publish their findings if permissions were not obtained before the start of the data collection.

In qualitative research, procedures for how the inquirer will collect data and protect the gathered information need to be stated in detail because the research often involves asking personal questions and collecting data in places where individuals live or work. The information collected from observing families at home, for example, may place individuals at particular risk. When behaviors are video recorded, participants are at risk of being identified and having unwanted behaviors disclosed. In quantitative research, individuals need to also provide their permission to complete instruments or have their behavior observed and rated. Often this research does not take place in individuals' homes or workplaces, and it is less obtrusive and less likely to put participants at risk of harm. If the research involves manipulating the conditions experienced by participants, such as in an experiment, then the details of the treatment procedures and potential risks and benefits need to be carefully considered and described to participants.

Obtaining permissions to access sites and participants relates directly to recruitment strategies. Such strategies involve determining how best to locate and enroll individuals in research studies. Sometimes a facilitating network or health provider organization will be needed to help with recruiting individuals and sites (Cohen et al., 2015). At other times, investigators need to be sensitive to ways to incorporate and recruit participants to projects. In global research projects, it may be necessary to win the support for recruiting participants from grassroots community-based organizations, nongovernmental organizations, and/or a government (Betancourt et al., 2014). Successfully recruiting participants can be a particularly challenging aspect of any research study. Incentives can help recruit individuals and sites, as can the provision of engaging materials that provide information about how the study results will benefit the groups participating in the project. Once sites and participants are recruited, ongoing contact with them will be needed throughout the project to maintain their participation in a long-term study.

Identify Data Sources

There are many types of qualitative and quantitative data that can be collected in a mixed methods study. Researchers need to examine and weigh each option so they can determine what sources of data will best answer the research questions or hypotheses. Some forms of data cannot be easily categorized as qualitative or quantitative, such as patient records in which both text in the form of providers' notes and numeric data in the form of results from screening tests exist side by side. Other forms can be either qualitative or quantitative depending on how they are implemented, such as interviews that can be unstructured or structured. The basic distinction we make between qualitative and quantitative data is that qualitative data consist of information obtained on **open-ended questions** in which the researcher does not use predetermined categories or scales to collect the data. Indeed, the participants provide information based on questions that do not restrict their options for responding. In contrast, quantitative data are collected on **closed-ended questions** based on predetermined response scales or categories. In a quantitative questionnaire, for example, a researcher identifies questions and asks participants to rate their answers to the questions on a scale, perhaps with options ranging from "strongly agree" to "strongly disagree."

In qualitative research, the types of data researchers can collect are extensive. Some forms of qualitative data may be decided upon before a study begins, whereas others will emerge during the process. Qualitative types of data might be broadly organized into text data (i.e., words) or images (i.e., types of pictures). These two broad forms can, in turn, be categorized in terms of types of information that researchers typically collect: open-ended interviews (e.g., one-on-one interviews, phone interviews, online e-mail interviews, focus groups); open-ended observations; documents (private and public); and audiovisual materials (e.g., videos, photographs, sounds). Options for sources of qualitative data continue to expand, and more recent formats include text messages, blogs and wikis, and various forms of eliciting information (such as through interviews) using artifacts, pictures, and videos. Because qualitative data collection is so labor intensive, qualitative researchers often make a point to mention the extensive nature of their data collection efforts (e.g., 3,000 pages of transcripts from the interviews, or multiple observations of a setting over a 6-month period). The key is to identify qualitative data forms that best provide information about the phenomenon of interest.

In quantitative research, the forms of data have been reasonably stable over the years. Investigators collect quantitative data using instruments that measure individual performance (e.g., aptitude tests) or individual attitudes (e.g., attitudes toward self-esteem scales). They also gather structured interview and observational data in which the response categories are determined before the data collection and the scores are recorded on scales in a closed-ended fashion. They collect factual information in the form of numbers from census data, attendance reports, and progress summaries. Other, newer forms of quantitative data include biomedical tests (e.g., tracking eye movements or brain responses); geographical information systems (GIS) spatial data; and computer-based tracking data (e.g., from server logs). Again, as with the forms of qualitative data, mixed methods researchers need to assess which quantitative data types will best address their research questions or hypotheses.

Record the Data

The collection of data in research involves systematically gathering information and recording it in such a way that it can be preserved and analyzed by a single researcher or a team of researchers (see Creswell, 2015c). Traditionally, data was recorded using analog formats, such as paper or tapes, but today data are often recorded using electronic devices, such as online forms, computer tablets, or digital recorders. For qualitative data collection, forms for recording the information need to be developed. If interview data are collected, then an **interview protocol** is needed that includes the major open-ended questions to be asked during an interview and that provides space for recording both information gathered during the interview and essential data about the time, day, and place of the interview. In many cases, the researcher makes an audio recording of the qualitative interviews and later transcribes them, and the protocol becomes a backup system for recording information. Having an interview protocol helps keep the researcher organized, and it provides a record of information in the event that the recording devices do not work. An **observational protocol** also provides a useful way of organizing an observation. On this form the researcher records a description of events and processes observed as well as reflective notes about emerging codes, themes, and concerns that arise during the observation. Recording forms can also be developed for reviewing documents and for recording image data, such as photographs. These protocols are typically included as an appendix to the research proposal or study.

In quantitative research, investigators select instruments, modify existing ones, or develop original ones to measure the variables of interest. If they wish to choose an existing instrument, researchers need to identify one for which there is evidence that past use of that instrument resulted in scores showing high validity and reliability. Alternatively, for structured observations, researchers will use a proven checklist to record information. For documents with numeric data, researchers often develop a form for recording information that summarizes the data. Data collected through computer-based methods need to be carefully recorded and organized within secure electronic files. As with qualitative protocols, the quantitative instruments are described and frequently included as part of the research proposal or study.

Administer the Procedures

Administering the procedures of data collection involves the specific actions taken by the researcher for gathering the data. It includes essential details about the process for collecting each data form, including who, when, what, where, and for how long. In qualitative research, much discussion in the literature is directed toward reviewing and anticipating the types of issues likely to arise in the field that will yield less-than-adequate data. Some of the concerns that need to be addressed include the time necessary to recruit participants, the researcher's role in observing, the adequate performance of recording equipment, the time needed to locate documents, and the details of the proper placement of video-recording equipment. Also, the researcher needs to enter sites in a way that is respectful and does not disrupt the flow of activities. Ethical issues, such as reciprocity to participants for their willingness to provide data, the handling of sensitive information, and disclosing the purposes of the research, apply to both qualitative and quantitative research. In addition, the procedures of quantitative data collection need to be administered with as little variation as possible so that bias is not introduced into the process. Standardized procedures should exist for collecting data on instruments, on checklists, and from public documents. If more than one investigator is involved in data collection, training should be provided so that the procedure is administered in a standard way each time.

General Considerations for Data Collection in Mixed Methods

It is essential to know the general procedures of collecting data in qualitative and quantitative research because mixed methods builds on these procedures. Sampling, for example, needs to be rigorous in both the quantitative and qualitative strands of a mixed methods study. However, issues such as sampling and sample size depend on the features of the type of mixed methods design being used. Before turning to specific mixed methods designs and their data collection procedures, we present several general guidelines for collecting both forms of data in mixed methods research.

- The purpose of data collection in a mixed methods study is to develop answers to the research questions (Teddlie & Yu, 2007). Mixed methods researchers cannot lose sight of this objective and should continually ask themselves whether their samples and data will provide answers to the questions. A good strategy is to develop a table that lists each of the primary research questions or study aims and identifies which samples and specific data sources (qualitative and quantitative) will be used to answer each question. This is sometimes referred to as an implementation matrix.
- Mixed methods research involves collecting both quantitative and qualitative data. Because multiple sources of data are collected, the mixed methods researcher needs to be familiar with the array of qualitative and quantitative data collection procedures and choose rigorous procedures such as those we have reviewed. Just because a study is mixed methods does not mean that the researchers can relax the standards for qualitative and quantitative research. Moreover, we encourage mixed methods procedures that involve creative qualitative data collection (e.g., use of photos to elicit information) and the careful selection of quantitative instruments that do not extend beyond those needed to answer the research questions or hypotheses.
- We stress the importance of detailing the qualitative and quantitative data collection procedures in the methods section of a mixed methods study proposal or report. This allows readers and reviewers to understand the procedures and make judgments about their quality. In addition, detailed procedures help others learn about mixed methods research and understand the often complex interweaving of qualitative and quantitative data collection efforts. These procedures can be difficult to specify at the

proposal stage for sequential designs that include an emergent second phase. A good strategy for these situations is to imagine two or three different possible results from the first phase and then describe the data collection decisions that would follow based on these hypothetical results.

- Decisions about the sampling for the qualitative and quantitative strands of a mixed methods research study are critically important because they impact the conclusions that can be drawn at the end of the study. Researchers also have a wide range of options to consider for their sampling. These options include typical strategies associated with qualitative and quantitative research (as reviewed earlier in this chapter) as well as mixed strategies. Although no widely accepted typology of mixed methods sampling strategies exists, there are several key writings on mixed methods sampling that provide useful frameworks. We highlight three frameworks here:
    - Teddlie and Yu (2007) advanced several sampling procedures using mixed methods "metaterms." In *basic mixed methods sampling*, the authors discuss sampling strategies that combine procedures associated with both purposeful and probability sampling, such as stratified purposive sampling where the researcher first stratifies the population into groups and then purposefully selects cases from the groups. In *sequential mixed methods sampling* and *concurrent mixed methods sampling*, the authors refer to sampling sequentially by using methodology or results from one strand to influence the sampling in the following strand and sampling concurrently by using independent samples, related samples, or a single sample. In *multilevel mixed methods sampling*, different types of individuals representing different nested levels of a system are sampled with diverse sampling procedures for the different levels. Teddlie and Yu also acknowledge that researchers may use *multiple mixed methods sampling strategies* that combine these various types in a project.
    - Onwuegbuzie and Collins (2007) also advanced a typology of mixed methods sampling designs. Their typology considers two dimensions. The first is the time orientation of the qualitative and quantitative strands, for which the options are concurrent or sequential. The second dimension is the relationship of the qualitative and quantitative samples, for which there are four options: (1) *identical samples* (exact same individuals in the quantitative and qualitative samples), (2) *parallel samples* (individuals who are different but from the same population in the quantitative and qualitative samples), (3) *nested samples* (the individuals in one sample are a subset of the individuals in

the other sample), and (4) *multilevel samples* (different individuals from different populations in the samples).

- A more recent article by Collins (2010) advances an integrative typology of sampling strategies in mixed methods. Her approach suggests a sampling strategy in mixed methods might consider five dimensions: (1) the timing among the strands (sequential or concurrent), (2) the relationship between the samples for the quantitative and qualitative strands, (3) the types of generalizations the researcher seeks to make in the study, (4) the types of research questions the researcher seeks to answer, and (5) the emphasis or priority given to the quantitative and qualitative data. This typology helps to drill down into several useful sampling topics that provide a foundation for the sampling strategy in a mixed methods study.

Collectively, these general considerations and writings suggest a helpful direction of seeking to link the sampling strategy and data collection procedures to the type of mixed methods design. Since the time of the key writings discussed here, we have become more specific about types of designs and how decisions about sampling strategies and data collection procedures reside not in general mixed methods procedures but in specific mixed methods designs.

Data Collection Within the Mixed Methods Designs

How should sampling and data collection proceed within each of the core designs and the complex designs? We recognize that the procedures need to respond to the research questions, the timing of a study, and the emphasis placed on the quantitative and qualitative data, but these issues reside *within* a type of design. Thus, our approach is to link sampling and data collection procedures directly to the types of designs. These links are illustrated in Table 6.2 and discussed for each design in the following sections.

TABLE 6.2 ■ Types of Mixed Methods Designs, Decisions, and Recommendations for Data Collection

Type of Mixed Methods Design	Decisions Needed in Data Collection	Recommendations for Designing a Mixed Methods Study
Convergent design	Will the two samples include different or the same individuals?	If the intent is to compare or directly relate the data sets, use the same individuals.
	Will the samples be the same size?	Consider which option to use and discuss the limitations of the choice. Choosing unequal sample sizes supports the rigorous application of the two methods but may limit the merging process. Choosing equal sample sizes supports the merging process but may limit the rigor of one or both of the strands.
	Will the same concepts be examined qualitatively and quantitatively?	Create parallel questions for the qualitative and quantitative data collection to facilitate integration.
	Will the data be collected from two independent sources or from a single source?	Collect independent qualitative and quantitative data sets from two sources.
Explanatory sequential design	Will the same or different individuals be used in both samples?	Individuals who participate in the qualitative phase should be individuals who participated in the quantitative phase.
	Will the samples be the same size?	The qualitative follow-up phase has a smaller sample size than the quantitative phase.
	What quantitative results will be followed up on?	Consider multiple options depending on the follow-up needed (e.g., significant results, surprising nonsignificant predictors, outliers).
	How will follow-up participants be selected?	Select follow-up participants based on initial quantitative results.
	How should the emerging follow-up phase be described for IRB approval?	Describe the follow-up phase as tentative and file an addendum with the IRB as needed.
Exploratory sequential design	Who and how many individuals should be included in the quantitative follow-up phase?	For the quantitative phase, use a large sample of individuals who did not previously participate in the qualitative phase.
	How should the emerging follow-up phase be described for IRB approval?	Describe the follow-up phase as tentative and file an addendum with the IRB as needed.
	What qualitative results will be used to inform the quantitative data collection?	Use themes, codes, and quotes to help design the instrument (e.g., themes become variables) or the taxonomy (e.g., different groups).
	In the survey-development variant, how do you develop a good instrument?	Use rigorous procedures in scale development.
	How do you convey the rigor of the survey-development variant?	Develop a diagram of the procedures to convey the multiple steps in this process.
Mixed methods experimental design	Why and when should the qualitative data be embedded in the experiment?	Give reasons for embedding the data and consider the timing for embedding in relation to the intervention.
	Will embedding the qualitative data introduce bias or confounding factors [factors likely to influence the outcomes of the experiment]?	Collect qualitative data using unobtrusive procedures (e.g., asking participants to keep a diary during an experiment) to minimize researcher interaction with participants.
	What types of qualitative data would best augment the experimental trial?	Tailor the qualitative data collection to its purpose in the experimental design.
Mixed methods case study design	How will the case (or cases) be defined?	Collect evidence for a case or cases based on specific criteria.
	What core design can be used to document a case (or cases)?	Employ rigorous qualitative and quantitative data collection procedures typical in a convergent design to develop an extensive database about each case.
	How should cross-case comparisons be made?	If multiple cases are examined, distinguish the cases and align the quantitative and qualitative data forms gathered for each case to facilitate cross-case comparisons.
Mixed methods participatory-social justice design	What labels will be used to refer to the participants?	Use labels meaningful to participants in the study.
	How can inclusiveness be promoted in the study?	Collaborate with likely participants to design a sampling procedure.
	How can data be collected that will be credible to the community being studied?	Involve participants as co-researchers throughout the study (e.g., an advisory board).
	What instruments can be used that are sensitive to the participants?	Choose measures sensitive to the participants in the study.
	How will the data collection be sensitive to the study community?	Create ways to give back to the community (e.g., referrals, sharing findings, volunteering).
Mixed methods evaluation design	What multiple sampling strategies will be used in the phases or projects?	Use sampling strategies that fit the phases or projects in the study (e.g., levels, qualitative and quantitative sampling).
	Will both concurrent and sequential sampling occur?	Match the sampling strategy to the needs of the phases or projects.
	How will the project handle measurement and attrition issues?	Consider emergent approaches, re-contacting individuals, and/or planning for attrition.
	What overall objective (or theoretical drive) will tie the phases or projects together?	Identify a single objective for the line of inquiry that is composed of multiple phases or projects.

Source: Adapted from Creswell & Plano Clark (2011).

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Convergent Design Data Collection

In the convergent design, the data collection involves gathering both quantitative and qualitative data at roughly the same time, analyzing the two databases separately, and then merging or comparing the results from the two databases. Typically this design prioritizes the two types of information equally, but researchers also use variants where there is a quantitative or qualitative priority for addressing the study's purpose. Within this overall process, researchers must make decisions related to sampling and data collection forms. Important **data collection decisions for the convergent design** include who will be selected for the two samples, the size of the two samples, the design of the data collection questions, and the format and order of the different forms of data collection.

Decide whether the two samples will include different or the same individuals.

There are two options for selecting individuals to participate in the quantitative and qualitative strands of a convergent study: the samples can include different or the same individuals. Different individuals may be used when the researcher is trying to synthesize information on a topic from different organizational levels of participants (e.g., school districts and schools, or hospitals and patients). In the article found in Appendix A, Wittink et al. (2006) sought to understand the concordance and discordance between physicians' and patients' views regarding depression. They gathered physician assessment of the level of depression in a patient on a 4-point scale and also conducted semi-structured interviews with patients about their depression. Thus, the quantitative and qualitative samples included two levels: physicians and patients.

It is also possible to use a parallel sample of different individuals drawn from the same population. For example, a researcher interested in student experiences might select some students to participate in focus group interviews and other students to complete a survey. Using different individuals can ensure that the two data forms are independent and that more perspectives are included. However, by collecting different types of data from different participants, the mixed methods researcher is introducing extraneous information into the study and potentially influencing her or his ability to converge the results. When the purpose is to corroborate, directly compare, or relate two sets of findings about a topic, we recommend that the individuals who participate in the qualitative sample be the same individuals or a subset of individuals who participate in the quantitative

sample. In a convergent study by Morell and Tan (2009), 230 elementary students were included in the quantitative sample, and 34 of these same students were included in the qualitative sample.

Decide whether the size of the two samples will be the same or different.

The mixed methods researcher needs to consider the size of the two samples when using the convergent design. One good option is for the two samples to have different sizes, with the size of the qualitative sample being much smaller than the quantitative sample. This helps the researcher obtain a rigorous, in-depth qualitative exploration and a rigorous, high-power quantitative examination of the topic. This disparity can raise the question of how to converge or compare the two databases in any meaningful way when the number of participants is so different. However, if the intent of combining the two databases is to compare the different results by topic or to synthesize them into a complementary picture about the phenomenon, then this size differential is not a problem because the intent is to combine the conclusions from gathering the two different databases: quantitative data collection aims to make generalizations to a population while qualitative data collection seeks to develop an in-depth understanding from a few people.

Another option is for the researcher to use an equal sample size for both the quantitative and qualitative samples. This option may limit the rigor of one (or both) strands, but it can facilitate the merging because both forms of data are obtained from the same participants. In a convergent mixed methods study of 21 women receiving domestic violence services in a rural region of Ireland, Saint Arnault and O'Halloran (2016) collected data for both the quantitative and qualitative strands of the study from the same women. Through t-tests quantitatively and a thematic analysis qualitatively, the authors related the survey items of structural and internal barriers to the themes from the interviews. This equal sample size approach often relies on medium sample sizes (e.g., 20–30 participants), which sacrifices some of the richness of the qualitative data gathered from each participant and limits the kinds of quantitative analyses that can be conducted due to low statistical power. This approach does, however, provide the researcher with the opportunity of merging the data for each participant if that is deemed useful.

There are some situations in which a large sample size is needed for both strands. When researchers use a data transformation variant of the convergent design, it is

important to have two large samples of equal size and to include the same individuals. In this situation, the researcher needs both quantitative data and qualitative data for each participant so that the qualitative data can be quantitized and analyzed quantitatively with the other measured variables (a process to be discussed further in Chapter 7). This approach limits the richness of the qualitative results but supports the researchers' ability to conduct advanced statistical analyses based on both databases. For example, Slate, LaPrairie, Schulte, and Onwuegbuzie (2011) gathered closed- and open-ended information about perceptions of effective teachers from 615 students. After identifying themes from the qualitative data, they converted the themes into variables and conducted statistical tests to determine differences in the perceptions based on other quantitative information gathered.

Decide to design parallel data collection questions.

We find that merging the two databases works best if the researcher designs the study by asking parallel questions in both the qualitative and the quantitative data collection efforts. Axinn and Pearce (2006) call this "the comparability of questions" (p. 74). By asking parallel questions we mean that the same concepts are addressed in both the qualitative and quantitative data collection so that the two databases can be readily compared or merged. If the concept of self-esteem is being addressed on a quantitative survey, then an open-ended question on self-esteem needs to be asked during the qualitative one-on-one interviews. In this way, results can be compared about the same concept from both the quantitative and the qualitative analysis.

Decide whether the data will be collected from two independent sources or a single source and decide the order of data collection.

Researchers need to consider whether the two data sets will be collected independently, using different forms (e.g., gathering quantitative data with a survey questionnaire and qualitative data through focus group interviews), or whether they will both be collected using one form (e.g., a single questionnaire or interview with both closed- and open-ended questions). If the researcher's intent is to triangulate the databases and produce corroborated and valid conclusions about a topic, then we recommend the use of two independent sources to ensure each separate database is rigorous and stands on its own. In contrast, one source may be preferred if the researcher's intent is to capture multiple facets of a phenomenon from each participant, particularly if the researcher only has one opportunity to gather data from each participant. The use of a single form often

limits the extent and quality of one or both databases, particularly in terms of the qualitative information. For example, a questionnaire that includes quantitative measures with a small number of open-ended questions does not usually produce a rigorous, in-depth qualitative database.

In addition to deciding how many sources to use, the researcher also needs to decide the order for collecting the two data forms. In many convergent designs, researchers typically collect one form of data (e.g., surveys) before the other form (e.g., focus groups) simply for logistical reasons. If the researcher is concerned that there may be an interaction between the two forms (e.g., participating in a focus group discussion may change the way participants respond to the survey items or vice versa), then one option is to alternate the order for collecting the data. Luzzo (1995) gathered survey packets and individual interviews from students and noted that "the order in which these students completed the packet and participated in the interview was counterbalanced" (p. 320).

Explanatory Sequential Design Data Collection

The data collection procedures in the explanatory sequential design involve collecting quantitative data, analyzing the quantitative data, and using the results to inform the follow-up qualitative data collection. Thus, sampling occurs at two points in this design: in the quantitative phase and in the qualitative phase. In this design, the quantitative and qualitative data collections are related to each other and not independent. One builds on the other. The emphasis on data collection may favor either quantitative or qualitative data. Most commonly, an emphasis is placed on the initial, substantial quantitative data collection with a smaller emphasis on the qualitative follow-up. The **data collection decisions for the explanatory sequential design** focus on making a strong connection between the two phases and include deciding whether to use the same or different participants for the second phase, what sample sizes to use for both strands, what results need to be further explained, how follow-up participants should be selected, and how to secure IRB permissions for the two phases of data collection.

Decide whether to use the same or different individuals in both samples.

Since the explanatory sequential design aims to explain initial quantitative results, we recommend that the individuals for the qualitative follow-up phase be a subset of individuals who participated in the quantitative data collection. The intent of this design is to use qualitative data to provide more detail about the quantitative results, and the individuals best suited to do so are ones who contributed to the quantitative data set.

Decide on the sizes for the two samples.

Although some researchers choose to follow up qualitatively with all participants in the first phase (resulting in equal sample sizes), we recommend that the qualitative data collection come from a much smaller sample than the initial quantitative data collection. The intent of this design is not to merge or compare the data—as it is in the convergent procedures—so having unequal sizes is not an issue in sequential designs. The important consideration lies in collecting enough qualitative information so meaningful themes can be developed that provide explanation for selected quantitative results. For example, in the explanatory sequential design found in Appendix B, Ivankova and Stick (2007) collected quantitative survey data from 207 current and former students in a doctoral

distributed education program and then followed up qualitatively with four participants representing different matriculation statuses.

Decide what quantitative results need to be explained.

In terms of the follow-up data collection, researchers need to make a decision as to what quantitative results need to be further explored through the qualitative data collection. Several options exist for making this decision. The first step is to conduct the quantitative analysis and examine the results to see which ones are unclear, surprising, or unexpected and call for further information. This will help dictate a strategy. Another follow-up option is to conduct qualitative data collection related to statistically significant results, statistically nonsignificant results, key significant predictors, variables that distinguish groups, outlier or extreme results, or distinguishing demographic characteristics. The researcher should assess each of these options as to which would yield the best information about the problem being studied and would best guide the design of the qualitative phase of research questions, sample selection, and data collection questions.

Decide how to select the best participants for the qualitative follow-up phase.

Another decision is how to select the participants to be studied in the qualitative follow-up. Once the researcher makes the decision to follow up on specific questions about the quantitative results, then the issue arises as to which participants can best supply information to answer these questions. Sometimes the participants will simply be individuals who volunteer to participate in interviews. In an explanatory sequential design study of adoptive fathers and birth fathers, Baumann (1999) asked the fathers completing the quantitative questionnaire in the first phase whether they would volunteer for interviews for the follow-up phase. This approach provides a connection between the phases that may be necessary in studies in which identifying information cannot be collected from all participants as part of the quantitative data. A more systematic approach is to use the quantitative statistical results to direct the follow-up sampling procedures to select the participants best able to help explain the phenomenon of interest. This approach requires having identifying information for all the participants in the quantitative sample. In an explanatory sequential mixed methods study of how supervisor support facilitates the transfer of new knowledge to employees, Schindler and Burkholder (2014) conducted a quantitative analysis of the influences of different support mechanisms on

knowledge transfer for 48 employees and then followed up by selecting the five employees who had the highest scores on the key quantitative measures to learn more about how they experienced the different support mechanisms.

Decide how to describe the emerging follow-up phase for institutional review board approval.

Since this design is implemented in two distinct phases, researchers might consider seeking IRB approval for each phase separately. However, we recommend researchers describe the plans for both phases in their initial IRB application materials, noting that the plans for the second, qualitative phase are tentative because they will evolve from the results of the first phase. IRBs require as full a disclosure of data collection procedures as possible. This means participants must be informed during the initial consent process about the potential of being contacted in the future for a second data collection. The researcher may also have to explain to the IRB that identifying information will be collected as part of the quantitative data to facilitate the follow-up process and address the additional ethical concerns associated with this information. We also recommend stating that the follow-up phase is tentative and being cognizant that an addendum may need to be filed with the IRB when the follow-up data collection procedures are firmly established.

Exploratory Sequential Design Data Collection

In an exploratory sequential design, the researchers first collect qualitative data and analyze it, and then they use the information to develop quantitative materials and conduct a follow-up quantitative phase of data collection. In this three-phase design—qualitative-quantitative-quantitative—the initial qualitative phase calls for purposeful sampling and the final quantitative phase ideally calls for random sampling. In addition, some thought needs to be given to the relationship between the initial qualitative results and the design of the middle quantitative phase, whether this phase consists of developing or modifying an instrument or survey (see Clark et al., 2012); generating new variables (Haber, 2012), typologies, or conceptual models (Watkins et al., 2015); specifying activities for an intervention (Püschel & Thompson, 2011); or crafting a website, an app, or a virtual reality program for testing (Ruffin, Creswell, Jimbo, & Fetters, 2009). Thus, the primary **data collection decisions for the exploratory sequential design** relate to the determination of samples for each phase and how to use results from the first phase to build the quantitative materials and plan the final quantitative phase.

Decide the samples and the sample sizes for the qualitative and quantitative phases.

Unlike the explanatory sequential design, the individuals who participate in the quantitative follow-up for the exploratory sequential design are typically not the same individuals who provided the qualitative data in the initial phase. Because the purpose of the quantitative phase is to objectively generalize the results to a population, different participants are used in the quantitative follow-up stage than in the initial qualitative phase. The quantitative phases require large sample sizes so that the researcher can conduct statistical tests and potentially make claims about generalization to the population in question. Since participants of an in-depth qualitative study might subsequently think about the phenomenon differently, it is generally also preferred to test the quantitative materials with other participants. In their study of the factors perceived to be affecting changes in adult education graduate programs, Milton, Watkins, Studdard, and Burch (2003) conducted qualitative interviews with 11 faculty members and administrators and then administered a quantitative instrument to a second population of 131 individuals representing 71 adult education programs.

Decide how to describe the emerging follow-up phase for institutional review board approval.

For IRB purposes, only the initial qualitative phase of data collection in the exploratory sequential design can be described fully because the second phase will evolve from the results of the first phase. When filing the initial application with the IRB, researchers can provide some tentative details for the second phase and then submit an addendum once the quantitative instrument (or other feature) has been developed. If the two phases do not include the same participants, it may also be possible to submit the application as two separate IRB proposals since separate selection, recruitment, and informed consent procedures will need to be described.

Decide what aspects of the initial qualitative results to use to inform the second-phase quantitative strand.

In an exploratory sequential design that has the intent of developing and testing an instrument (or a new variable, taxonomy, set of intervention activities, or website or app), researchers need to determine what information from the initial qualitative phase can be most helpful in designing the follow-up quantitative data collection phase. During the initial qualitative phase, we recommend researchers employ a typical qualitative data analysis, which consists of identifying useful quotes or sentences, coding segments of information, and grouping codes into broad themes or a typology (as will be discussed in Chapter 7). The emergent quotes, codes, themes, and typology then provide the results to use in shaping the development of the quantitative feature. For example, a key theme may suggest a new variable and inform the selection, modification, or design of an instrument to measure that variable. Crede and Borrego (2013) identified six variables related to engineering graduate student retention from the six themes that emerged from the analysis of their qualitative observations and interviews. They used significant quotes identified for each theme to inform the development of specific items for the instrument. If the second phase requires specifying the types of intervention activities to use in an experiment or trial, then the researcher can use the qualitative themes as guidance for the specific viewpoints that need to be considered and the activities that should be developed. In sum, the results of the initial qualitative phase need to inform the second, quantitative phase in this design. A good strategy for conveying this step is to develop a table that lists each of the major qualitative findings in one column and then specifies how each finding was used in the design of the quantitative feature in a second column.

Decide what steps to take in developing a good quantitative instrument.

When a quantitative instrument is being developed, researchers must make decisions about how to design a good instrument so it has strong psychometric properties. It takes time and hard work to develop a valid instrument, and the mixed methods researcher may instead use the themes from the initial qualitative phase to locate published instruments to use that best match the different qualitative themes. When that is not possible, mixed methods researchers may decide to develop their own instrument based on the qualitative findings. The best instruments are rigorously developed using good procedures of scale development. A general approach that we recommend has been adapted from DeVellis (2012):

1. Determine what you want to measure and ground yourself in theory and in the constructs to be addressed (as identified by the qualitative findings).
2. Generate an item pool, using short items, an appropriate reading level, and items that ask a single question (based on participant language identified in the qualitative findings when possible).
3. Determine the scale of measurement for the items and the physical construction of the instrument.
4. Have the item pool reviewed by experts (such as participants from the qualitative phase who are experts in their own experiences in addition to formally trained content experts).
5. Consider the inclusion of validated items from other scales or instruments to detect undesirable responses.
6. Administer the instrument to a development sample for validation.
7. Evaluate the items (e.g., reverse scoring, item-scale correlations, item variances, factor analysis, coefficient alpha reliability, analysis of participant comments).
8. Optimize scale length based on item performance and reliability checks.

Another way to learn about mixed methods procedures for generating an instrument from qualitative findings is to examine published mixed methods studies that use an exploratory sequential design with the intent to develop an instrument. In addition to Enosh et al.'s (2015) study about social workers' experiences with client violence found in Appendix C, other examples of this design are found in a study of creating a measure of organizational assimilation in diverse industries (Myers & Oetzel, 2003); a study of global research and the

design of culturally sensitive instruments for an intervention (Betancourt et al., 2011); an education study about the teaching of reading comprehension (Meijer, Verloop, & Beijaard, 2001); a psychological study of the tendency to see oneself as significant to a romantic partner (Mak & Marshall, 2004); a career development study about parents' attitudes of career education in preschools (Cinamon & Dan, 2010); and a culturally situated study of the fruit and vegetable intake of Native American children (Sinley & Albrecht, 2016).

If developing an instrument, decide how to convey the design of it in a procedural diagram.

Finally, the connecting phase during which the researcher designs the instrument (or other quantitative feature) needs to be clearly communicated and can be incorporated into a discussion or a diagram of the overall procedures in a mixed methods study. We recommend the use of a diagram to highlight the numerous steps required to design a good instrument. Bulling (2005, 2006) designed a mixed methods study addressing how emergency personnel reacted to tornadoes. Figure 6.1 is a figure from her study. This figure indicates the instrument development stages and how they paralleled the qualitative and quantitative procedures in her exploratory sequential design study.

Mixed Methods Experimental Design Data Collection

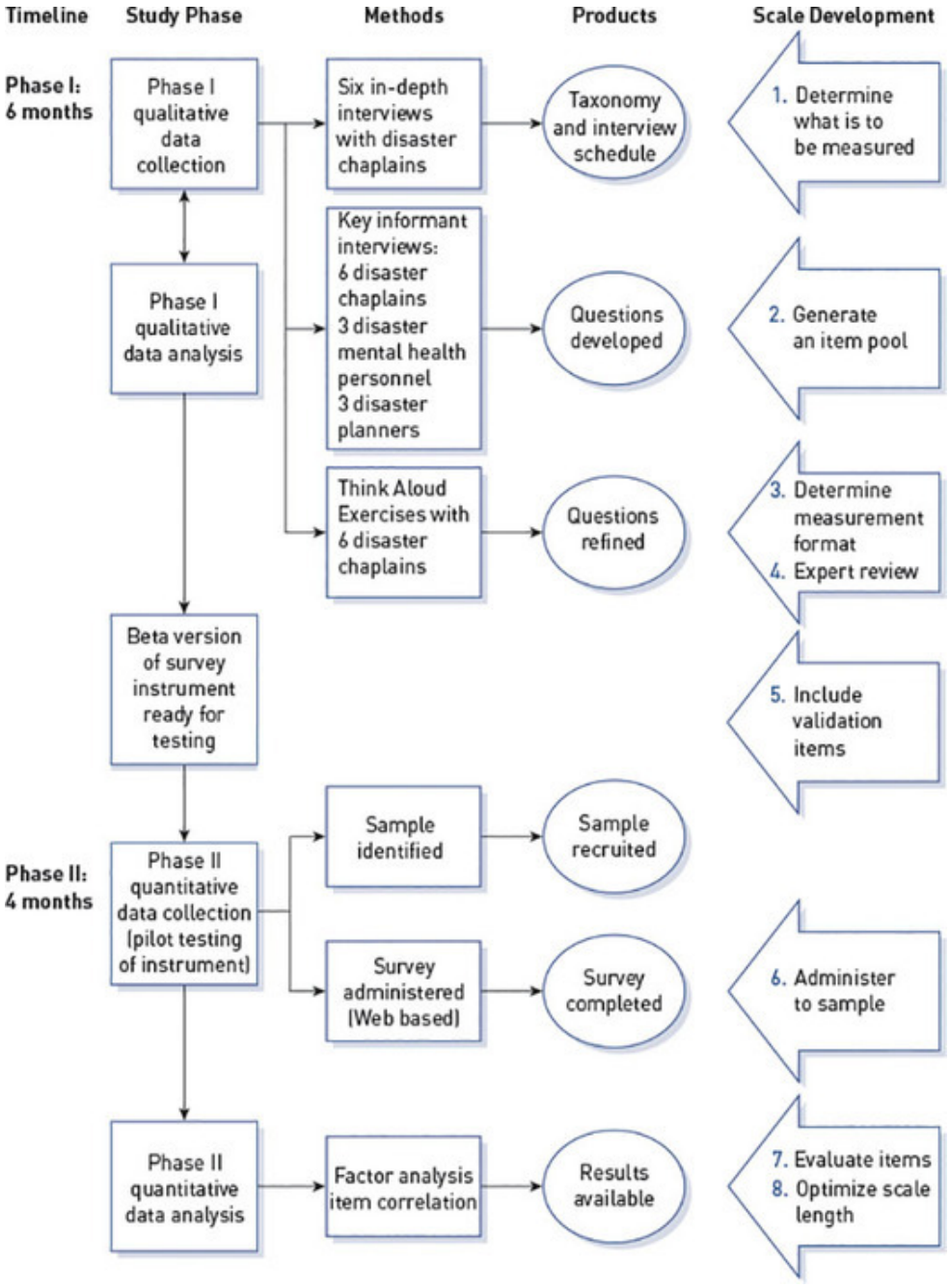
In a mixed methods intervention design, the qualitative data are embedded within an experimental trial and can be collected either before, during, or after the experiment (or intervention), or at multiple times. The decisions about data collection therefore reflect considerations related to conducting a good experimental trial and those already mentioned for the core designs. What decisions about data collection does a researcher have to face when using this design? The **data collection decisions for the mixed methods experimental design** include deciding on the reasons for the collection and timing of the qualitative data, taking steps to reduce the potential for introducing bias if the qualitative data collection occurs during the trial, and determining what collected qualitative data will best augment the experiment.

Decide on the reason and timing for collecting qualitative data within the experimental design.

In terms of a rationale and timing for embedding supportive qualitative data into a quantitative experiment, reasons need to be advanced for why the qualitative data are being used. These reasons might be stated in a purpose statement (see Chapter 5). One approach to an experimental study is to consider introducing the supportive qualitative database in one or more phases of the experiment: before the trial begins, during the trial, or after the trial. Introducing it before and/or after the trial means a sequential introduction of the qualitative data, while using qualitative data during the trial indicates a concurrent use of the two databases. Sandelowski (1996) first conceptualized these possibilities. In subsequent writings, we have expanded on specifically how qualitative data might flow into an experimental trial and the reasons for its inclusion in health science research (Creswell, Fetters, Plano Clark, & Morales, 2009). These reasons are mentioned in Table 6.3. We have also noted that depending on resources and personnel, qualitative data might be added at a single phase, such as before the trial (see Donovan et al., 2002, in which the authors collected qualitative interview data before the randomized controlled trial to enhance the rate of consent to participate) or during the trial (see Plano Clark et al., 2013, in which authors collected qualitative recordings during the treatment sessions to enhance understanding of the intervention implementation and participant experience). The qualitative data might also be gathered at multiple times during a study (see Wiart et al., 2016, in Appendix D, in which the qualitative data were collected before the trial to understand why some participants withdrew from the study and

to describe the expectations that participants brought to the treatments, and were collected after the trial to examine the experiences and outcomes valued by participants in the treatment conditions). O'Cathain and colleagues have also advanced a framework for thinking about the reasons for gathering qualitative data in terms of how it is used in the trial more than when it is gathered (Drabble & O'Cathain, 2015; O'Cathain et al., 2013). They note the qualitative data can be gathered in order to inform the intervention, the design and conduct of the experiment, the outcomes, the measures, and the understanding of the target condition.

Figure 6.1 Diagram of the Procedures for an Exploratory Sequential Study With Instrument Development



Source: Bulling (2005, 2006). Used with permission from the author.

Decide how to minimize the possibility of the qualitative data introducing bias into the experiment.

One issue that can occur when a researcher concurrently embeds qualitative data into an experiment is the introduction of bias or confounding variables. The qualitative data collection has the potential to affect the outcome results of the trial, which, if not controlled for, can reduce the internal validity of the experiment. For example, will gathering focus group data during the trial with the treatment sample affect the outcomes in the experiment by influencing how people think about the outcomes or changing how they engage with the treatment? Researchers need to be alert to this possibility and openly discuss it. Steps should be taken to minimize this potential bias. One option for the researcher is to collect unobtrusive qualitative data that minimizes the contact between the researcher and the participants, such as collecting diaries or making recordings of the activities occurring during intervention sessions. Victor, Ross, and Axford (2004) used diaries in an intervention trial of individuals with osteoarthritis of the knee. They asked individuals in the intervention group to maintain diaries during the intervention to record their symptoms, medication use, and goals for treatment during the trial. The investigators then collected these diaries after the intervention and reviewed them. Another approach is to equally distribute the qualitative data collection across all treatment and control groups. Finally, investigators might postpone the qualitative data collection until after the intervention is complete by employing an explanatory sequential approach to data collection.

TABLE 6.3 ■ Reasons for Adding Qualitative Research Into Intervention Trials

Reasons for adding qualitative data before the trial begins:

- To develop an instrument for use in an intervention trial (when a suitable instrument is not available)
- To develop good recruiting or consent practices for participants in a intervention trial
- To understand the participants, context, and environment so that an intervention is more likely to work (i.e., adapting interventions to real-life situations)
- To document a need for the intervention
- To compile a comprehensive assessment of baseline information

Reasons for adding qualitative data during the trial:

- To validate the quantitative outcomes with qualitative data representing the voices of the participants
- To understand the impact of the intervention on participants (e.g., barriers and facilitators)
- To understand unanticipated participant experiences during the trial
- To identify key constructs that might potentially impact the outcomes of the trial, such as changes in the sociocultural environment
- To identify resources that can facilitate the conduct of the intervention
- To understand and depict processes experienced by the experimental groups
- To check the fidelity of the implementation of procedures
- To identify potential mediating and moderating factors

Reasons for adding qualitative data after the trial concludes:

- To understand how participants view the results of the trial
- To receive participant feedback to revise the treatment
- To help explain the quantitative outcomes, such as underrepresented variations in the trial outcomes
- To determine the long-term, sustained effects of an intervention after a trial
- To understand in more depth how the mechanisms worked in a theoretical model
- To determine if the processes in conducting the trial had treatment fidelity
- To assess the context when comparisons of outcomes are made with baseline data

Source: Adapted from Table 9.1 in Creswell, Fetters, Plano Clark, and Morales (2009).

Source: Adapted from Table 9.1 in Creswell, Fetters, Plano Clark, and Morales (2009).

Decide what type of qualitative data will best augment the experiment.

Researchers using a mixed methods experimental design need to carefully select the forms of qualitative data gathered. If unobtrusive diary data would least disrupt the intervention trial, what types of data might be collected before and after the trial to best augment the development and understanding of the trial? The answer to this question depends on the purpose for collecting the qualitative data. If the purpose of collecting the qualitative data before the trial is to help determine recruitment strategies, then focus group data might capture the largest number of perspectives in a short time frame. If the purpose is to explain the intervention results, then the use of one-on-one interviews, observations, or any of the many diverse sources of qualitative data (e.g., interviews, observations, documents, audiovisual materials) could be appropriate. Typically, one-on-one qualitative interviews are gathered following an experimental trial, and individuals in the treatment group comprise the interview pool because investigators seek to understand why the experimental treatment worked or did not work.

Mixed Methods Case Study Design Data Collection

Data collection in a mixed methods case study typically involves collecting both quantitative and qualitative data that help to provide evidence for a case or cases or to generate a case or cases. As a complex design, the quantitative and qualitative data collection is embedded into a case design structure. Also apparent in mixed methods case study designs are the variants of beginning with a case or cases and then establishing evidence for the cases or, alternatively, ending the study with cases generated from the qualitative and quantitative data. As a further extension of this idea, cases, according to Yin (2009), can be descriptive (i.e., simply describing the case); exploratory (i.e., ending with a case); or explanatory (i.e., beginning with a case)—a typology that lends itself well to various designs in mixed methods. The unit of analysis for sampling typically is the case (Patton, 2014), although multistage sampling may occur in mixed methods case studies. Regardless of the variant, type, or unit of analysis, a hallmark of case study research data collection has been the collection of multiple sources of information (Carolan, Forbat, & Smith, 2016). Therefore, the **data collection decisions for the mixed methods case study design** involve determining the boundaries for a case and deciding on criteria for distinguishing among cases if data are collected on multiple cases, employing rigorous quantitative and qualitative data collection through a convergent core design, and aligning multiple cases in order to facilitate cross-case comparisons.

Decide on the criteria to use to define the case(s) for the study.

In mixed methods case study designs, the researcher should carefully describe the boundaries of the case or cases involved in the study. The case may be the unit of study; a design (see Creswell, 2012); or the product of the case study (Carolan et al., 2016). As we discuss data collection in this design, we will view the case as the unit of study. These boundaries may be segmented by time, location, and/or activities. In mixed methods studies, authors identify the case(s) and describe them. For example, Smith, Moore, Anderson and Siderelis (2012) specified three cases for their study of the linkages between localized resource conditions and community organization and change. Each case was a county that met specific criteria in terms of its economic, geographic, and demographic characteristics. The researchers then gathered a collection of quantitative and qualitative data for each case that represented the trends and activities of the counties from 1977 to the present time so they could predict similar results across the counties and replicate trends in their multiple case analysis.

Decide on the core design to provide evidence for the case(s).

Mixed methods case studies typically involve merging quantitative and qualitative data in a convergent core design to provide extensive evidence for each of the cases (Curry & Nunez-Smith, 2015). A sequential core design can be used to build a case profile or to test a case, but example studies point toward a convergent design as the primary core design in mixed methods case studies. Even when a sequential design is used to identify cases, a convergent approach is used to describe and interpret the cases. Smith et al.'s (2016) study in Appendix E is an example of a complex mixed methods approach that included both sequential and convergent approaches. The authors began with a sequential approach by quantitatively examining available school-level data and using the results to select four cases for in-depth study. They then gathered qualitative focus groups, interviews, field notes, and artifacts and quantitative surveys, structured observations, and school performance data concurrently for each of the four selected schools. These quantitative and qualitative results were then combined to identify patterns of support and student outcomes for the participating schools. From the merged results, the authors identified contexts, programs, practices, processes, and policies that differentiated the higher value-added schools from the lower value-added schools.

Decide on the criteria for distinguishing cross-case comparisons.

If multiple cases are compared, the researcher needs to identify criteria for distinguishing among the cases in the sampling selection procedure and gather similar data across the cases to facilitate comparisons. The criteria will be unique to each study, but they need to be clearly identified in a mixed methods study. For example, concerns about safety and fragmented community mental health care in the United Kingdom led to the development of care programs in England and Wales. Simpson et al. (2016) conducted a comparative mixed methods case study using a concurrent (convergent) design that employed surveys and interviews. To compare cases at the national, macro level, government websites were systematically searched to locate case study sites, identify local documents, and locate individuals at the sites to be interviewed. At the meso level, the researchers gathered survey responses from service users and care coordinators for each case. At the micro level, they conducted semi-structured interviews with service users. Thus, they generated multiple forms of data for each case by engaging in multistage sampling approaches to build a complex profile of safety and community health.

Mixed Methods Participatory-Social Justice Design Data Collection

The mixed methods participatory-social justice design involves the researcher framing a core mixed methods design within a participatory or social justice framework. Data collection for the qualitative and quantitative strands of the study can proceed convergently, sequentially, or both. Therefore, this design can include the data collection decisions already specified for the core designs. Additional considerations then relate to how the core designs can reflect a participatory or social justice framework. Many of these considerations surfaced during reviews of the use of social justice frameworks in mixed methods studies (Sweetman, Badiee, & Creswell, 2010; Ponterotto, Mathew, & Raughley, 2013). Ponterotto et al. (2013) highlighted how the use of mixed methods data provides social justice researchers "with multiple windows into the lives of less empowered and historically silenced people within our society" (p. 47). Their approach to mixed methods includes "ethical vigilances" during all phases of research, including data collection. Therefore, the **data collection decisions for the mixed methods participatory-social justice design** relate to how to refer to study participants, implement inclusive sampling procedures, actively involve participants so the data collection will be credible to the community, use culturally sensitive instruments, and provide benefits to participants and the community.

Decide how best to refer to and interact with participants.

Avoid stereotypical labels for participants when collecting data and use labels that are meaningful to the participants in the study. In a mixed methods study of individuals with disabilities, Boland, Daily, and Staines (2008) mentioned that the interviewers used in the qualitative phase were trained in appropriate language and etiquette related to disability: "Five interviewers were given specific training on the social model of disability, etiquette and language when interviewing clients with disability" (p. 201).

Decide what sampling strategies will promote inclusiveness.

Use sampling strategies that improve the inclusiveness of the sample to increase the probability that traditionally marginalized groups are adequately and accurately represented. A collaborative approach to making decisions about

sampling might be used. For example, Payne (2008) described how he formed a research team with four street life–oriented black men, and this team mapped out street communities of interest, identified "street allies" as gatekeepers, and utilized snowball sampling to identify street life–oriented black male participants for their mixed methods participatory study of resiliency.

Decide how to actively involve participants in the data collection process.

Use methods to ensure the research findings will be credible to the focal community and design data collection to permit effective communication with community members. Use data collection methods that are sensitive to the community's cultural contexts and that open up avenues for participation in the social change process. Stakeholders can be involved in data collection as advisors or co-researchers through helping to identify study questions, recruiting participants, developing interventions, delivering the interventions, collecting data, and forming a community advisory committee (De Las Nueces et al., 2012). For example, in their research on assessing racial discrimination for Cambodian American adolescents, Sangalang et al. (2015) discussed working with youth and adult members of the community throughout every step of their research process and regularly sharing their work with community partners. In Appendix F, Greysen et al. (2012) made the community involvement aspect of their mixed methods study explicit by presenting their findings to community members as they became available and having stakeholders review the accuracy of the findings and make recommendations for implementing changes.

Decide to use data collection instruments that are sensitive to the cultural context of the group being studied.

Researchers using mixed methods participatory-social justice designs need to carefully select quantitative measures that are sensitive to the constructs and groups under study to keep from further marginalizing participants by using inappropriate data collection measures. Hodgkin (2008) described selecting a particular measure of social capital that was shown to be sensitive to the range of formal and informal activities in which women become involved. McMahon (2007) also discussed selecting a nonstandard measure for use in her study of student–athlete cultures of rape myths. She wrote that the selected measure "represents a departure from the instruments that are typically used to measure students' attitudes toward sexual assault because it was specifically designed to address issues of acquaintance rape on a college campus" (p. 360). Sangalang et

al. (2015) found that an appropriate measure for their study did not exist and decided to develop a new instrument to measure racial discrimination for Cambodian American adolescents. They implemented an exploratory core design shaped by a participatory approach to develop, validate, and administer the new culturally sensitive measure.

Decide how the data collection process and outcomes will benefit, not marginalize, the community being studied.

This decision reflects the notion of reciprocity—giving back to participants. It is not enough to develop and implement a study that may be useful to the community; there has to also be an attempt to disseminate the findings within the community to bring about needed change. During the process of conducting a study of Hispanic females, Cartwright et al. (2006) shared "the findings with the participants as the study progressed, as well as through addressing participants' questions during the process" (p. 100). Referrals can be another source of reciprocity. Filipas and Ullman (2001), who studied female sexual assault survivors, provided their participants "with a list of medical and mental health resources in the community for dealing with rape and other violence and the cover letter to students gave an additional contact for counseling referrals at the university" (p. 676).

Mixed Methods Evaluation Design Data Collection

The mixed methods evaluation design combines both sequential and convergent strands over a period of time within an evaluation procedure aimed at assessing the implementation of a program or an intervention strategy. Prime examples are large-scale evaluation projects (e.g., Teddlie & Stringfield, 1993); health science community improvement projects (e.g., Scanlon et al., 2016); program evaluation of humanitarian aid (Bolton et al., 2007); and community prevention projects (Rossow & Baklien, 2011). These all involve multiple forms of quantitative and qualitative data collection and typically are conducted over several years. What all of these projects have in common is that (1) they are more complex and have more phases than the core designs, (2) they typically occur over time, (3) they often involve a team of researchers, (4) they require extensive funding, and (5) they involve collecting multiple quantitative and qualitative databases that build toward an overall objective. These studies often are described as multiple projects based on the different databases and appear in different publications with varying publication lags (Morse & Niehaus, 2009), which makes it difficult to discern the specific data collection issues. The evaluation data collection may relate to qualitative data to assess *process* as well as quantitative data to determine *effect* (Rossow & Baklien, 2011). Alternatively, it might follow the evaluation process of steps—for example, of research, partnership, and intervention as described by Nastasi and Hitchcock (2016) and illustrated in Figure 4.11 and in Appendix G in this book. As the use of mixed methods in the evaluation of longitudinal programs becomes more common (Axinn & Pearce, 2006), mixed methods evaluation designs will be developed further. The **data collection decisions for the mixed methods evaluation design** relate to using multiple sampling strategies, using multiple data collection forms, addressing issues with longitudinal designs, and developing a programmatic objective that binds the multiple projects together.

Decide to use multiple sampling strategies that fit different phases of the evaluation.

The mixed methods evaluation design often involves multiple sampling strategies and may include different sampling procedures for different levels of analysis. In an examination of schools in the Louisiana Effectiveness Study (Teddlie & Stringfield, 1993), the authors used eight different sampling strategies (e.g., types of probability, such as random; types of qualitative purposive, such as typical case sampling; and types of combinations, such as stratified purposive) at five levels

of education: state school system, school districts, individual schools, teachers or classrooms, and students within classrooms.

Decide how to sample and collect data for each phase.

Mixed methods evaluation designs may include both convergent and sequential forms of data collection, and one or both forms may apply to different levels of an organization (Teddlie & Yu, 2007) and/or to different phases of a longitudinal study. This might mean using different samples for different phases to keep from biasing the participants or causing them research fatigue. Bradley et al. (2009) described their different samples and data collection procedures across four phases in a study to improve hospital care for patients with acute myocardial infarction. They first examined quantitative performance data in a database representing all U.S. hospitals. In the next step, they conducted in-depth qualitative studies of 11 hospitals identified as high performers. The sample at each hospital included individuals in various roles, such as cardiologists, emergency medicine physicians, nurses, technicians, ambulance staff, and administrators. From the qualitatively derived practices, the team developed a quantitative online survey that was administered to a randomly selected sample of 365 hospitals. After disseminating recommendations based on results, the team evaluated the success of the dissemination efforts using a combination of approaches.

Decide how to handle measurement and attrition issues.

Longitudinal approaches to mixed methods research are common in mixed methods evaluation designs, and specific issues may surface related to the longitudinal aspect (Plano Clark, Anderson, et al., 2015). One of these is the possible attrition of participants if the data collection methods take place over several years (Axinn & Pearce, 2006). Other issues involve the tension between maintaining close comparability of measures over time and measures that change over time given emerging data collection efforts. In addition, when multiple data collection points are used, the participants may change (as may social context or the subject matter of interest) over the course of a multiphase study that includes longitudinal data collection. Procedures for participant recontact and cooperation need to be built into the study. If the unit of analysis is a household, individuals may change in households over time. Also, researchers need to keep an emergent approach in mind so that the inquiries build incrementally and not simply develop as separate studies. As pointed out by Axinn and Pearce (2006), “Information

gleaned from methods used at one point can be used to guide implementation of the next round of alternative methods" (p. 178).

Decide on the programmatic thrust to provide the framework for the evaluation project.

There needs to be consistency among the multiple projects in this design, and this consistency should be provided by a central programmatic thrust. Morse and Niehaus (2009) discussed the importance of this programmatic objective, and it was the subject of an article by Campbell et al. (2000) on developing complex interventions to improve health. Campbell and colleagues discussed complex interventions "made up of various interconnecting parts" (p. 694). Their complex intervention studies in the health sciences have addressed several topics, including service delivery and organization units (e.g., stroke units); health professionals' behavior (e.g., strategies for implementing guidelines); community interventions (e.g., community-based programs to prevent heart disease); group interventions (e.g., school-based interventions to reduce smoking); and health care for individuals (e.g., cognitive behavioral therapy for depression). The phases of these intervention projects were sequential or iterative and often were not linear. They consisted of a preclinical or theoretical phase, a phase defining components of the intervention, a phase defining the trial and intervention design, and a phase promoting effective implementation. The investigators included qualitative and quantitative data collection methods in these phases and discussed method issues concerning the difficulty of randomization, concealing allocation of treatment, and poor recruitment.

Summary

Qualitative and quantitative data collection involve the key components of sampling, obtaining permissions and recruitment, selecting types of data, preparing forms for recording data, and administering the data collection. For each component, the procedures differ for quantitative and qualitative approaches to data collection. In mixed methods research, it is helpful to conceptualize the type of data collection as either convergent or sequential and to relate the data collection procedures to the specific types of mixed methods designs. General principles for collecting data in mixed methods studies involve gathering information to address the research questions, providing details for the procedures, being familiar with both quantitative and qualitative data collection, and using sampling that draws on the approaches found in both qualitative and quantitative research.

There are also specific decisions related to data collection associated with each of the mixed methods designs. For the convergent design, the decisions relate to who will be selected for the two study samples, the size of the two samples, the concepts addressed by the data collection questions, and the format and order of the different forms of data collection. For the explanatory sequential design, the decisions relate to who the participants in the second phase should be, what sample sizes to use for both data strands, what quantitative results will be further explained by the second-phase data collection, how participants will be selected for the second phase, and how to secure IRB permissions for the two data collections. For the exploratory sequential design, the decisions relate to the determination of samples for each phase; how to describe the emergent aspects of the study for IRB approval; what results to use from the first phase to build the second, quantitative phase; how to develop a good instrument; and how to convey the rigor of this design.

When considering complex mixed methods designs, there are additional considerations that go beyond the decisions associated with the core designs. For the mixed methods experimental design, the data collection decisions involve the reasons and timing for collecting the qualitative data, how to minimize the potential for introducing bias if the qualitative data collection occurs during the trial, and what qualitative data will best augment the experiment. In the mixed methods case study design, key decisions involve determining the boundaries for the case(s), deciding how to employ rigorous quantitative and qualitative data collection through a convergent core design, and deciding on criteria for

comparing cases if data are collected on multiple cases. In the mixed methods participatory-social justice design, the decisions relate to how to refer to participants, how to promote inclusiveness through sampling, how to actively involve participants, how to identify and use instruments that are culturally sensitive, and how to provide benefits to participants and the community. For a mixed methods evaluation design, the data collection decisions relate to what multiple sampling strategies to use, how to match the sampling strategies to the core designs, how to account for the issues related to longitudinal designs, and how to ensure a programmatic objective binds the multiple projects together.

Activities

1. Examine one qualitative and one quantitative journal article. The two studies should display data collection procedures as summarized in Table 6.1. Discuss the different approaches used and to what extent they represent rigorous procedures for the qualitative or quantitative research approach.
2. Find a convergent mixed methods study published in a journal. Draw a diagram of the data collection activities for the two strands. Indicate in the drawing specifics about the sampling strategies, the sample sizes, the participants, and the different forms of data collection.
3. Find an explanatory sequential mixed methods study published in a journal. Examine how the authors selected the participants for the second phase and the reason(s) the authors gave for selecting those individuals. List the ways the authors used the quantitative results to guide the collection of data in the qualitative phase.
4. Find an exploratory sequential mixed methods study in which the intent was to develop an instrument. List the steps the authors used to develop the instrument from the qualitative database. Compare these steps with those in DeVellis (2012) mentioned in this chapter.
5. Find a published example of a mixed methods experimental study. Examine how the authors gathered the qualitative data as part of the experiment. List the reasons and timing for the qualitative data and any steps that the authors took so the qualitative data collection would not introduce potential bias.
6. Find a published example of a mixed methods case study. Describe how the authors defined the case(s) and list the quantitative and qualitative data gathered as evidence within each examined case.
7. Find a feminist mixed methods participatory-social justice design study. Look closely at the data collection and determine how the authors collaborated with participants, were respectful of participants' rights, used data collection procedures that were sensitive to the participants' contexts, and built community support to engage in the research.
8. Find a mixed methods evaluation design study in the social sciences or the health sciences. Identify the various phases that were linked together. Draw a diagram of the data collection procedures within each of the phases and add in boxes to illustrate where the quantitative and qualitative data flowed into the projects.
9. Write a description of the data collection procedures you might use in a mixed methods study of your choice. Specify your sampling strategy, sample size, data collection types, forms for recording information, and administration procedures for the quantitative and qualitative strands of your study. Also write a paragraph describing the specific mixed methods data collection decisions that would be part of this study.

Additional Resources to Examine

There are numerous books available to help develop a good understanding of quantitative and qualitative data collection methods. Books are available within specific discipline fields, but the

resources listed here include both quantitative and qualitative methods and are broadly aimed at the social sciences and education.

- Creswell, J. W. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (5th ed.). Upper Saddle River, NJ: Pearson Education.
- Creswell, J. W. (2015). *30 essential skills for the qualitative researcher*. Thousand Oaks, CA: Sage.
- Plano Clark, V. L., & Creswell, J. W. (2015). *Understanding research: A consumer's guide* (2nd ed.). Upper Saddle River, NJ: Pearson Education.

Several online sources also provide overviews of key ideas in both quantitative and qualitative research, including the following:

- Trochim, W. M. *The research methods knowledge base* (2nd ed.). Retrieved from http://www.socialresearchmethods.net/kb/
- Cohen, D., & Crabtree, B. *Qualitative research guidelines project*. Retrieved from http://www.qualres.org/

For a detailed overview of the steps involved in constructing an instrument and in scale development, see the following re**source:**

- DeVellis, R. F. (2012). *Scale development: Theory and application* (3rd ed.). Newbury Park, CA: Sage.

For a discussion of collecting both qualitative and quantitative data embedded within a design or procedure, see the following re**source:**

- Axinn, W. G., & Pearce, L. D. (2006). *Mixed method data collection strategies*. Cambridge, UK: Cambridge University Press.

7 Analyzing and Interpreting Data in Mixed Methods Research

Data analysis in mixed methods research consists of analyzing separately the quantitative data using quantitative methods and the qualitative data using qualitative methods. It also involves combining both databases using approaches that mix, or integrate, the quantitative and qualitative data and results—the mixed methods analysis. Researchers analyze the data in response to the research questions or hypotheses in a study, including mixed methods questions. Therefore, our focus here will be primarily on the types of analyses used to address the mixed methods questions in studies. Data are analyzed to address these questions through distinct steps and through key decisions made by the researcher. The steps and decisions vary among the core and complex mixed methods research designs that we introduced in Chapters 3 and 4. Using these analysis procedures, the mixed methods researcher represents, interprets, and validates the data and results. Computer programs can help in these procedures, and we will address the use of these programs in mixed methods data analysis. Our discussion, however, begins with a review of the basics of quantitative and qualitative research. Thus, this chapter will

- review the procedures in quantitative and qualitative data analysis and interpretation,
- summarize the history and key principles guiding mixed methods data analysis and interpretation,
- discuss mixed methods integrative data analysis and interpretation for each of the core and complex mixed methods designs,
- identify validity issues for each of the core and complex designs, and
- suggest ways computer software programs can be used in mixed methods data analysis.

Procedures in Quantitative and Qualitative Data Analysis and Interpretation

Researchers go through a similar set of steps for both quantitative and qualitative data analysis: preparing the data for analysis, exploring the data, analyzing the data, representing the analysis, interpreting the analysis, and validating the data and interpretations of the results. These steps unfold in a linear fashion in quantitative research but are often implemented both simultaneously and iteratively in qualitative research. As shown in Table 7.1, the procedures associated with each step also differ for quantitative and qualitative research. These steps may be familiar, so the presentation here will only review and highlight essential aspects of data analysis (for more detailed presentations, see Creswell, 2015a and Plano Clark & Creswell, 2015).

TABLE 7.1 ■ Recommended Quantitative and Qualitative Data Analysis Procedures for Designing Mixed Methods Studies

Quantitative Data Analysis Procedures	Steps in Data Analysis	Qualitative Data Analysis Procedures
• Assign a numeric value to each response in a database (e.g., Excel, SPSS) • Clean the database (e.g., check for data entry errors) • Recode items and compute new variables (e.g., summed scores) • Establish a codebook (name and definition of each quantitative variable)	Prepare the data for analysis	• Transcribe the data • Check transcripts for accuracy • Organize the data by data type, participant, or case • Format the data to facilitate the analysis (by hand or with software)
• Visually inspect trends in the data and check whether data are normally distributed • Conduct descriptive analyses for each major variable • Conduct basic assessments of the reliability and validity of the measures • Address any issues of missing data	Explore the data	• Read through the data to obtain a sense of it all • Write memos about initial thoughts • Develop a few initial codes (all projects) and develop a qualitative codebook (only appropriate for some projects)

• Select appropriate inferential statistical tests based on research questions, scale type, number of variables, and distributions
• Analyze data using quality statistical software (e.g., SPSS, SAS, R, JMP) to answer quantitative research questions and test hypotheses
• Conduct inferential tests and calculate effect sizes and confidence intervals
	Analyze the data	• Select the analysis approach(es) based on the research questions
		• Use qualitative data analysis software programs (e.g., MAXQDA, NVivo, Atlas.ti)
		• Implement a coding process:
		  ○ Code the data
		  ○ Develop description and themes by grouping codes
		  ○ Interrelate themes (or categories) based on overall qualitative approach or develop abstract categories into a smaller set of themes

• Summarize statistical results (e.g., statistics and *p* values) in the text, tables, and figures • Follow style guidelines (e.g., APA style) for reporting results	Represent the data analysis	• Represent the findings in discussions of description, themes, or categories • Provide evidence for the themes/description, such as quotes, multiple perspectives, and rich description • Present visual models, figures, and/or tables about the descriptions or themes • Follow style guidelines (e.g., APA style) for reporting findings
• Summarize the major quantitative results • Compare the results to hypotheses or interpret in terms of the research questions • Examine results with respect to prior predictions or explanations drawn from the literature • Identify limitations of the study • Identify implications for future research and for audiences	Interpret the results	• Summarize the major qualitative findings • Interpret how the findings answer the research questions • Relate findings to past literature and/or theories • Bring in a personal assessment of the meaning of the findings • Identify limitations of the study • Identify implications for future research and for audiences

• Use external standards
• Establish the reliability and construct validity of the obtained scores:
  ○ in the data collection section (from past uses of the instruments) and
  ○ in your analysis (from current study) such as by assessing the internal consistency of the scores or test-retest results
• Use procedures that reduce threats to internal validity (which is the extent to which cause-and-effect claims can be made)
• Use procedures that reduce threats to external validity (which is the extent to which the results can be generalized to other persons, settings, or times)
	Validate the data and results	• Use researcher, participant, and reviewer standards
		• Check for the accuracy of the account—extent that the information is credible, transferable, dependable, and confirmable
		• Use at least three of the following validation strategies:
		  ○ member checking,
		  ○ triangulating data from several sources or individuals,
		  ○ spending extended time in the field,
		  ○ reporting disconfirming evidence, or
		  ○ conducting an external review of the data and procedures (e.g., peer review or audit)
		• Employ limited procedures for checking reliability (e.g., the extent to which multiple coders agree on codes)

Source: Adapted from Creswell & Plano Clark (2011).

Source: Adapted from Creswell & Plano Clark (2011).

Prepare the Data for Analysis

In *quantitative data analysis*, the investigator begins by converting the raw data into a form useful for data analysis, which means scoring the data by assigning numeric values to each response, cleaning data entry errors from the database, and creating special variables that will be needed, such as recoding items on instruments with inverted scores or computing new variables that comprise multiple items that form scales. Recoding and computing are completed using statistical computer programs, such as the Statistical Program for the Social Sciences (SPSS; http://www.spss.com), the Statistical Analysis System (SAS; http://www.sas.com), R (https://www.r-project.org/), and JMP software (https://www.jmp.com). A codebook that lists the variables, their definitions, and the numbers associated with the response options for each also needs to be developed.

For *qualitative data analysis*, preparing the data means transcribing text from interviews and observations into word processing files for analysis. The preferred approach is for the researcher to create verbatim (word-for-word) transcriptions of the data. During the transcription process, the researcher checks the transcription for accuracy and then formats and organizes the data to facilitate the later analysis steps. For example, if the researcher plans to do hand coding of the data, preparing the data includes formatting the transcription files with extra-wide margins and organizing all the gathered text and visual data into folders. The researcher may also choose to enter the various forms of data into a qualitative data analysis software program, such as MAXQDA (http://www.maxqda.com), Atlas.ti (http://www.atlasti.com/), NVivo (http://www.qsrinternational.com), HyperRESEARCH (http://www.researchware.com/), or QDA Miner (https://provalisresearch.com/).

Explore the Data

Exploring the data means examining the data with an eye to identifying broad trends and preliminary understandings of the database. Exploring the data in *quantitative data analysis* involves visually inspecting the data and conducting a descriptive analysis (e.g., the mean, standard deviation [SD] and variance of responses to each item on instruments or checklists) to determine the general trends in the data. Descriptive statistics are generated for all major variables in the study—especially the main ones, such as the independent and dependent variables. Researchers explore the database to see its distribution and determine whether it is normally or non-normally distributed so proper statistics can be chosen for analysis. The quality of the scores from the data collection instruments is also examined using procedures to assess their reliability and validity. Researchers also address any issues of missing data using procedures such as data imputation.

Exploring the data in *qualitative data analysis* involves reading through all of the data to develop a general understanding of the database. In this general review of the data, all forms of data are reviewed, such as observational field notes, journals, minutes from meetings, pictures, and transcripts of interviews. It involves recording initial thoughts by writing short memos in the margins of transcripts or field notes. Making these memos becomes an important first step in forming broader categories of information, such as codes or themes. A qualitative codebook can be developed at this time as well. The codebook is a statement of the codes for a database. It is generated during a project and may rely on codes from past literature or theory as well as codes that emerge during an analysis. Generating this codebook helps organize the data, and it facilitates agreement (if several individuals code the data) on the analysis of the transcripts as new codes are added and other codes removed during the coding process. Not all qualitative researchers use such a systematic procedure, but it helps to organize large databases.

Analyze the Data

Analyzing the data consists of examining the database to address the research questions or hypotheses. We see multiple levels of analysis in both quantitative and qualitative analysis. In *quantitative data analysis*, the researcher analyzes the data based on the type of questions or hypotheses and uses the appropriate statistical test to address those questions or hypotheses. The choice of a statistical test is based on the type of research question asked (e.g., a description of trends, a comparison of groups, or the relationship among variables); the number of variables in the question; the types of scales used to measure those variables; and whether the variables' scores are normally or non-normally distributed. Information in research methods texts discusses all these considerations (e.g., Creswell, 2015a). The quantitative data analysis is conducted using statistical software (e.g., SPSS, SAS, JMP, or R) and proceeds from descriptive analysis to inferential analysis, during which multiple steps build a more refined analysis (e.g., from interaction effects to main effects to post hoc group comparisons). Researchers should also conduct analyses and report evidence of practical results, such as effect sizes and confidence intervals.

Qualitative data analysis begins with identifying the best approach to address the research questions. The researcher then either hand codes the data directly on a typed transcript or uses a qualitative data analysis software program (e.g., MAXQDA, Atlas.ti, NVivo, HyperRESEARCH, or QDA Miner). **Qualitative data analysis software programs** perform some combination of the following functions (see Creswell & Maietta, 2002; Kuckartz, 2014): store text documents and visual data for analysis; enable the researcher to block and label text segments with codes so that they can be easily retrieved; organize codes into a visual, making it possible to diagram and see the relationship among them; and search for segments of text that contain multiple codes. The programs vary in how and the extent to which they carry out these functions.

Qualitative data analysis software programs aid in implementing the core feature of qualitative data analysis: coding. Coding is the process of grouping evidence and labeling ideas so that they reflect increasingly broader perspectives. In coding the researcher divides the text into small units (phrases, sentences, or paragraphs), assigns a code label to each unit, and then groups the codes into themes (see Creswell, 2015c). The coding label can come from the exact words of the participants (in vivo coding), phrases composed by the researcher, or concepts used in the social or human sciences. If the researchers code directly on a typed

transcript, they assign code words to text segments in one margin and record broader themes in the other margin. Coding evidence can then be grouped into broad themes. Themes then can be grouped into even larger dimensions or perspectives, or they can be linked to each other to form a larger story or model. A typical example of relating themes can be seen in grounded theory, in which researchers form themes or codes (called categories) and then relate them in a theoretical model. Another example can be seen in narrative research, in which a chronological story of an individual's life is composed using a sequence of codes, or themes, from the data. In this process, the themes, interrelated themes, or larger perspectives are the findings, or results, that provide evidence for answering the qualitative research questions.

Represent the Data Analysis

The next step in the analysis process is to represent the results of the analysis in summary form in statements, tables, or figures. In *quantitative data analysis*, researchers represent the results of analysis in statements, tables, and figures. Statements of quantitative results generally identify the results and summarize the statistical evidence for those results. An example statement is, "The scores varied for the four groups in the experiment. The analysis indicated a statistically significant difference ($p < .05$) among the groups, $F(4,10) = 9.98$, $p = .023$, effect size = .93 *SD*." Tables in quantitative research can report results related to descriptive questions or inferential questions. If hypotheses are tested, tables report whether the results of the test were statistically significant (as well as the effect size and confidence intervals). Researchers usually present only one statistical test in each table. Tables need to be well organized, with a clear, detailed title and labels for the rows and columns. There is standard information that should be reported for each type of statistical procedure, and various statistics books provide sample tables as models. Researchers use figures to present quantitative results in a visual form, such as in bar charts, scatterplots, or line graphs. These visual forms depict the trends and distributions of the data. The information needs to augment rather than duplicate information provided in the text, be easy to read and understand, and omit visually distracting details. Some statistical programs permit figures to be copied directly into word processing documents. In developing statistical summary statements, tables, and figures, researchers need to follow an appropriate style guideline.

In *qualitative data analysis*, representing the results may involve a discussion of the evidence for the themes or categories, the presentation of figures that depict the physical setting of the study, or diagrams presenting frameworks, models, or theories. When discussing the evidence for a theme or category, the basic idea is to build a discussion that convinces the reader that the theme or category emerges from the data. Writing strategies for providing this evidence include conveying subthemes or subcategories, citing specific quotes, using different sources of data to cite multiple items of evidence, providing multiple perspectives from individuals in a study to show the divergent views, and using rich description (for specific examples of these strategies, see Creswell, 2015c). Apart from these discussions, researchers may represent their findings through visuals, such as figures, maps, or tables that present the different themes. The interrelated themes may comprise a model (as in grounded theory), a chronology (as in narrative research), or comparison tables (as in ethnography) (Creswell, 2012). A map may

show the physical layout of the setting in which the research took place. As with quantitative approaches to representation, the qualitative researcher needs to follow style guidelines in representing the data analysis.

Interpret the Results

After presenting the results or findings, the researcher next seeks to interpret the meaning of the results. This often comes in a discussion section of a report. Basically, an interpretation of results involves stepping back from the detailed results and advancing their larger meaning in view of the research problems, the questions or hypotheses in a study, the existing literature, and perhaps author-related experiences (in qualitative research). For *quantitative interpretation*, this means summarizing the major quantitative results and then comparing the results with the initial research questions asked to determine how the questions or hypotheses were answered in the study. It also means comparing the results with prior predictions or explanations drawn from past research studies or theories. Other aspects of interpretation involve identifying the limitations of the study procedures and drawing out implications for future research and for audiences.

In *qualitative interpretation*, the researcher provides similar explanations about the results but with a few differences. Similar to quantitative research, the interpretation begins with a summary of the major qualitative findings, and how the research questions were answered by the qualitative findings. In addition, comparisons can be made between the findings and those of past research studies in the literature. Different from quantitative research, however, qualitative researchers may bring in their personal experiences and draw personal assessments of the findings. This feature sets qualitative research apart from quantitative approaches, and it reflects the role of the qualitative researcher, who believes that research (and its interpretations) can never be separated from the researcher's reflexivity or personal views and characterizations. Finally, in interpretation, the researcher identifies limitations of the study and indicates implications for future research and for audiences.

Validate the Data and Results

Another component of all good research is to utilize procedures to ensure the validity of the data and results, and of their interpretation. Validity differs in quantitative and qualitative research, but in both approaches it serves the purpose of checking on the quality of the data, the results, and the author's interpretation of the data results.

In *quantitative research*, the researcher is concerned about issues of validity and reliability. Standards for assessing these issues are available from several sources, such as the American Psychological Association (2014). **Quantitative validity** (also called construct validity) means that the scores received from participants are meaningful indicators of the construct being measured. **Quantitative reliability** means that scores received from participants are consistent and stable over time. Researchers establish the reliability and construct validity of scores by selecting quality instruments and by analyzing their data. They also use procedures throughout the study to reduce threats to internal validity (i.e., extent to which cause-and-effect claims can be made) and to external validity (i.e., the extent to which the results can be generalized to other persons, settings, or times).

In *qualitative research*, there is more of a focus on validity than reliability. **Qualitative validity** comes from standards based on researchers, participants, and reviewers (Creswell & Miller, 2000). Various authors have used alternative terms for qualitative validity over the years, such as *trustworthiness* or *authenticity* (e.g., Lincoln & Guba, 1985). Qualitative validity is important to establish, but there are so many commentaries and types of qualitative validity that it is difficult to know which approach to adopt. We will work from standards we have set in prior publications (Creswell, 2012; Creswell & Miller, 2000). Overall, checking for qualitative validity means assessing whether the information obtained through the qualitative data collection is accurate, such as examining the extent to which the information is credible, transferable, dependable, and confirmable (Lincoln & Guba, 1985). There are strategies available to determine this validity, and we recommend that qualitative researchers use at least three of the following strategies. Member-checking is a frequently used strategy in which the investigator takes summaries of the findings (e.g., case studies, major themes, theoretical model) back to key participants in the study and asks them whether the findings are an accurate reflection of their experiences. Another validity strategy is the triangulation of data drawn from several sources (e.g., transcripts and pictures) or several individuals such that the

inquirer builds evidence for a code or theme from these sources or individuals during data analysis. A third strategy consists of reporting disconfirming evidence. Disconfirming evidence is information that presents a perspective that is contrary to the one indicated by the established evidence. A report of disconfirming evidence in fact confirms the accuracy of the data analysis because in real life we expect the evidence for themes to diverge and include more than just positive information. A final strategy is to ask others to examine the data. These others may be peers (e.g., graduate students or faculty) who are familiar with qualitative research as well as the content area of the specific research, or they may be external auditors not affiliated with the project who review the database and the qualitative results using their own criteria.

In general, reliability plays a minor role in qualitative research because the inquirer instead emphasizes the value of his or her subjective interpretations. When reliability is emphasized in qualitative research, it relates primarily to the reliability of multiple coders on a team to consistently agree on codes for passages in the text. Therefore, reliability is useful in qualitative research when there is interest in comparing coding among several coders. Called **intercoder agreement in qualitative research**, the basic procedure involves establishing a codebook and having several individuals code a transcript and then compare their work to determine whether they applied the codes and themes in the same or different ways (Miles, Huberman, & Saldana, 2014). Agreement rates are calculated for the percentage of codes that are similar, and reliability statistics (kappas) can be computed for systematic data comparisons.

Mixed Methods Data Analysis and Interpretation

Mixed methods data analysis consists of analytic techniques applied to both the quantitative and the qualitative data as well as the integration of the two forms of data (see a similar definition in Onwuegbuzie & Teddlie, 2003). Data analysis can occur at a single point in the process of mixed methods research or at multiple points. It also involves certain steps undertaken by the researcher and key decisions made at different steps. Once analyses are complete, **mixed methods interpretation** involves looking across the quantitative results and the qualitative findings and making an assessment of how the information addresses the mixed methods question in a study. Teddlie and Tashakkori (2009) call this interpretation drawing inferences and meta-inferences. **Inferences in mixed methods research** are conclusions or interpretations drawn from the separate quantitative and qualitative strands of a study as well as from across the quantitative and qualitative strands (meta-inferences). Teddlie and Tashakkori (2009) see mixed methods as a vehicle for improving the quality of inferences drawn from both the quantitative and qualitative methods. We agree, but refer to the value of mixed methods as adding insight beyond the information provided by only quantitative analysis or qualitative analysis. Before discussing details of data analysis within different mixed methods approaches, it is useful first to review how our understanding of this data analysis has evolved.

The Evolution of Integrative Thinking

Insight into mixed methods data analysis has emerged slowly over the years. The first discussions on the topic identified several general procedures that could be used. These procedures were not related to specific designs but advanced generic approaches to analyzing and integrating data. A case in point is the discussion of four analytic strategies by Caracelli and Greene in 1993. Their four integrative strategies comprised the following:

- Data transformation—the conversion or transformation of one data type into the other so that both can be analyzed together
- Typology development—the analysis of one data type so that it yields a typology (or set of categories) then used as a framework for analyzing the other data type
- Extreme case analysis—the identification of extreme cases from the analysis of one data type, which are then examined with data of the other type to test and refine the initial explanation for the extreme cases
- Data consolidation or merging—the joint review of both data types to create new or consolidated variables or data sets used in further analyses

By 2003 a more substantive conversation was taking place about data analysis that was linked more to the process of conducting research. Onwuegbuzie and Teddlie (2003) discussed a model for mixed methods data analysis involving seven stages in the data analysis process. This model is useful in describing the various alternatives and steps available to the mixed methods researcher:

1. Data reduction—reducing data collected through statistical analysis of quantitative data or writing summaries of qualitative data
2. Data display—reducing the quantitative data to, for example, tables and the qualitative data to, for example, charts and rubrics
3. Data transformation—transforming qualitative data into quantitative data (i.e., quantitizing qualitative data) or vice versa (i.e., qualitizing quantitative data)
4. Data correlation—correlating the quantitative data with quantitized qualitative data
5. Data consolidation—combining both data types to create new or consolidated variables or data sets

6. Data comparison—comparing data from different sources
7. Data integration—integrating all data into a coherent whole

A more recent editorial began to bring the discussion about mixed methods data analysis into research designs by acknowledging both convergent and sequential possibilities. Bazeley (2009) identified several emerging ways to consider mixed methods data analysis: (1) through a substantive common purpose for a study (e.g., intensive case analysis, extreme or negative cases, or inherently mixed analysis, such as social network analysis); (2) through employment of the results in one analysis in approaching the analysis of another form of data (e.g., typology development); (3) through synthesis of data from several sources for joint interpretation (e.g., comparing theme data with categorical or scaled variables using matrixes); (4) through conversion of one form of data into the other (e.g., data transformation); (5) through the creation of blended variables; and (6) through multiple, sequenced phases of iterative analyses.

Our current thinking is that integration is the centerpiece of mixed methods research. The presence of meaningful integration distinguishes mixed methods from other methodologies that do not highlight the mixing of the databases. **Integration** is the point in the research procedures where qualitative research interfaces with quantitative research. We find that integration has been poorly described in the literature, and often is absent in studies because investigators consider mixed methods to be simply collecting and analyzing both quantitative and qualitative data (Bryman, 2006). Such a nonintegrative approach does not reflect the true value of mixed methods, which arises when additional insight emerges beyond that gleaned from the separate quantitative and qualitative results. This additional insight may be, for example, a more complete understanding developed by combining statistical results with personal experiences (i.e., convergent design); the deeper understanding that occurs when personal experiences help to explain statistical results (i.e., explanatory sequential design); or more accurate and better measures that result from first exploring what will work with participants before administering a survey (i.e., exploratory sequential design) (see the intent for the designs in Chapters 3 and 4).

Viewing Integration From a Design-Based Perspective

Since integration is central to mixed methods research, we need to understand it well and see it as the primary feature of mixed methods data analysis. We argue that integration differs depending on the type of mixed methods design, and recent writing helps to understand it better (Fetters, Curry, & Creswell, 2013; Guetterman, Fetters, & Creswell, 2015). The discussion to follow advances our perspectives for how mixed methods integrative data analysis relates to the core and complex designs.

Our approach identifies four key considerations that researchers must address when planning and implementing their integrative analyses and interpretation: the integration intent, the integration data analysis procedures, the representation of the integration results, and the interpretation of the integration results.

The *intent of the integration* conveys why researchers integrate in a study. In Chapters 3 and 4, we discussed the intent of each type of design, but here we emphasize the reasons for doing the integration. The different reasons relate to what researchers are trying to accomplish through the integration of qualitative and quantitative data within a design. This information could be explicitly described in an integration intent statement included in the introduction or methods section of a dissertation proposal, application for funding, or mixed methods journal article.

The *integration data analysis procedures* reflect key steps used to accomplish the integration intent and describe what the researcher actually does to accomplish the integration. These procedures are described in the methods section of a proposal or report and vary for the different designs.

The *representation of integration results* concerns how the findings of the integration are reported. The integration results are typically found in the results or discussion section of a report. They can be described in words or assume the form of visual displays that combine both quantitative and qualitative results (called joint displays), which can be tailored for each type of design.

The *interpretation of the integration results* means that the researcher makes inferences from the combined results and joint display to suggest an answer to the mixed methods research question. These interpretations aim to make sense of the

integration in light of the study purpose and integration intent and are included as part of the discussion section.

Integrated Data Analysis and Interpretation Within the Mixed Methods Designs

In this section we discuss integration for the different mixed methods designs. These ideas build on the earlier discussions by Caracelli and Greene (1993); Bazeley (2009, 2012); and Onwuegbuzie and Teddlie (2003). We also emphasize the four integration considerations of integration intent, integration data analysis procedures, representation of integration results, and interpretation of integration results. Table 7.2 provides an overview of the key features of our discussion for the core mixed methods designs.

Convergent Design Data Analysis and Interpretation

In the convergent design, after collecting both quantitative and qualitative data concurrently, the researcher first analyzes the information separately and then merges the two databases.

Intent of integration.

The intent of integration in a convergent design is to develop results and interpretations that expand understanding, are comprehensive, and are validated and confirmed. To accomplish this intent, the researcher merges the results to answer the mixed methods research question in one of two ways: by comparing the two data sets or by transforming one of the data sets and conducting further analyses. For a convergent design, the analysis should answer the mixed methods questions, such as: To what extent do the quantitative and qualitative results converge or diverge? Do the transformed qualitative findings significantly contribute to the quantitative results? The merging approach has also been called simultaneous integration (Morse & Niehaus, 2009). In the process of mixed methods data analysis using the convergent design, researchers need to decide what integration procedures to use, how to represent the merged results, and how to interpret the merged results.

TABLE 7.2 ■ Linking Integrative Data Analysis and Interpretation to Mixed Methods Designs

Type of Core Design	Intent of Integration	Primary Data Analysis Integration Procedures	Representation of the Integration Results	Interpretation of Integration Results
Convergent design	• Use simultaneous integration or merging to develop integrated results and interpretations that expand understanding, to provide comprehensive results, and/or validate and confirm results	• Obtain results by analyzing quantitative and qualitative data • Look for common concepts across the results • Compare the quantitative and qualitative results for each concept • Determine in what ways the results confirm, disconfirm, or expand each other • Interpret and resolve differences • Use different procedures for data transformation	• Develop side-by-side comparisons of quantitative and qualitative results (through a narrative or comparison joint display) • Transform quantitative or qualitative results and combine in one database	• Consider how the confirming, disconfirming, and expanded results provide insight into the problem being studied and answer the mixed methods research question
Explanatory sequential design	• Use sequential integration by connecting the qualitative data and results to explain the quantitative results	• Obtain quantitative statistical results and identify results that need further explanation • Identify a purposeful qualitative sample and data collection questions that can best explain the quantitative results • Collect and analyze the qualitative data • Represent the connected results with a joint display • Interpret the joint display by noting the value added by the qualitative explanations	• Present a table that connects the quantitative results with the qualitative data collection strategy • Compose a joint display that arrays the quantitative results and connected qualitative results	• Consider the evidence for how the qualitative results help to explain the quantitative results
Exploratory sequential design	• Use sequential integration or building to connect the qualitative results to a contextually appropriate quantitative feature for testing	• Analyze the qualitative database for themes and codes • Determine what quantitative feature will be designed that builds on the qualitative results (e.g., a new instrument) • Link the qualitative results to elements of the new feature • Convey this explicit link in a joint display • Use rigorous pilot test procedures to try out and refine the feature • Test the quantitative feature with a large sample • Interpret how the quantitative results support the quality and cultural specificity of the developed feature	• Present a joint display that connects the qualitative themes with the elements of the quantitative feature • Advance a joint display that arrays the key qualitative results and quantitative test results	• Consider the evidence for how the developed quantitative feature is contextually and culturally sensitive

Primary data analysis integration procedures.

The more common approach for the convergent design is to compare the separate results of the two databases. The major procedure used in analyzing data for a convergent design comparing the two databases consists of several steps:

- Obtain results by quantitatively analyzing the quantitative data and qualitatively analyzing the qualitative data.
- With the quantitative and qualitative results identified, look for common concepts across both sets of findings (this is why it is important to gather data on the same or similar concepts during the quantitative and qualitative data collection, as mentioned in Chapter 6).
- Develop joint display tables or graphs that array the two results together (often organized by the common concepts) so that a comparison can easily be made.
- Compare the results of the tables or graphs by concepts to determine in what ways they confirm, disconfirm, or expand each other.
- If the results are disconfirming, engage in additional strategies to understand the disconfirming evidence.
- Advance interpretations of how the confirming, disconfirming, and/or expanded evidence from the merged databases enhances understanding of and provides insight into the research problem.

Data transformation integration procedures.

For convergent designs using data transformation, the steps differ slightly. Data transformation has been addressed in the mixed methods literature in, for example, Caracelli & Greene (1993); Onwuegbuzie and Teddlie (2003); and Sandelowski, Voils, and Knafl (2009). The procedure for mixed methods data analysis using data transformation is as follows:

- Obtain results by quantitatively analyzing the quantitative data or qualitatively analyzing the qualitative data.
- Transform the results of one of the databases into the other type of data (i.e., qualitative themes transformed into quantitative counts or variables, or quantitative results transformed into qualitative text codes, themes, or descriptions).
- Incorporate the transformed data into the other database by conducting additional quantitative analyses with the transformed qualitative variables or additional qualitative analyses with the transformed quantitative text data.

- Develop joint display tables and text summaries that represent the results of the analyses that incorporated the transformed information.
- Advance interpretations of how the additional analyses provide insight into the research problem.

More common in mixed methods research is to transform qualitative data into numeric counts (quantitative data) than vice versa. **Transforming qualitative data** into quantitative data involves reducing themes or codes to numeric information, such as dichotomous categories. Some of the most specific information about this procedure is based on writings from Onwuegbuzie and Teddlie (2003). A key issue in this process is deciding what aspect of qualitative data to quantify and how to quantify it in a way that is valid and reliable (Plano Clark, Garrett, & Leslie-Pelecky, 2010; Seltzer-Kelly, Westwood, & Peña-Guzman, 2012). Perhaps the simplest approach is to define a new dichotomous variable that indicates whether a theme or code is present (scored as a 1) or not present (scored as a 0) for each participant. Other approaches can involve counting, such as counting the number of times a theme or code appears in the data for each participant and using these counts in a statistical analysis. Onwuegbuzie and Teddlie (2003) provided detailed procedures for using counts, such as counting

- the frequency of a theme within a sample by converting it to percentages;
- the number of units for each theme by converting it to a percentage;
- the percentage of total themes associated with a phenomenon;
- the percentage of people selecting or endorsing multiple themes;
- the count of time, length, and number of behaviors per hour during observations and interviews;
- the number of times a significant statement appears per page; and
- the amount of time that elapses before a unit of analysis is observed.

In an article by Daley and Onwuegbuzie (2010), the authors discuss data transformation in a mixed methods study of violence attribution of male juvenile delinquents. The authors sought to correlate closed-ended items with open-ended items using a convergent design. From the open-ended responses, seven themes emerged. The researchers dichotomized each theme by assigning a score of 1 or 0 for each individual in the sample, depending on whether the theme was represented by that individual. Then they developed a display for comparing the scores across individuals and correlated scores from the open-ended themes with scores on the closed-ended items. In another study, Sandelowski (2003) discussed

the quantitizing of qualitative data in her study of transition to parenthood. She and her colleagues transformed interview data into a display that compared the number of couples having or not having amniocentesis with the number of physicians encouraging or not encouraging the couples to have the procedure. She then used a statistical test to report nonsignificant findings.

Far fewer examples exist of the transformation of quantitative data into qualitative data. Punch (1998), however, provided one example for this procedure. He cited a case in which quantitative data was loaded into factors in a factor analysis and the factors viewed as aggregated units similar to themes. This allowed the factors (derived quantitatively) to be qualitatively compared with and incorporated into the themes that had been developed qualitatively. As another example, Teno, Stevens, Spernak, and Lynn (1998) reported transforming quantitative data (i.e., medical records, closed-ended interviews, survival predictions) into qualitative narrative summaries as part of their study on the use of written advance directives.

Representation of merging integration results in a narrative discussion.

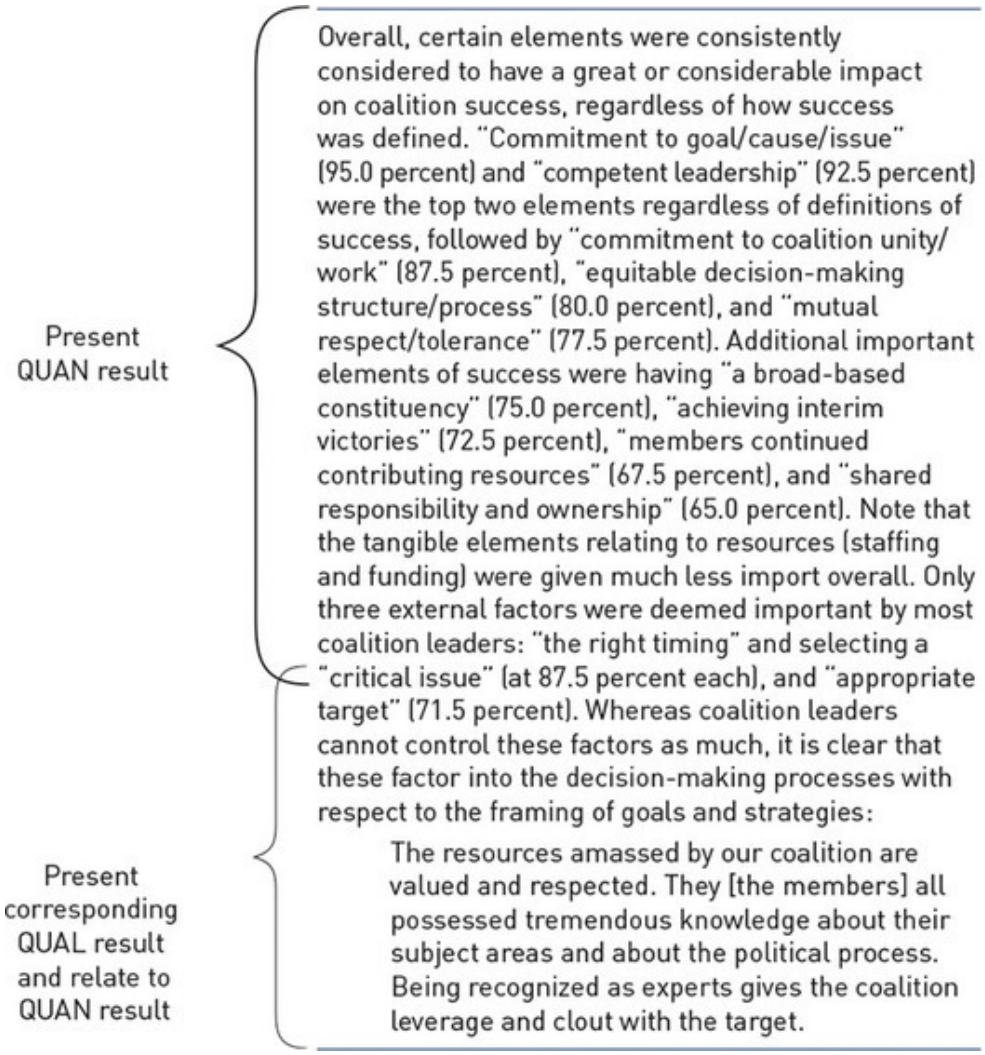
Two options exist for the representation of the integration results for a convergent design when researchers compare databases: a side-by-side comparison either in a narrative discussion or a joint display. The most straightforward option occurs when a researcher presents the integration of a convergent design in a narrative discussion. Using this option, the researcher organizes the quantitative results and the qualitative results side by side within a section of text and discusses them in terms of how the results are similar or dissimilar. This narrative discussion typically occurs in the results section in a research report, but it may also appear in the discussion section. In this case, the discussion becomes the vehicle for merging the results.

One popular approach for integrating the results in a narrative discussion is to first present the quantitative statistical results about a topic followed by qualitative results in the form of quotes about the same topic. A comment then follows specifying how the qualitative quotes either confirm, disconfirm, or complement the quantitative results. An example of this approach appears in the results section of a mixed methods social work study addressing the success of coalitions (Mizrahi & Rosenthal, 2001). As shown in Figure 7.1, the authors first present the quantitative results followed (side by side) by the qualitative results. This approach enables a reader to make a direct comparison of the two results and

determine whether the results are in agreement or disagreement. In this example, the authors present a passage in which they use a qualitative quote (at the bottom of Figure 7.1) to support the quantitative descriptive findings (presented at the top of the figure). This comparison order could easily be reversed in another study with the quantitative used to support the qualitative quotes (e.g., see McAuley, McCurry, Knapp, Beecham, & Sleed, 2006).

In some studies, the authors first present the separate results and then include a section that explicitly compares the results. This alternative approach to presenting the results of a convergent design is shown in Figure 7.2. In this figure, the intent is not to directly compare the quantitative and qualitative results in a discussion section but to convey how the results agree (i.e., converge) or disagree (i.e., diverge). Siebert et al. (2014) used this approach in their study of Hispanic and Native American caregivers' food safety behaviors. After presenting their quantitative survey results and the qualitative focus group results, the researchers discussed the points of convergence and divergence among the results.

Figure 7.1 Excerpt From a Results Section Showing a Side-by-Side Comparison Discussion of Quantitative and Qualitative Results



Source: Mizrahi and Rosenthal (2001), p. 70.

Representation of merging integration results through joint displays.

Another approach for representation in a convergent design consists of analyzing the data to create a table or a graph that jointly displays the quantitative and qualitative results side by side. A **joint display** (or an integration display) is an approach to show the integration data analysis by arraying in a single table or graph the quantitative and qualitative data. This approach facilitates a more direct and nuanced comparison of the results. In effect, the display merges the two forms of data. Researchers are incorporating joint displays into their mixed methods studies with increasing frequency, particularly those studies that use a

convergent design. The most common form for merging joint displays is a table. For example, Figure 7.3 depicts part of a joint display developed by Moseholm, Rydahl-Hansen, Lindhardt, and Fetters (2016) in their convergent study of health-related quality of life for patients undergoing a diagnostic process with the suspicion of cancer. This table is organized by key topics, and for each topic the researchers presented a summary of the quantitative results obtained during the diagnostic process, qualitative categories and exemplar quotes about patient experiences during the diagnostic process, and a comparison of the two types of information.

Figure 7.2 Excerpt From a Results Section Discussing Convergence and Divergence of Quantitative and Qualitative Results

Mixed Methods

After analyzing the qualitative and quantitative datasets, the results from each were compared at the point of interpretation to identify areas of convergence (similarity) and divergence (difference).

Convergence

Discussing points of agreement in comparing the QUAN and QUAL results

Quantitative and qualitative data converged when the results of each data set were similar. Convergent data analysis reveals that food safety practices mentioned by focus group participants as areas of confusion were also reflected as low-scoring knowledge items such as: cleaning surfaces and countertops/proper bleaching methods, leftover storage, reheating leftovers, and meat cooking and preparation practices (such as meat thermometer use). The preferred channel to receive food safety information differed between groups, but this preference was similarly reflected in both data sets.

Divergence

Discussing points of disagreement in comparing the QUAN and QUAL results

Quantitative and qualitative data diverged when the data sets were dissimilar. Focus group participants' reported personal efficacy to cook, store, prepare, and purchase food was high but the mean knowledge scores extrapolated from the food safety knowledge survey were low across all subscales (Cook and Separate being the lowest).

Source: Siebert et al. (2014), p. 67.

Figure 7.3 Example of a Joint Display Table (Partially Represented Here) for a Convergent Design

Major topics	QUAN results			QUAL results	Mixed methods comparison

Table 4 Joint display of quantitative, qualitative and mixed methods meta-inferences of functional domains

MM domains	EORTC-QLQ-C30 scores			Qualitative findings Qualitative subcategories	Mixed methods meta-inferences
	Change in mean baseline-follow-up		95 % CI of diff*		
Physical function	75–75	0	(−1.0; 1.0)	*Physical functioning during investigations* All I could do was to sit in this chair. I could not do anything else (man, age 91, not cancer) My overall function has only improved since referral to the NSSC-CPP (woman, age 65, not cancer) *Dealing with physical problems* It's your body and you can't. . . .so I have to focus on what I can do. . .I can lift my heel from the floor and down again, and I can bend my leg (male, age 62, not cancer) I just started walking with my walker. . . and I hope I can continue with that. I walk 1 km and back (male, age 88, not cancer)	*Discordance* Participants describe affected physical functioning in the diagnostic period, incongruent to the EORTC scores
Role function	**62–66**	**↑4**	**(1.4; 5.9)**	*Maintaining everyday life* . . .then I can actually focus so much on these small chores that I forget that I am sick, and focus on what I am doing right now (male, age 64, cancer) I made a promise (to myself) to get out of all this (illness) and get back to normal life (male, age 91, not cancer) *Self-image* After starting diagnostic evaluations. . .I looked at my life and thought this is now. I don't want to be so sick that I cannot walk. I have to do something (woman, age 67, not cancer) I won't just accept having a bad life. So it is about what you can do for yourself right now (male, age 62, not cancer)	*Expansion* Understanding the importance of managing everyday life and focusing on improving situation confirm the improvement seen in the EORTC scores
Emotional function	**71–75**	**↑4**	**(2.6; 5.6)**	*Burdensome emotions* I was worried when I went to the doctor, because I didn't feel healthy. And that concern is increased, when my doctor says that I need to be examined thoroughly (male, age 53, not cancer) I can still feel the physical aftermath. But that might be all the other luggage I am carrying (woman, age 51, not cancer) *Favorable emotions* I have to say that I was very very relieved (woman, age 67, not cancer) The important emotions became more important and you had to ask yourself. . .you couldn't really run from things and you can say that improved quality of life, because it is good to be close to the important emotions and the things that mean the most to you (male, age 53, not cancer)	*Confirmation* Receiving a diagnosis and feeling privileged about life improves emotional functioning, thereby explaining the improvement seen in EORTC-QLQ-C30 scores

Source: Moseholm, Rydahl-Hansen, Lindhardt, and Fetters (2016), Table 4 (excerpt), p. 9. Reprinted with permission from Springer.

Note: The EORTC-QLQ-C30 scores refer back to the whole survey sample; *Significant differences are highlighted in bold.

Figure 7.4 provides an example of a joint display for a convergent design using a table to display both congruent and discrepant results. Lee and Greene (2007) studied the relationship between language proficiency (measured as CEEPT scores) and student grade point average (GPA). They organized their table in terms of the quantitative relationship results (low CEEPT score, high GPA; low CEEPT score, low GPA; etc.) and presented qualitative results that were congruent and discrepant with the quantitatively measured relationship. Another example of using a joint display to merge results is found in Table A.3 in Appendix A. In this table, Wittink et al. (2006) used the qualitatively derived typology of patients to organize and present the quantitative results for each patient type as a way to merge the data forms to draw more complete understandings of the combined results.

Another example of a joint display using a figure is found in Figure 7.5 in which Beck, Eaton, and Gable (2016) graphically displayed quantitative scores and qualitative quotes to provide a more complete view of the different dimensions of vicarious posttraumatic growth experienced by delivery nurses who provided care to mothers during traumatic births.

Figure 7.4 Example of a Joint Display Table (Partially Represented Here) for Presenting Congruent and Discrepant Findings

QUAN relationships between two variables

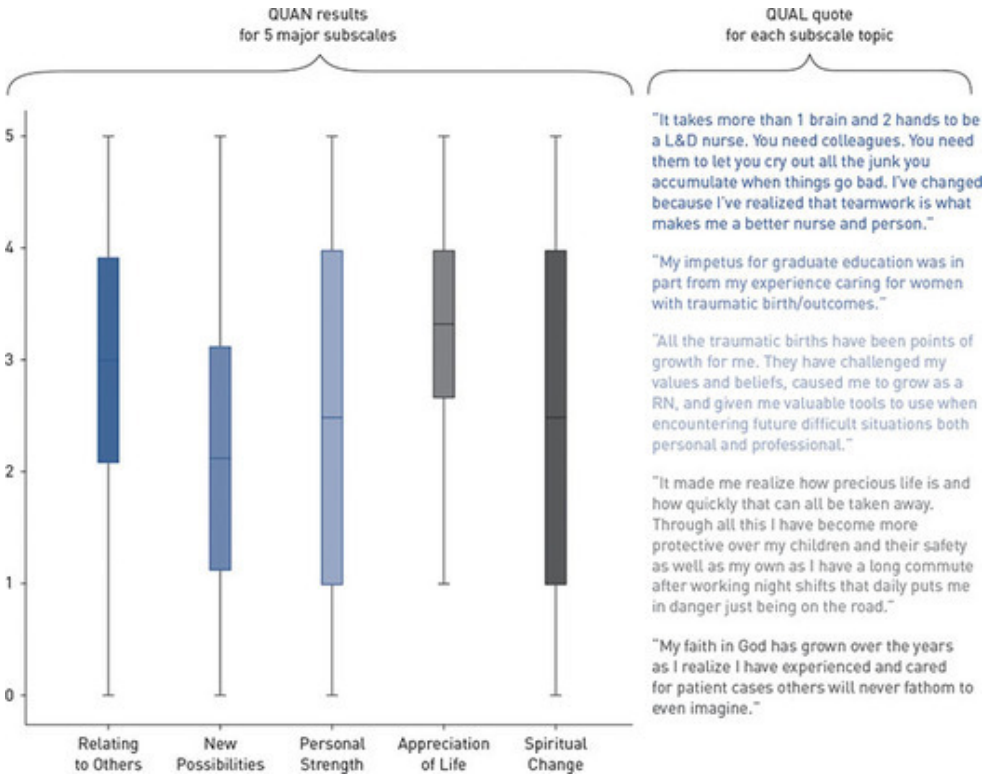
QUAL results that are congruent with and discrepant with the QUAN relationships

Linking Computerized Enhanced ESL Placement Test (CEEPT) Scores and Student and Faculty Member Quotes Regarding the Role of English Proficiency in Course Performance

CEEPT Score	GPA	Faculty Members' Responses		Students' Responses	
		Congruent	Discrepant	Congruent	Discrepant
2	Above 3.18	"*He has problems with listening, speaking, and reading.* In my course, *he got an A–*; and the lowest grade I assigned was B +. *He is the second to last.*" (ID 0624,1) (3.80) (technology)	"Her *submitted assignments are well considered and prepared*" (ID 2005, Q.) (3.75) (humanities) "He is *the second highest among 12 students.* He asked very good questions based on lectures. *His notes were quite good*" (ID0620,1) (4.00) (science)	"*Lack of Knowledge about idiomatic expressions* prevents me from understanding questions on the homework assignment."(ID 2037,1) (3.22) (business) "Because of my poor listening, I am struggling with catching up with my content courses." (ID 0605,1) (3.5) (humanities) "I understand only *60-70% of the lectures.* It has *made my scores less than my expectation.*" (ID 0620, Q) (4.00) (science)	"It is *easy to understand the lectures and participate in class discussions.* The instructor speaks slowly." (ID 0624,1) (3.80) (technology)
	Below 3.18	No data available	No data available	No data available	No data available
3	Above 3.25	"The student is *quiet in class, but did well in her oral presentation.* Her written work on homework is comparable to other international students (overall, very good)." (ID 2036, Q) (3.57) (Humanities)	"She is in the *top 10%.* She got a grade of A. I do not think she has problems because of her language." (ID 2032, I) (4.00) (science)	"I still have some *problem in speaking.* This difficulty *doesn't affect my ability to do well* in all the courses I take." (ID 0603, Q.) (3.39) (technology) "*Listening is a problem.* Lack of cultural knowledge interferes with understanding the concept." (ID 0610,1) (3.53) (technology)	No data available

Source: Adapted from Lee and Greene (2007), Table 5 (excerpt), p. 383. Used with permission from Sage Publishing.

Figure 7.5 Example of a Joint Display Figure for a Convergent Design



Source: *Journal of Obstetric Gynecologic and Neonatal Nursing, 45*(6), Beck, Eaton, and Gable, "Vicarious posttraumatic growth in labor and delivery nurses." 2016, Figure 2, p. 809. Reprinted with permission of the Association of Women's Health, Obstetric and Neonatal Nurses; Elsevier Inc. All rights reserved.

Note: Graphed data points and quotes are color coded in the original. For example, the "relating to others" plot and quote are both in dark blue font and the "new possibilities" plot and quote are both in light blue font.

Interpretation of integration results.

After merging the results in a side-by-side comparison narrative or joint display, researchers must interpret their combined results to assess how the analysis answers the mixed methods research question. These interpretations relate specifically to the procedures being used. For example, a researcher using data transformation might interpret whether a significant relationship is found among the transformed data with other data, what meaning can be drawn from the relationship, and what limitations must be considered.

In merging the two data sets for the purpose of comparison, what differences should the mixed methods researcher look for when interpreting findings? If differences occur, how will the researcher address the inconsistencies? In terms of the first question, what the mixed methods researcher looks for in comparing the two data sets is not fixed and rigid. As discussed earlier, Lee and Greene (2007) looked for congruent and discrepant evidence between the databases, as shown in Figure 7.4. Other ways of comparing the two data sets is to look for consistencies or inconsistencies, conflicts, contradictions, and complexities. Slonim-Nevo and Nevo (2009) illustrated an example of inconsistency in their study of Israeli immigrant adolescents and their parents and teachers in which they assessed family functioning using a quantitative standardized scale and in-depth interviews with members of the family. In this situation, the in-depth interviews told "a different story" (p. 112), leading the authors to ask, "Which method, then, is right —the quantitative or the qualitative?" (p. 112). The authors discussed potential discrepancies between their quantitative and qualitative results.

In light of the different ways results might be interpreted, we favor the idea of noting discrepant and congruent results, as suggested in the convergent study of Lee and Greene (2007). In this sense, we believe the mixed methods researcher should look for how the quantitative and qualitative databases tell different stories and to assess whether the statistical results and the qualitative themes are more congruent than incongruent.

What if discrepant findings emerge from the comparison? Several options exist for handling this situation. The discrepancy may well be a result of methodological problems in the quantitative or qualitative aspects of the study, such as quantitative sampling problems or qualitative theme development issues. In this case, the mixed methods researcher would cite that she or he had more trust in the results of one form of data than the other and state the limitations of the study. Alternatively, the researcher could collect additional data to help resolve the discrepancies. Researchers could also view the problem as a springboard for new directions of inquiry (Bryman, 1988).

The best and least costly alternative, however, is to reexamine the existing databases to try to resolve the discrepancy. This was the approach taken by Padgett (2004) in a social work mixed methods study called the Harlem Mammogram Study. Padgett's study recounted how a team of researchers returned to their initial database to gain additional insight. They examined factors that influenced delay in response to an abnormal mammogram among African American women living in New York City. Padgett's research team had collected

both structured quantitative data and open-ended interview data. After data analyses, the team concluded that the women's decisions to delay were not driven by factors in their quantitative model. The researchers then turned to their qualitative data, highlighted two qualitative themes, and reexamined their quantitative database for support for the themes. To their surprise, the quantitative data confirmed what the participants had said. This new information, in turn, led to a further exploration of the literature in which they found some confirmation for the new findings. Therefore, in a convergent design, interpretation involves not only identifying points of congruence and discrepancy but also working to understand how these points provide additional insight into the problem being studied.

Explanatory Sequential Design Data Analysis and Interpretation

In the explanatory sequential design, data analysis and integration occur at more than one point in the study. In this design, the researcher first collects and analyzes the quantitative data, connects from the quantitative results to the qualitative phase, collects and analyzes the qualitative data, and then uses the qualitative results to understand the quantitative results.

Intent of integration.

The intent of the integration in an explanatory sequential design is to connect the quantitative and qualitative phases of the study so that the follow-up qualitative phase provides a strong explanation of specific results from the initial quantitative phase. This intent involves examining the quantitative results closely to isolate findings that may be surprising, contrary to expectations, perplexing, or unusual and then gathering qualitative data to explore those specific findings in more depth. In short, the integration connection bridges from the initial quantitative results to the follow-up qualitative data collection. Thus, this connection could be called a sequential integration approach (Morse & Niehaus, 2009). A strong connection between the phases, such as the selection of participants for the qualitative phase from information arising from the quantitative data analysis, helps the researcher achieve more meaningful explanations. At the end of the study, the connected results are used to answer the mixed methods questions, such as: What mechanisms explain the quantitative results? How do the follow-up qualitative results based on personal experiences illuminate the statistical results in the study?

Primary data analysis integration procedures.

The procedure for conducting integrative data analysis in the explanatory sequential design occurs in three phases: the analysis of the initial quantitative data, an analysis of the follow-up qualitative data, and an analysis of how the qualitative data helps to explain the quantitative data to answer the mixed methods question. This procedure includes the following steps:

- Analyze the quantitative database and note statistical results that need further explanation.

- Determine the purposeful sample (usually selected from individuals who participated in the quantitative phase) that can best provide explanation.
- Design qualitative data collection procedures that identify the types of questions that need to be answered by the purposeful sample.
- Collect and analyze the qualitative data.
- Develop a table or graph (joint display) that illustrates how the qualitative results enhance the quantitative results.
- Interpret the value added by the qualitative explanations.

As these steps highlight, a key data analysis decision relates to how to use the results of the quantitative analysis to purposefully identify participants for the qualitative phase. There are many possible options, such as the following:

- Select participants who are typical or representative of different groups for the follow-up to understand how groups differ. This may entail conducting quantitative analyses to describe typical scores or trends within groups of interest in the quantitative sample. From these analyses, purposefully select individuals who are typical of the groups for the second phase. For example, in Ivankova and Stick's (2007) study of student persistence in a distributed doctoral program found in Appendix B, the researchers identified typical scores for each of four groups (a beginning group, a matriculated group, a graduated group, and a withdrawn/inactive group) and then selected one individual per group whose score was similar to the typical scores for the corresponding group.
- Select participants who score at extreme levels outside the norm to understand why these individuals differ from the norm or how they manifest the phenomenon of interest. This may entail graphically displaying scores for the participants in the first phase to identify outliers or using procedures such as calculating *z* scores to identify scores that are extreme (e.g., by setting a level as a specific number of standard deviations from the sample mean). Then sample these individuals based on their scores and ask them questions about why their scores were so extreme. For example, Clark (2016) graphed career success scores as a function of grit scores for all participants and purposefully selected five gritty, successful individuals who scored most positively on both variables. She then asked those individuals questions about how they experienced grit and success in their careers.
- Select participants from groups that differ in their statistical results. This will permit an analysis as to why groups differed. Ask the same questions to individuals in all of the groups to learn how they differ and how they are the

same. For example, Weine et al. (2005) studied Bosnian refugees engaged in multiple-family support and education groups in Chicago. They compared two groups—those who engaged and those who did not engage—through statistical analysis in the first phase of the study. The factors that distinguished the two groups then became key issues explored in follow-up qualitative interviews.

- Select participants who differ in their scores on significant predictors (positive scores, neutral scores, and negative scores) so that reasons behind different results might be further examined. This involves analyzing the data to identify significant predictors and also examining responses to identify participants whose scores matched the patterns of interest. Once participants are selected, focus the follow-up questions on significant predictors and ask participants to explain their thoughts about the predictors. In a mixed methods study of student note-taking, Igo, Kiewra, and Bruning (2008) found puzzling results in the quantitative dependent measures of student learning that were inconsistent with previous research. The follow-up qualitative phase was then aimed at explaining these results. Participants were selected based on several of the previous criteria (demographics, statistical results, and so forth), and the data collection questions related to predictors and group factors.

Researchers using an explanatory sequential design to explain results should also consider how best to analyze the second, qualitative data set. This qualitative analysis should use rigorous procedures to address the qualitative research question (as summarized earlier in Table 7.1), but it should also ensure the researcher will be able to answer the mixed methods research question (i.e., how the qualitative data help to explain the quantitative results). Therefore, the researcher may utilize the initial quantitative results to inform aspects of the qualitative data analysis. For example, the researcher may include some predetermined topic codes in the qualitative analysis that are based on the important factors identified in the quantitative results. As another example, if the researcher plans on explaining group differences with the qualitative follow-up data, then the strategy may link the demographic group variables to qualitative themes in the mixed methods analysis.

Representation of sequential integration through joint displays.

Researchers need to also represent the results of the connected integration at the different points of the study. This representation involves describing how the quantitative results are used to guide the purposeful sampling for the second,

qualitative phase. This may include using a table or graph that describes the sampling decisions or provides the quantitative information for the purposefully selected participants. An example is shown in Figure 7.6. Eckert (2013) developed a joint display table that highlighted the quantitative scores for the 14 teachers purposefully selected to participate in the qualitative follow-up phase in her study, which was undertaken to explain the relationship between urban teachers' preparation and performance.

Figure 7.6 Example of a Joint Display Table to Describe Purposeful Sampling Based on Quantitative Results in an Explanatory Sequential Design

Table 2. Participant Scores on PTE/GTE

Participant	Grade level/subject	Preparation	PTE	GTE
Nell[a]	Fifth grade	0.80	2.29	1.67
Shelly	Ninth-grade English	0.80	2.14	2.33
Brad[a]	High school Spanish/social studies	0.92	2.29	2.33
Hadley	Fifth grade	1.00	2.57	2.33
Rachel	High school, special education math	1.00	2.57	2.67
Laura[a]	Third grade	1.00	2.86	2.33
Tom	High school physics	1.00	2.43	3.00
Hana	Second grade	0.92	3.14	2.67
Natalie	Fourth grade	1.00	3.00	3.00
Noelle[a]	High school English	1.00	3.14	3.00
Rhea[a]	Fourth- and fifth-grade science and social studies	1.00	3.00	3.33
Annie	High school math	1.00	3.43	3.00
Kent	Ninth-grade English	1.00	3.29	3.33

Note: PTE = personal teacher efficacy; GTE = general teacher efficacy. Shaded scores indicate that the participant scored above the average in the novice population of SASS.

[a]Key informants.

Source: Eckert (2013), Table 2, p. 82. Reprinted with permission from Sage Publishing.

Researchers also need to represent the connection between the initial quantitative results and the follow-up qualitative results with a joint display or graph. The purpose of such a results display is to make specific the link between the two connected databases and to help visualize how the qualitative findings enhance the understanding of the quantitative results. A good strategy for an explanatory sequential design is to create a statistics-by-theme joint display, as discussed by

Guetterman, Fetters, and Creswell (2015). An example of this type of joint display was developed by Finley et al. (2013) in their study addressing the validation of the Work Relationships Scale (WRS) within primary care clinics affiliated with the Department of Veterans Affairs (VA). The authors gathered WRS quantitative survey data from clinicians and staff in 17 VA primary care clinics. In connecting the quantitative data to the qualitative data, they conducted interviews in six clinics that scored the highest and lowest on the WRS. Their article included a joint display in the form of a table that linked the clinics with high and low quantitative ratings for the WRS constructs to specific qualitative quotes gathered from individuals at the different settings (see Figure 7.7).

Interpretation of integration results.

For an explanatory sequential design, the interpretation of the mixed methods results from the joint display should indicate how the qualitative results provide a deeper understanding of the statistical findings. The interpretation of the Finley et al. (2013) joint display (Figure 7.7) was located in the results section of the article, and in it the authors highlighted how the patterns of communication differed between the low- and high-scoring clinics in terms of work relationships. Without connecting both forms of data in a single table, the researchers would not have been able to see clearly how the low- and high-scoring clinics differed.

One issue that has surfaced with this design is whether further analysis should be undertaken to compare the qualitative findings with the initial quantitative results (such as in a convergent design). This could certainly be done, but it goes against the basic logic of the explanatory sequential design. If the researcher has made a strong connection between the quantitative and qualitative phases, then everything about the qualitative phase (purposeful sample, data collection questions, analysis focus) should be informed by and shaped by the quantitative results. Therefore, simply comparing the results from the two databases is not a meaningful comparison because the connection introduces a confounding factor (i.e., the qualitative sample is a subset of the quantitative sample) into the comparison analysis. Instead, the intent of this design is to drill down into specific quantitative results by using qualitative results to provide further insight and explanation. A better approach therefore is to determine how the qualitative themes and codes provide additional insight into and nuances about the quantitative database—an approach consistent with an explanatory sequential design intent. This additional insight could suggest new quantitative analyses based on the explanations (for an example, see Ivankova, 2014), but that approach is different from comparing two independent sets of results.

Exploratory Sequential Design Data Analysis and Interpretation

As with the explanatory sequential design, the mixed methods integrative data analysis occurs at different points of the exploratory sequential design. In an exploratory design, the mixed methods integrative data analysis involves exploring first with a small qualitative sample; building a quantitative feature (e.g., intervention activity, survey or instrument, new variable, or website); and then testing the quantitative feature with a large sample.

Figure 7.7 Example of a Joint Display (Partially Represented Here) Representing Connected Results for an Explanatory Sequential Design

Table 4. Quotes Related to Lanham et al's Relationship Characteristics in Clinics With High and Low WRS Scores

Rich communication Communication through face-to-face conversation; most effective when messages are unclear or ambiguous	
Low WRS score clinics	"I think that some days we should just sit down and say, 'Okay, this is what's going on. What do you know—how do you perceive this is supposed to be done?'. . . [S]ometimes the hurdles that we run into are just, they could have been easily avoided if there had been a little bit better communication."
High WRS score clinics	"Well, you know we have what's called huddle every morning and any problems from the day before are discussed in huddle with all the team members and the clerical staff, social workers, the pharmacist. So we all get to know anything that's going on at that time."
Heedful interrelating Individuals are attentive to their work tasks and sensitive to how their roles and actions affect and intersect with those around them	
Low WRS score clinics	". . . [T]here's a whole lot of tension and a lot of it has to do with, 'That ain't my job and you're messing in my area and you don't belong in my area and you need to back out and just stay in your own business.'"
High WRS score clinics	"I think the teamwork here is just excellent. You know we really pitch in and try and help. Everyone's attitude basically is that if one person's working hard, we're all working hard."
Trust Individuals feel safe in making themselves vulnerable to others	
Low WRS score clinics	"Some people are probably not going to verbalize a lot, because they're afraid it might get back to their boss or . . . because they don't want to rock the boat."
High WRS score clinics	"So, I have learned so much about medicine itself from these people; they're wonderful . . . I'm not afraid to approach them for whatever the patient needs, because the goal is to provide the best and safest patient care."

Reprinted with permission from Ann Fam Med. 2013;11(6):543–549.[31]

Source: Reprinted with permission from Relationship Quality and Patient-Assessed Quality of Care in VA Primary Care Clinics: Development and validation of the Work Relationships Scale, November/December, 2013, Vol 11, No 6, Annals of Family Medicine Copyright © 2013 American Academy of Family Physicians. All rights reserved.

Note: WRS = Work Relationships Scale.

Intent of integration.

As such, the intent of the integration in an exploratory sequential design is to build from the qualitative phase of the study so that a contextually appropriate quantitative feature is developed and subsequently tested. Terminology used for this sequential integration process may include *building* from one database to another or *generating* a quantitative feature from a qualitative exploration. Basically the results from the initial qualitative exploration are used specifically to build the quantitative feature that is later tested. Results from the test help to answer the mixed methods question, such as: How can the personal experiences embedded within a culture help in designing an instrument so the instrument best fits the needs of those being studied? How can personal experiences contribute to the design of experimental activities that would work with participants or enhance the recruitment of participants to an experiment?

Primary data analysis integration procedures.

The integrative data analysis procedure in the exploratory sequential design consists of analyzing the qualitative data, building from the qualitative data to an interim phase of designing a quantitative feature informed by the qualitative results, and analyzing the subsequent quantitative data. The steps in this procedure are as follows:

- Analyze the qualitative database for themes and codes to describe the personal experiences of individuals or advance a theory or typology that provides a context or cultural-specific understanding of the phenomenon of interest.
- Determine what quantitative feature needs to be developed (e.g., intervention treatment, survey questionnaire, website, new variable, new instrument) and state its specific goal and purpose.

- Link the themes and codes specifically to elements of the quantitative feature (e.g., use quotes to design items for a new culturally specific survey questionnaire or develop a new variable grounded in qualitative personal experiences).
- Design a joint display that conveys the link between themes/codes and specific elements of the quantitative feature.
- Pilot test and refine the quantitative feature using rigorous procedures.
- Test the quantitative feature with a large sample of participants.
- Interpret how the quantitative results support the quality and cultural specificity of the newly developed quantitative feature for the specific population and sample being studied.

A key step in the exploratory sequential design integrative data analysis is building the connection from the qualitative analysis and results to the development of the quantitative feature. This analytic process may include examining the qualitative data to identify useful quotes, codes, and themes that can be used in designing the items, variables, and scales on an instrument. Developing a table of these themes, codes, and quotes is particularly useful for specifying the content to be included on the quantitative instrument. Researchers can also analyze the qualitative data to develop a typology (e.g., a set of five different profiles) by looking for natural differences in responses so categories can be formed that can inform the structure of the instrument or materials to be developed. In an exploratory mixed methods study, Meijer, Verloop, and Beijaard (2001) examined language teachers' knowledge about teaching reading comprehension to students aged 16 to 18. They first conducted a qualitative study consisting of interviews and concept mapping and used the qualitative findings to develop a questionnaire. They described in some detail the procedure of designing this questionnaire. They used the qualitative categories to organize the questionnaire, formulating the teacher expressions into items, creating Likert-type scales for the items, and adapting certain questionnaire items to the context of the different languages being taught by participants in the study.

Representation of sequential integration through joint displays.

Elements of these integrative procedures can be represented in joint displays. Two joint displays can be designed for most examples of the exploratory sequential design. One joint display can be drafted that shows the explicit link between the qualitative results in the first phase and the design of the quantitative feature in the second phase. For example, Figure 7.8 illustrates a connection joint display table developed by Peterson et al. (2013) to indicate how they used their initial

qualitative findings to culturally tailor the development of the content and methodology of the materials tested in their subsequent intervention.

A second joint display can represent how the tested quantitative feature reflects the qualitative context and culture. An example of this second type of joint display for an exploratory sequential design is illustrated in the study of nonspousal family support and mental health (distress) among older, churchgoing African American men by Watkins et al. (2015). As shown in Figure 7.9, the first, qualitative interview phase led to themes that were mapped to a national database (NSAL) and formed a new variable, grounded in personal perspectives. The authors created a joint display to present their results. In the first column they identified qualitative themes, then they linked these themes to quantitative questions from a large national database (building from the qualitative database to the quantitative database). The quantitative questions then formed a new latent variable, called nonspousal family support, that was related to the dependent variable—distress—in a quantitative analysis for older, churchgoing African American men.

Figure 7.8 Example of a Joint Display to Describe How Qualitative Results Inform a Quantitative Feature in an Exploratory Sequential Design

Table 2.1 *Qualitative Findings Applied to the Pilot Phase*

Area	Methodology revisions	Cultural tailoring
Information and knowledge	Develop informational workbooks: –Interactive format –Basic level of literacy Topics: –Health behavior and risk reduction –Gaining confidence to control the disease –Partnering with doctor	Disease-specific informational workbooks Disease-specific vignettes drawn from qualitative phase that include culturally-specific references to behaviors Culturally diverse illustrations Behavior change success stories from the qualitative phase, reflective of the population Include themes that were important to the clinical populations (e.g., social support)
Intervention	Provide workbooks to control and intervention groups	Identify population-specific core values for SA intervention
Recruitment/retention	Adjust recruitment strategy (e.g., enrolled immediately post-PCI)	Research staff of the same race/ethnicity as participants

Note: PCI = percutaneous coronary intervention; SA = self-affirmation.

Source: Peterson et al. (2013), Table 2, p. 223. Used with permission from the American Psychological Association.

Interpretation of integration results.

The interpretation of the joint displays in an exploratory sequential design relates to how the quantitative feature and its subsequent results are improved through understanding the qualitative contextual and cultural sensitivity of participant experiences. In the Watkins et al. (2015) mixed methods study, the authors interpreted the ways in which the qualitatively informed variables performed and gave culturally situated insights into the churchgoing African American male experience. This interpretation was explicitly stated as part of the results joint display (see final column in Figure 7.9). In addition, they provided their interpretations in the discussion section of the study, noting such conclusions as, "Our quantitative findings suggested that the six characteristics we identified from the qualitative findings (i.e., help, communication, closeness, feeling loved, listening, and expressing interests/concern) were a good fit for our latent variable, nonspousal family support" (p. 16). In other exploratory sequential designs, authors might discuss in the interpretation how the initial qualitative phase helped to design a culturally sensitive instrument, create specific intervention activities, shape the content of a website to be tested, or point toward existing survey instruments that might work with participants in a study.

Figure 7.9 Example of a Joint Display to Represent Linked Results for an Exploratory Sequential Design

Qualitative subthemes (from Churches study)	Quantitative variables (from NSAL items)	*p*	Mixed methods interpretation
Men reported that family members (siblings/sons/ daughters) help frequently.	How often do people in your family—including children, grandparents, aunts, uncles, in-laws, and so on—help you out? Would you say *very often, fairly often, not too often,* or *never*?	<.001	***Help:*** Not only was it socially and culturally (QUAL) relevant, but it was also found to be statistically significant (QUAN) for older, Church-going African American men in the study.
Men reported that they communicate with family members often, and reach out to family whenever they need help.	How often do you see, write or talk on the telephone with family or relatives who do not live with you! Would you say *nearly every day, at least once a week, a few times a month, at least once a month, a few times a year, hardly ever* or *never?*	<.001	***Communication:*** Not only was it socially and culturally (QUAL) relevant, but it was also found to be statistically significant (QUAN) for older, Church-going African American men in the study.
Men reported that they feel close enough to family members to go to them with their mental health problems.	How close do you feel toward your family members? Would you say *very close, fairly close, not too close,* or *not close at all?*	<.001	***Closeness:*** Not only was it socially and culturally (QUAL) relevant, but it was also found to be statistically significant (QUAN) for older, Church-going African American men in the study.
Men reported that they feel emotionally supported by family members regarding their mental health needs.	Other than your (spouse/partner), how often do your family members make you feel loved and cared for? Would you say *very often, fairly often, not too often,* or *never?*	<.001	***Feel Loved:*** Not only was it socially and culturally (QUAL) relevant, but it was also found to be statistically significant (QUAN) for older, Church-going African American men in the study.
Men reported how well their family members listen to them, how they feel connected to family members.	Other than your (spouse/partner), how often do your family member listen to you talk about your private problems and concerns? Would you say *very often, fairly often, not too often,* or *never?*	<.001	***Listen:*** Not only was it socially and culturally (QUAL) relevant, but it was also found to be statistically significant (QUAN) for older, Church-going African American men in the study.
Men reported that their family members appear interested in their mental health needs and overall well-being.	Other than your (spouse/partner), how often does your family member express interest and concern in your well-being? Would you say *very often, fairly often, not too often,* or *never?*	<.001	***Interested/Concerned:*** Not only was it socially and culturally (QUAL) relevant, but it was also found to be statistically significant (QUAN) for older, Church-going African American men in the study.

Note: NSAL = National Survey of American Life; QUAL = qualitative; QUAN = quantitative.

Source: Watkins et al. (2015). Used with permission from Sage Publishing.

Integrated Data Analysis and Interpretation Within Complex Designs

In complex designs, the researcher intersects one (or more) of the core designs with another design, methodology, or theory. Therefore, the basic mixed methods data analysis and integration considerations for integration intent, procedures, representation, and interpretation discussed for the core designs also apply to these more complex applications. In addition, researchers need to consider how these considerations are adapted and aligned to the specific type of complex design.

Mixed methods experimental design.

The intent of this design is to augment the trial by embedding qualitative data so that the experiment can incorporate the personal experiences of the participants. This means analyzing the trial results, analyzing the qualitative results, and then further determining how the qualitative data augments the trial. A joint display can present the integration of the experimental and qualitative results. For example, Bradt et al. (2014) studied the psychological and pain outcomes for cancer patients receiving two treatments: music therapy with a trained music therapist and music medicine consisting of prerecorded music. Qualitative data were embedded during this randomized cross-over trial by asking all participants about the treatment benefits and harms from the two interventions as well as their descriptions of their intervention experiences. This constituted embedding a convergent design within an experimental trial. Bradt et al. (2014) developed a joint display that showed the relationship between treatment benefits and patient experiences, as shown in Figure 7.10. From the outcomes, the researchers created a typology of four types of responses to illustrate diverse treatment benefits, and, for each category in the typology, they interpreted the findings by contrasting the changes with differing patient experiences. This led to additional insights into the effectiveness of the treatment conditions.

Mixed methods case study design.

This design involves embedding both quantitative and qualitative data into a case or cases. The intent of this design is to develop in-depth cases through integrating multiple sources of data. The procedure for data analysis consists of analyzing both sets of data separately and then using the combined data to document or

generate a case or cases. Further analysis consists of making cross-case comparisons, if multiple cases emerge.

If researchers embed a convergent core design within the mixed methods case study, a good joint display of the integration results would be the statistics by theme approach. Alternatively, cases might be placed on a quantitative scale along with quotes that suggest differences in the cases. An example of this display is found in Mendlinger and Cwikel's (2008) study of women's health behaviors among mother-daughter dyads from six ethnic groups (Israeli, European, North African, former Soviet Union, American/Canadian, and Ethiopian). As shown in Figure 7.11, four individual cases were arrayed on a scale for health assessment that ranged from poor to excellent. Quotes were provided for daughters and mothers to indicate what they said about their health, which formed the basis for the quantitative ratings. Country categories were also assigned to the daughters and mothers. In this way, the resulting figure illustrated the combination of numeric rating scores as well as textual qualitative data in a single display. A visual interpretation of the differences among the cases along the scales and specific quotes showed how the combined data distinguished among the cases.

Figure 7.10 Example of a Joint Display of Patient Experiences per Treatment Benefits for a Mixed Methods Experimental Design

Treatment benefits	Change in music therapy[a]	Change in music medicine[a]	Patient experiences
↑MT, ↓MM	0.65 to 1.88	−0.11 to 0.38	• Emphasize the importance of therapeutic relationship and support by therapist • Enjoy the creative aspect of music making • Are hopeful for the future
↑MM, ↓MT	−0.46 to 0.59	0.33 to 1.63	• Apprehensive about active music making • Prefer familiarity of pre-recorded music • Hesitant about exploring feelings related to cancer
↑MT, ↑MM	0.61 to 1.07	0.73 to 1.37	• Strong conviction about the power of music to support and give hope • Use music for mental escape • Use music for emotional exploration and value processing of emotions with therapist
↓MT, ↓ MM	−0.67 to −1.03	−0.52 to −1.06	• Hold little hope for the future • Music evokes sad and traumatic memories • Feel inadequate regarding music making and singing • Prefer aesthetics of original recordings

↑ great Improvement, ↓ less improvement or worsening

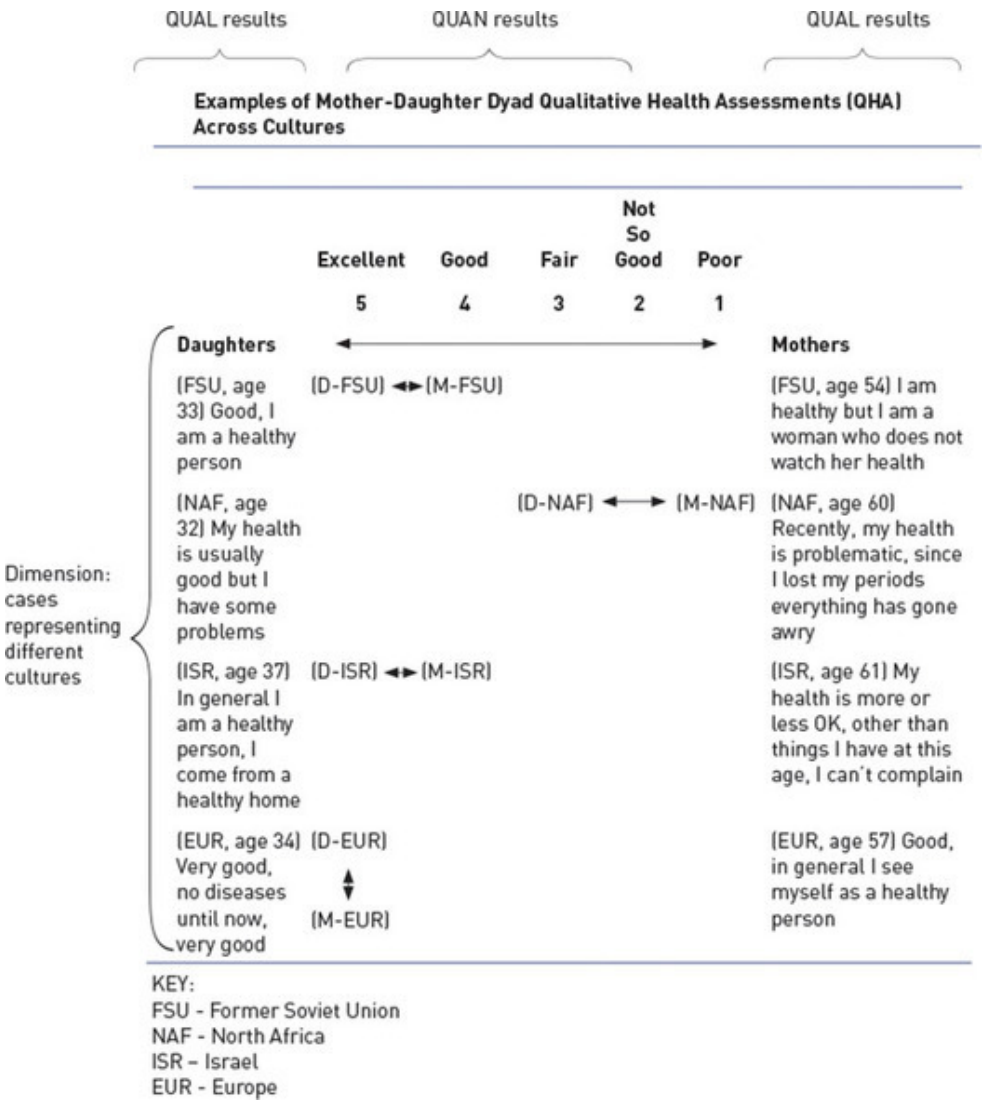
[a] Range of overall z-scores (average of z-scores for mood, anxiety, relaxation, and pain)

Source: Bradt et al. (2014). Used with permission from Springer Publications.

Mixed methods participatory-social justice design.

In this complex design the researcher frames the study within a theoretical or participatory perspective to help address injustices against underrepresented or marginalized groups or to involve stakeholders in the process of research. Data collection for the qualitative and quantitative strands of the study can proceed concurrently, sequentially, or both. Analysis steps may reflect convergent data analysis procedures (e.g., as in the convergent design) or sequential data analysis procedures (e.g., as in the explanatory or exploratory sequential designs). Joint displays reflect the specific type of design and serve to highlight social justice concerns and/or possible action steps. Data analysis decisions thus occur within each set of data, in the merging or connecting the two sets of data, and in the interpretation phase. For example, DuBay et al. (2014) first noted that a large health disparity exists in organ donation between white and African American adults. Thus, their mixed methods social justice design used a convergent core design that identified factors associated with African American adults choosing to become registered organ donors. The theoretical orientation guiding the study was the theory of planned behavior, which examined the three domains of behavioral beliefs, subjective norms, and behavioral control. The data collection consisted of focus group data and a quantitative questionnaire about awareness and knowledge of organ donation and of becoming a registered organ donor. The specific analysis involved integrating the quantitative and qualitative results and displaying the results in a joint display to highlight the concerns and voices of African American adults. As shown in Figure 7.12, the display allows a reader to see the components of the theory in the first column, the qualitative themes as related categories in the second column, specific related survey items in the third column, and the statistical results comparing the donors and the nondonors in the last column. The discussion of these findings compared the qualitative results with the statistical results to identify important concerns and needs within the African American community.

Figure 7.11 Example of a Joint Display Using the Case Study Approach to Position Individual Cases on a Scale and Provide Text



Source: Mendlinger and Cwikel (2008), Figure 3, p. 288. Reprinted with permission from Sage Publishing.

The mixed methods evaluation design.

This design relates the type(s) of core designs to steps in an evaluation. The intent of data integration is to merge and connect the different methods to best accomplish the evaluation objectives by embedding a core design at one or multiple points within the evaluation process. For example, a convergent design might be used to compare the formative qualitative process data with the quantitative outcome data. As another example, an exploratory sequential design might span from the initial needs assessment to the development of measures to

assess the impact of an implemented program. Data analysis decisions relate to individual analysis of the quantitative and qualitative data as well as to the concurrent or sequential integrated analysis between the two databases. Rossow and Baklien (2011) provided a joint display that converges the process and effect data in a single table for a methodological discussion of the evaluation of a community prevention project aimed at reducing alcohol consumption and related harm among young people. As shown in Figure 7.13, they arrayed information about the evaluation of both the process and the effect in terms of the overall project, the data collection and analysis, and the type of knowledge generated. They then contrasted the differences between the qualitative process component and the quantitative effect component in the evaluation to indicate significant challenges in conducting their evaluation.

Figure 7.12 A Joint Display (Partially Represented Here) for a Study ThatIncluded Social Justice Concerns About African American Organ Donors

Table 3 Comparison of qualitative and quantitative results

Theory of Planned Behavior constructs/ qualitative themes	Related categories	% Text references	Survey items	% Yes/ true	"Registered organ donor" (N = 87: 22 registered, 65 not registered)
Behavioral beliefs					
Advantages	Saving someone's life	51.6	I believe organ transplantation is an effective treatment (kidney, liver, lungs, heart).	76	Donors 5.0 vs nondonors 3.9, *P* = .04
			Organ donation allows something positive to come out of a person's death.	82	Donors 4.6 vs nondonors 3.9, *P* = .19
	Making it your own decision	20.0	A person's wish to donate organs should be honored under all circumstances.	77	Donors 34 vs nondonors 2.3, *P* = .01
	Not needing organs when dead	18.3	I am willing to donate the organs of my loved ones after their death.	67	OR 15 (95% CI, 1.9-121), *P* = .002[a]
Disadvantages	Fear	30.3	I am afraid that my body will be mutilated if I donate my organs.	11	Donors 3.0 vs nondonors 4.5, *P* = .008
	Legal issues	21.2	A person's wish to donate organs should be honored under all circumstances.	77	Donors 3.4 vs nondonors 2.3, *P* = .01
	Religious and moral beliefs	10.6	I believe that God wants our bodies whole for the afterlife.	7	Donors 4% vs nondonors 8%, *P* = .61
			I believe that it is God's will that those with organ-related diseases are sick so doctors should not intervene.	6	Donors 3.7 vs nondonors 4.1, *P* = .49
			I cannot have an open casket funeral if I am an organ donor.	13	Donors 3.5 vs nondonors 4.5, *P* = .09
	Social justice	7.6	The process of selecting who gets donated organs discriminates against African Americans.	11	Donors 3.3 vs nondonors 4.4, *P* = .05
			On average, African Americans wait longer to get an organ transplant than whites.	67	Donors 64% vs nondonors 68%, *P* = .72

Source: DuBay et al. (2014). Used with permission from NATCO, the Organization for Transplant Professionals.

Notes: Abbreviation: OR, odds ratio. [a]Reference groups for all odds ratios are the nonregistered participants.

Figure 7.13 A Joint Display Showing Qualitative Process Evaluation and Quantitative Effect Evaluation

	Process	Effect
Relation to prevention project		
Involvement in prevention project	Strong and close	None
Influence on prevention project	Formative and summative	Only summative
Data collection and analyses		
Relation to time use and timing	Permanent and continuing data collection, significant time use. Timing dependent on the prevention project	Data collected at certain time points, limited time use. Timing much decided by the researchers
Involvement in informants	Strong and close	None
Person dependence	Data collection, analyses, and interpretations strongly dependent on the individual researcher	Data collection, analyses, and interpretations not/not much dependent on the individual researcher
Generated knowledge		
Level of knowledge	Primarily about structures and system level (or individuals in these contexts)	Mostly about individuals
Type of knowledge	In-depth knowledge, very detailed and nuanced, hardly categorical, but particular, no broad overview	Broad general overview, details and nuances of another kind
Aims	Understanding beyond the specific project, transferable knowledge	Cumulative, generalizable knowledge

Source: Rossow and Baklien (2011). Reprinted with permission from *Nordic Studies on Alcohol and Drugs.*

Validity and Mixed Methods Designs

Considerations about validity and quality in mixed methods have long been been identified as one of the major issues in mixed methods research and as the most important aspect of a research project (Tashakkori & Teddlie, 2003a). Despite its importance, however, even finding agreement on the best term to use for this concept has been an issue. Although many scholars use the term *validity*, others question whether that is the best option. Maxwell and Mittapalli (2010) pointed out that *validity* has been rejected by some mixed methods scholars either because of its overuse, its meaninglessness, or because it is routinely used in quantitative research, which taints its acceptability to qualitative researchers. Other terms that have been suggested for mixed methods include *legitimation* (Onwuegbuzie & Johnson, 2006), *construct validity* (Dellinger & Leech, 2007), *quality* (e.g., Greene, 2007), and *inference quality* (Teddlie & Tashakkori, 2009).

Early discussions about validity in mixed methods focused on identifying both quantitative and qualitative approaches to it (see, for example, Tashakkori & Teddlie, 1998). More recently, scholars have added mixed methods validity considerations to the discussion that focus on the integration aspects of using mixed methods research. For example, Onwuegbuzie and Johnson (2006) advanced a set of nine types of legitimation that identify quality issues unique to mixed methods research, such as sample integration legitimation, weakness minimization legitimation, and paradigmatic mixing legitimation. Dellinger and Leech (2007) arrayed traditional quantitative, traditional qualitative, and mixed methods types of validation under a general framework of construct validation and incorporated several discussions of mixed methods validity under a common rubric.

Authors have also discussed how validity relates to the process of doing research. For example, Teddlie and Tashakkori (2009) addressed validity in mixed methods as it relates to the study design and to the interpretation stage of research. They discussed design quality (suitability given the questions, fidelity of the quality and rigor of procedures, consistency across all aspects of the study, and analytic implementation of procedures) and interpretive rigor (consistency with findings, consistency with theory, interpretations given to participants and scholars, and distinctiveness in terms of credible or plausible conclusions). Similarly, O'Cathain (2010) advanced a comprehensive validity framework for mixed methods that specified criteria for the five stages of any mixed methods study:

planning, undertaking, interpreting, disseminating, and applying in the real world. More recent discussions have gone beyond general considerations of validity within mixed methods to advancing and applying validity considerations in the context of specific mixed methods designs (e.g., Creswell & Plano Clark, 2011). For example, Ivankova (2014) described how she applied validity strategies specific to the explanatory sequential design in her study of graduate student engagement in online research methods courses.

Although many important ideas have already been advanced about validity in mixed methods, discussions continue to emerge offering different perspectives and debates on how validity should be defined and applied within mixed methods research (e.g., Collins, 2015; Heyvaert, Hannes, Maes, & Onghena, 2013; Plano Clark & Ivankova, 2016). Having sorted through these discussions, we offer a set of general principles that guide our perspective on mixed methods validity and suggest how these principles can be applied to the different mixed methods designs.

General Principles

We feel that several overarching principles of validity need to guide mixed methods approaches. First, since mixed methods research involves both quantitative and qualitative strands of data, there is a need to address the specific types of validity checks associated with both strands. Quantitative and qualitative validity considerations were highlighted in Table 7.1 and are discussed in many research methods books. Second, even though different terms are available in the mixed methods literature, we believe that the best term to use is *validity* because of its acceptance by both quantitative and qualitative researchers today and because such use presents a common language understandable to many researchers. Third, we define **validity in mixed methods research** as employing strategies that address potential threats to drawing correct inferences and accurate assessments from the integrated data. Fourth, rather than a generic discussion of validity in all mixed methods, we believe that validity can be viewed and addressed best in reference to the type of mixed methods design being used.

Validity Threats and Types of Mixed Methods Designs

For mixed methods researchers to understand validity threats, those threats must be specifically related to the type of design the researcher is using. This is because each mixed methods design has its own inherent logic and intent to obtain certain types of inferences, and therefore the validity threats vary among the different core and complex designs. In Table 7.3 we have related each type of mixed methods design to its potential validity threats and listed strategies to minimize those threats. Some of these threats relate to types of questions, the sampling procedures of the quantitative and qualitative strands, the use of results from one sample to the other, and the rigorous procedures used at different phases.

TABLE 7.3 ■ Type of Design, Validity Threats, and Strategies to Minimize Threats

Type of Design	Validity Threats	Strategies to Minimize Threats
Convergent design	• Not using parallel concepts in data collection for both the quantitative and qualitative databases	• Create parallel questions addressing same concept
	• Having unequal quantitative and qualitative sample sizes	• Use same sample sizes for quantitative and qualitative strands if comparing data for each participant or acknowledge different intents of sample size (e.g., to compare group means with individual experiences)
	• Keeping results from the different databases separate	• Use convergent data analysis integration strategy (e.g., joint display or comparing quantitative and qualitative results side by side)
	• Failing to resolve disconfirming results	• Engage in strategies to understand disconfirming results (e.g., new analyses)
Explanatory sequential design	• Failing to identify important quantitative results to explain	• Consider all possibilities for explanation of results (e.g., significant and nonsignificant predictors)
	• Not explaining surprising, contradictory quantitative results with qualitative data	• Design qualitative data collection questions to probe into the surprising, contradictory quantitative results
	• Not connecting the initial quantitative results with the qualitative follow-up	• Purposefully select the qualitative sample using the quantitative results to identify participants from the sample of quantitative participants who can provide the best explanations
Exploratory sequential design	• Not building the quantitative feature based on the qualitative results	• Make explicit how each major qualitative finding is used to inform the development of specific elements of the quantitative feature
	• Not developing rigorous quantitative features	• Use systematic procedures to design the quantitative feature (e.g., use good psychometric instrument design steps or pilot test intervention materials)
	• Selecting participants for the quantitative test that are the same individuals as the qualitative sample	• Use a large sample of individuals for the quantitative sample who are different from those in the qualitative sample
Mixed methods experimental design	• Not addressing threats to internal and external validity in an experiment design	• Address internal and external threats noted in the literature about experimental designs
	• Not specifying why and where the qualitative component is embedded in the experiment	• Provide an explicit rationale for collecting qualitative data and its use in the experimental design
	• Introducing bias in the experimental design when qualitative data are collected during the experiment	• Consider strategies such as unobtrusive data collection during the experiment that do not introduce bias that might alter the experimental outcomes
Mixed methods case study design	• Not defining the case(s) adequately	• Specify the bounding of the case(s) and describe each case
	• Failing to articulate clearly the case(s) and a rationale for them and the core design(s) used	• Identify the type of core design(s) used to select or generate cases and provide the rationale for this approach
	• Reporting the cases based on either quantitative or qualitative results but not on integration of the results	• Explicitly merge the quantitative and qualitative databases for each case
	• When multiple cases are selected, failing to make a meaningful cross-case comparison	• Engage in cross-case analysis of the integrated quantitative and qualitative results for the multiple cases
Mixed methods participatory-social justice design	• Failing to clearly identify the participatory focus or the social justice lens used in the study	• Advance the participatory focus or the social justice lens early in the study
	• Failing to specify the type of core design used in the study	• Specify the core design being embedded within the participatory-social justice lens and indicate how the design decisions reflect the participatory-social justice lens
	• Failing to link integrated results to possibilities for action and social change	• Develop a joint display that links specific results to possible action steps
	• Marginalizing participants in the project	• Involve participants as much as possible in the decision making and implementation for the different stages of the project
Mixed methods evaluation design	• Lacking an evaluation model to frame the project	• Clearly articulate an overall objective and the evaluation steps in the project
	• Failing to link the steps in the evaluation process so that one step builds on the previous step	• Be clear as to how the steps in the evaluation process connect and build toward a common objective
	• Failing to identify the core design(s) embedded within the stages of the evaluation process	• Draw the core design(s) into the evaluation process to make their use explicit and to highlight the points of integration where connection and building occurs

Software Applications and Mixed Methods Data Analysis

Quantitative and qualitative software packages have been available for years to assist researchers in the analysis of data. Recently, attention and discussion has developed around the topic of computer software applications and mixed methods. In our opinion, the conversation has been lodged mainly at the more general level, but the commentary is becoming increasingly specific. Two writers in particular—Bazeley (1999, 2009, 2010) and Kuckartz (2009, 2014)—have begun substantive conversations about mixed methods and specific software products. Bazeley (2009) reviewed the range of software packages that might be used in mixed methods research. She cited Excel for mixed methods tasks and then highlighted two software programs primarily designed for qualitative analysis that might also be used for mixed methods analysis: NVivo (http://www.qsrinternational.com) and MAXQDA (http://www.maxqda.com). She also mentioned the software program from Provalis (http://www.provalisresearch.com), which has subprograms (SimStat and QDA Miner) for both quantitative and qualitative data analysis. Bazeley described how the software applications can be used in mixed methods to

- compare how individuals from different cases with diverse characteristics discuss an issue,
- review changes in individual experiences over time on a case-by-case or group basis,
- consider the impact of changing settings on the evolution of an experience,
- examine the interrelationship of exported codes, and
- conduct quantitative comparative analysis of cases.

Kuckartz (2009, 2014) has gone into more detail about the relationship of mixed methods to qualitative computer analysis—specifically the use of mixed methods with MAXQDA. He feels that MAXQDA can be most useful in mixed methods research in the areas of linking, coding, and memoing; transforming the qualitative data into quantitative data; and creating visual representations of code distributions for exporting to statistical software. Some specific mixed methods applications of MAXQDA he mentioned include the following:

- Quantifying qualitative data—counting the number of times that a code occurs
- Linking text and variables using text codes and the "attributes" features (demographic or other quantitative variables)
- Exporting and importing data into a statistical program—a researcher can create a data display of demographic variable names on the horizontal axis and themes on the vertical axis with counts in the cells and export this display into a statistical computer program
- Using word counts—analyzing the qualitative data for the frequency of words used and linking the word counts to the codes or to the variables

The suggestions by Bazeley (1999, 2009, 2010) and Kuckartz (2009, 2014) provide useful starting points for conceptualizing the use of software in mixed methods data analysis. First, quantitative and qualitative software (such as those highlighted earlier in this chapter) can help to separately analyze the strands of data (such as in the convergent design). In addition, qualitative software programs have numerous capabilities that facilitate the merging or linking of databases. For example, qualitative software enables us to compare qualitative themes in terms of categorical variables or quantitative scores, which is very useful for developing joint displays. In addition, researchers can output qualitative codes to Excel or SPSS spreadsheets for developing joint displays. Researchers can also derive quantified counts of themes, codes, or words from a qualitative software program, a procedure useful in data transformation procedures. Newer approaches continue to emerge for using qualitative software for visualizing mixed methods analysis in developing joint displays (Guetterman, Creswell, & Kuckartz, 2015). These approaches build on the increasing capabilities of the different software packages and the creativity of researchers during the data analysis and integration process.

Summary

In mixed methods data analysis, the researcher needs to incorporate sound procedures of data analysis for both the quantitative and qualitative strands of the study. This involves preparing the data for analysis, exploring the data, analyzing the data to answer the research questions and test the research hypotheses, representing the results of the data analysis, interpreting the results, and validating the data, results, and interpretation. In mixed methods research, the additional process of mixed methods data analysis and interpretation exists for each type of design. As data integration is central to mixed methods analysis, the intent of integration, the procedures for integration, the representation of integration and the use of joint displays, and the interpretation of the results of integration take different shapes for the core designs and the complex designs. Furthermore, validation for a mixed methods study needs to be considered in terms of rigorous quantitative and qualitative validity procedures as well as validity considerations unique to mixed methods. Within each type of design, the threats to validity differ, and mixed methods researchers need to engage in strategies that minimize these threats. Mixed methods researchers also have access to data analysis software programs that increasingly offer capabilities for facilitating the mixed methods data analysis and integration procedures.

Activities

1. Develop sections on quantitative and qualitative data analysis for your study that describe (a) how you will prepare the data for analysis, (b) how you will explore the data, (c) how you will analyze the data to respond to your questions and hypotheses, (d) how you will represent the results (including a possible joint display), (e) how you will interpret the results, and (f) how you will validate the data, results, and interpretations.
2. Assume that your data analysis and integration process will use a convergent design. Discuss the intent you would have for your integration and, consulting the examples discussed in this chapter, describe a joint display you might develop to represent the results from the merging integration.
3. Assume your data analysis and integration will consist of an explanatory sequential or an exploratory sequential design. Indicate how you might link the results of the initial phase to the development of some aspect of the second phase (e.g., sampling decisions for an explanatory sequential design or feature development for an exploratory sequential design). Describe a joint display you might develop to represent the connection for this sequential integration.
4. There are validity issues attached to each type of mixed methods design. Choose one of the core or complex designs you might use in a study and write a paragraph that indicates what specific strategies you would use to address the potential threats to validity for this design.

Additional Resources to Examine

For discussions about data analysis and integration, see the following resources:

- Bazeley, P. (2009). Integrating data analyses in mixed methods research [Editorial]. *Journal of Mixed Methods Research*, *3*(3), 203–207.
- Caracelli, V. J., & Greene, J. C. (1993). Data analysis strategies for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, *15*(2), 195–207.
- Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs—principles and practices, *Health Services Research, 48*(6), 2134–2156. doi:10.1111/1475-6773.1211
- Onwuegbuzie, A. J., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 351–383). Thousand Oaks, CA: Sage.

For examples of applications of mixed methods analysis and joint displays, see the following resources:

- Guetterman, T., Fetters, M. D., & Creswell, J. W. (2015). Integrating quantitative and qualitative results in health science mixed methods research through joint displays. *Annals of Family Medicine, 13*(6), 554–561.
- Plano Clark, V. L., Garrett, A. L., & Leslie-Pelecky, D. L. (2009). Applying three strategies for integrating quantitative and qualitative databases in a mixed methods study of a nontraditional graduate education program. *Field Methods, 22*(2), 154–174.
- Plano Clark, V. L., & Sanders, K. (2015). The use of visual displays in mixed methods research: Strategies for effectively integrating the quantitative and qualitative components of a study. In M. T. McCrudden, G. Schraw, & C. W. Buckendahl (Eds.), *Use of visual displays in research and testing: Coding, interpreting, and reporting data* (pp. 177–206). Charlotte, NC: Information Age Publishing.

For validity discussions, consult the following resources:

- Collins, K. M. T. (2015). Validity in multimethod and mixed research. In S. N. Hesse-Biber & R. B. Johnson (Eds.), *The Oxford handbook of multimethod and mixed methods research inquiry* (pp. 240–256). New York, NY: Oxford University Press.
- Onwuegbuzie, A. J., & Johnson, R. B. (2006). The validity issue in mixed research. *Research in the Schools*, *13*(1), 48–63.
- Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks, CA: Sage.

For discussions about computer applications and mixed methods research, see the following resources:

- Guetterman, T., Creswell, J. W., & Kuckartz, U. (2015). Using joint displays and MAXQDA software to represent the results of mixed methods research. In M. T. McCrudden, G. Schraw, & C. W. Buckendahl (Eds.), *Use of visual displays in research and testing: Coding, interpreting, and reporting data* (pp. 145–175). Charlotte, NC: Information Age Publishing.
- Kuckartz, U. (2014). *Qualitative text analysis: A guide to methods, practice & using software.* London, UK: Sage.
- Bazeley, P. (2010). Computer-assisted integration of mixed methods data sources and analyses. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods research for the social and behavioral sciences* (2nd ed., pp. 431–467). Thousand Oaks, CA: Sage.

8 Writing and Evaluating Mixed Methods Research

We focus now on the stage of composing and writing a mixed methods study proposal or report. Part of this stage is thinking about how to structure and organize the written document. Due to the multiple forms of data collection and analysis, it is easy for a reader to get lost in the complexity and numerous steps involved in a mixed methods study. To make the information clear, the structure of a mixed methods study should mirror the design used. Some readers may not know what a mixed methods study "looks" like, and a well-designed structure for presentation will educate individuals new to this approach. In addition, the length of an article on a mixed methods study may be a problem for journals because of the longer word length needed with the inclusion of both qualitative and quantitative approaches. Care needs to be taken so that both structure and writing are lean and concise. Ways of evaluating a mixed methods study may also be unfamiliar to readers. Discussions of quality in the literature suggest several elements of a "good" mixed methods study. Having some sense of possible criteria is invaluable to graduate student advisors, editors of journals, proposal reviewers, and individuals designing and conducting this form of research. Learning from current discussions about standards can help reviewers know what to look for in studies, help researchers locate exemplars and good models of mixed methods research, and help researchers ensure the quality of their own mixed methods reports.

This chapter will address

- general guidelines for writing a mixed methods study;
- the structure to use in writing a mixed methods graduate student mixed methods proposal, a doctoral dissertation or thesis, a proposal for federal funding, and a mixed methods journal article; and
- criteria for evaluating a mixed methods study.

General Guidelines for Writing

Excellent books are already available on grammar, syntax, and scholarly writing, so this discussion will focus on the structural aspects of writing a mixed methods study (see additional readings at the end of this chapter). Some of these ideas apply to all scholarly writing, but we will discuss them with a special focus on mixed methods projects. As with all writing, the audience must be kept in mind when the writer is organizing and structuring material. When writing about mixed methods, it is useful to consider whether the audience is more oriented to qualitative research or quantitative research and how familiar the audience is with mixed methods research.

Writers should use mixed methods terms (e.g., *convergent design*) but recognize that these terms may not be well known to their audience and therefore may need to be explained when they are first used. Writers should also be aware that some terms hold particular meanings to different audiences. For example, the word *exploratory* has different meaning for those trained in quantitative research, qualitative research, and mixed methods research. Care needs to be given to make the use of such terms transparent within a mixed methods report.

The writing can educate a reader about mixed methods research. Complete methods discussions can be placed into proposals, dissertations, and journal articles. Writers should provide a definition of mixed methods research, include references to the mixed methods literature and specific mixed methods studies, and embed in the writing the parts of research with mixed methods components (e.g., a mixed methods research question or discussion of the mixed methods data analysis). Graduate students can encourage this educational process by selecting a published mixed methods study in their field and sharing it with committee members and advisors prior to presenting their proposal or dissertation/thesis.

Because of the complexity of mixed methods research, readers will need aids to help them understand a mixed methods study. These aids have already been highlighted in this book, including diagrams of procedures, well-designed purpose statements following the scripts, the inclusion of mixed methods research questions, and clear headings that separate the quantitative and the qualitative elements of data collection and analysis.

Scholarly research writing using all methodologies involves telling a good story. It aids the reader when the writer takes care to tell a coherent and cohesive

narrative throughout the qualitative, quantitative, and integration aspects of the mixed methods study. The reasons for including more than one type of data become clear if the writing builds from one component to the other and helps provide a seamless transition among the components. The two databases need to link in some way, and the more carefully this link is established through integration, the more coherent and cohesive the overall story will be.

What point of view best fits mixed methods research and the type of design being used? The point of view—who is telling the story—can be crafted from the first person (*I*, *we*); the second person (*you*); or the third person (*he*, *she*, *they*). It can also be described from how the story is told—from the subjective to the objective (Bailey, 2000). The first person subjective approach is typically found in qualitative research. We see the use of first person pronouns, such as *I* or *we*, used throughout the study report. The subjective stories of individuals are presented through quotes. In quantitative research, the subjective first and second person are not typically used. Instead, the objective third person is the norm used by describing factually the results or using impersonal referrals, such as *the investigator* or *the researcher*. The researcher is largely in the background, objectively reporting the results and having an unseen and unheard personal voice. How is one to proceed, then, in mixed methods with both qualitative and quantitative points of view present in the study? Consider one of two possibilities: (1) Write the mixed methods report using one consistent voice throughout or (2) write the report by varying the voice, with the objective voice used in the quantitative sections, the subjective voice in the qualitative sections, and choosing one or the other for the integration sections. Although both are possible, we recommend using one consistent voice. The decision as to which voice to choose may be based on the type of design (e.g., explanatory sequential designs start out strong in the quantitative approach, suggesting a more objective, third-person voice); the quantitative or qualitative approach given emphasis or priority (e.g., a qualitative priority would align with a more subjective, first-person voice); personal writing style; or, of course, the audience for whom you are writing.

It is important that the writer adapt the structure of the written study to the type of mixed methods design being used. Because the components of research (e.g., purpose statement, data collection, integration) differ for each of the major types of mixed methods designs, it should not come as a surprise that the structure used in writing about them will also differ. In fact, when done well, the structure of the written study can help the reader better understand the type of design. This structure should reflect the key topics as well as the order in which the topics are presented. For example, the integration procedures for an explanatory sequential

design would be discussed at a different point in the methods section than they would be in a convergent design. One useful strategy for thinking about the organization of topics is to use the order of activities depicted within a study's procedural diagram as a guide for how to order the quantitative, qualitative, and integration topics.

Relate the Mixed Methods Structure to the Type of Writing

We have long embraced the idea that there is value in considering the thoughtful organization of the final research report even before the study begins. At the same time, we believe in allowing the design to emerge, and, in many cases of sequential types of designs, the details of the steps down the road are unknown. But before the study begins, it is helpful to have an image in mind as to what the final mixed methods study might look like. This image may be a vague picture at the outset, but it will become clearer as the study proceeds.

Thus, because a good plan is central to sound mixed methods research, we provide several writing outlines that may be useful: the structure of a graduate student proposal for a dissertation or thesis, the structure of a final mixed methods dissertation, the structure of an outline of topics addressed in a proposal for federal funding, and the structure of topics to include in a mixed methods empirical journal article. Looking at these various structures, we see some common features of mixed methods research being introduced that we have discussed in earlier chapters in this book. However, the features differ depending on the type of mixed methods design chosen and whether the writing is a plan for a study or the report of a completed study.

Structure of a Proposal for a Mixed Methods Dissertation or Thesis

A proposal for a dissertation or thesis needs to convince graduate committees and advisors that the topic is worth pursuing, that it will be studied in a rigorous and insightful way, and that it is feasible for the student to carry out. The proposal needs to be convincing, and when the study design is mixed methods, special components need to be included in the overall plan that persuade readers of the value of mixed methods and that educate readers about the major components of mixed methods. Proposal formats will differ from campus to campus, and students need to obtain copies of past proposals to review to see how they are composed. Our first recommendation, then, is that graduate students visit with faculty members and ask for examples of proposals from prior dissertations or theses that have been completed. A search through dissertation and theses abstracts using an academic library search or a search engine will also yield mixed methods dissertations to examine. It is also useful to locate several mixed methods studies using a similar design that can serve as models for the structure and to design a proposal that contains both major elements of mixed methods and information about the specific design.

It is helpful to realize that a dissertation or thesis proposal consists of three major topics: the introduction, the literature review, and the methods (see DeCuir-Gunby & Schutz, 2017, and their suggestions for elements of a mixed methods dissertation proposal). A mixed methods proposal goes further to include special elements unique to this approach. Examine Table 8.1, which outlines these unique aspects of mixed methods that belong in a proposal for a dissertation or thesis.

TABLE 8.1 ■ Outline of the Mixed Methods Components in the Structure of a Dissertation or Thesis Proposal

Title Page

- Foreshadow the use of mixed methods in the title.

Abstract

- Identify the type of mixed methods design, the quantitative and qualitative methods, and the integration intent.

Introduction

- When describing the deficiencies of past research, introduce the need for both quantitative and qualitative data and the insight that emerges from integration.

Purpose and Questions

- Write a clear purpose statement that conveys the overarching mixed methods intent.
- Write three research questions (or study aims) that reflect the qualitative strand, the quantitative strand, and the mixed methods integration and that are ordered to match the mixed methods design.

Philosophical and Theoretical Foundations

- State the worldview and positionality that you are using and how it relates to your planned use of mixed methods in the study.
- Include the theoretical model or conceptual framework that explains and provides an understanding of what you expect to learn in your study. Draw a diagram of the model or framework.

Literature Review

- Review quantitative, qualitative, and mixed methods studies related to your research problem.
- End with a call for a study that includes the need to add mixed methods insights to the literature and explain how the reviewed literature informs the study plans.

Methods

- Define and provide a rationale for your use of mixed methods.
- State the type of mixed methods design you will use, give reasons for its use, and cite examples of its use.
- Present and discuss a procedural diagram for your mixed methods design (as a figure or in an appendix).
- Discuss both the quantitative and qualitative sampling; data collection; data analysis (and data transformation, if used); and validity. Order these topics to match the design.
- Convey how you will integrate your data; represent the integrated results (e.g., in a joint display); and make an interpretation of the additional insight the integration brings.
- Mention mixed methods validity threats that match your design and discuss how they will be anticipated and addressed.

Potential Ethical Issues

- Mention any risks or benefits associated with the use of mixed methods.

Researcher's Resources and Skills

- Include the materials, software, and training required to gather, analyze, and integrate the quantitative and qualitative data.

Timeline for Completing the Study

- Identify each major milestone (e.g., approvals, data collection, analysis, integration, interpretation, and writing).

References

Appendices

- Recruitment Materials, Consent Forms, Instruments, Protocols, and Procedural Diagram

Source: Adapted from Creswell & Plano Clark (2011).

Source: Adapted from Creswell & Plano Clark (2011).

Our discussion here will focus on the sections of the proposal with mixed methods components, and we have simply placed mixed methods aspects into a traditional format for a proposal.

- The title should be stated so that it foreshadows the use of mixed methods. This title should focus on the topic of the study, mention that the study is a mixed methods one, and identify the study participants and the research site.
- The abstract should refer to the use of mixed methods and the type of design as well as the quantitative and qualitative data collection anticipated. We consider a good proposal abstract to identify the problem leading to the study, the purpose or study aim of the project, the major theories used (if applicable), the samples for and collection of the qualitative data and the quantitative data, the integration approaches planned, and the significance of the study for specific audiences. This general format may need to be adapted to fit particular institutional contexts for dissertations and theses.
- The introduction is rather standard for scholarly research in that it basically sets forth the research problem and why it is important that it be studied. It should be noted that one of the deficiencies in past research is a lack of what mixed methods research has to offer, such as a more comprehensive analysis, multiple viewpoints, or a need to explore and confirm (see Table 5.1 for additional deficiency examples).
- The purpose statement needs to convey a mixed methods approach, and the research questions should convey the qualitative and quantitative strands of the study as well as the mixed methods question. The purpose statement and mixed methods question can be framed using the scripts in Chapter 5. It is important to include the justification for mixed methods in the purpose statement, as suggested in the scripts. The order of the research questions depends on which design is being used. In sequential studies, the order should mirror the design procedures proposed for the study (e.g., qualitative first followed by quantitative for an exploratory sequential design). In convergent studies, the order might reflect the priority of the strands.
- The philosophical foundation for the use of mixed methods needs to be described and an explanation presented for the use of one or more worldviews. Further, if a theoretical (or conceptual) framework is used (e.g., a social science or an advocacy lens), this lens needs to be mentioned and the proposal needs to detail how it will flow into the study. If no theoretical lens is used in the study, then this section would only address the worldview perspective being taken by the researcher and perhaps the researcher's positionality (such as prior experiences related to the study topic).

- In a mixed methods study, we recommend including a literature review section. It should cover the literature (divided into subtopics) examining the research problem in the study and include qualitative, quantitative, and mixed methods studies. The end of this literature review should point out how the proposed study will significantly add to the literature and note the additional insight afforded by a mixed methods approach.
- The methods section typically begins with information about mixed methods research and the specific type of design being used. In Chapter 3 we provided an example of this opening paragraph that might be adapted for a proposed study. Since proposal reviewers might not be familiar with mixed methods, offering a definition for it is important, as is including key references.
- The methods section needs to be carefully shaped to convey the details of the procedures of the mixed methods design—both what will be done and why it will be done this way. Details about the sampling, data collection, data analysis, and validity procedures need be explained for both the qualitative and quantitative strands. In addition, the intent and procedures for the integration and inferences should be discussed. The description of the procedures should be ordered to match the design. In a sequential design, the order could be: procedures for the first strand, connection procedures, procedures for the second strand, and procedures for integrating and drawing inferences. In a convergent design, the order could be: sampling procedures (qualitative and quantitative), data collection procedures (for both), data analysis and validity procedures (for both), merging procedures and validity, and procedures for drawing inferences. Additionally, here would be the place to describe some of the validity threats that challenge the use of the selected design, as set forth in Chapter 7.
- It is important to discuss larger issues related to the conduct of the proposed study, such as the need to identify potential ethical issues likely to present challenges in the dissertation or thesis and the strategies that will be used to address these issues. This might include both the potential risks and benefits involved with the use of mixed methods. The researcher's skills in conducting mixed methods research need to be mentioned. The researcher needs to be familiar with both quantitative and qualitative research and the forms of data collection and analysis used in both approaches. Providing a timeline is useful in mixed methods research given the extensive time involved in collecting, analyzing, and integrating two forms of data.

Structure of a Mixed Methods Dissertation or Thesis

The ideal structure of a mixed methods dissertation or thesis mirrors the proposal but adds the results or findings and the conclusions. An example of the table of contents for a mixed methods dissertation can serve to illustrate the structure of a final study. The content and order of the topics will differ depending on the type of mixed methods design and the program requirements.

The dissertation structure by Maresh (2009), as illustrated in Table 8.2, was an exploratory sequential mixed methods design with the intent to develop and test an instrument. This example study is from the field of communication studies and examined hurtful communication from college teachers to students. It began with collecting and analyzing qualitative interview data from students. From this, Maresh then analyzed the results to obtain nine themes of hurtful messages that teachers communicate to students. An instrument was then developed from these themes, and the instrument was administered to a large sample of students. As shown in the structure of this dissertation, the study consisted of six chapters. The first three chapters conveyed the introduction, the relevant literature, and the methodology. In the methodology chapter, the author advanced philosophical assumptions, stated the mixed methods research design, and provided a figure to illustrate the procedures. Then the methodology discussion conveyed the phases of the research, from the initial qualitative beginnings to the interim phase of instrument development and on to the quantitative data collection. Separate chapters were included for the qualitative results (including the instrument), the quantitative results, and the final discussion. In summary, this dissertation table of contents contained more chapters than typically found in a quantitative five-chapter dissertation, and chapters were shaped around the specific results, presented in the order of the design from qualitative to quantitative.

TABLE 8.2 ■ Example Structure for a Mixed Methods Dissertation or Thesis

Chapter One: Introduction

- Defining Teacher Misbehaviors and Recognizing Their Impact (*Establishing the importance of the problem*)
- Face in the Teacher–Student Relationship (*Description and references of a key idea*)
- Defining and Rationalizing the Study of Hurt (*Description and references of a key idea*)
- Purpose of the Present Study
- Summary

Chapter Two: Overview of Relevant Literature

- Hurtful Messages in Human Relationships
- Individuals' Responses to Hurtful Messages
- Theoretical Rationale
  - Face Theory
- Relational Consequences of Hurtful Messages
- Content-Oriented Consequences of Teacher Misbehaviors
- Summary

Chapter Three: Methodology

- Epistemological Assumptions
- Research Design
- Communication Studies and Mixed Methods Research
- Limitations of Mixed Methods Inquiry
- Phase One: Qualitative/Interpretive
  - Participants
  - Data Collection
  - Focused Interviews
  - Data Analysis
  - Data Validation
- Interim Phase: Instrument Development
  - Mixed Methods Validity
- Phase Two: Quantitative
  - Participants
  - Data Collection
  - Instrument
- Summary

Chapter Four: Understanding Hurtful Messages (*Qualitative results and integration*)

- Types of Hurtful Messages
- Hurtful Messages and Teacher Misbehaviors
- Students' Responses to Hurtful Messages
- Face and Hurtful Messages
- Advice for Teachers
- Perceived Impact of Hurtful Messages
- Instrument Development
- Summary

Chapter Five: The Impact of Hurtful Messages (*Quantitative results*)

- Research Question
- Hypotheses
- Summary

Chapter Six: Discussion

- Hurtful Messages in the Teacher–Student Relationship
- Face Theory and Students' Attributions of Hurtful Messages
- The Impact of Hurtful Messages in the College Classroom
- Significance of the Study
- Implications of Conclusions
- Practical Application
- Limitations
- Directions for Future Research
- Summary

References

Appendices

Source: Adapted from Maresh (2009). Used with permission from the author.

Source: Adapted from Maresh (2009). Used with permission from the author.

Structure for an Application for Funding to the National Institutes of Health

It is helpful to discuss how mixed methods research is mapped onto a proposal or application for funding. Unquestionably, funding agencies are increasingly interested in funding mixed methods research. We have chosen the recommendations by the National Institutes of Health (NIH) for our illustration, but we might just as easily have chosen the National Science Foundation (NSF) or other federal agency or a private foundation (e.g., W. T. Grant Foundation, Robert Wood Johnson Foundation, Spencer Foundation).

NIH issued some guidelines (National Institutes of Health, 1999) for designing an NIH proposal that included a combination of qualitative and quantitative approaches. It has also held workshops focused on mixed methods research, such as the one in the summer of 2004 for social work and health professionals. NIH's 1999 guidelines mentioned the challenge of conducting "combined" research. In the document, the authors recommended that the combined components of mixed methods relate to research questions and hypotheses. They also suggested how the data might be integrated (mixed) and stated that authors needed to explain how the results will be interpreted, taking into account the use of data from two different research paradigms. The guidelines called for expertise in both approaches and a complete description of both methods and their contributions, rather than a superficial approach to either of the two. They discussed the integrated (convergent) and sequential models and pointed out that integrated approaches are challenging and require extensive explanation. Finally, they recommended that adequate time be made available for this form of research.

A major development emerged in the field of mixed methods in 2011 that built on the 1999 report. NIH convened a working group to develop *Best Practices in Mixed Methods in the Health Sciences* (Creswell, Klassen, Plano Clark, & Smith, 2011). Eighteen individuals representing NIH and the field of mixed methods met for almost a year and produced a document of recommendations available through the NIH website (https://obssr.od.nih.gov/training/mixed-methods-research/). These recommendations address (1) the need for mixed methods; (2) the essential nature and design of mixed methods; (3) specific elements of conducting mixed methods in the health sciences (i.e., teamwork, campus infrastructure and resources, and training); (4) mixed methods components for major types of NIH awards (i.e., R series grants, fellowships, career development grants); and (5) criteria for reviewing mixed methods applications.

Two elements need to guide thinking about a mixed methods application for funding: general guidelines and quality criteria. First, the application needs to conform to the general guidelines provided by the funding agency. For example, the Research Strategy section (one of many elements in an NIH application) for an investigation using mixed methods needs to conform to the requested content areas, as shown in Table 8.3. Specific page limits vary depending on the type of mechanism being funded, but the general overview consists of specific aims, significance, innovation, and approach. Within each of these categories, NIH provides specific guidance, as summarized in Table 8.3.

TABLE 8.3 ■ National Institutes of Health Guidelines for a Proposal Narrative With Mixed Methods Components Added

A. Specific Aims (Limit to one page)

- State concisely the goals of the proposed research [*include a mixed methods purpose statement*] and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved.
- List succinctly the specific objectives of the research proposed (e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.) [*Identify objectives for the quantitative, qualitative, and mixed methods aspects of the planned design.*]

B. Research Strategy (Match page length to application type)

(1) Significance [*Incorporate statements about the need for mixed methods and how it will generate insights into the problem.*]

- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
- Describe the scientific premise for the proposed project, including consideration of the strengths and weaknesses of published research or preliminary data crucial to the support of your application.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.

(2) Innovation [*Discuss how any aspects of the planned use of mixed methods are innovative as a methodology.*]

- Explain how the application challenges and seeks to shift current research or clinical practice paradigms.
- Describe any novel theoretical concepts, approaches or methodologies, instrumentation or interventions to be developed or used, and any advantage over existing methodologies, instrumentation, or interventions.
- Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation, or interventions.

(3) Approach

- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Describe the experimental design and methods proposed and how they will achieve robust and unbiased results. Unless addressed separately in the Resource Sharing Plan, include how the data will be collected, analyzed, and interpreted as well as any resource sharing plans as appropriate. [*Provide mixed methods details, including the overall mixed methods design with a diagram, quantitative procedures (sampling, data collection and analysis, and validity), qualitative procedures (sampling, data collection and analysis, and validity), and integration and inference procedures.*]
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims. [*Discuss the design's validity threats and how the threats will be minimized.*]
- If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high risk aspects of the proposed work.
- Explain how relevant biological variables, such as sex, are factored into research designs and analyses for studies in vertebrate animals and humans. For example, strong justification from the scientific literature, preliminary data, or other relevant considerations, must be provided for applications proposing to study only one sex.
- If your study(s) involves human subjects, the sections on the Inclusion of Women and Minorities and Inclusion of Children can be used to expand your discussion on inclusion and justify the proposed proportions of individuals (such as males and females) in the sample, but it must also be addressed here in the Approach section.

Preliminary Studies for New Applications:

For new applications, include information on Preliminary Studies. Discuss the PD/PI's preliminary studies, data, and or experience pertinent to this application. Except for Exploratory/Developmental Grants (R21/R33), Small Research Grants (R03), and Academic Research Enhancement Award (AREA) Grants (R15), preliminary data can be an essential part of a research grant application and help to establish the likelihood of success of the proposed project. Early Stage Investigators should include preliminary data. [*Preliminary studies can include research that used quantitative, qualitative, and mixed methods approaches.*]

Source: General Application Guide for NIH and Other PHS Agencies. Retrieved from https://grants.nih.gov/grants/how-to-apply-application-guide/forms-d/general/g.400-phs-398-research-plan-form.htm#Research

Source: General Application Guide for NIH and Other PHS Agencies. Retrieved from https://grants.nih.gov/grants/how-to-apply-application-guide/forms-d/general/g.400-phs-398-research-plan-form.htm#Research

The second element that needs to guide thinking about a mixed methods application for funding is quality—that is, the criteria for effectively describing the elements of a good mixed methods application. In the NIH best practices recommendations (Creswell et al., 2011), the task force presented a table citing mixed methods components that needed to be mapped onto a research application for NIH funding. These recommendations were intended for both those developing applications and those reviewing applications at NIH. As shown in Table 8.4, the provisions in this checklist address many of the components we have already discussed in prior chapters. Although this table applies to an R series mechanism for NIH, the strategies work for other mechanisms at the institutes as well. In terms of significance, we note that the mixed methods criteria speak to arguing for a need for using multiple perspectives in the study. In terms of the investigators, the mixed methods criteria assess the investigators' methods skills, leadership skills, and collaboration plans. In terms of the innovation, the mixed methods criteria assess the advantages of mixed methods over single (or monomethod) approaches and the innovation of where and how the integration occurs in the design. In terms of the approach, the mixed methods criteria assess the link between the philosophy and theory (or conceptual framework) in the study and the use of mixed methods, the value of mixed methods, the rigor of data collection and analysis for both the quantitative and qualitative strands, the use of analytic software, and the feasibility of using mixed methods. Lastly, in terms of the environment, the mixed methods criteria assess the extent to which the institutional environment supports mixed methods.

TABLE 8.4 ■ Sample Review Criteria and Strategies for Reviewing a Mixed Methods R Series Application to NIH

Criterion	Strategies for Meeting the Criterion
Significance	• Does the application make a convincing case that the problem is relevant (e.g., if aims are achieved, the work will improve knowledge or practice)? • Can the problem be best studied through the multiple perspectives of mixed methods research?
Investigator(s)	• Do the investigator(s) have the required skills to conduct all proposed methods (e.g., investigator(s) have prior publications and/or grants related to proposed qualitative, quantitative, and mixed methods; co-investigators with appropriate expertise are identified to lead each method as needed)? • Is there evidence that the project leadership is committed to mixed methods research (e.g., each component of the study is addressed sufficiently and consistently throughout the application; there are references to current relevant literature on mixed methods; investigators have experiences in professional development in mixed methods)? • Has the approach to collaboration been described (e.g., frequency of meetings between leaders of different components, management of differences between co-investigators)?
Innovation	• Does the use of mixed methods provide a platform for innovative investigation of the research problem(s) (e.g., provides insights into mechanisms of organizational change not possible with a single method)? • Is the combination of methods used innovative, or the way in which they are integrated innovative?
Approach	• Is there a description of the philosophy or theory informing the research and the ways this philosophy or theory shapes the investigation? • Have the applicants offered a convincing explanation of why mixed methods research is needed to address the study aims and the value added by using this approach (e.g., explained how alternative designs would be inappropriate or inadequate)? • Is there a clear description of the full study design, including where integration occurs (e.g., using a comprehensive figure or matrix)? • Is the integration of the methods well described, including the timing, techniques, and responsibilities for integration?
	• Is the design appropriate for the study aims? • Are the methods consistent with established standards of rigor for quantitative and qualitative data collection and analysis (e.g., sampling, sample size and analysis plans are specified for each method, with appropriate citations)? • Will appropriate computer software be used for each analytic component, and if not, is a convincing rationale provided? • Is the study feasible within its proposed time frame and resources (e.g., a timetable is provided that allocates time for data integration)?
Environment	• Is there evidence that the institution supports mixed methods research (e.g., forums for multidisciplinary collaborations, faculty with funding for mixed methods research)?

Source: Creswell, Klassen, Plano Clark, and Smith (2011), Table 1, pages 32–33. Retrieved from https://obssr.od.nih.gov/training/mixed-methods-research/

Source: Creswell, Klassen, Plano Clark, and Smith (2011), Table 1, pages 32–33. Retrieved from https://obssr.od.nih.gov/training/mixed-methods-research/

Structure of a Mixed Methods Journal Article

Our writing examples thus far relate to planning a mixed methods study in a dissertation proposal, reporting a full dissertation project, or applying for external funding. After completing a mixed methods study, many authors submit the results of their work to scholarly journals. The list of journals publishing mixed methods continues to expand into different fields. Also, journals devoted exclusively to publishing discussions about the use of mixed methods are becoming more prevalent, including the *Journal of Mixed Methods Research, Field Methods, Quality and Quantity,* and a recent revival of the *International Journal of Multiple Research Approaches.*

We have included numerous examples in this book of mixed methods studies published in journals (see Appendixes A-G). Although these studies vary in writing structure, there are some common elements of mixed methods research that do (or should) flow through all of them, as well as features that earmark each study as having used one of the major types of core and complex designs. In Table 8.5 we present a general structure for developing a mixed methods journal article.

TABLE 8.5 ■ Outline of the Structure for a Mixed Methods Journal Article

Title (foreshadow the use of mixed methods research)

Introduction

- State the research problem.
- Include literature on the research problem or issue (focused on establishing the need for studying the research problem or issue).
- State deficiencies in previous studies (incorporate need for collecting both quantitative and qualitative data).
- Indicate audiences for the study.
- Write a purpose statement (written using script that applies to type of design) and/or
- Write research questions (order quantitative, qualitative, and mixed methods questions to align with the mixed methods design).

Related Literature Review (optional, depending on use of theory; a broad literature review about the topic of the study that narrows the focus to the specific issue or problem of the study)

Methods

- Indicate use of mixed methods and provide a definition of it.
- Specify the type of mixed methods design in the study (define the major elements of the design, give reasons for using design, cite studies using design in the relevant field).
- Include a diagram of design procedures (usually a figure, but may include as appendix).
- Describe data to be collected (order quantitative and qualitative collection methods according to design).
- Describe analysis procedures for the data (order quantitative, qualitative, and integration analyses according to design).
- Indicate strategies for validity (quantitative, qualitative, and mixed methods validity).

Results

- Report the quantitative and qualitative results as well as the mixed methods integration results.
- Portray tables and figures for the quantitative and qualitative results. Illustrate mixed methods integration through a joint display.

Discussion

- Summarize results (overall quantitative, qualitative, and mixed results).
- Explain results by relating them to the literature.
- State limitations in the study.
- State future research that will address the limitations.
- End with statements about the major or unique contributions of the study.

References

Appendixes (e.g., tables, figures, instruments, protocols, or guides)

Source: Adapted from Creswell & Plano Clark (2011).

Source: Adapted from Creswell & Plano Clark (2011).

The specific mixed methods components and the design components of a mixed methods journal article are as follows:

- The title needs to reflect the fact that this is a mixed methods study and incorporate such terms as *mixed methods research*. As discussed in Chapter 5, the title can also foreshadow the type of design by using neutral language or language that gives emphasis to quantitative or qualitative research.
- The introduction can note a deficiency in previous studies that points to a need for collecting both quantitative and qualitative research. It can also include a purpose statement, written using the scripts in Chapter 5, and quantitative, qualitative, and mixed methods research questions.
- The methods section can open with a statement about mixed methods research and the type of design used in the study. The reasons for using that type of design and examples of other studies that have used it can also be incorporated into this section. A procedural diagram, found with increasing frequency in mixed methods studies today, should be provided in the form of a figure or perhaps as an appendix to the journal article. Both quantitative and qualitative data collection and analysis procedures should be mentioned in addition to the integration procedures.
- It is in the results section that mixed methods journal articles vary in structure, but knowing the types of mixed methods designs helps the writer to understand the different structures. In a convergent design, the results section might report the separate analysis results from both the quantitative and qualitative data, or it might report the results of both types of data analysis plus the results of the mixed methods merged analysis. When the latter option is chosen, the researcher presents either joint displays that relate the themes to the quantitative variables or some other alternative display(s), as mentioned in Chapter 7. In a sequential design, the results for the first phase are reported, followed by the results of the connection procedures, followed by the results of the final phase and any steps taken to connect and interpret the results. As discussed in Chapter 7, joint displays can be helpful to include for sequential designs as well.
- In the discussion section, we find the interpretation of the results as well as a discussion relating this interpretation to the literature. We also find an accounting of the limitations of the study and how the results might inform future research. How should the interpretation of the results be reported in a mixed methods study? In a convergent design, the interpretation may reflect the merging of the data, and the authors will compare the findings from the quantitative and qualitative analyses in order to answer the mixed methods

research question. In explanatory and exploratory sequential designs, the interpretation often mirrors the sequence of the data collection and analysis (e.g., in an explanatory design, first quantitative results are explained, then qualitative results are explained). Then the researcher reports on the conclusions drawn from answering the mixed methods question. In mixed methods intervention designs, the focus in the interpretation of the major findings relates to the primary data set, but the author also needs to comment on how the mixed methods question was answered. In mixed methods case study designs, the interpretation often involves discussing the meaning of the case for understanding an issue or the meaning of cross-case comparisons among the cases to identify important dimensions related to the cases. In mixed method participatory-social justice designs, the researcher interprets how the merged or connected findings address the mixed methods research question and suggests a plan of action for social change. In mixed methods evaluation designs, some combination of a concurrent, merged summary of findings and a sequential, connected summary of findings will be interpreted in terms of how the findings advance the overall objective of the program of inquiry.

There are some additional considerations for researchers wanting to publish the results of their mixed methods studies. For example, Stange, Crabtree, and Miller (2006) have discussed various writing options in the health sciences, such as publishing separate quantitative and qualitative articles from a mixed methods study, staging papers as separate articles in a single issue of a journal, and integrating the methods into a single article. If the researcher is publishing results of a mixed methods study in more than one journal article, we recommend that all articles make reference to the use of mixed methods research and that the studies be cross-referenced so they all can be identified and located.

Evaluating a Mixed Methods Study

A writing structure that conveys the elements of mixed methods research and is organized to reflect the type of design used adds to the sophistication and credibility of a completed study. For those conducting mixed methods research, it is important to consider how to evaluate the quality of their study and to reflect on the criteria that others, such as graduate committee members, funding agencies, journal editors, and readers in general, might use in their assessment of the study.

The issue of *quality* in mixed methods is a contemporary and controversial one (Fàbregues & Molina-Azorin, 2016). A number of authors over the years have presented standards for evaluating the quality of a mixed methods study that range from lengthy, detailed criteria to a hands-off approach. Tashakorri and Teddlie's (2010b) *SAGE Handbook of Mixed Methods in Social & Behavioral Research*, for example, had only one chapter devoted to evaluation, and the Hesse-Biber and Johnson (2015) *Oxford Handbook of Multimethod and Mixed Methods Research Inquiry* had none. As mentioned by O'Cathain (2010), issues arise about the appropriate language to use when discussing the idea of quality, the different audience interpretations of the concept, the concern about "one size fits all" standards of quality when mixed methods studies and researchers are so diverse, the various views about quality from philosophical stances, and the distinctions in viewing quality from different design perspectives. Some would say that creating standards of quality and evaluation limits the creativity of researchers (e.g., Cheek, 2015), yet new investigators look to standards for guidance.

One way to engage with the literature about quality as it relates to mixed methods research is to consider viewing the standards for quantitative research, qualitative research, and mixed methods. This is the approach taken by O'Cathain (2010) and in our own writings (Creswell & Plano Clark, 2011). The sections that follow provide an overview of the key ideas found within the literature about quality.

Quantitative and Qualitative Evaluation Criteria

The **standards for evaluating a quantitative study** often reflect the type of research design and the methods of data collection and analysis (Bryman, Becker, & Sempik, 2008; Hall, Ward, & Comer, 1988). A rigorous quantitative study phase in mixed methods research must use an appropriate design (e.g., experimental or correlational) that matches the research question; a theory that frames the study; and data collection that will lead to reliable and valid scores. The sample needs to be carefully selected and described, and the sample size needs to provide sufficient statistical power to address the questions of interest. The statistical test must be appropriate and robust. The overall study needs to have accurate measures and be generalizable, valid and reliable, and replicable.

The **standards for evaluating a qualitative study** depend on how the researcher positions herself or himself in the study. Qualitative researchers differ in the criteria they use, which include philosophical criteria, participatory and advocacy criteria, or procedural, methodological criteria (see Creswell, 2012). A useful guide is available in the Robert Wood Johnson qualitative standards available online (Cohen & Crabtree, 2006; www.qualres.org). In our approach to qualitative research, we stress the importance of procedural or methodological criteria. These criteria include the following: framing the study within philosophical assumptions of qualitative research; using an accepted approach to inquiry (e.g., ethnography, case study); focusing on a single phenomenon; emphasizing rigorous data collection; using validity strategies to confirm the accuracy of the account; conducting multiple levels of data analysis; and writing a study that is persuasive and engages the reader (see Creswell, 2012). To this list we could add that researchers need to disclose their role (i.e., reflexivity) and its impact on the interpretations they make in a study.

Mixed Methods Evaluation Criteria

Our stance is that while mixed methods research must be responsive to both qualitative and quantitative criteria, there is a separate set of expectations for a mixed methods study beyond what is needed for quantitative and qualitative research. Bryman (2006) called this the "bespoke" approach, in which criteria are developed especially for mixed methods studies. Also, we see mixed methods evaluation criteria reflecting trends that seem to exist within qualitative research. As we discussed earlier, in qualitative research several perspectives exist about evaluation, and a researcher's viewpoint depends on her or his orientation. In mixed methods, this orientation may be as a methods person, a methodologist, a philosopher, or a theoretically oriented scholar. Policymakers who fund research want to know whether the research questions are adequately answered; researchers who engage in mixed methods studies want to know if they can trust the findings and take action on them; research participants want to know if they have had a worthwhile experience; and teachers of research need to convey standards by which studies will be judged (O'Cathain, 2010). For all of these stakeholders, we need to establish criteria for assessing mixed methods studies.

Another approach for considering quality in mixed methods research is to study researchers' perceptions. Bryman, Becker, and Sempik (2008) asked specifically about quality criteria for mixed methods research in a mixed methods study that examined researchers' perceptions. The quantitative results found that over two-thirds ofthe surveyed researchers felt different criteria should be used to judge the quality of the quantitative and qualitative components of a mixed methods study. The analysis of the interview data identified four themes concerning criteria that can be applied to mixed methods studies:

1. The use of mixed methods needs to be relevant to the research questions.
2. There needs to be transparency about the mixed methods procedures.
3. The findings need to be integrated or mixed.
4. A rationale needs to be provided for the use of mixed methods.

An alternative approach to evaluating mixed methods studies is to consider mixed methods within the larger process of research. In 2008, O'Cathain, Murphy, and Nicholl (2008b) developed a set of criteria known as Good Reporting of a Mixed Methods Study (GRAMMS). Building on this work, O'Cathain (2010) provided a set of evaluation criteria in which she pointed out that evaluation discussions in

mixed methods have been derived from literature reviews, from researchers' expertise and interviewing researchers, and from mapping exercises with researchers. O'Cathain further supports building an evaluation framework for mixed methods and extending the quality criteria of mixed methods research introduced by Tashakkori and Teddlie (2008). O'Cathain's framework includes the following quality considerations for a mixed methods study:

- Planning quality (e.g., the extent that the initial study plan is feasibile, transparent, and situated in existing literature)
- Design quality (e.g., the extent that the study design is described in detail, suitable for the study purpose, and employs methods that complement each other)
- Data quality (e.g., the extent that the methods of sampling, data collection, analysis, and integration are appropriate, adequate, and rigorous)
- Interpretive rigor (e.g., the extent that the findings emerge from the methods, the inferences align with the findings, inconsistencies are explained, and others could reach the same conclusion)
- Inference transferability (e.g., the extent that conclusions can be applied to other settings, groups, and times)
- Reporting quality (e.g., the extent to which the study is successfully completed, clearly reported, and yields understandings more than the separate parts)
- Synthesizability (e.g., the extent that the study is worthy of inclusion in a synthesis of evidence)
- Utility (e.g., the extent to which the results are usable by consumers)

O'Cathain ends by stating that there may be too many criteria. We agree that a parsimonious set of criteria will be most useful for those designing a mixed methods study—especially those with limited experience who are beginning their first such study.

Other authors have advanced criteria for assessing quality of mixed methods studies based on reviews of the literature. For example, Heyvaert, Hannes, Maes, and Onghena (2013) conducted a systematic review of existing frameworks available for assessing the quality of mixed methods studies. They reviewed 13 different frameworks and advanced three major categories of quality criteria: (1) criteria for the methodological quality of the quantitative and qualitative strands; (2) criteria specific to mixed methods research (i.e., mixing and rationale); and (3) generic criteria (i.e., design, interpretation, analysis, research questions,

sampling and data collection, theoretical framework, impact of investigator, transparency, and context). As another example, Ponterotto, Mathew, and Raughley (2013) reviewed 23 examples of mixed methods social justice studies to identify exemplary aspects. They listed several indicators of quality in the reviewed studies; these indicators were present when the authors

> a) had mastery of both the quantitative and qualitative research on the topic at hand; b) presented strong rationales for the study and for their decision to mix research methods; c) appeared to have team members with expertise in quantitative and qualitative methods; d) wrote in a clear and concise manner even when including extensive participant quotes; e) were detailed in noting their design and study limitations; and f) could point clearly to needed follow-up research using quantitative, qualitative, and mixed methods designs. (p. 53)

A thoughtful article by Fàbregues and Molina-Azorin (2016) advanced an extensive review of the literature about quality in mixed methods published prior to February 2016. They summarized available criteria, identified the most prevalent quality criteria, and proposed a number of recommendations for future discussion. They noted that publications on quality of mixed methods have increased in prevalence and that a set of core quality criteria can be identified. Their core criteria resembled those domains identified by O'Cathain (2010) and included planning a study, undertaking a study, interpreting a study, and disseminating results. Further, they noted that a need exists for more empirical publications on quality, for a consistent use of terminology about quality in the field of mixed methods, and for some agreement on core criteria. They cited our work (Creswell & Plano Clark, 2011) as well as Bryman (2014) and Mertens et al. (2016) as examples of scholars that support the value of minimal agreement on core evaluation criteria for mixed methods research.

Most recently, the American Psychological Association (APA) has formed a task force to develop standards for both qualitative and mixed methods research that will appear in the next edition of the *APA Style Manual* (in press). Additionally, an article on the standards for both qualitative and mixed methods research is forthcoming at this writing (Levitt et al., in press). These efforts to develop standards signal a major development in the advancement of mixed methods because the *APA Style Manual* and *American Psychologist* are widely read publications in both the social and human sciences.

What stance do we take on mixed methods evaluation? We do support a core set of the minimum criteria. This is why in Chapter 1 we advanced four key characteristics of mixed methods research, which also inform our identification of a good-quality mixed methods study. That is, to **conduct and evaluate a mixed methods study**, the researcher

- collects and analyzes both qualitative and quantitative data rigorously in response to research questions and hypotheses,
- intentionally integrates (or mixes or combines) the two forms of data and their results,
- organizes these procedures into specific research designs that provide the logic for conducting the study, and
- frames these procedures within theory and philosophy.

These criteria identify key elements expected in a good mixed methods study (e.g., quality research questions, rigorous qualitative data collection and analysis, rigorous quantitative data collection and analysis, and quality integration). In addition, they highlight the need for the key elements to fit together in a logical way that is consistent with the considerations associated with a particular mixed methods design and with the relevant theoretical and philosophical considerations informing the study's content. We use these criteria with our students completing mixed methods studies and in reviewing manuscripts submitted for publication; they are consistent with the ideas set forth in this book.

It is useful to consider how these criteria might be applied to the report of a mixed methods study within a journal article. Bear in mind that we are focusing on the research approach used in the study in this discussion, not the content or topic of the study. Although our review procedure does not always follow the lockstep guide identified here, we tend to use the following steps when considering the quality of a mixed methods study report:

1. *We look in the methods section first.* We examine the methods section to see if the researcher collected both quantitative and qualitative data in response to research questions or hypotheses. We look for the typical qualitative approaches of open-ended data forms, such as interviews, observations, documents, or audiovisual materials, and the closed-ended data forms of quantitative research, such as instruments, observational checklists, and documents reporting numeric data. Sometimes this division is unclear because one form of data (e.g., patient records) could be viewed as having

both qualitative data (notes from provider) and quantitative data (values reported on screening tests). We also look for typical qualitative analysis procedures (e.g., thematic analysis) and quantitative analysis procedures (e.g., graphical or statistical analysis).

2. *Next we examine the method section in detail.* We read the description of the methods to determine whether they were pursued thoroughly. This means that we examine the qualitative methods and the quantitative methods to determine if they were developed rigorously (see Chapters 6 and 7 on data collection and data analysis).
3. *We look at the results and discussion for evidence of mixing.* We are interested in whether the researcher actually integrated the two methods as opposed to collecting data for both strands and keeping them separate throughout the study. This is sometimes difficult to pinpoint. It is helpful in assessing whether mixing occurred if the author mentions a justification for why the two strands were collected (e.g., qualitative data were collected in order to explain the quantitative results). This justification could be found anywhere in the study. Other signs of mixing consist of tables or figures that represent both databases, connected phases of the study with one devoted to quantitative data and the other to qualitative data, and results or interpretation sections in which the author explicitly brings together the two databases.
4. *We look for mixed methods terms.* The use of mixed methods terms in a study denotes that the authors made a conscious attempt to use mixed methods procedures, were familiar with the literature on mixed methods, and sought to have their study understood and evaluated by readers as a mixed methods study. We look for mixed methods terms in such places as the title (does it include the words *mixed methods*?), in the method discussion and the specification of a type of mixed methods design, in the justification for the choice of research approach, and in the advantages of mixed methods noted in the conclusions of the article.
5. *Finally, we consider whether all the elements fit together in a logical way.* Once we have determined a study has included the key elements of mixed methods research, then the final consideration is how well the elements fit together to address the study intent. We look to see whether the study argument, the mixing rationale, the purpose and research questions, the quantitative and qualitative strands, the integration, and the inferences all fit together in a coherent and logical way. Throughout this book we have described how the different mixed methods designs address different study intents and questions and are associated with different procedures so that the

researcher can draw valid integrated conclusions. Therefore, we apply this design-based thinking in our evaluation of mixed methods studies.

In the end our list of criteria is not lengthy, reflects standards aimed at a specific audience, and takes a largely methods orientation. Others may adhere to a philosophical approach or a research process approach. This diversity of approaches to quality criteria is healthy for the field of mixed methods as it continues to develop.

Summary

General guidelines can help researchers write a mixed methods study proposal or report. Writers need to consider the writing structure most accommodating to the anticipated audiences, how their report and its composition will educate audiences, how their mixed methods study will be understood by audiences because of its complexity, and how their study tells a coherent story from a consistent point of view or from a point of view natural to a specific type of design.

Because planning in advance is helpful in all forms of research, we have provided examples of structures for designing mixed methods studies. We have suggested outlines for writing a dissertation or thesis proposal, a final dissertation, an NIH application for funding, and a mixed methods journal article. Using a structure for the type of writing that is consistent with mixed methods research adds to the sophistication and credibility of a study. Most important to recognize is how the reporting approach changes based on different types of mixed methods designs.

We have also examined several sets of criteria that might be used for evaluating the quality of a mixed methods study since various stakeholders, such as graduate committee members, funding agencies, journal editors, and readers, all need some criteria for determining such quality. Quality might be assessed for the qualitative and quantitative strands separately, and research methods books detail well these criteria. However, we feel that mixed methods research deserves its own set of criteria, although, as discussed, no absolute criteria currently exist. Several sets of criteria draw on recent writings about quality in mixed methods research and cover planning a study, using a research design, gathering high-quality data, making rigorous interpretations, providing quality reports, and using mixed methods studies for literature syntheses and practice. We suggest, however, using our core mixed methods criteria for assessing a good quality study published in a journal as a starting point. A final recommendation is to consider the key characteristics of the research study designs we have advanced in this book to see whether a particular mixed methods study also incorporates those characteristics.

Activities

1. Develop an outline for the structure of a graduate student dissertation or thesis proposal that is reflective of the type of design you plan to use.
2. Locate a published mixed methods study in your field. Use the points made in this chapter to evaluate a published mixed methods journal article to critique your selected study.
3. Obtain the guidelines for a research application from a private foundation or federal agency other than NIH. Take the outline of topics for the NIH application found in Table 8.3 and adapt it to fit the guidelines for the foundation or agency.
4. Use the criteria mentioned by O'Cathain (2010) to critique a mixed methods project you are designing.

Additional Resources to Examine

For discussions about publishing a mixed methods study, see the following resources:

- Sandelowski, M. (2003). Tables or tableaux? The challenges of writing and reading mixed methods studies. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 321–350). Thousand Oaks, CA: Sage.
- Stange, K. C., Crabtree, B. F., & Miller, W. L. (2006). Publishing multimethod research. *Annals of Family Medicine*, *4*, 292–294.

For criteria for evaluating quantitative and qualitative studies, see the following resources:

- Cohen, D., & Crabtree, B. (2006). *Using qualitative methods in healthcare research.* Robert Wood Johnson Foundation. Retrieved from www.qualres.org
- Creswell, J. W. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (5th ed.). Upper Saddle River, NJ: Pearson Education.

For a discussion about the criteria to use in evaluating a mixed methods study, see the following resources:

- Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Clegg Smith, K. (2011). *Best practices for mixed methods research in the health sciences.* Bethesda, MD: National Institutes of Health. Retrieved from https://obssr.od.nih.gov/training/mixed-methods-research/

- Fàbregues, S., & Molina-Azorin, J. F. (2016). Addressing quality in mixed methods research: A review and recommendations for a future agenda. *Quality and Quantity.* doi:10.1007/s11135-016-0449-4
- O'Cathain, A. (2010). Assessing the quality of mixed methods research: Toward a comprehensive framework. In A. Tashakkori & C. Teddlie (Eds.), *SAGE handbook of mixed methods in social & behavioral research* (2nd ed., pp. 531–555). Thousand Oaks, CA: Sage.
- O'Cathain, A., Murphy, E., & Nicholl, J. (2008). The quality of mixed methods studies in health services research. *Journal of Health Services Research and Policy*, *13*(2), 92–98.

9 Advances in Mixed Methods Research

In this book we have discussed ways to design and conduct mixed methods research. As we worked on this new edition of the book, we were aware of how far the mixed methods field had advanced since our last edition in 2011. This explains why in this edition we rewrote several chapters to reflect current thinking. In this process we can now assess our interest in recent years in the developments of mixed methods research. This interest is most concretely reflected in our own writings to summarize, map, and highlight developing controversies in the field of mixed methods (Creswell, 2011a, 2011b; Plano Clark & Ivankova, 2016). In this concluding chapter we summarize key developments introduced in earlier chapters of this book that stand out as specific advances. Having these advances recorded in each new edition of this book will ensure a continuous dialogue about how this methodology has grown and expanded. Recognizing these advances also helps researchers who are designing and conducting mixed methods studies to consider how their research efforts may potentially advance the field.

We hear from researchers who tell us, "I have always been doing mixed methods, but you have just provided a new language." Unquestionably, a language appears with each new methodology, and mixed methods is no exception. Glossaries found in this book and in many mixed methods texts attest to this development. However, the inference about "always doing" mixed methods speaks to the perception that gathering and integrating both quantitative and qualitative data in a research study has a long tradition and characterizes mixed methods as a way to gather data in social science research. This would be like arguing we have always been doing Pearson correlation coefficients when we conduct a regression analysis or like saying we have always been doing observations when we conduct an ethnography today. Methodologies grow and develop over time, and early antecedents of current practice are, of course, present in current approaches. Thus, the field of mixed methods involves the collection of both quantitative and qualitative data, but it is much more than that. Mixed methods today is much more sophisticated than the data collection process or the informal integration of the data seen in the early evaluation literature (Patton, 1980) or in projects incorporating both quantitative and qualitative data in early social science, such as the Marienthal study of unemployed textile factory families in an Austrian village in 1931 and 1932 (Jahoda, Lazarsfeld, & Zeisel, 2009).

If mixed methods research has grown and developed over the years, what are the latest innovations that point toward increased rigor and sophistication in the future? In this chapter we emphasize 10 advances moving the field forward:

- Advances in mining data
- Advances in the insight gained through the value of mixed methods research
- Advances in mixed methods designs
- Advances in representation of design procedures
- Advances in integration
- Advances in creating mixed methods questions and study aims
- Advances in representing integration through joint displays
- Advances in mixed methods validity
- Advances in understanding skills required for mixed methods
- Advances in publishing mixed methods manuscripts

Advances in Mining Data

We continue to work to introduce mixed methods in a way that will resonate with a diverse audience of disciplines and countries around the world. As found in Chapter 1, our approach has traditionally been to highlight the essential characteristics of mixed methods and to provide definitions crafted by several authors, journals, handbooks, and highly published mixed methods researchers. We also recognize and applaud the diverse perspectives on defining the nature of mixed methods research found in the literature. Some authors focus on the philosophical issues (Johnson, 2012); emphasize process-of-research perspectives and how the research questions dictate the methods (Teddlie & Tashakkori, 2009); or take a stand about the primacy of theory (Morse & Niehaus, 2009) or qualitative perspectives (Hesse-Biber, 2015). In contrast, as applied research methodologists, we emphasize the important role of data in our mixed methods projects. This orientation holds concrete meaning for many scholars, especially those new to mixed methods research, who can easily visualize the collection of survey data or interview data.

Consequently, our focus on the databases leads to a different way of presenting mixed methods and advancing new thinking about it. We now see mixed methods as a procedure for *mining* our databases further. It stands alongside recent interest in understanding big data characteristics, such as volume, velocity, and veracity (Mayer-Schonberger & Cukier, 2013). It keeps company with efforts to push quantitative results into meta-analyses (Cooper, 2016); qualitative results into metasyntheses (Levitt et al., in press); or combined results into mixed methods syntheses (Heyvaert, Hannes, & Onghena, 2017). Building on this orientation of mining the data, when we consult with individuals who seek to conduct mixed methods research, we ask them to first identify their qualitative, open-ended databases, such as observations, interviews, digital, and text documents. We then ask them to specify their quantitative, closed-ended data, such as information found gathered on instruments or surveys, observational checklists, or numbers-oriented documents. Behind this questioning lies the idea that qualitative data, as open-ended information drawing on participants' views, and quantitative data, as closed-ended information based on predetermined data collection tools, need to be separated and clearly identified before they can be integrated. We are also highlighting that the two sources of data constitute different types of data, and so they bring different perspectives to the study of a research problem.

After this we point out that the analysis of the databases is important and that researchers should try to mine both databases thoroughly to understand the problem of interest. In qualitative research, researchers analyze the data to identify codes and themes, develop concept maps of the themes, create visual diagrams that present chronologies and processes, and use metasyntheses across studies. In quantitative research, researchers analyze the data to develop trends, see variations in the data, identify new factors or scales, map longitudinal trends, and use meta-analyses across studies. Thoroughly analyzing each database is important and a useful first step. However, mixed methods researchers go beyond this and look for the mixing or integration of the results of the two databases. Integration represents a signature characteristic of mixed methods research and sets it off as distinct from other methodologies. In essence, through mixing methods, researchers are mining their quantitative and qualitative databases for more insights and information than what would result from only analyzing the databases separately. As mentioned in Chapter 1, mixed methods has been described as 1 + 1 = 3 (Fetters & Freshwater, 2015); that is, when researchers combine quantitative research and qualitative research, they gain additional insight.

Advances in the Insight Gained Through the Value of Mixed Methods Research

What new insights can be gained from mixing methods? In the mixed methods literature, as we have discussed in Chapter 1 and elsewhere, there have been extensive conversations about the purpose, rationale, reasons, and justification for using mixed methods. Bryman (2006), for example, listed 16 rationales for using mixed methods research (e.g., triangulation of greater validity, completeness, explanation, etc.). Greene, Caracelli, and Graham (1989) provided five purposes that have often been cited by authors using mixed methods:

- Triangulation—seek convergence and corroboration by comparing findings from qualitative data with the quantitative results
- Complementarity—seek elaboration, illustration enhancement, and clarification of the findings from one strand with the other strand
- Development—use the results from one strand to help inform the other strand
- Initiation—discover paradoxes and contradictions that emerge when findings from the two strands are compared
- Expansion—expand breadth and range of a study by using multiple strands for different study components

We know that new methodologies need to be justified or rationalized in applications for funding and in journal articles and graduate student studies. However, these purposes, justifications, and rationales only speak to the use of quantitative and qualitative methods; they do not address the *value added* by mixing or integrating methods to the study of a research problem.

Therefore, another advance in mixed methods is for researchers to not only justify the use of mixed methods in their studies but to also be more specific about the value this adds to the study. This raises the question: What insight of a practical nature *is* added to a study by using mixed methods? The answer is only now beginning to surface in mixed methods research as writers specify the insight added and discuss it in studies. For example, Farquhar, Ewing, and Booth (2011) included a value-added table in their mixed methods study on palliative care in the health sciences. This table identified the different phases within their overall mixed methods project, and for each phase they highlighted studies published

from the project, indicated the purpose for mixing methods, identified the design used, and explained the value added by using mixed methods. They further commented that using mixed methods in their pilot provided evidence of the study's acceptability to participants of their fast-track trial and increased both the workability of the procedures and the suitability of their outcome measures.

As another example, take gathering quantitative, closed-ended results and comparing them with qualitative, open-ended results. When researchers identify an instrument (e.g., a survey) and have participants respond to that instrument, is the full story being captured? If we stop after just collecting quantitative data, we will not know whether participants, if asked qualitative questions, might provide contrary information. In a study of the national adoption of a mathematics curriculum, Spencer, Creswell, Reed, Young, and Mark (in press) found a quantitative instrument to assess teacher use of a mathematics curriculum. They also conducted qualitative interviews with teachers. When they compared the two databases in a mixed methods project, they found that the results did not always match. This insight provided added value to the study, and as a result the researchers developed a better quantitative measure of teacher use of the curriculum.

In another mixed methods study, this one in the African country of Rwanda, Betancourt et al. (2011) were interested in the protective processes and resilience of Rwandan children and families affected by HIV/AIDS. To design an intervention that could harness resilience and local protective processes, they conducted qualitative interviews with adults and children. This qualitative exploration was needed to design a quantitative measure and intervention that would be culturally sensitive to the population being studied. Western-style resilience measures and interventions would not work well, so the development of appropriate materials was a clear added value. Donovan et al. (2002) provide a final example of the value added by mixed methods. In their experimental study of prostrate screening, the researchers reported they were unsuccessful in recruiting men to enroll. They decided to interview a few men to learn how they understood the information about the study and how this made them decide whether to enroll in the study. The researchers gathered important qualitative information and then used that information to improve the description of the study during the recruitment process. With the improvement, they were able to obtain the necessary sample to run the intervention trial.

These examples illustrate the new insight and added value that can be gained from mixed methods. Mixed methods can help develop improved, culturally

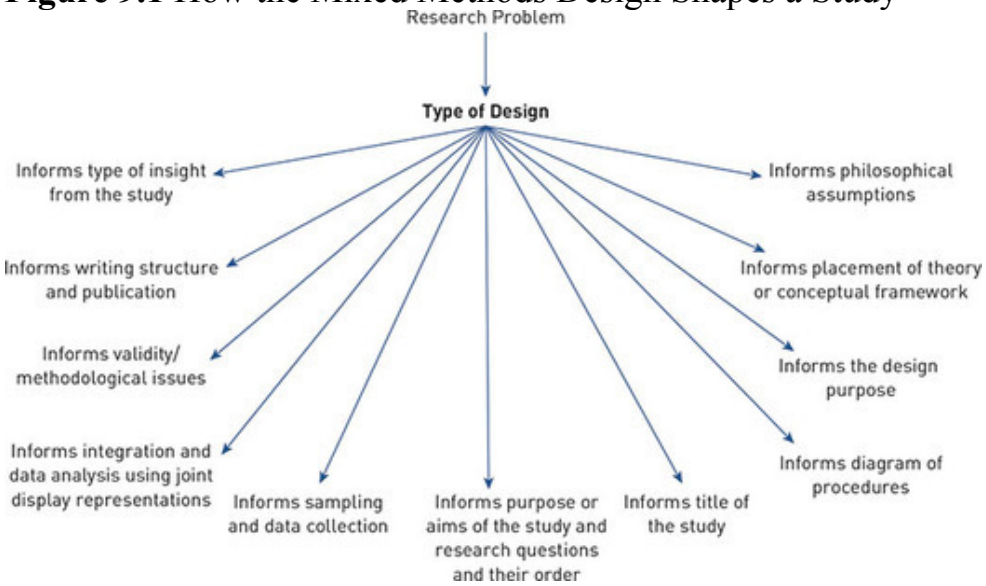
sensitive measures; elucidate surprise quantitative findings; reconcile what people say on instruments with their personal experiences; improve experimental recruitment, treatment experiences, and outcomes; develop in-depth cases for comparison, design programs attuned to local community needs; and enhance evaluations by using systematic procedures to link different facets of the evaluation process. These insights provide more than a methods orientation; they illustrate the value that can be found in understanding a research problem through mixed methods insights.

Advances in Mixed Methods Designs

These additional insights from combining or integrating the quantitative and qualitative databases can relate directly to types of mixed methods designs. In other words, we use a specific type of design to yield new insights. Just as we have different types of quantitative designs (e.g., RCT) and qualitative designs (e.g., ethnography), so too we have different types of designs in mixed methods research. No longer do we think of integration as a set of random procedures; it is now folded into a specific, systematic type of design.

The dilemma has been that we have had far too many different types of designs and different names for the designs, which has led to confusion about the choice of the best design to use in a particular project. In fact, the types of mixed methods designs (or procedures) available to the researcher have been the most overworked topic in the field of mixed methods. Our many classifications of designs mentioned earlier in Chapter 3 testify to the extensive discussion that has taken place in the literature. Thus, we have attempted in this book to simplify the design choices to three core designs (in Chapter 3), to which we added several examples of complex designs (in Chapter 4). As shown in Figure 9.1, once the researcher specifies the research problem and chooses a mixed methods design, the design informs many phases of the study, from the philosophical assumptions to the insight to be gained.

Figure 9.1 How the Mixed Methods Design Shapes a Study



How does the mixed methods design shape the study? In Table 9.1 we illustrate this shaping using the three core designs presented in Chapter 3: convergent design, explanatory sequential design, and exploratory sequential design. The procedures for each of the core designs can reflect different elements in a study, as listed in Table 9.1. In prior chapters we separated these elements; here, we link them in one table to show the differences among the core designs. Also when a researcher adds these core designs into a complex framework, as discussed in Chapter 4, additional procedures come into play that are associated with intervention trials or experiments, case studies, participatory or social justice studies, or evaluation projects.

TABLE 9.1 ■ Core Mixed Methods Designs and Procedures

Design Procedures	Convergent Design	Explanatory Sequential Design	Exploratory Sequential Design
Use of philosophical assumptions	• Use overarching philosophy, such as pragmatism or a transformative framework	• Use multiple philosophies, starting with postpositivism in first phase followed by constructivism in second phase, or • Use a transformative framework	• Use multiple philosophies, starting with constructivism in first phase followed by postpositivism in second phase, or • Use a transformative framework
Placement of theory or conceptual framework	• Use theory to span the quantitative and qualitative strands	• Use theory typically to inform the variables in the quantitative strand or the stance in the qualitative strand	• Use theory typically to inform the stance in the qualitative strand or the variables in the quantitative strand
Purpose of design	• To develop complete and corroborated conclusions by comparing or combining the databases	• To develop a strong explanation by explaining the quantitative results with qualitative data	• To develop a contextually appropriate feature by qualitatively exploring first before designing a quantitative phase of the project
Diagram of the design	• Diagram two parallel tracks for the quantitative and qualitative strands	• Diagram a quantitative strand followed by a qualitative strand	• Diagram a qualitative strand followed by a development phase and a quantitative strand
Title for the study	• Develop a neutral title tipping in neither the quantitative nor qualitative direction	• Develop a title that foreshadows explaining quantitative results with qualitative data	• Develop a title that foreshadows first exploring the topic then making a quantitative assessment
Purpose or aims of the study	• Include a purpose that aims to both explore and explain	• Include a purpose with the intent of explaining quantitative results with qualitative data	• Include a purpose with the intent of first exploring qualitatively before attempting to measure or assess quantitatively
Research questions order in the study	• State quantitative and qualitative questions in an order that is comfortable and include a mixed methods question	• State the questions in this order: quantitative question, mixed methods question (for the connection), qualitative question, mixed methods question (for the interpretation)	• State the questions in this order: qualitative question, mixed methods question (for the connection), quantitative question, mixed methods questions (for the interpretation)
Sampling decisions and the data collection in the design	• Sample ideally at the same time • Sample equal or unequal size from quantitative and qualitative strands to match question • Develop questions parallel in scope	• Sample qualitative participants from the pool of quantitative participants • Sample follow-up participants based on quantitative results	• Sample smaller number of qualitative participants than quantitative participants • Sample for qualitative should be different than sample for quantitative
Integration in the mixed methods analysis of the design	• Integrate the quantitative and qualitative results with a joint display that shows results side by side for comparisons	• Integrate the data by using the quantitative results to inform the qualitative phase of the study and to interpret the connected results • Use joint displays	• Integrate the data by using the qualitative results to inform the development of a quantitative approach and to interpret the connected results • Use joint displays
Validity/ methodological issues in the mixed methods analysis of the design	• Look for convergent validation of the qualitative results with the quantitative results to demonstrate corroborated conclusions	• Look for the validity of using the quantitative results to inform the questions and the participants for the qualitative strand to make a strong connection	• Look for the qualitative results to inform the rigorous development of the quantitative approach in the study to make a strong connection
Writing structure of the design	• Report the quantitative and qualitative results either separately or by subtopic and then make a comparison of them	• Report the quantitative results followed by the mixed methods connection results and then the qualitative results	• Report the qualitative results followed by the mixed methods connection results and then the quantitative results
Insight from the study	• Insight developed into a complete understanding or a comparison of measured results with personal perspectives	• Insight developed into how the qualitative personal perspectives help to explain the quantitative results	• Insight developed through the initial exploration of personal perspectives that inform later quantitative methods

Thus, as seen in these design procedures, we view the designs as a centerpiece in mixed methods methodology. Another advance is to simplify the choice of designs to convergent designs, explanatory sequential designs, and exploratory sequential designs. Further, we have long used the concept of "fitting" mixed methods projects into our three designs. Now, we think about "fitting" mixed methods procedures into the steps or phases of a research project such as an experiment, a case study, a participatory-social justice project, or an evaluation. Thus, when we visit with individuals about their projects, we have them identify the steps in their project and then look within their project to see where they are combining their quantitative and qualitative data. This is especially helpful in complex design projects. In some cases the combination of data may result in a convergent design; in others, an explanatory or exploratory sequential design; and in others, a combination of two or more of these designs. In this way, we can see multiple core designs flowing into complex projects. We have effectively moved from numerous design types in mixed methods to a clearer, more parsimonious set of core designs and can now position them within more complex procedures such as found in evaluation projects, intervention or experimental trials, case studies, and community-based research approaches.

Advances in Representations of Design Procedures

Over ten years ago we began to seriously draw diagrams of the different mixed methods designs (Creswell, Plano Clark, Gutmann, & Hanson, 2003). This came about largely because a project officer at the National Institute of Health said to us that he liked mixed methods studies but found them too difficult to understand. Researchers present complex discussions about multiple qualitative and quantitative data collection and multiple forms of data analysis. Diagrams of procedures for mixed methods have long been in the literature, dating back to 1980 (Patton, 1980) and discussions in the 1990s (Steckler, McLeroy, Goodman, Bird, & McCormick, 1992; Morgan, 1998), but these diagrams were rudimentary models of design without much detail. Since our focus has been on rigorous methods, we began drawing what we would see today as methods-oriented diagrams that showed the flow of data collection, analysis, and interpretation.

Several advances in drawing these diagrams have emerged in recent years. The more we began to draw these diagrams, the more we added detail into them, such as enumerating both the specific procedures at each juncture of data collection and analysis as well as the products or outcomes specified with each procedure (see Figure 3.2). We now have some guidelines for drawing these diagrams. We have notations to use in presenting them. We can add into these diagrams multiple features, including study aims and a timetable, and present them in various formats (e.g., a table or a diagram). We can point to numerous examples in the literature of types of diagrams being used. In time we began adding new elements into these diagrams, such as matching the study aims to each phase and color-coding the quantitative and qualitative strands of the designs. Further, as we began to work with individuals on their mixed methods procedures, we found that scholars were most comfortable adding content phrases (e.g., gathering information about coping with depression) into their diagrams and using less methods language (e.g., collecting data using focus groups). This advance, we believe, made the drawing of mixed methods diagrams more practical and useful since scholars undertaking mixed methods may have less of a methodological orientation to their study and more of a "content" orientation.

In these diagrams we can also mark where theory or a conceptual framework helps to inform the procedures. The role of theory in a mixed methods study has been underspecified. We know now that theoretical models or conceptualizations

inform different phases of a mixed methods study. We have scripts for writing theory into a mixed methods study. On a broader level, we know that researchers use different worldviews (or paradigms) as a foundation for mixed methods research. These philosophies are expanding so that individuals have a choice of philosophical position (e.g., epistemology, ontology, etc.). We know that the design is closely interrelated to the philosophy embraced by the researcher.

Another, and perhaps alternative, model to visually drawing the procedures of mixed methods emerged through discussions of an implementation matrix during the development of the best practices recommendations of the National Institutes of Health (Creswell, Klassen, Plano Clark, & Smith, 2011). That report contains an example of an implementation matrix composed by Joe Gallo at Johns Hopkins University (see Figure 9.2). This matrix draws together key components for the implementation of the study: the strategies used, the corresponding samples, the goals, and the analysis procedures. This visual focuses on the content of the project rather than only on the methods. Further, there are space-saving and word-saving advantages to having a table (in an implementation matrix) rather than a detailed figure (as in a diagram) for funding applications. One table can be advanced that contains the features necessary for understanding the procedures. To these tables, however, we might add an integration column to indicate where in the process of research the central component of mixed methods —the integration—occurs.

Figure 9.2 Example of an Implementation Matrix

Box 2. Table of Strategy, Sample, Goals, and Analysis

Strategy	Sample	Goals	Analysis
Structured, standardized interviews	Stratified random sample (based on depressive symptoms) of older adult patients from non-academic primary care settings	Assess depressive symptom patterns and correlates	Multivariant regression models
Semi-structured interviews	Purposive: 50 African American and 50 white adults from Spectrum sample (who may or may not be depressed)	Identify an explanatory model for depression	Grounded theory
Free listing and pile sorts	First 25 African American and 25 white adults selected above for semi-structured interviews for free listing. Second 25 African American and 25 white adults selected above for pile sorts	Identify the domain of depression and its characteristics	Cultural consensus analysis
Ethnographic discourse-centered analysis	Purposive: Another 15 African American and 15 white adults who are depressed based on survey responses from the Spectrum sample	Identify social meaning of depression	Discourse analysis

Gallo, J.J (2003-2007). The sociocultural context of depression in late life. Research grants funded by the National Institute of Health (R01MH67077,

R01MH62210, and R01MH62210-01S1).

Source: Creswell, Klassen, Plano Clark, and Clegg Smith (2011).

Advances in Integration

Integration is not an intuitive concept because researchers have kept quantitative and qualitative data and results separate for years. Besides, if the distinction between the two forms comes from working with text or working with numbers (as some scholars suggest), the idea of mixing or combining the two databases does not make sense. As suggested in Chapter 7 on data analysis, we view integration as a central feature of mixed methods data analysis and as its "signature" method. Therefore, if we suggest integration is a central idea that distinguishes mixed methods as a methodology from other approaches to research, we need to continually clarify and parse our understanding of it. As Yin (2015) has written,

> With adequate development, the integrating practices could become part of [mixed methods research]'s signature method and even transcend the qualitative and quantitative crafts being bridged. (p. 661)

Over the years advances have been made in thinking about integration (Fetters, Curry, & Creswell, 2013). One of these involves placing an arrow in our design diagrams at the point where integration occurs, an innovation pioneered by Morse and Niehaus (2009). Thus, we can see that integration occurs in an explanatory sequential design between the analyzed results from the initial quantitative phase and the data collection procedures in the follow-up qualitative phase. Another advance consists of specifying the types of integration. We see *merging* the two database results in a convergent design, the *connecting* that occurs in the explanatory sequential design, and the *building* that exists in the exploratory sequential design (see Chapter 3). Also, when investigators place qualitative and quantitative data into intervention designs, case studies, participatory-social justice studies, and complex evaluation projects, they are essentially *embedding* various core designs into other frameworks or applications.

At a more detailed level, we have advanced our knowledge of the intent of integration and related it to each type of core and complex design. This is why in Chapters 3 and 4 we carefully inserted a new subsection on integration as part of the discussion of each design, which was not the case in our last edition of this book. The intent of integration can be identified to clarify the reasons the

researcher is integrating in a particular design. We are also aware the intent for designs can vary, and we have tried to provide a vocabulary that addresses these reasons (see Chapters 3 and 4). Finally, at an even more specific level, we believe integration scripts that researchers can use in their mixed methods studies represent an advancement in the field. The three examples below illustrate template scripts that might be used.

- **Example 1. A Convergent Design.** "Integration in my convergent design consists of the intent to match the results by comparing them and illustrating them with a side-by-side joint display in order to identify points of convergence or divergence."
- **Example 2. An Explanatory Sequential Design.** "Integration in my explanatory sequential design will consist of explaining the survey results with qualitative interviews, connecting the quantitative results with the qualitative data collection, displaying the results that link the survey results with the qualitative research questions, and interpreting the results to help explain the survey results with information from participants who can best reflect on the survey results."
- **Example 3. An Exploratory Sequential Design.** "Integration in my exploratory sequential design will consist of building from the exploration of personal experiences to generate a context-specific instrument and conveying this link through a display that summarizes how qualitative results informed each aspect of the quantitative instrument. It will also involve interpreting at the end of the study the extent to which I have an improved instrument over those instruments already available."

Such scripts are useful for published manuscripts, graduate student dissertation or thesis proposals, or applications for funding in which readers need to have integration specifically identified. These scripts highlight the advances in thinking about integration as the central feature of mixed methods research.

Advances in Creating Mixed Methods Questions and Study Aims

Advances in mixed methods draw attention to the need for distinct quantitative and qualitative aims and questions—particularly aims or questions that address the integrative component of mixed methods. We know that study aims, purpose statements, research questions, objectives, and goal statements orient readers to the central idea of a research study, as discussed in Chapter 5. We also know that general statements like study aims or purpose statements can be narrowed into quantitative questions (objectives, research questions, hypotheses) and qualitative questions (objectives or research questions). How to write the general statement of purpose and the more specific research questions for quantitative and qualitative studies is well known and has been thoroughly reported in standard methods discussions (see Chapter 5; Creswell, 2013).

Mixed methods involves more than just reporting results for the quantitative and qualitative data; it also incorporates the insight from combining the two databases. Therefore, we need another type of research question or study aim—a mixed methods question or aim. This advance in mixed methods thinking does not yet appear in standard research methods texts, and we have found that reviewers often want to remove the mixed methods aim because they do not realize the integrative defining feature of mixed methods.

The idea of mixed methods questions surfaced in the first edition of this book (Creswell & Plano Clark, 2007); in an article linking mixed questions to mixed analysis procedures (Onwuegbuzie & Leech, 2006); and, later, in an editorial published in the *Journal of Mixed Methods Research* (Tashakkori & Creswell, 2007a). These works advocated for mixed methods questions in all mixed methods studies to guide the combination of the qualitative and quantitative components. More recently, the best practices recommendations from NIH (Creswell et al., 2011) emphasized the need for three types of questions or study aims: quantitative, qualitative, and mixed methods. Now that integration is a defining feature of mixed methods, we recommend separating the quantitative and qualitative aims to aid thinking in terms of specific databases in projects. This division of aims is often helpful in a mixed methods study because the ultimate goal is to combine the results or data from the two databases. Investigators therefore also need to advance one aim that squarely addresses the insights or outcomes of integration in a mixed methods study. These mixed methods aims

can foreshadow the merging combination or the sequential connection of the components through the language and ordering of the questions.

Once a researcher makes the decision to provide a mixed methods aim, then the question becomes how to write it to best capture the integrative feature. Our stance is simply to think about the mixed methods question or aim in terms of a specific mixed methods design in use (see Chapter 5 for scripts for writing design-specific mixed methods research questions). One final recommendation emerged through the NIH best practices discussions: Write the aim question or statement so the content to be addressed is mentioned first in the aim and the methods are addressed last. An example can illustrate this model, which we think makes sense because the methods should follow the content, and the content typically drives a study.

Here is an example of the inclusion of multiple aims for a mixed methods study:

1. Relate personal isolation to depression among older adults based on survey data. (quantitative aim)
2. Explain how personal isolation affects depression among older adults by obtaining personal experiences. (mixed methods aim)
3. Explore personal isolation among older adults using semi-structured interviews. (qualitative aim)
4. Develop an intervention (experiment) to compare different groups of isolated older adults. (future research aim)

We see in this example three study aims—quantitative, mixed methods, and qualitative. Further, we see an additional aim that points in the direction of future research (or policy implementation or some other future outcome).

Advances in Representing Integration Through Joint Displays

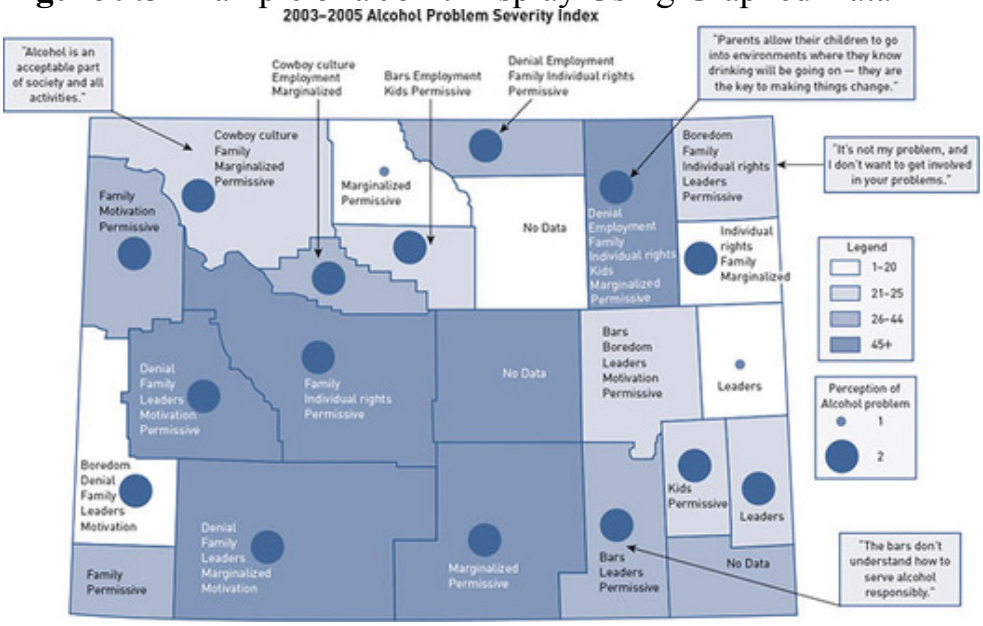
Integration in a mixed methods study can assume several forms. It can remain implicit (something we do not recommend), it can be identified in a procedural diagram (through the use of an arrow to highlight the point where it occurs), it can be advanced in a statement (using a script), it can be woven into a discussion section that juxtaposes the quantitative and qualitative results, or it can be discussed in a data transformation procedure, such as transforming qualitative results into quantitative counts that are analyzed statistically. Most importantly, integration can be reflected as a data analysis procedure. Thus, another advance in mixed methods is the technique for representing and reporting integration: the joint display (also sometimes called a joint matrix or an integration display), which we discussed in Chapter 7. Recently, joint displays have been linked to types of integration strategies (Plano Clark & Sanders, 2015); types of mixed methods designs and qualitative software applications (Guetterman, Creswell, & Kuckartz, 2015); and to five exemplar joint displays and illustrative studies that represent integration in exploratory sequential designs, explanatory sequential designs, convergent designs, and intervention designs (Guetterman, Fetters, & Creswell, 2015). Due to their importance as an advance in mixed methods, we included several different examples of joint displays in Chapter 7.

Another advance suggests that we think not only in terms of tables but also array the quantitative and qualitative data together in graphic displays, such as Figure 7.5. As another example, an ethnoarray can visually represent both quantitative and qualitative ethnographic data to form a picture representing varying responses to a question (Abramson & Dohan, 2015). This application in the social sciences extends procedures found in analyzing biological samples through microarrays that graphically illustrate patterns of gene expression in tissues. Another example is found in a study of alcohol problem severity in the state of Wyoming (Minugh, 2012). As shown in Figure 9.3, a state graph indicates the diverse levels of the severity of the problem using color shading (explained in a legend) and incorporates quotes from individuals in the counties. The author also used dots of various sizes to illustrate the percentage of the alcohol problem in a county for the total population of the state. As mixed methods approaches are incorporated more and more into procedures such as network analyses and geocoding, graphics will likely play a more prominent role in integration procedures, and much work will need to be done in developing and interpreting the displays.

Advances in Mixed Methods Validity

The advances that have been made in the identification of mixed methods validity issues highlight the need for a separate validity approach for mixed methods. The approach should match the design type, and the researchers should create visualizations of the points in research procedures where validity challenges may occur. In Chapter 7 we reviewed both quantitative and qualitative validity, sketching out what this meant and the types found in current literature. In any mixed methods study, both quantitative and qualitative validity issues need to be reported because data collection and analysis of both types of data occur. A development in recent years has been the consideration of a third type of validity: mixed methods validity. Several perspectives on this type of validity have emerged in the literature, such as viewing validity in mixed methods from a larger framework (Dellinger & Leech, 2007); renaming it "legitimation" (Onwuegbuzie & Johnson, 2006) to help establish a unique language for mixed methods; and linking it to evaluation procedures, such as the quality of design and the rigor of interpretation (Teddlie & Tashakkori, 2009) (see Chapter 7 for an extended discussion).

Figure 9.3 Example of a Joint Display Using Graphed Data

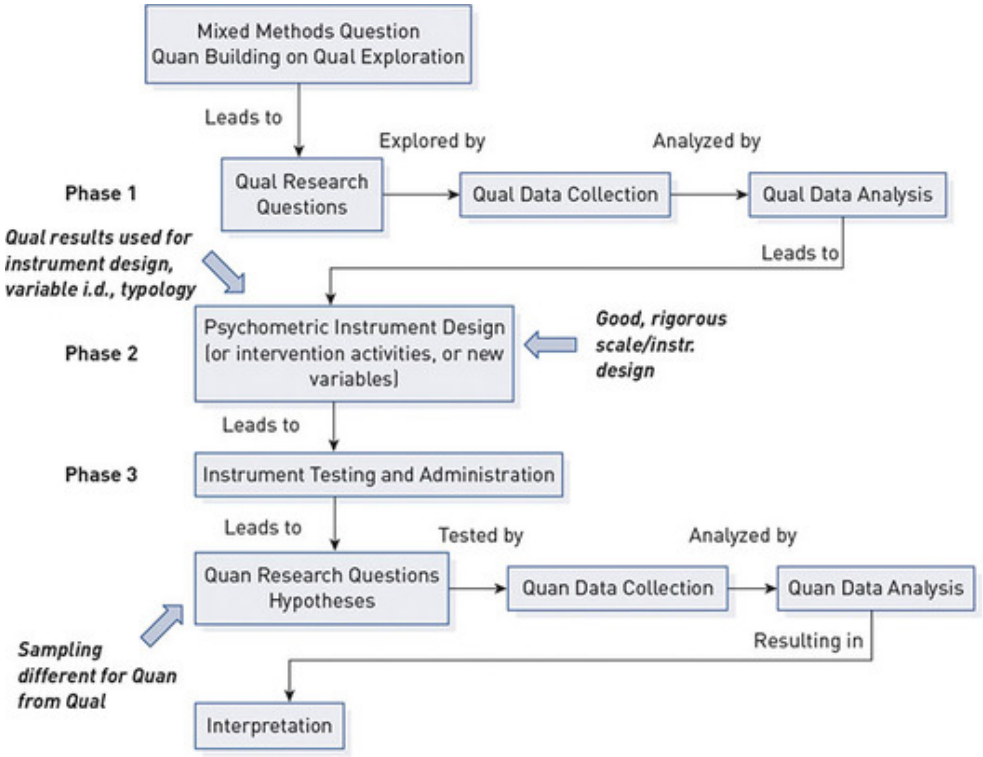


Source: Minugh (2012).

A few years ago we were reviewing the classic work on experimental and quasi-experimental research by Campbell and Stanley (1963). These authors innovatively mapped the types of experimental designs (that are still popular today) and also identified for each type of design specific threats to its validity. As mixed methods emerges as a new methodology, this idea of matching validity threats to specific mixed methods designs seems like a good idea. Thus, rather than viewing mixed methods validity as a one-size-fits-all prospect, as has been found in the literature, we can now identify types of validity issues that correspond to each of the mixed methods designs. We have not been alone in this thinking. Papadimitriou, Ivankova, and Hurtado (2013) presented eight recommendations to help ensure the quality of meta-inferences from a mixed methods explanatory sequential design. These recommendations included using rigorous procedures, applying quantitative and qualitative validation strategies, selecting participants for a qualitative follow-up consistent with the overall purpose of the study, using systematic statistical processes for selecting participants, following up with results from the quantitative phase, allowing for interaction between the phases, and creating meta-inferences grounded in the results.

Another advance involving validity is that we have begun noting potential validity threats in our diagrams of designs so researchers can clearly see at what point(s) during the procedures they need to be cognizant of those threats. We also pose strategies to minimize these threats. In short, we have begun linking our diagrams with our validity discussion. This type of figure is shown in Figure 9.4, in which we present a core exploratory sequential design with the intent to develop a measurement instrument; the inserted arrows indicate the places where threats to validity may occur. One validity concern that might arise in this design would be the use of inappropriate qualitative results to design the instrument. Another might occur if rigorous scale and instrument design procedures are not used (e.g., DeVellis, 2012). And, finally, validity concerns may appear if researchers do not understand that the quantitative sample should be much larger than the qualitative sample and typically include different participants so that the quantitative test is unbiased.

Figure 9.4 Diagram Showing Validity Threats in Exploratory Sequential Design Procedures


Mixed Methods Question
Quan Building on Qual Exploration
Leads to
Explored by
Analyzed by
Phase 1
Qual Research Questions
Qual Data Collection
Qual Data Analysis
Leads to
Qual results used for instrument design, variable i.d., typology
Psychometric Instrument Design (or intervention activities, or new variables)
Phase 2
Good, rigorous scale/instr. design
Leads to
Phase 3
Instrument Testing and Administration
Leads to
Tested by
Analyzed by
Quan Research Questions Hypotheses
Quan Data Collection
Quan Data Analysis
Resulting in
Sampling different for Quan from Qual
Interpretation

Advances in Understanding Skills Required for Mixed Methods

The design in Figure 9.4 illustrates the complex set of skills required to conduct mixed methods—skills in qualitative research, quantitative research, mixed methods research, and measurement. When we discussed the need for mixed methods researchers to possess these skills in Chapter 1, we indicated that a single researcher might possess most if not all of the skills or might connect with team members possessing complementary skills. Our thinking has advanced over the last few years with regard to the multiple ways to learn mixed methods, the types of mixed methods skills needed and their assessment, and the team dynamics needed to form a mixed method collaborative group.

As with most methodologies, mixed methods began with books about the methods and a sprinkling of courses on select campuses. Over the last 30 years, the number of available courses has multiplied, both in residence and online. An estimated 30 books are available on mixed methods (see Onwuegbuzie, 2012), with some focusing on methodology (Teddlie & Tashakkori, 2009); some addressing specific theoretical perspectives (Hesse-Biber, 2010); some covering an introduction to the field (Plano Clark & Ivankova, 2016); some advancing a short introduction (Creswell, 2014); and some focusing on specific content areas, such as second language assessment (e.g., Moeller, Creswell, & Saville, 2016) or the field of social work (Watkins & Gioia, 2015). Three handbooks are also now available that cover many topics and address the landscape of the field (Hesse-Biber & Johnson, 2015; Tashakkori & Teddlie, 2003a, 2010b). Another resource is the new Mixed Methods Research Series, edited by Plano Clark and Ivankova, that at the time of this writing included a survey of the field (Plano Clark & Ivankova, 2016); a discussion of program design and evaluation for culture-specific interventions (Nastasi & Hitchcock, 2016); a primer in mixed methods in the health sciences (Curry & Nunez-Smith, 2015); a guide to conducting mixed methods research syntheses (Heyvaert et al., 2017); and a practical guide for beginning researchers to develop a mixed methods proposal (DeCuir-Gunby & Schutz, 2017). Mixed methods can also be taught in workshops sponsored by individual campuses or held during pre- or postconference events, in classes sponsored by federal funding agencies, or through special training programs. Scholars can apprentice with experienced mixed methods researchers in programs such as NIH's R25 mixed methods training program, which is directed out of

Johns Hopkins University in collaboration with Harvard and the University of Michigan (see Guetterman, Creswell, Deutsch, & Gallo, 2016).

Much thought has been given to the types of mixed methods skills needed in quantitative research, qualitative research, and—of late—mixed methods. We now have an assessment instrument useful in determining the readiness of a researcher for learning and conducting a mixed methods study (Guetterman, 2015). This instrument assesses a researcher's professional experiences, personal characteristics, mixed methods knowledge, and mixed methods skills. What, then, are the mixed methods skills required? As shown in Table 9.2, Guetterman (2015) suggests 19 skills in Section 4 of his assessment. These skills generally follow the content areas addressed in the chapters in this book.

TABLE 9.2 ■ Skills Required for Mixed Methods

Mixed Methods Skills
1. Assessing the quality of mixed methods studies
2. Planning a mixed methods study
3. Collaborating with others to conduct a study
4. Conducting rigorous qualitative research
5. Conducting rigorous quantitative research
6. Identifying the purpose for using mixed methods
7. Adapting a mixed methods design to a particular research purpose
8. Writing mixed methods research questions
9. Identifying the rationale for methodological decisions (e.g., design, collection, and analysis) in a mixed methods study
10. Deciding what to mix in a study
11. Integrating between paradigms
12. Integrating qualitative and quantitative data
13. Developing a joint display to represent the integration of quantitative and qualitative strands
14. Writing a narrative to represent the integration of quantitative and qualitative strands
15. Making inferences linking qualitative and quantitative data
16. Disseminating a mixed methods study
17. Writing about mixed methods conceptually
18. Adapting mixed methods to a sociocultural context
19. Adapting mixed methods to a discipline

Source: Guetterman (2015). Instrument items reprinted with permission of T. C. Guetterman.

Source: Guetterman (2015). Instrument items reprinted with permission of T. C. Guetterman.

A final consideration in this area is the team dynamics at work when individuals collaborate on a mixed methods study. We now have applications of group theories to help researchers anticipate and navigate the challenges of working with team members of diverse backgrounds and with varying levels and types of training (Curry et al., 2012). We also know that team challenges can occur within specific mixed methods procedures, such as during data transformation (Seltzer-Kelly, Westwood, & Peña-Guzman, 2012). We are also aware that it is important for team leaders to help members articulate and share their philosophies, visions, values, and research goals. The group needs to be formed into a community that supports individuals with differing methodological orientations (Johnson, Onwuegbuzie, Tucker, & Icenogle, 2014).

Advances in Publishing Mixed Methods Manuscripts

In Chapter 8 we discussed publishing a mixed methods journal article. We noted that publishing opportunities exist in journals exclusively devoted to mixed methods and in discipline journals that are now accepting mixed methods studies. We also highlighted the components that might flow into a mixed methods journal article to embed the study with rigorous accepted methods and terminology. Some works on publishing a mixed methods study (Stange, Crabtree, & Miller, 2006) focus on advancing separate quantitative and qualitative papers, multiple articles in a journal, or a single overall article. We also note the recent work by the American Psychological Association to set standards for publishing mixed methods projects in APA journals (Levitt et al., in press).

So what is new about publishing a mixed methods manuscript? As we have mentioned, mixed methods gives a researcher the opportunity for multiple publications from a single project. This is valuable especially to a new scholar who needs a strong publication record for tenure and advancement. Further, this is not simply parsing a study into multiple parts—a critique often leveled at experimental studies subdivided from a single project. In a mixed methods study, we see distinct studies emerge based on different strands or phases (qualitative and quantitative) that provide unique content for different articles. From a single project, researchers can craft a qualitative manuscript, a quantitative manuscript, an overview mixed methods manuscript, and possibly a methodological paper if the study contains innovative mixed methods thinking. A case in point would be the series of articles on mammogram screening in Chile led by Püschel and colleagues. In this project, they published a qualitative article focused on barriers and facilitators for mammogram screening (Püschel, Thompson, Coronado, et al., 2010); a quantitative article reporting a randomized clinical trial addressing strategies for increasing mammogram screening (Püschel, Coronado, et al., 2010); and a mixed methods overview article on policy planning (Püschel & Thompson, 2011). Looking at the citations for these studies, we can see that the overview article was published later than the quantitative and qualitative articles. Also, cross-references occurred to the other studies in each article.

When multiple articles are published from one project, one important question is what was deleted from the overview article in order to condense it to the

appropriate size for a journal and to avoid plagiarizing the other articles? In the three articles by Püschel et al., the overview article limited parts of the methods section discussion, such as the sampling and data collection and the reports of the data analysis (for the truncating process that occurred, see Creswell, 2014). This project also raised the issue of word limit. We know that word limits, especially in the biomedical and health services fields, may prohibit publication of entire mixed methods studies. Curry et al. (2013) found in a review of health services research journals incomplete reporting of sampling and data analysis for both the quantitative and qualitative components.

When publishing, we advise using the appropriate mixed methods terms as well as referencing the latest methodological books on mixed methods. Unfortunately, all too many scholars conducting mixed methods studies are not reading the mixed methods literature and using the terms that have been developed. Mixed methods research, like other research methodologies, has a distinct language. We know now that we can use the term *mixed methods* in titles. We can define this methodology using a standard definition in the literature. We recognize the importance of citing the mixed methods literature—the books and methodological discussions on the topic. We can use the numerous glossaries available in mixed methods texts to encode our mixed methods studies with the language of this methodology.

Summary

In this chapter we have identified 10 recent advances that continue the march of mixed methods toward a rigorous and procedurally sound methodology. We began our discussion of each advance by first highlighting past research and the information on that advance provided in each chapter of this book. As a result of thinking about these advances, we now often present mixed methods from the standpoint of *mining* the quantitative and qualitative data further. We also discuss the value added by using mixed methods, which goes further than simply stating the purpose of using this methodology or noting its justification in a study. We have crafted a new perspective on research designs that allows us to consider the core mixed methods designs and how they fit into larger, more complex designs. Our diagrams of designs have become more sophisticated as well, with new features being added into the diagrams. In addition, implementation matrices are now being used as alternatives to design diagrams. We have parsed in more detail the central feature of mixed methods—integration—and can show where it occurs in designs and how it might be phrased in a study report. We have advocated the importance of a research question (or study aim) specifically focused on the integrative feature of a project—a mixed methods question or aim. We have advanced our thinking about how to present the integration of the databases in a joint display table or a graph. We have clarified validity threats in mixed methods studies by relating them to specific designs and indicating through our diagrams where these threats might arise in a mixed methods procedure. Conducting a mixed methods project undoubtedly requires a large toolkit of skills that span qualitative, quantitative, and mixed methods research, and potentially even other methodologies, theories, or research processes (such as measurement). Finally, we have acknowledged the advantage of using mixed methods to publish multiple papers from a project that describe each phase of the study as well as advance the mixed methods methodological literature.

These are but a few of the advances we have seen in recent years. As the field of mixed methods continues to grow and expand, more changes and improvements will undoubtedly occur, and hopefully they can be reflected in future editions of this book.

Activities

1. Locate a recent methodological article about mixed methods research, such as those published in the *Journal of Mixed Methods Research* or the *International Journal of Multiple Research Approaches*. What mixed methods topic did the authors try to advance with their article? Does it address one of the major advances noted in this chapter?
2. Consider the 10 advances highlighted in this chapter. Pick one that interests you and describe how you might apply the latest thinking on this topic in your own work and study design.
3. Consider the mixed methods study you have designed while reading this book. Identify a way your study procedures might contribute to the ongoing conversations about the topics discussed in this chapter. How might your work help advance mixed methods research?

Additional Resources to Examine

We direct you to several of our articles and those of others that, like this chapter, contain suggestions about the future of mixed methods research:

- Creswell, J. W. (2011). Controversies in mixed methods research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE handbook of qualitative research* (4th ed., pp. 269–284). Thousand Oaks, CA: Sage.
- Creswell, J. W. (2011). Mapping the developing landscape of mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *SAGE handbook of mixed methods research in social & behavioral research* (2nd ed., pp. 45–68). Thousand Oaks, CA: Sage.
- Creswell, J. W. (2015). Revisiting mixed methods and advancing scientific practices. In S. N. Hesse-Biber & R. B. Johnson (Eds.), *The Oxford handbook of multimethod and mixed methods research inquiry* (pp. 57–71). Oxford, UK: Oxford Press.
- Mertens, D. M., Bazeley, P., Bowleg, L., Fielding, N., Maxwell, J., Molina-Azorin, J. F., & Niglas, K. (2016). Expanding thinking through a kaleidoscopic look into the future: Implications of the Mixed Methods International Research Association's Task Force Report on the Future of Mixed Methods. *Journal of Mixed Methods Research, 10*(3), 221–227.
- Munce, S. E. P., & Archibald, M. M. (2017). "The Future of Mixed Methods: A Five Year Projection to 2020": An early career perspective. *Journal of Mixed Methods Research, 11*(1), 11–18.
- Plano Clark, V. L., & Ivankova, N. V. (2016). *Mixed methods research: A guide to the field.* Thousand Oaks, CA: Sage.

Appendix A Unwritten Rules of Talking to Doctors About Depression: Integrating Qualitative and Quantitative Methods

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Source: "Unwritten rules of talking to doctors about depression: Integrating qualitative and quantitative methods," 4.4, 2006, Vol 4, No 4, Annals of Family Medicine.

Abstract

PURPOSE: We wanted to understand concordance and discordance between physicians and patients about depression status by assessing older patient's views of interactions with their physicians.

METHODS: We used an integrated mixed methods design that is both hypothesis testing and hypothesis generating. Patients aged 65 years and older, who identified themselves as being depressed, were recruited from the offices of primary care physicians and interviewed in their homes using a semistructured interview format. We compared patients whose physicians rated them as depressed with those whose physicians who did not according to personal characteristics (hypothesis testing). Themes regarding patient perceptions of their encounters with physicians were then used to generate further hypotheses.

RESULTS: Patients whose physician rated them as depressed were younger than those whose physician did not. Standard measures, such as depressive symptoms and functional status, did not differentiate between patients. Four themes emerged in interviews with patients regarding how they interacted with their physicians; namely, "My doctor just picked it up," "I'm a good patient," "They just check out your heart and things," and "They'll just send you to a psychiatrist." All patients who thought the physician would "just pick up" depression and those who thought bringing up emotional content would result in a referral to a psychiatrist were rated as depressed by the physician. Few of the patients who discussed being a "good patient" were rated as depressed by the physician.

CONCLUSIONS: Physicians may signal to patients, wittingly or unwittingly, how emotional problems will be addressed, influencing how patients perceive their interactions with physicians regarding emotional problems.

Introduction

The primary health care setting plays a key role for older adults with depression and other psychiatric disturbances, because older persons in the community are unlikely to receive mental health care from a mental health care specialist.[1–3] Nevertheless, evidence on the quality of care for older adults with depression in primary care suggests that often their depression is not diagnosed or actively managed.[4] Although much attention has been focused on understanding physician-based reasons for underdiagnosis of depression, primary care physicians believe that barriers to depression treatment are most often patient centered and related to patient attitudes and beliefs about depression care.[5]

Several previous studies have linked patient-physician communication to important health outcomes and adherence to treatments.[6,7] When patients like the way their physician communicates with them, they are more likely to heed the physician's recommendations and are less likely to sue for medical malpractice in the event of a negative outcome.[8] For depression, how patients perceive the communication between physician and patient becomes particularly salient, because patients may not readily reveal their feelings or accept the diagnosis, and they may be unwilling to take medicine or seek counseling. Studies of physician communication behaviors have suggested that certain behaviors, such as showing empathy, listening attentively, and asking questions about social and emotional issues, are associated with increased patient willingness to share concerns.[8,9]

Our study focuses on the patient's view of the interactions with their physicians and is based on an integrated mixed methods design that includes elements derived from both quantitative and qualitative traditions,[10,11] alternating hypothesis-testing and hypothesis-generating strategies. This design allowed us to link the themes regarding how patients talk to their physicians with personal characteristics and standard measures of distress. We suspected that patients who identified themselves as being depressed and whose physicians rated them as depressed would report more distress and functional impairment than patients not rated as depressed by their physicians. Our work differs from previous studies of communication and the physician-patient relationship in that most previous work focuses on the interaction of patient and physician at a specific visit and underemphasizes the patient's contribution to and perspective on the active production of the diagnostic process.[9,12,13] In this study, we wanted to understand aspects of the physician-patient relationship (as perceived by the patient) that may influence the way patients communicate about depression. To draw attention to a

clinically relevant situation, we focus on older adults who identified themselves as being depressed.

Methods

Study Sample

The overarching goal of the Spectrum Study (the parent study from which our sample was derived) was to characterize how older primary care patients report depression. The design of the study was a cross-sectional survey of patients aged 65 and older and their physicians recruited from nonacademic primary care practices in the Baltimore, Md, area (n = 355).[14,15] Subsequently, patients were selected for semistructured interviews using purposive sampling.[10] From the 102 persons who provided semistructured interviews, 48 were selected for this study because they identified themselves as being depressed and had physician ratings of depression (the online-only Supplemental Appendix provides a summary of the sampling methods and is available at http://www.annfammed.org/content/suppl/2006/07/24/4.4.302.DC1. The study protocols were approved by the Institutional Review Board of the University of Pennsylvania.

Measurement Strategy

Physician Evaluation of the Patient at the Index Visit.

At the index visit, the physician rated the patient's level of depression on a 4-point scale: none at all, mild, moderate, or severe. How well the physician knows the patient was rated as very well, somewhat, or not at all.

Patient Assessment.

In addition to obtaining information from the respondents on age, sex, ethnicity, marital status, living arrangements, level of educational attainment, and the number of visits made to the practice for medical care within 6 months of the index visit, we used the following measures to examine selected factors that have been associated with recognition of depression in primary care settings.[16] We used the Center for Epidemiologic Studies Depression (CES-D) scale, which was developed by the National Institute of Mental Health for use in studies of depression in community samples,[17–23] and the Beck Anxiety Inventory (BAI), which was developed to measure the severity of anxiety symptoms.[24,25] Thresholds used to indicate substantial depressive symptoms on the CES-D range from 16 to

21,[19,21] and scores of 14 and above on the BAI typically indicate high levels of anxiety.[24] We used the Beck Hopelessness Scale (BHS) to assess factors (hopefulness about the future, a sense of giving up, and future anticipation or plans)[26] found to be related to suicidal ideation.[27] We measured baseline medical comorbidity with an adaptation of the Charlson index,[28] and we used questions from the Medical Outcomes Study 36-item short-form health survey (SF-36) to assess functional status.[29] Cognition we assessed with a standard measure of global functioning (Mini-Mental State Examination [MMSE]).[30,31]

Semistructured Interviews

Trained professional interviewers carried out semistructured interviews in the patient's home, and these interviews were recorded, transcribed, and entered into N6 software for coding and analysis.[32,33] The interview questions used to examine patient's perceptions of their encounters with physicians are displayed in Table A.1. A multidisciplinary team that included medical anthropologists, family physicians, and older persons from the community processed each transcript for discussion in weekly team meetings (details are provided elsewhere[10] and at http://www.uphs.upenn/spectrum). Study participants were asked: "Have you ever considered yourself depressed?" In practice, the characterization of the patient as depressed was not based on a single yes-or-no response to this question because the interviewer probed further for whether the patient reported being depressed. In summary, we have captured 3 perspectives about the depression status of each patient: (1) a rating from the physician at the index visit, (2) the patient's responses on a standardized questionnaire (CES-D), and (3) the patient's self-report as depressed.

Analytic Strategy

Our analytic strategy reflects the integration of hypothesis testing and hypothesis generation in a single study that is the hallmark of a mixed methods investigation. In the first phase, we compared the personal characteristics of patients who identified themselves as being depressed while their physicians did not with those who were concordant with their physician's rating of depression (using x^2 or *t* tests for comparisons of proportions or means, respectively). We used a level of statistical significance set at $\alpha = .05$, recognizing that tests of statistical significance are approximations that serve as aids to interpretation and inference.

In the second phase, we used the constant comparative method, moving iteratively between codes and text to derive themes related to talking with the

physician.[34,35] Originally developed for use in the grounded theory method of Glaser and Strauss,[35] this strategy involves taking 1 piece of data (e.g., 1 theme) and comparing it with all others that may be similar or different to develop conceptualizations of the possible relations between various pieces of data. During the process of developing themes, the study team did not have access to the survey data, including whether the patient was rated as depressed by the physician. We focused our attention on responses to interview questions related to discussing feelings and emotional issues with the physician (Table A.1). We then related themes to personal characteristics and whether the patient and physician were concordant about depression status. Data analysis was carried out with the use of SPSS (SPSS Corporation, College Station, Texas) and QSR N6.0 (QSR International, Durham, UK).

TABLE A.1 ■ Semistructured Interview Guide Questions

Have you discussed your feelings with your doctor? If YES, ask A and B If NO, skip to C and D
A. Who brought it up? How do you think the discussion went? Do you think (he/she) would have known if you hadn't brought it up?
B. What does (he/she) say about it?
C. What do you think your doctor thinks about the way you feel emotionally?
D. What words (other than depression) would your doctor use to describe how you feel?

Results

Sample Characteristics

In all, 53 patients from the 102 who participated in semistructured interviews considered themselves to have been depressed. Transcripts of 5 were excluded because of missing data, leaving 48 patients in the sample for this study (Figure A.1). Table A.2 compares the characteristics of patients whom the physician rated as depressed with the patients who were not rated as depressed. Except for age (patients who were identified by their physicians as depressed were younger), no significant differences were found among patients whose physician rated them as depressed at the index visit. There were no significant differences in any SF-36 scale means (data not shown in table).

Themes That Emerged in Semistructured Interviews

Several themes emerged from careful review of the transcripts. We describe 4 major themes selected for their clinical importance. The themes relate to the patients' perception of the relationship with their physician.

'My Doctor Just Picked It Up'.

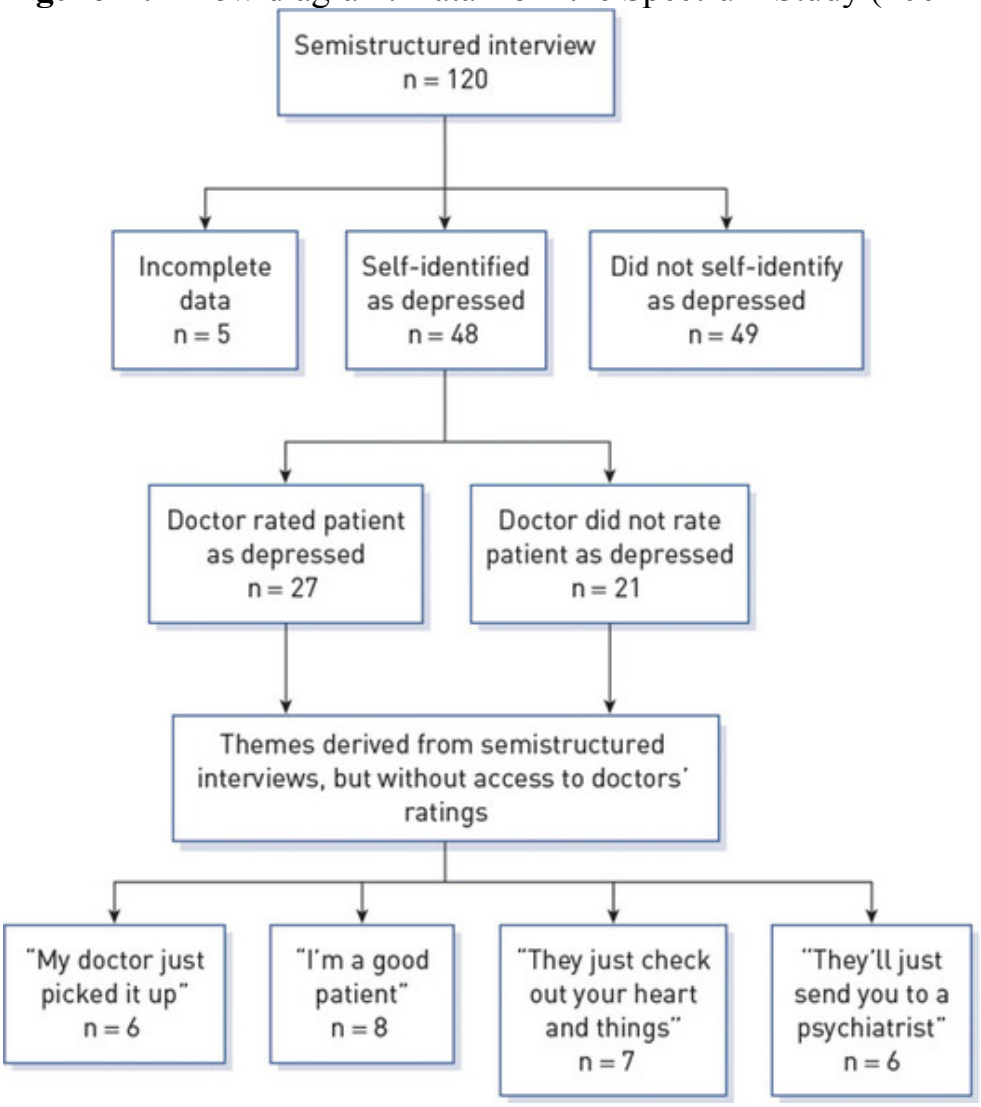
In several of the transcripts patients express a belief that their physicians are able to "pick up" on depression without the patient being explicit about their emotions. For example, Mrs K says that her doctor understands how she feels:

"Because she seems to pick up on some things that I don't tell her, and she'll bring it up right now. 'Now you didn't tell me this, let's get down to this. What's going on?' That's the way she is, so I know something is wrong, yes."

This response suggests that the physician has an almost intuitive capability to recognize when something is wrong with a patient, which could reflect the ability of some physicians to recognize nonverbal cues, as is illustrated in the following excerpt from another woman:

"I had one doctor tell me, when I walked into the room, he said, 'Young lady what's your problem? And um, I was trying to tell him how I was struggling. He said, 'You're depressed.' Yes, he just said, 'You look depressed to me.'"

Figure A.1 Flow diagram. Data from the Spectrum Study (2001–2004).



'I'm a Good Patient'.

This theme emerged when patients discussed what the physician thinks of them and often came up specifically in response to the interviewer's question: "What words would your doctor use to describe how you feel?" In this context, patients referred to themselves as "a good patient," suggesting that they perceived themselves as being well-liked by the physician. For example, Mrs S said:

"He thinks I'm a good patient, he thinks I'm doing good. Besides, other people come in there have more pains and that more than I do."

Another patient, Mrs R, said:

“He thinks I’m . . . how does he put it? ‘Quite a lady,’ and then he told his nurse-practitioner, ‘You’re going to love her; she’s quite a gal.’ You know?”

These excerpts illustrate a recognition on the part of the patient that they portray a positive image to the physician. The notion of the good patient is further manifested as a particular role that may be co-constructed by the physician and patient, as seen in the following excerpt from Mr J in response to the interviewer’s question: “Did you feel that your doctor understood how you feel?”

TABLE A.2 ■ Characteristics of Patients Who Identified Themselves as Depressed in Semistructured Interviews (n = 48)

Characteristics	Physician Rated Patient Depressed *n* = 27	Physician Rated Patient Not Depressed *n* = 21	*P* Value
Sociodemographic characteristics			
Age, mean, No. (SD)	73.0 (5.3)	77.1 (5.3)	.012
Women, No. (%)*	21 (79)	15 (71)	.623
African American, No. (%)*	10 (39)	12 (57)	.173
Education less than high school, No. (%)*	8 (30)	10 (48)	.210
Psychological status			
CES-D score, mean (SD)	18.3 (13.5)	15.6 (10.0)	.450
BAI score, mean (SD)	10.0 (9.2)	11.8 (8.5)	.498
BHS score, mean (SD)	5.5 (4.1)	4.8 (3.7)	.607
Cognitive status			
MMSE score, mean (SD)	27.8 (2.2)	27.1 (3.0)	.371
Physician ratings at index visit			
Physician rates the patient as depressed, No. (%)*	27 (100)	0 (0)	.842
Physician knows the patient very well, No. (%)*	20 (75)	15 (71)	.843

Note: *Data From the Spectrum Study (2001–2004).*

*Column percent.

CES-D = Center for Epidemiologic Studies Depression Scale; BAI = Beck Anxiety Inventory; BHS = Beck Hopelessness Scale; MMSE = Mini-Mental State Examination.

Note: *Data From the Spectrum Study (2001–2004).*

Column percent.

CES-D = Center for Epidemiologic Studies Depression Scale; BAI = Beck Anxiety Inventory; BHS = Beck Hopelessness Scale; MMSE = Mini-Mental State Examination.

“I doubt if I ever discussed it with him. I never felt it important enough to discuss it with him. No, he wouldn’t know, because I go there and cut up and flirt with the girls and kid and everything. He wouldn’t know.”

Mr J's response illustrates his perception of a role that is perhaps even expected of him during the office visit. For example, when asked, "What do you think your doctor thinks about the way you feel emotionally?" he stated: "He thinks I'm in great physical and mental shape and am very happily married." Nevertheless, this patient considered himself to be depressed and was open to discussing his depression with the interviewer elsewhere in the transcript. Another patient, Mrs R, also discussed how she thought she is a "good patient" in the eyes of her physician. She stated explicitly that her doctor does not care about her feelings:

"No, he don't care. No, in fact . . . he had a substitute come in one time when he wasn't there. . . . This doctor didn't know me. My own doctor does . . . but we don't ever get into my feelings and moods."

Yet when she describes how she thinks her doctor sees her, she evokes the notion of a good patient. When asked, "What do you think your doctor thinks about the way you feel emotionally?" she said:

"He has no idea. He thinks I'm a very, very happy person all the time, wonderful, in excellent health for an old woman, 77 years old. He thinks I'm doing great. He likes me, thinks I'm good. He's always happy to see me, takes enough time to say, 'What are you reading here?' There is only a little bit of small talk."

'They Just Check Out Your Heart and Things'.

Several patients mentioned that physicians focus mostly on the physical issues and tend to ignore emotional ones. For instance, Mrs W talks about visits to her physician in the following way:

"[I] just know it's going to be a 3-minute visit, and he'll say, 'Hi, how are you? Good. Need any medicines?' He listens to your chest and back and that's it."

Mr P also portrays his physician as someone who does not focus on emotional issues:

"Well, I don't know—he doesn't bother asking about that. They just check your heart out and things. I'm going to tell you, I don't think they think anything about emotions. I'm just being truthful. I don't think they worry about your mental state, you know, how you feel."

Similarly, Mr R says of his physician:

“He didn’t talk about my feelings. All he did, he gave me the numbers that he got from the last blood test, what we’re going to do, change the medicine a little bit and that’s all.”

When asked, “What do you think your doctor thinks about the way you feel emotionally?” he said, “I don’t think that it ever occurs to him.” Mrs T, another patient, wondered about the reasons that a physician might not want to discuss emotional or mental issues:

“Well it’s really not part of, as far as I know, mental exam is not a part of a physical exam at all, you know? So, but even so, doctors, they don’t . . . I don’t know why they don’t address you on it, unless they are afraid that you might not appreciate it, you know? Your mental health is something that is very touchy, something that is very stigmatizing, so people may kind of avoid it if they are not sure how you will react.”

‘They’ll Just Send You to a Psychiatrist’.

This theme connotes that patients feel any discussion of emotional issues will lead to a referral to a psychiatrist. We refer to this notion here as *turfing,* a term commonly used among physicians when one passes on difficult issues to another physician with other expertise.

The concept of turfing comes up when patients discuss what their physicians say when the patient brings up emotional issues. For example, in response to the question, “Do you think your doctor is cognizant of your feelings?” Mrs W says, “Oh, I think he knows, yeah, cause he says, ‘Well, we’ll send you to the psychiatrist.’” And yet when asked whether the physician understands how she feels, she says, “No, no. He just sent me to the psychiatrist.” Another patient, Mrs T, also talks about turfing and offers a reason why it may occur when asked, “What do you think you doctor thinks about the way you feel emotionally?”

“I don’t know, I think he recommended that I go see a psychiatrist. He’s not—obviously, he’s not comfortable with trying to treat me—so he never gave me any medicine.”

Yet another patient links this notion of turfing to the physicians’ focus on the physical aspects of health:

“We never got into emotions that much. They don’t get into your emotional health that much. I think if you start complaining about your emotional state,

they'll just want to send you to a psychiatrist."

Patient Characteristics and Themes

Table A.3 displays characteristics of patients according to the themes (as indicated in Figure A.1). All of the patients who discussed the theme of "my doctor just picks it up" were women and were concordant with their physicians on the diagnosis of depression. Few of the patients who brought up the "good patient" were rated by their physician as depressed (3 out of 8), and most were women (6 of 8). Among patients who brought up the theme of physicians only focusing on physical illness tended to have more education and to be white; in 4 of 7 cases, the physician rated the patient as depressed. Finally, all of the patients who discussed the notion of being referred when bringing up emotional issues were rated by their physicians as depressed.

TABLE A.3 ■ Characteristics of Persons According to Themes Raised in Semistructured Interviews (n = 48)

Characteristics	"My doctor just picked it up" *n* = 6	"I'm a good patient" *n* = 8	"They just check out your heart and things" *n* = 7	"They'll just send you to a psychiatrist" *n* = 6
Sociodemographic characteristics				
Age, mean y (SD)	73.3 (3.3)	77.5 (4.2)	75.1 (7.8)	71.3 (6.3)
Women, No. (%)*	6 (100)	6 (75)	4 (57)	4 (67)
African American, No. (%)*	2 (33)	3 (38)	2 (28)	3 (50)
Education less than high school, No. (%)*	2 (33)	3 (38)	2 (28)	2 (33)
Psychological status				
CES-D score, mean (SD)	19.0 (11.8)	11.9 (7.4)	15.3 (9.6)	14.0 (10.3)
BAI score, mean (SD)	10.5 (4.9)	10.0 (9.1)	6.4 (4.5)	6.8 (3.8)
BHS score, mean (SD)	4.8 (4.9)	3.8 (3.1)	4.6 (3.7)	5.7 (3.1)
Cognitive status				
MMSE score, mean (SD)	28.7 (1.2)	27.5 (2.2)	28.9 (0.7)	27.8 (1.7)
Physical health				
Physical function score, mean (SD)	64.2 (21.5)	63.6 (31.0)	71.3 (24.8)	56.7 (28.2)
Role physical score, mean (SD)	45.8 (36.8)	65.6 (35.2)	46.4 (44.3)	29.2 (29.2)
Role emotional score, mean (SD)	88.9 (27.2)	72.3 (39.8)	50.0 (50.0)	83.3 (40.8)
Social function score, mean (SD)	75.0 (17.7)	70.3 (34.0)	62.5 (27.0)	72.9 (21.5)
Bodily pain score, mean (SD)	61.3 (17.7)	55.0 (25.8)	50.4 (26.1)	43.8 (24.2)
General health perception score, mean (SD)	41.7 (15.7)	61.3 (17.5)	54.3 (16.4)	42.5 (14.4)
No. of medical conditions, mean (SD)	8.7 (0.8)	6.6 (2.9)	8.0 (3.1)	8.0 (2.3)
No. of visits within 6 months, mean (SD)	2.5 (1.0)	2.8 (1.4)	2.6 (1.5)	2.8 (1.5)
Discussion of depression with physician				
Doctor understood how you feel, No. (%)*	5 (83)	4 (50)	1 (14)	3 (50)
Has discussed feelings with doctor, No. (%)*	5 (83)	3 (38)	1 (14)	2 (33)
Physician ratings at index visit				
Physician rates the patient as depressed, No. (%)*	6 (100)	3 (38)	4 (57)	6 (100)
Physician knows the patient very well, No. (%)*	5 (83)	6 (75)	4 (57)	4 (67)

Note: Data From the Spectrum Study (2001–2004).

*Column percents.

BAI = Beck Anxiety Inventory; CES-D = Center for Epidemiologic Studies Depression Scale; MMSE = Mini-Mental State Examination.

Note: *Data From the Spectrum Study (2001–2004).*

Column percents.

BAI = Beck Anxiety Inventory; CES-D = Center for Epidemiologic Studies Depression Scale; MMSE = Mini-Mental State Examination.

Discussion

Our integrated, mixed methods design allowed us to combine hypothesis testing and hypothesis generation in a single study. Standard measures did not differentiate between patients whose physician rated them as depressed and those whose physician did not (hypothesis testing). When older adults were asked to reflect on how they discuss emotional issues with their physician, however, several themes emerged (hypothesis generating). All the themes represent patients' perceptions of their interaction with their physician regarding feelings and emotional status.

Our study has some potential limitations. First, we relied on the perception of the patient regarding the clinical encounter. Patient perceptions can provide only a partial view of what actually occurs in any given encounter. For the purposes of this study, however, we were specifically interested in the patient's perspective of their interaction with the physician. Because we did not focus on a specific encounter, we considered the narratives in the semistructured interviews to represent the patients' perceptions of encounters over time. We also relied on the patient's self-report of depression because we were interested in the patient's point of view with respect to depression. In doing so, we wanted to recognize that we could not disentangle mild, moderate, and severe depression from somatizing patients, or the worried well. Furthermore, the various assessments were not carried out at the same time. Nevertheless, we attempted to use the quantitative data to sharpen our ability to distinguish themes among participants in a way that can improve our understanding of the role of the physician-patient relationship regarding the identification of depression from both the patient's and physician's points of view. We realize that many system, physician, and patient factors play a role in physician-patient interaction, all of which could not be accounted for in our study. Alternative designs to studying how patient behavior and expectations play a role in identification of depression, such as intensive analysis of physician-patient encounters or interviewing patients immediately following an office visit, would not capture the kind of data we have described here.

"My doctor just picked it up" suggests that these patients might not have known about their depression had the physician not suspected it. The physicians' diagnostic skills, as these patients describe them, appear to include an ability to intuit aspects of the patient's mood without necessarily needing to elicit them directly. This theme emerged only among those patients whose physician rated them as depressed and among patients who reported having discussed their

feelings with the physician and who thought their physician understood them. One concern, however, is that for some patients, relying on their physician's ability to " just pick up" on their mood may obviate the need to express mood symptoms at all, leaving depression potentially unaddressed. All the patients who mentioned this theme were women. Perhaps women behave in ways that are stereotypical for depression, leading physicians to pick up on depression without the need for patients to bring it up themselves. It is also possible that physicians, aware that depression is more common among women,[36] are more likely to diagnose depression in women.

"I'm a good patient" may indicate those patients whom physicians do not see as having any negative feelings or being depressed, because the patient and the physician have together created a role that might inhibit any discussion of emotions without happy or positive content. Depression may be seen as a moral failing requiring pulling up oneself by one's bootstraps.[37] The notion of the good patient may be more common among older patients who have grown up in the era of the paternalistic physician. Patients who view themselves as a good patient may operate on the notion that the good patient is one who is respectful of the physician's expertise and recommendations, will be compliant with recommendations, and does not complain or burden their physician. Discussing emotional difficulty with the physician may be seen as unnecessary complaining.

"They just check out your heart and things" was mentioned by patients who discuss the tendency of physicians to focus on physical findings and symptoms and who have learned from experience that emotional symptoms are not appropriate for the medical encounter. These patients seem to assume what falls under the purview of physician's expertise is purely physical, namely, patients are clearly not bringing up emotional issues because they may believe their physician will not be interested. Debra Roter and Judith Hall discuss this phenomenon in the following way: "Most patients have particular expectations in mind when they visit the doctor, although they may be reluctant to make these known directly."[12] This expectation appears to lead to a reluctance on the part of the patient to bring up anything that is not viewed as a physical concern.

"They'll just send you to a psychiatrist" was expressed by patients who believe they had been turfed, namely, a sense that the physician will not directly address any emotional issues but will instead send the patient on to a mental health specialist. All the patients who discuss the notion of turfing were rated by the physician as depressed. Thus while these patients tended to discuss turfing in dissatisfied terms, physicians were nonetheless concordant with regard to the

depression diagnosis. If patients expect their physician will send them to a psychiatrist when emotional issues are discussed, patients may either avoid discussing emotional issues or they may try to express their emotional issues in physical terms.

We believe our findings have both clinical and methodological implications. Patients come to the physician encounter with experiences and expectations about depression that may have an impact on what patients are willing to tell physicians. The give-and-take between patients and physicians is clearly a dynamic activity, a dance of sorts, with important implications for the ability of physicians to recognize depression and negotiate a treatment plan. From a methodological viewpoint, had we limited the analysis to patient characteristics (a purely quantitative study), we would have missed the patient's perspective. The themes represent patient voices and allowed us to identify possible contributing factors to the dynamic process of physician-patient interaction around depression.

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Key words: Aged; communication; depression; research methodology; primary health care

Submitted June 8, 2005; submitted, revised, December 9, 2005; accepted December 12, 2005.

Presented in part at the North American Primary Care Research Group (NAPCRG) annual meeting, Banff, Canada, October 28, 2003.

Funding support: The Spectrum Study was supported by grants MH62210-01, MH62210-01S1, and MH67077 from the National Institute of Mental Health. Dr. Wittink was supported by a National Research Service Award from the National Institutes of Health (MH019931-08A1). Dr. Wittink was supported by a National Research Service Award from the National Institutes of Health (MH019931 08A1) and a Mentored Patient Oriented Research Career Development (K23) award (MH073658).

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Appendix B Students' Persistence in a Distributed Doctoral Program in Educational Leadership in Higher Education: A Mixed Methods Study

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Source: Ivankova, N., & Stick, S. (2007). Students' persistence in a Distributed Doctoral Program in Educational Leadership in Higher Education: A mixed methods study. *Research in Higher Education, 48*(1), 93–135. Reprinted with permission of Springer Science + Business Media, Inc.

The purpose of this mixed methods sequential explanatory study was to identify factors contributing to students' persistence in the University of Nebraska-Lincoln Distributed Doctoral Program in Educational Leadership in Higher Education by obtaining quantitative results from surveying 278 current and former students and then following up with four purposefully selected typical respondents to explore those results in more depth. In the first, quantitative, phase, five external and internal to the program factors were found to be predictors to students' persistence in the program: ''program'', ''online learning environment'', ''student support services'', ''faculty'', and ''self-motivation''. In the qualitative follow up multiple case study analysis four major themes emerged: (1) quality of academic experiences; (2) online learning environment; (3) support and assistance; and (4) student self-motivation. The quantitative and qualitative findings from the two phases of the study are discussed with reference to prior research. Implications and recommendations for policy makers are provided.

KEY WORDS: persistence; doctoral students; distributed program; online learning environment.

Introduction

Graduate education is a major part of American higher education, with more than 1850 million students enrolled in graduate programs (NCES, 2002). Approximately one fifth are graduate students pursuing doctoral degrees (NSF, 1998). Out of this number, from 40% to 60% of students who begin their doctoral studies do not persist to graduation (Bowen and Rudenstine, 1992; Geiger, 1997; Nolan, 1999; Tinto, 1993). High failure rate and the ever increasing time to degree are reported as chronic problems in doctoral education (Lovitts and Nelson, 2000; NSF, 1998). In educational majors, attrition from doctoral programs is estimated at approximately 50%. In addition, about 20% give up at the dissertation stage (Bowen and Rudenstine, 1992; Cesari, 1990). Failure to continue in the doctoral program is not only painful and expensive for a student, but is also discouraging for faculty involved, injurious to an institution's reputation, and results in a loss of high-level resources (Bowen and Rudenstine, 1992; Golde, 2000; Johnson, Green, and Kluever, 2000; Tinto, 1993).

Researchers claim a much higher dropout rate among students pursuing their doctoral degrees via distance education (DE) (Carr, 2000; Diaz, 2000; Parker, 1999; Verduin and Clark, 1991). Persistence in DE is a complex phenomenon influenced by a multitude of factors: challenges set by the distance learning environment, personally related internal and external variables, computer literacy, ability to access requisite technology, time management, and absent or questionable support from an employer and/or family (Kember, 1990). The student population is composed of mainly part-time adult students, who often have numerous and demanding commitments to work, family, and social lives (Finke, 2000; Holmberg, 1995; Thompson, 1998). These students tend to be more vulnerable to factors encroaching on their academic progress because their school-related activities often are not primary life objectives.

Although many studies have been done to understand reasons for persistence of doctoral students in traditional campus-based programs (Bair and Haworth, 1999; Bowen and Rudenstine, 1992; Golde, 2001; Haworth, 1996; Kowalik, 1989), there is much less research on doctoral students' persistence in DE (Tinto, 1998), particularly distributed programs (distributed connotes the material is sent electronically to persons at various locations throughout the world and removes the need for participants to be located at a given site at a given time). Existing studies either focused on DE students' persistence in individual undergraduate

and graduate courses, or other than distributed distance learning delivery means (Ivankova and Stick, 2003).

Knowledge and understanding of factors contributing to graduate students' persistence in distributed programs may help academic institutions better meet DE students' needs, improve the quality of their academic experiences, and increase their retention and degree completion rate. This is especially important today when postsecondary institutions have to confront the growing problems of revenue generation and increasing budget cuts and turn to offering graduate programs in distributed environments. Knowledge of the evolving tendencies may serve as a baseline for higher educational administrators in elaborating DE policies, designing and developing graduate distributed programs, and improving distance student support infrastructure.

This article reports on the study conducted to understand students' persistence in the Distributed Doctoral Program in Educational Leadership in Higher Education (ELHE) offered by the University of Nebraska-Lincoln (UNL). The purpose of this mixed methods sequential explanatory study was to identify factors contributing to students' persistence in the ELHE program by obtaining quantitative results from a survey of 278 current and former students and then following up with four purposefully selected individuals to explore those results in more depth through a qualitative case study analysis. In the first, quantitative, phase of the study, the research questions focused on how selected internal and external variables to the ELHE program (program-related, advisor-and faculty-related, institutional-related, student-related factors, and external factors) served as predictors to students' persistence in the program. In the second, qualitative, phase, four case studies from distinct participant groups explored in-depth the results from the statistical tests. In this phase, the research questions addressed seven internal and external factors, found to have differently contributed to the function discriminating the four groups: program, online learning environment, faculty, student support services, self-motivation, virtual community, and academic advisor.

Theoretical Perspective

Three major theories of students' persistence—Tinto's (1975, 1993) Student Integration Theory, Bean's (1980, 1990) Student Attrition Model, and Kember's (1990, 1995) Model of Dropout from Distance Education Courses—served as a theoretical foundation for this study. Tinto's and Bean's models focused primarily on undergraduate campus students and Kember's model was aimed at explaining attrition of distance adult students. Although these models differed in their approach to persistence, they shared similar core elements and complemented each other. Their principle components helped identify critical internal and external factors presumably impacting students' persistence, such as entry characteristics, goal commitment, academic and social integration, and external forces (family, friends and employers).

Extensive literature review also revealed that graduate students' persistence in a program of study seldom is the result of the influence of one factor. Among those identified were institutional and departmental factors (Austin, 2002; Golde, 1998, 2000; Ferrer de Valero, 2001; Lovitts, 2001; Nerad and Miller, 1996), academic advisors (Ferrer de Valero, 2001; Golde, 2000; Girves and Wemmerus, 1988), support and encouragement (Brien, 1992; Hales, 1998; Nerad and Cerny 1993), motivation and personal goals (Bauer, 1997; Lovitts, 2001; McCabe-Martinez, 1996; Reynolds, 1998), and family and employer relationships (Frasier, 1993; Golde, 1998; McCabe-Martinez, 1996). Based on these factors and the principle components from three theories of students' persistence a set of variables was created to test for the predictive power of internal and external factors on doctoral students' persistence in the ELHE program.

Distributed Doctoral Program in Educational Leadership in Higher Education

The Distributed Doctoral Program in Educational Leadership in Higher Education is offered through the Department of Educational Administration at the University of Nebraska-Lincoln (Stick and Ivankova, 2004). The program was initiated in 1994 and offers students a choice of the PhD or the EdD Degrees in Educational Studies with the emphasis in Educational Leadership in Higher Education. It is possible for students to complete an entire program via distributed means. Innovative teaching methodologies and a distributed learning environment enabled most students to complete their programs of study within a 36- to 60-month period, with minimal disruption to lifestyle, family responsibilities, and employment. Most of the coursework necessary for the degree is provided through distributed learning software, which utilizes the Internet as a connecting link. Most of the program is delivered to students via Lotus Notes and Blackboard groupware, which provides asynchronous and collaborative learning experiences to participants. More than 260 students were enrolled and in varying stages of their programs, with 180–200 active during a given semester. Since 2004 there have been more than 70 students graduated. Some students did partial coursework on campus because either selected courses were not available online, or students wanted the on-campus experience.

Methods

Study Design

To answer the study research questions, the researchers used a mixed methods approach (Tashakkori and Teddlie, 2003), which is a procedure for collecting, analyzing and mixing or integrating both quantitative and qualitative data at some stage of the research process within a single study (Creswell, 2005). The rationale for mixing both types of data is that neither quantitative nor qualitative methods are sufficient by themselves to capture the trends and details of situations, such as the complex issue of doctoral students' persistence in the distributed environment. When used in combination, quantitative and qualitative methods complement each other and provide a more complete picture of the research problem (Greene, Caracelli, and Graham, 1989; Johnson and Turner, 2003; Tashakkori and Teddlie, 1998).

This study used a sequential explanatory mixed methods design, consisting of two distinct phases (Creswell, Plano Clark, Guttman, and Hanson, 2003; Tashakkori and Teddlie, 1998). In this design, the quantitative, numeric, data is collected and analyzed first, while the qualitative, text, data is collected and analyzed second in sequence, and helps explain, or elaborate on the quantitative results obtained in the first phase. In this study, the quantitative data helped identify a potential predictive power of selected external and internal factors on the distributed doctoral students' persistence and purposefully select the informants for the second phase. Then, a qualitative multiple case study approach was used to explain why certain external and internal factors, tested in the first phase, were significant predictors of students' persistence in the program. Thus, the quantitative data and results provided a general picture of the research problem, while the qualitative data and its analysis refined and explained those statistical results by exploring the participants' views regarding their persistence in more depth.

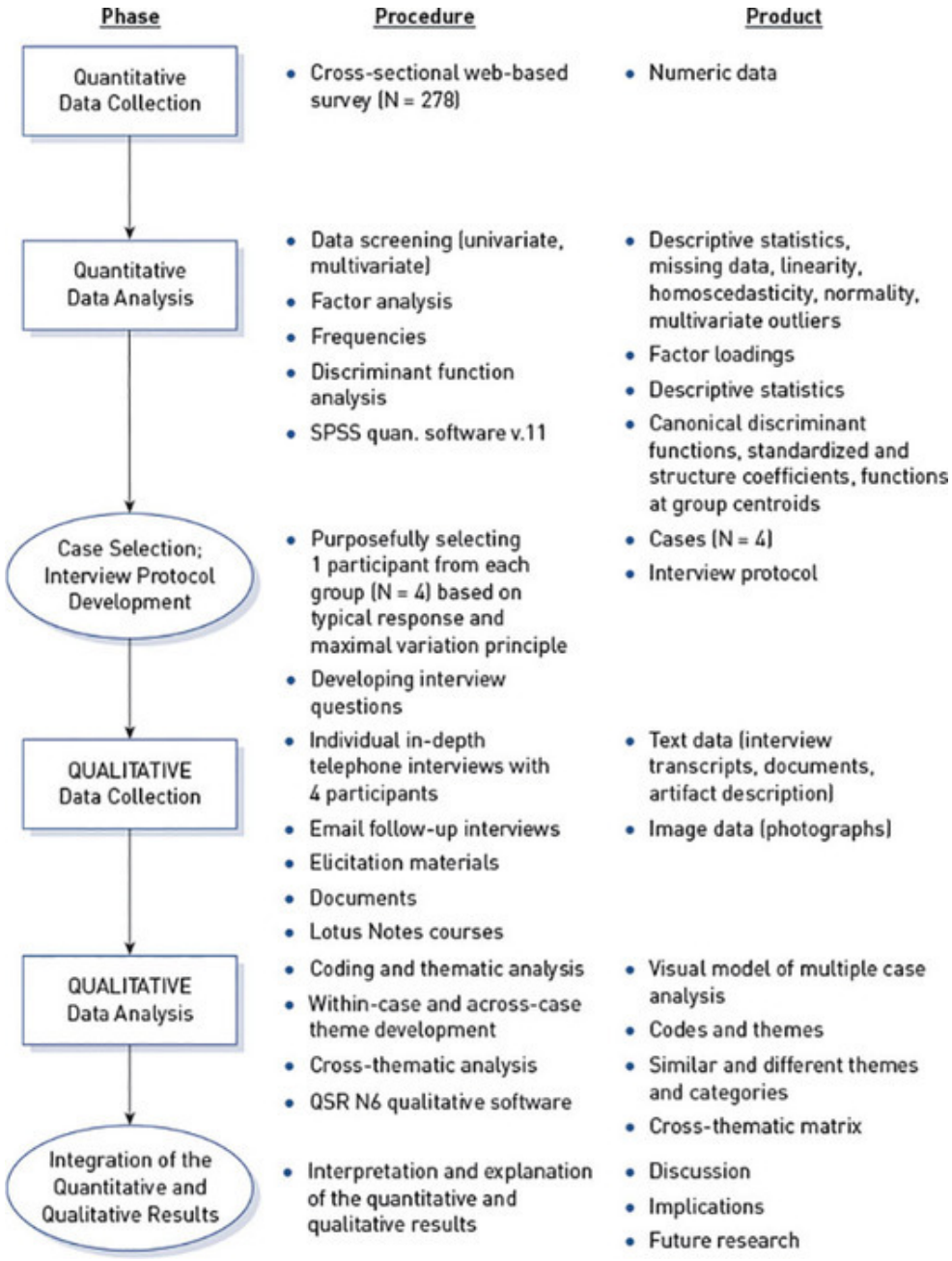
The priority (Creswell et al., 2003) in the study was given to the qualitative approach, because it focused on in-depth explanations of the results obtained in the first, quantitative, phase, and involved extensive data collection from multiple sources and two-level case analysis. The quantitative and qualitative phases were connected (Hanson, Creswell, Plano Clark, Petska, and Creswell, 2005) when selecting four participants for qualitative case studies and developing the interview protocol based on the results from the statistical tests from the first phase. The results of the quantitative and qualitative phases were integrated (Creswell et al., 2003) during the discussion of the outcomes of the entire study

(see Fig. B.1 for a diagram of the mixed methods sequential explanatory design procedures in the study)[1].

Target Population

The target population in this study were active and inactive students, who were admitted to the ELHE program and taking classes during the spring 2003 semester. Also part of the target population were students who had been graduated with an earned doctoral degree from the program and those who had withdrawn, or had been terminated from the program prior to the spring 2003 semester. Students were referred to as DE students if they had taken half of their classes via distributed means. The students' status varied in terms of progress and/or completion of courses, number of online courses taken, and doctoral degree pursued. Criteria for selecting the participants included: (1) being in ELHE vs. other programs; (2) time period of 1994-Spring 2003; (3) must have done 1/2 of course work online; (4) be either admitted, both active and inactive, graduated, withdrawn, or terminated from the program; (5) for those who just started, they must have taken at least one online course in the program. A total of 278 students met the criteria. The breakdown by their matriculation status in the program was: (1) those admitted and active in the program (n = 202); (2) those admitted but inactive (n = 13); (3) those who were graduated (n = 26), and (4) those who withdrew or were terminated from the program (n = 37) since its inception in 1994. The anonymity of the participants in the first phase was protected by assigning them unique numeric passwords to access the web-based survey. In the second phase, the participants selected for case study analysis were assigned fictitious names, thus keeping the responses confidential. In addition, all the names and gender related pronouns were removed from the quotations used for illustrations.

Figure B.1 Visual Model for Mixed Methods Sequential Explanatory Design Procedures


Phase
Procedure
Product
Quantitative Data Collection
Cross-sectional web-based survey (N = 278)
Numeric data
Quantitative Data Analysis
Data screening (univariate, multivariate)
Factor analysis
Frequencies
Discriminant function analysis
SPSS quan. software v.11
Descriptive statistics, missing data, linearity, homoscedasticity, normality, multivariate outliers
Factor loadings
Descriptive statistics
Canonical discriminant functions, standardized and structure coefficients, functions at group centroids
Case Selection; Interview Protocol Development
Purposefully selecting 1 participant from each group (N = 4) based on typical response and maximal variation principle
Developing interview questions
Cases (N = 4)
Interview protocol
QUALITATIVE Data Collection
Individual in-depth telephone interviews with 4 participants
Email follow-up interviews
Elicitation materials
Documents
Lotus Notes courses
Text data (interview transcripts, documents, artifact description)
Image data (photographs)
QUALITATIVE Data Analysis
Coding and thematic analysis
Within-case and across-case theme development
Cross-thematic analysis
QSR N6 qualitative software
Visual model of multiple case analysis
Codes and themes
Similar and different themes and categories
Cross-thematic matrix
Integration of the Quantitative and Qualitative Results
Interpretation and explanation of the quantitative and qualitative results
Discussion
Implications
Future research

Quantitative Phase

Data Collection.

For the first, quantitative, phase, the cross-sectional survey design (McMillan, 2000) was used. The survey instrument was self-developed and pilot tested on 5% of randomly selected participants. The core survey items formed five 7-point Likert type scales related to five internal and external entities affecting students' persistence, and reflected nine variables, representing a range of internal and external to the program factors: ''online learning environment'', ''program'', ''virtual community'', ''faculty'', ''student support services'', ''academic advisor'', ''family and significant other'', ''employment'', and ''self-motivation''. Table B.1 presents the relationship between the survey scales, subscales and variables, and lists the survey items measuring each variable, as well as reliability indexes for each subscale. The survey items and scales were developed based on the analysis of the related literature, three theoretical models of students' persistence (Bean, 1980, 1990; Kember, 1990, 1995; Tinto, 1975, 1993) and an earlier qualitative thematic analysis study of seven ELHE active students (Ivankova and Stick, 2002). A panel of professors teaching in the program was used to secure the content validity of the survey instrument. Based on the pilot testing, some survey items were revised slightly.

The survey was administered online and was accessed through the URL. Active e-mail addresses of the potential participants were obtained through the UNL Department of Educational Administration and identified through other sources. The participants were recruited via e-mail a week before the beginning of the study. The data collection took place between April 1 and July 18, 2003. The procedure was complicated by having to correct 50 inactive e-mail addresses and locate former students, who had withdrawn or graduated from the program. Technological glitches in the system also presented challenges. Twenty-three participants who were willing to complete the questionnaire, could not access the survey, or failed to complete it in full. A hard copy of the survey was mailed, faxed, or sent as a Word document attachment to such participants. Nineteen such participants returned the completed survey.

TABLE B.1 ■ Survey Scales and Predictor Variables in Quantitative Analysis

Survey scales/Factors	Subscales/Predictor variables	Cronbach's alpha	Survey items
Related to ELHE program	Online learning environment	.8503	Q14 a-j
	Program	.8344	Q13 a-g
	Virtual community	.8012	Q13 h-l
Related to faculty and academic advisor	Academic advisor	.9818	Q15 a-m
	Faculty	.9079	Q13 m-r
Related to institution	Student support services	.8243	Q13 s-y
Related to student	Self-motivation	.8948	Q16 a-g
External to ELHE program	Family and significant other	.5829	Q17 a-d
	Employment	.5289	Q17 e-h

From 278 potential participants 207 responded, which constituted a response rate of 74.5%. All respondents were organized into four groups based on their matriculation status in the program and similarity of academic experiences: (1) students who had completed 30 or fewer credit hours of course work (Beginning Group) (n = 78); (2) students who had completed more than 30 credit hours of course work (Matriculated Group) (n = 78); (3) former students who had graduated from the program with the doctoral degree (Graduated Group) (n = 26); and (4) former students who either had withdrawn or had been terminated from the program, or had been inactive during the last three terms (spring, fall, summer) prior to the survey administration (Withdrawn/Inactive Group) (n = 25). Reliability and validity of the survey scales and items were established, using descriptive statistics, frequency distributions, internal consistency reliability indexes (Cronbach's alpha, item-total correlation, corrected item-total correlation, and alpha-if-item deleted), as well as inter-item correlations and factor analysis (Ivankova, 2004).

Data Analysis.

Both univariate and multivariate statistical procedures were used to analyze the survey data. Survey demographic information and the participants' answers to separate items on each survey sucscale were analyzed using cross tabulation and frequency counts. Discriminant function analysis was used to identify the predictive power of nine selected factors as related to students' persistence in the ELHE program. Prior to the analysis, data screening was conducted at both univariate and multivariate levels, following the procedures outlined by Kline (1998) and Tabachnick and Fidell (2000).

Qualitative Phase

Qualitative Research Design.

A multiple case study design (Stake, 1995; Yin, 2003) was used for collecting and analyzing the data in the second, qualitative, phase. The instrumental multiple cases (Stake, 1995) served the purpose of ‘‘illuminating a particular issue’’ (Creswell, 2005, p. 439), such as persistence in the ELHE program. The unit of analysis was a former or current ELHE student. Each case study was bounded by one individual and by the time he or she matriculated in the ELHE program.

Case Selection.

A systematic two-stage case selection procedure was developed[2]. During the first stage, typical respondents in each participant group were identified, first, by calculating the summed mean scores and their respective group means for all participants in each of the four groups based on their responses to the survey questions, and then by selecting a few respondents from each group with the mean scores within one standard error of the mean. During the second stage, one ‘‘best informant’’ from each group was selected using a maximal variation strategy (Creswell, 2005). This procedure yielded one male and three females, displaying different dimensions on such demographic characteristics, as age, gender, residency, and family status, which allowed for preserving multiple perspectives on persistence in ELHE program. All four agreed to participate.

Interview Protocol Development.

The content of the interview protocol was grounded in the quantitative results from the first phase of the study. Because the goal of the qualitative phase was to explore and elaborate on the results of the statistical tests (Creswell et al., 2003), we wanted to understand why certain predictor variables differently contributed to the function discriminating four participant groups with regards to their persistence. Five open-ended questions explored the role of five factors (‘‘online learning environment’’, ‘‘program’’, ‘‘faculty’’, ‘‘student support services’’, and ‘‘self-motivation’’), which demonstrated statistically significant predicting power for this sample of the ELHE students. Two other open-ended questions explored the role of academic advisor and virtual learning community in students’ persistence. Although those two factors did not significantly contribute to the function discriminating four participant groups, their important role in students’

persistence in traditional doctoral programs was reported by other researchers (Bowen and Rudenstine, 1992; Brown, 2001; Golde, 2000; Lovitts, 2001). The interview protocol was pilot tested on one participant, purposefully selected from those who had completed the survey in the first phase of the study. As a result, the order of the protocol questions was revised slightly and additional probing questions were developed.

Data Collection.

The data was collected from multiple sources to provide the richness and the depth of each case description and included: (1) in-depth semistructured telephone interviews with four participants; (2) electronic follow-up interviews with each participant to secure additional information on the emerging themes; (3) academic transcripts and students' files to validate the information obtained during the interviews and to get additional details related to the cases; (4) elicitation materials, such as photos, objects, and other personal things, provided by each participant relating to his/her persistence in the program; (5) participants' responses to the open-ended and multiple choice questions on the survey in the quantitative phase; and (6) selected online classes taken by the participants and archived on a Lotus Notes or Blackboard server. The data collection took place during November–December of 2003.

Qualitative Analysis.

Each interview was audio taped and transcribed verbatim (Creswell, 2005). The analysis was performed at two levels: within each case and across the cases (Stake, 1995; Yin, 2003), using the QSR N 6, qualitative software for data storage, coding, and theme development. Steps in the qualitative analysis included: (1) preliminary exploration of the data by reading through the transcripts and writing memos; (2) coding the data by segmenting and labeling the text; (3) verifying the codes through inter-coder agreement check; (4) using codes to develop themes by aggregating similar codes together; (5) connecting and interrelating themes; (6) constructing a case study narrative composed of descriptions and themes; and (7) cross-case thematic analysis. Credibility of the findings was secured by triangulating different sources of information, member checking, inter-coder agreement, rich and thick descriptions of the cases, reviewing and resolving disconfirming evidence, and academic advisor's auditing (Creswell, 1998; Creswell and Miller, 2002; Lincoln and Guba, 1985; Miles and Huberman, 1994; Stake, 1995).

Results

Quantitative Phase

Demographic Information.

The study participants were compared on the following demographic characteristics: age, gender, and employment while in the ELHE program, Nebraska (NE) residency status, and family status. The typical participants were: between 36 and 54 years of age, predominantly women, employed full-time, mostly out-of-state, and married with children (see Table B.2).

Scale Items Frequencies Analysis.

Most of the participants were satisfied with their academic experiences in the program. The amount of satisfaction was the greatest among the Graduated participants (92.3%), while satisfaction increased from the Beginning group (57.7%) to the Matriculated group (71.8%). Only 20% of the Withdrawn/Inactive group reported the program met their needs, and another 20% expressed negative feelings about the program. The majority of participants in the three matriculated groups positively rated their involvement with the online courses and agreed that online courses were more challenging academically. Across the groups, the participants gave more positive ratings to instructors' accessibility and promptness of the feedback, rather than the quality of the feedback and instructors' willingness to accommodate to distance learners' needs.

TABLE B.2 ■ Demographic Characteristics of Survey Respondents*

Row Pct Total	Group 1: Beginning ($n = 78$)	Group 2: Matriculated ($n = 78$)	Group 3: Graduated ($n = 26$)	Group 4: Withdrawn/ Inactive ($n = 25$)	Total
Age					
26–35	45.7	31.4	5.7	17.1	100.0
36–45	41.6	45.5	6.5	6.5	100.0
46–54	35.7	32.9	18.6	12.9	100.0
Over 55	16.7	37.5	25.0	20.8	100.0
Total	77	78	26	25	206
Gender					
Male	33.3	38.7	15.1	12.9	100.0
Female	40.2	37.5	10.7	11.6	100.0
Total	76	78	26	25	205
Employment					
Full-time	38.0	37.5	12.0	12.5	100.0
Part-time	35.7	42.9	21.4	0	100.0
Unemployed	0	0	0	100.0	100.0
Total	78	78	26	25	207
NE Residency					
In-state	30.6	37.1	16.1	16.1	100.0
Out-of-state	41.3	37.0	10.9	10.9	100.0
International	28.6	57.1	14.3	0	100.0
Total	78	78	26	25	207
Family status					
Married with kids under 18	39.2	36.7	12.5	11.7	100.0
Married with kids over 18	34.9	44.2	11.6	9.3	100.0
Single with kids under 18	44.4	33.3	0	22.2	100.0
Single, never married	22.2	44.5	11.1	22.2	100.0
Single, divorced or separated	50.0	16.7	25.0	8.3	100.0
Single person, widowed	0	100.0	0	0	100.0
Married without children	14.3	57.1	14.3	14.3	100.0
Total	75	77	25	24	201

*Missing data is excluded.

* Missing data is excluded.

Most participants were comfortable learning in the online environment (84.3%). Across the groups, the Graduates expressed the highest comfort level with online learning (96.2%), while the Withdrawn/Inactive group was the least comfortable (47.8%). More participants from the Graduated (100.0%) and the Matriculated (81.3%) groups, than from the Beginning (68.8%) and the Withdrawn/Inactive (39.1%) groups were comfortable with participating in online discussions and the course workload. The same pattern of increased comfort level from the Beginning group to the Graduated group was observed when participants rated their learning in the distributed environment as compared to a face-to-face setting. However, the participants differentially benefited from the virtual community. Only two-thirds of the respondents claimed they could establish long-term social relationship with their fellow-students online. The Withdrawn/Inactive group was the least satisfied, had low comfort level (47.8%), and was more negative in rating the effectiveness of learning in the distributed environment (30.4%).

Participants had different experiences with academic advising. The Graduated group had more positive experiences (76.0%), than any other group. Across all the items, the Matriculated participants rated their experiences with academic advising more positively than the Beginning group, which might be due to the fact that they had more opportunities to experience a variety of relations with their academic advisor than those who had completed less than 30 credit hours in the program. In the Withdrawn/Inactive group, fewer participants rated their academic advisor positively (38.0%).

All the participants, except for the Withdrawn/Inactive group (32.0%), were highly motivated to pursue the doctoral degree in the distributed environment. The Graduates were the most motivated group (100.0%), while the Matriculated group (93.6%) was a little more motivated than the Beginning group (76.9%). More than 50% of the participants were satisfied with the institutional support services. However, their satisfaction differed depending on the particular service and the level of students' matriculation in the program. The Withdrawn/Inactive group was the least satisfied (48.0%).

More than 70% of the participants agreed they had favorable family conditions to support their efforts to pursue the doctoral degree via distributed means. Across all the groups, the Graduated group received the most support (80.8%) and the Withdrawn/Inactive group the least (65.0%). There was more satisfaction for the Matriculated group (77.6%) than for the Beginning group (72.7%). More Graduates also believed their friends encouraged them in their study efforts (60.0%). About 65.6% of the participants received encouragement from their

employers to pursue the doctoral degree. The Graduated participants were the most encouraged (76.9%), while the Matriculated group received the least support (63.0%). 61.1% of the Withdrawn/Inactive participants positively rated their employer.

Discriminant Function Analysis.

The analysis yielded three discriminant analysis functions. Based on the Wilks' Lambda test, only the first function was statistically significant ($x^2 = 98.858$; df = 27; $\rho = .000$), meaning only this function discriminated for this set of variables (Tabachnick and Fidell, 2000). The standardized coefficients for the first discriminant function indicated all nine predictor variables provided their relative unique contribution to group differences as related to students' persistence in the program (see Table B.3).

The discriminant variate that best discriminated the four groups was represented by the following linear relationship equation:

V = 1.187 * program - 0.078 * online learning environment + 0.105 * virtual community + 0.187 * faculty - 0.341 * student support services - 0.180 * academic advisor + 0.224 * self-motivation + 0.103 * family and significant other + 0.116 * employment

TABLE B.3 ■ Standardized Canonical Discriminant Function Coefficients

	Function		
	1	2	3
Program	1.187	0.458	0.187
Online learning environment	-0.078	0.588	0.065
Faculty	0.187	0.425	-0.608
Self-motivation	0.224	-0.427	0.176
Student support services	-0.341	0.209	0.016
Employment	0.116	0.635	0.151
Virtual community	0.105	0.786	0.163
Academic advisor	-0.180	-0.129	1.076
Family	0.103	-0.080	0.455

The variable ‘‘program’’ (1.187) contributed the most to the participants' being in a particular group as related to their persistence in the ELHE program. No other

variable had a similarly high coefficient. The variable ‘‘student support services’’ (−0.341) had the second largest contribution to the group differences. It was followed by ‘‘self-motivation’’ (0.224), ‘‘faculty’’ (0.187), and ‘‘academic advisor’’ (−0.180). Other variables had low coefficients and contributed very little.

Based on the structure coefficients for the three discriminant functions, five variables, ‘‘program’’, ‘‘online learning environment’’, ‘‘faculty’’, ‘‘self-motivation’’, and ‘‘student support services,’’ had a statistically significant correlation with the discriminant function, and hence, contributed to discriminating the participants as related to their persistence (see Table B.4).

‘‘Program’’ ($r = 0.905$) and ‘‘online learning environment’’ ($r = 0.526$) had the highest correlations and made the most contribution to discriminating the four matriculated groups, followed by ‘‘faculty’’ ($r = -0.486$), ‘‘self-motivation’’ ($r = 0.482$), and ‘‘student support services’’ ($r = 0.202$). Those differences in function and correlation coefficients made it somewhat difficult to interpret the discriminant function, especially since only one function was generated. However, both statistics indicated the top variable was ‘‘program’’. So, we named this function ‘‘ELHE program’’ and concluded that the nature and the context of the program contributed to discriminating the participants as related to their membership in one of the matriculated groups. This discriminant function also indicated that 88.7% of the participants were classified correctly. ‘‘Virtual community’’, ‘‘academic advisor’’, ‘‘family and significant other’’, and ‘‘employment’’ made no significant contribution to the discriminant function.

Functions at group centroids revealed that on the discriminant function the Withdrawn/Inactive group (1.654) differed from the other three participant groups the most. The Graduate group (−.960) differed from both the Beginning and the Matriculated groups, though less from the Matriculated group and the most from the Withdrawn/Inactive group. The Matriculated group (−.410) differed notably from the Beginning group (.200) (see Table B.5).

TABLE B.4 ■ Structure Matrix in Discriminant Function Analysis

	Function		
	1	2	3
Program	0.905*	−0.066	0.030
Online learning environment	0.526*	0.037	−0.160
Faculty	−0.486*	0.245	−0.086
Self-motivation	0.482*	−0.331	0.005
Student support services	0.202*	0.097	−0.046
Employment	−0.111	0.542*	0.255
Virtual community	−0.438	0.521*	0.106
Academic advisor	−0.447	−0.034	0.690*
Family	−0.041	0.190	0.339*

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions variables ordered by absolute size of correlation within function.

*Largest absolute correlation between each variable and any discriminant function.
Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions variables ordered by absolute size of correlation within function.

Largest absolute correlation between each variable and any discriminant function.

Qualitative Phase

The analysis of each case and across four cases yielded four themes related to the participants' persistence in the ELHE program: quality of academic experiences, online learning environment, support and assistance, and self-motivation. The description of each case follows.

Gwen

Gwen was 40 years old and in her third year in the ELHE program. She was Dean of Students in a small private college in the Midwest. She was single and had a cat, Sam, who was her close friend. At the time of the interview, she had successfully completed 30 credit hours, of which 18 were taken online.

Quality of Academic Experiences.

Gwen's persistence in the program was positively affected by the tight structure of the program and ability to plan her coursework. The coursework reportedly challenged Gwen's critical thinking and gave her the opportunity to learn from others: ''It . . . helped me to think differently, because I have to put that all in

writing and share it with everyone.'' It was also relevant to her professional life. The quality of the coursework was directly related to an instructor's involvement with the course and the feedback he/she provided.

On the other hand, Gwen did not receive any quality feedback from her academic advisor: ''I haven't found my advisor to be fulfilling in that role.'' On the survey in the first phase of the study, she rated advising negatively. Communication with the advisor was rare and not informative. Analysis of the e-mail communication between Gwen and her advisor revealed that approximately 70% of Gwen's messages were left unanswered. Although low quality advising was frustrating for Gwen, she was determined to continue with her efforts to pursue the degree via DE: ''I'm not going to let [the advisor] stop my persistence or stop my progress in the program.'' At the time of the study, Gwen decided to initiate another attempt to switch the academic advisor. The request was being honored.

Online Learning Environment.

Learning via distance was convenient for Gwen and provided a lot of flexibility. An intensive work schedule did not allow her to leave work during the day, so the ability to study at her own pace and time positively affected her matriculation in the program: ''You have the opportunity to do things . . . when they work for you.'' Learning online fit Gwen's learning style. She liked to write and was cognizant enough to participate extensively in written communications with other students. The online format also gave her the opportunity to learn from other students' work. Gwen was comfortable not seeing her classmates and professors and created mental images of them based on their writings: ''I'd be getting an idea of a person's looks or image by their work.'' She believed a virtual community was established among the students, but it depended on the nature of a course and was limited to one course.

TABLE B.5 ■ Structure Matrix in Discriminant Function Analysis

	Function		
Membership in the group	1	2	3
Group 1: Beginning	0.200	0.137	-0.177
Group 2: Matriculated	-0.410	-0.224	0.005
Group 3: Graduated	-0.960	0.302	0.284
Group 4: Withdrawn/Inactive	1.654	-0.043	0.242

Unstandardized canonical discriminant functions evaluated at group means.
Unstandardized canonical discriminant functions evaluated at group means.

Support and Assistance.

Support and encouragement from faculty and students was stimulating. Support from peers ranged from encouragement on a particularly challenging assignment to sharing personal stories and school related experiences. Gwen especially benefited from learning about other distance doctoral students and their problems and concerns: ‘‘It’s been neat to just connect with other students in the program and learn that they’re having similar experiences or, they’re just as busy in trying to make everything happen.’’ Advice from the faculty was assignment specific, but also related to the content and logistics of the program. Having been left without an active advisor, Gwen was comfortable asking other instructors academic and dissertation related questions: ‘‘They’ve been very open.’’ Institutional support services played an important role in Gwen’s persistence and she highly rated those services on the survey. She also received constant support from her new employer and her colleagues, as well as her parents and three sisters. The photos she provided reflected a loving and caring family, attentive to each other’s needs. A cat, named Sam, was another source of support. Gwen admitted both taking care of Sam and his calm attitude kept her ‘‘sane and balanced.’’

Self-Motivation.

Gwen was highly motivated to earn a doctoral degree and it positively influenced her persistence in the program. For her securing the terminal degree was both a dream and a personal challenge. She was aware that the process was not smooth and there could be a lot of challenges: ‘‘I had just known upfront that it takes a lot of initiative and self thrive to make things happen.’’ Gwen admitted even negative experiences with academic advising would not impact her desire to persist and finish the program. The very idea of moving through the program and being close to completion of her course work was stimulating: ‘‘Knowing that . . . almost within the next year I’ll be starting a new phase of the program . . . keeps me motivated.’’

Lorie

Lorie was 43 years old and in her fourth year in the program. She worked as Academic Dean at a private business school on the Eastern Coast. Lorie had been married for 23 years and had a 23-year old son, who was a college senior. She successfully completed 45 credit hours of course work via distributed means. At

the time of the study she was working on her dissertation and writing the comprehensive examination.

Quality of Academic Experiences.

Lorie's persistence in the ELHE program was affected by its high quality. On the survey, she indicated program quality, prestige, and offerings as factors contributing to her persistence. Lorie claimed she was learning more online than if she were in a conventional classroom: ''I anticipated that maybe I wouldn't learn the depth that I was accustomed to being in the classroom . . . But much to my surprise, I found that it was better.'' She also benefited from the opportunity to learn from other students and tried to read and respond to everybody in class. Lorie found the course work relevant to what she was doing in her professional life. She benefited most from courses when instructors were acting as facilitators, encouraging students to seek knowledge and find the answers themselves. With few exceptions Lorie received positive and constructive feedback from the instructors and it fulfilled her expectations: ''It was exactly what I needed to hear.''

The quality of advising evolved along with Lorie's matriculation in the program. When her academic advisor retired, it took nearly a month to get the new advisor to respond to Lorie's e-mail messages. Subsequently, the advisor became more responsive and attentive to her needs. Lorie claimed her advisor had a crucial role in the dissertation stage of her program: ''I've never done this before . . . and [advisor] knows the process, and exactly what the committee is looking for, and what works, and what doesn't.''

Online Learning Environment.

The distributed learning environment offered Lorie convenience and flexibility of learning and positively enhanced her persistence. ''I guess that's probably the thing that supported me, that allowed me to stay in the program, because I travel a lot.'' A high comfort level with technology made it easy for Lorie to learn in this environment. She also enjoyed writing, was comfortable developing essay-type responses to course assignments and participating in online discussions. She purposefully involved herself in discussions with students she had taken classes with, because she knew their ''mannerisms, behavior and responsiveness.'' Examination of selected archival Lotus Notes classes Lorie had taken revealed she typically interacted with the same group of students. Lorie believed a learning community was established among the virtual students, but it was limited to a

particular course and built around some course issues: ‘‘It was a community of learners that had a particular interest in a particular subject matter.’’ However, with some students the relationship extended beyond online interactions and later Lorie was able to meet with two students when she traveled to the states they lived in.

Support and Assistance.

Lorie’s efforts to pursue the degree via DE were supported at different levels. Because she had to travel a lot for her work, the instructors were responsive and willing to accommodate to Lorie’s needs. Support from other students in the program was essential, but limited, although she admitted having good relationships with other students and rated peer support high on the survey. Support from the academic advisor came in the form of guidance with ‘‘how-to kinds of things.’’ She pointed out student support services played an important role in her persistence in the program, despite not being highly visible. Unfortunately, Lorie did not provide any information related to support from her family and employer.

Self-Motivation.

Motivation played an important role in Lorie’s persistence in the program. She had always dreamed of having a doctorate, and her intrinsic motivation was supported by a sense of responsibility for the process and by the very nature of the online learning environment, where one’s work was exposed to and evaluated by everybody in class. She also knew her classmates depended on her participation in online discussions or her involvement in virtual group projects: ‘‘I knew . . . without [my piece of the puzzle] we were all going down.’’ The fact Lorie enjoyed what she was doing in the program added to her intrinsic motivation. She found the process of learning exciting and fascinating: ‘‘I enjoyed it. It was like almost my entertainment and my recreation in a twisted way, I guess.’’ A dissertation fellowship added extrinsic motivation to Lorie’s persistence in finishing the program.

Larry

Larry was 45 years old when he graduated with the PhD degree from the ELHE program in the Spring of 2001. He successfully completed the program in four years and did most of the coursework online. He was then Dean of Language and Letters in a private religious university in a northwestern state. Larry had been

married for more than 25 years and had four children, two graduated from college and one son still in high school.

Quality of Academic Experiences.

Larry's persistence in the program was positively affected by its quality. The program was structured and well laid out, ''I knew exactly what I needed to do.'' The course work was relevant and the content covered distinct dimensions of an administrator's work and issues: ''The things I was learning . . . were just as current as issues that we were facing on our campus.'' The emphasis of the program on engaged learning and written communication made it even more appealing to Larry. The idea of learning from colleagues from all over the country and other nations in addition to books and other data sources was beneficial. This idea was also reflected in the professional performance portfolio Larry submitted to his advisor as part of the degree requirement.

Faculty feedback varied in its quality and for Larry sometimes lack of faculty commitment to online students was disappointing. He assigned a big role to his academic advisor in his successful matriculation in the program. The advisor provided high quality professional advice and was an instructor in a third of Larry's courses: ''Very good personal encouragement and advice on many dimensions.'' Larry also received quality feedback from his dissertation committee members and believed their role was central in the final stages of his program.

Online Learning Environment.

The online format of the ELHE program positively affected Larry's persistence. On the survey, Larry chose family, work schedule, convenience and flexibility of the program offerings as factors important for his decision to persist in the program. Absence of time and place constraints gave Larry the convenience of adhering to his work routine and the opportunity to be with his family and his teenaged children even while taking classes: ''I was able to work during the day, come home and have dinner with my family, and then sit in my office during the evening at my home and do my course work.'' This flexibility gave him emotional freedom to pursue the degree.

Larry's comfort level with online learning was very high. Because he was trained as a journalist and liked writing, he never experienced any problems interacting with his classmates in the discussion threads, or communicating with instructors

via electronic means. The structure of the program and the delivery method provided a nice fit to his background, talents, and skills, making it easier to be successful in the program: ‘‘. . . if I were in another program, I think it would have been very difficult.’’ Larry believed a community of virtual learners had been established, though it was not sustained over the time: ‘‘It was really interesting our first semester together, how much time we spent in the cafeteria talking to each other and getting to know each other a little bit better, and how that over time seemed to fade away.’’ The students recognized how demanding it was for everybody to have a full-time position and to pursue a doctoral degree, so the role of the community was not strong.

Support and Assistance.

Larry received support and encouragement at different levels. High quality advising and personal friendship with the academic advisor created a supporting niche and helped Larry complete the program. Instructors were always ready to waiver the assignment due date understanding the challenges of online learning. Relations with classmates were built on mutual respect and recognition, and the students were sensitive to Larry’s religious background and respected his viewpoints. Continuous assistance from different university support services also helped Larry move through the program. Technology help with the course software and platform problems was for the most part ‘‘timely’’, library resources were ‘‘invaluable’’, and the registration and records department staff was always ‘‘beyond helpful.’’ Larry also highly rated institutional support services on the survey.

Support also came from sources external to the program, such as family and work. Larry’s family had created a supportive environment for him and encouraged his efforts in pursuing the doctorate degree. Larry assigned his mother one of the major roles in his getting the doctorate: ‘‘. . . she’s probably my number one supporter in terms of ‘I’m so proud of you’.’’ The president of the university where Larry was employed also provided constant encouragement and help, including emotional support, release time, and financial assistance.

Self-Motivation.

The innovative character of the ELHE program and the notion of pursuing advanced graduate studies via DE constituted specific value for Larry and raised his motivation. The fact of being among the few faculty with a doctoral degree at the institution that did not have a doctoral requirement added to Larry’s

recognition and self-esteem. Larry assigned a big role to himself and his personal motivation in his efforts to pursue a doctorate via DE. Only once after successfully finishing all the course work and passing his comprehensive examination, did Larry considered quitting the program: ‘‘I was getting weary of the grind for the two solid years, year round . . . Just to finish my coursework and my comps. And then you look at that mountain of a dissertation and you’re thinking, do I have it in me to even complete that?’’ It took Larry some ‘‘real internal motivation to get going again’’ in addition to the encouragement from the academic advisor, his family and university president.

Susan

Susan was 54 years old when she withdrew from the ELHE program. She worked as a registrar at a small private religious college in one of the northern states. She successfully completed two online courses in the program and both were related to her major. At the time of the study she had completed two years of a three year doctoral program at a small private university within 40 miles of her home. She was a single person with no children.

Quality of Academic Experiences.

Though Susan took only two courses in the program she believed its quality was high and it was tailored to meet students’ needs. She appreciated the broad content of the program and the opportunity to choose the area of concentration later. She was mostly satisfied with the feedback she was getting from the faculty regarding her course work and the promptness of their responses. She also benefited from her interactions with the academic advisor. Though Susan did not get far into the program and did not have an opportunity to discuss the future dissertation, she received good and quick advice from her advisor: ‘‘When I wrote a couple of times about different things, [the advisor] was quick to answer and gave me good advice.’’ On the survey, Susan highly rated advising. At the same time, Susan was not satisfied with the quality of other doctoral students’ postings and feedback. She believed the students did not possess the appropriate writing skills so important in the program with the focus on written interaction: ‘‘It was frustrating to try to respond to those people . . . They really didn’t write very well. They didn’t express themselves that well.’’ She also did not like the nature of the discussion going online. She thought it was primarily academic and more focused on the exchange of facts, but not the opinion.

Online Learning Environment.

Convenience and freedom of time was one of the biggest attractions for Susan in the ELHE program. The focus on writing did not bother her and she was comfortable developing essay-type responses to assignments and responding to other students' postings. However, the asynchronous format of the online courses did not match Susan's learning style. She missed the real time component of face-to-face interactions and could not comply with it: ''The whole format of posting my response and then reading other people's responses and responding to them . . . that was very frustrating to me.'' On the survey, Susan indicated that the online format was the primary factor influencing her decision to withdraw from the program.

Susan was also concerned with not seeing other students and instructors and not being able to observe their body language. In her new campus-based program this component was present and, reportedly, positively affected her persistence. She also believed there was not much community building in the courses she took. On the survey, Susan indicated lack of personal contact with fellow students as the biggest barrier for her in distance learning. Exploration of two Lotus Notes archival courses she had taken showed little social interaction in the course Virtual Cafeteria. Susan herself did not invest a lot of effort into establishing the online community either. Those two components, online learning environment and lack of personal interaction, were the only reasons for Susan not to continue with the program: ''The problem was not with [the university] and it wasn't really with the program. It was with the method. And that would be my primary concern and my primary reasons for leaving the program.''

Support and Assistance.

Although Susan took only two classes in the program, she sensed the supportive atmosphere created by the faculty, students, and institutional support services. The feedback she received from the faculty, especially personal encouraging notes in one class, was helpful to stay focused on the task. Both instructors were also willing to accommodate to her needs. Susan received quick assistance with the technological problems: ''When I contacted them, I did get answers pretty quickly.'' When she was getting set up to take her first course in Lotus Notes, she got all the help she needed and in a timely fashion. That created a positive atmosphere for her to begin the program.

Self-Motivation.

In spite of the fact Susan withdrew from the ELHE program, she was highly motivated to earn a doctoral degree. When Susan realized pursuing the degree in the distributed learning environment did not fit her learning style, she began looking for an alternative doctoral program, where she could have real time communication and meet other doctoral students in person. At the time of the study Susan was working on her EdD in Leadership at another university. Every week, she drove 40 miles one way to meet with her cohort. In addition to enjoying the format of her new program, Susan claimed she had a strong personal responsibility for earning the degree. This sense of responsibility and a long-term wish to have a doctorate acted as a driving force for Susan as she commuted weekly to the class and complied with whatever other difficulties she had to face: ‘‘It’s me, or it ain’t going to get done.’’

Cross Case Analysis

Four similar themes related to the participants' persistence in the ELHE program emerged in the analysis across four cases: quality of academic experiences, online learning environment, support and assistance, and self-motivation. In spite of being common for all participants, those themes differed in the number and similarity of sub-themes and categories comprising them (see Table B.6).

TABLE 8.6 ■ Themes, Sub-Themes, and Categories Across Cases

Themes, Sub-Themes	Gwen	Lorie	Larry	Susan
Quality				
University		Distance education	Research one	
Program	Well-structured	Well-structured	Well-structured	
	Relevant	Relevant	Relevant	
	Scholarly	Scholarly	Scholarly	
	Learning from others	Learning from others	Learning from others	
	Challenging	Challenging		
		Broad content		
	Delivery	Depth	Clarity of expectations	Broad content
	Good fit	Well-known	Engaged learning	Good
	Reputation		Written dialog	Students' needs
	High standards		Laid out	
Faculty	Feedback	Feedback	Feedback	Feedback
	Involvement	Involvement	Involvement	Involvement
	Prompt			Prompt
		Facilitating	Interactions	
		Readiness to teach online	Commitment	
Students	Feedback		Feedback	Feedback
	Professional		Interactions	Writing skills
	Positive		Varied	Fact based discussion
Advising	Negative	Need	Professional	Helpful
	Useless	Varied	Involvement	Prompt
	Lack of guidance	Knowledge of the process	Diligent	
	Communication		Champion dissertation	
	Switching advisor			
Dissertation Committee Members			Second opinion	
Online learning environment				
	Convenience	Convenience	Convenience	Convenience
	Flexibility	Flexibility	Flexibility	Flexibility
	Learning style	Learning style	Learning style	Learning style
	Non-physical presence	Non-physical presence	Non-physical presence	Non-physical presence
	Online community	Online community	Online community	Online community
	Comfort with technology	Comfort with technology	Comfort with technology	
		Work schedule	Work schedule	Work schedule
	Mental images	Class size	Emotional relief	Writing component
	Learning via distance	Familiar students	Staying with family	Non-real time
		Meeting in person		Involvement
Support				
University			Cooperation	
Faculty	Willing to accommodate	Willing to accommodate	Willing to accommodate	Willing to accommodate
	Varied	Receptive	Personal relationship	Personal notes
	Responsive			
	Advice			
	Open			
Students	Encouragement		Encouragement	Encouragement
	Sensitive		Sensitive	
	Polite	Using for references	Respect	
	Personal experiences	Limited to course activities	Recognition	
	Sympathies		Best wishes	
	Congratulations			
Academic Advisor	None	Assistance-guidance	Assistance	No need for assistance
		"How-to"	Friendly	
			Encouragement	
			Personal interest	
			Accommodating	
Student support services	Prompt	Prompt	Prompt	Prompt
	Helpful	Not helpful	Helpful	Helpful
		Smooth		Smooth
	Convenient	Simple	Timely	Straightforward
	Always worked		Easily solved	
	Friendly		Attention	
			Qualified	
Family	Encouragement		Encouragement	
	Pride		Pride	
	Care		Supportive environment	
	Attention			
Employment	Time off		Time off	
	Life learning		Encouragement	
	Sharing experiences		Advice	
			Extra credit	
			Pushing	
Pet	Watching silently			
Self-motivation				
	Responsibility	Responsibility	Responsibility	Responsibility
	Enjoyed	Enjoyed	Enjoyed	Enjoyed
	Exposure	Exposure	Exposure	
	Dream	Dream		Wish
	Balancing	Balancing		
		Dissertation	Dissertation	
	Personal challenge	Dependability	Career advancement	Accreditation
	Credentials	Frustration	Recognition	
	Personal drive	Fellowship	Compensation	
	Extra effort		Experience distance learning	
	Finishing coursework		Doctoral work	
	Staying positive			

Overall, there were more similarities between the participants who were still in the program, although at different stages, than with those who graduated or withdrew from the program. Factors deemed important for these four participants as related to their persistence in the ELHE program were:

Quality of Academic Experiences.

This included quality of the program and relevance of the course work, focus on engaged learning, quality of faculty and student feedback and their involvement with online courses, quality of academic advising and an advisor's commitment to students.

Online Learning Environment.

The online environment offered students convenience and flexibility of learning, although it differentially affected students' persistence. The students who persisted had a high comfort level with technology, good writing skills and were comfortable interacting with other students online. The virtual community was not very important because it varied with each class and often was limited to a particular course.

Support and Assistance.

A supporting and encouraging environment, created by both internal and external entities to the program, positively affected students' persistence. The internal sources of support included: faculty responsiveness and willingness to accommodate to distance learners' needs; peer support and encouragement; academic advisor's assistance and guidance; the institutional student support services infrastructure. Support and encouragement from sources external to the program included families, employment, and pets.

Self-Motivation.

This included intrinsic motivation to pursue the doctoral degree in the distributed learning environment, such as personal challenge, responsibility, love for learning, and experiencing the new learning format. Extrinsic factors cited were: career advancement, earning the credentials, recognition, and increase in pay.

Discussion

The purpose of this mixed methods sequential explanatory study was to identify factors contributing to students' persistence in the ELHE program. In the quantitative phase, five external and internal to the program factors (''program'', ''online learning environment'', ''student support services'', ''faculty'', and ''self-motivation'') were found to be predictors to students' persistence in the program. The qualitative follow up multiple case study analysis revealed that four reasons were pivotal: (1) quality of the program and other related academic experiences; (2) the very nature of the online learning environment; (3) support and assistance from different sources; and (4) student self-motivation. The quality of academic experiences had the most favorable affect on the participants' persistence in the program. Support and assistance they received contributed to their matriculation, while the online format was the cause for quitting the program for one participant. All participants were equally motivated to get the degree.

The way quantitative and qualitative findings highlighted the quality of the program and participants' academic experiences in it, the importance of student support infrastructure, and self-motivation to pursue the doctoral degree in the distributed learning environment were consistent with the basic ideas of Tinto's Student Integration Theory (1975, 1993). At the same time, relative importance of the external factors to doctoral students' persistence did not fully support Bean's Student Attrition Model (1980, 1990), which claimed factors external to an institution equally affected students' matriculation in college. However, Bean's model was specifically tailored to the undergraduate student population. For doctoral students pursuing the degree in the ELHE program, external factors might have played a secondary role to the internal factors related to the program and the online learning environment. The qualitative and the quantitative findings in this study supported the principle components of Kember's (1990, 1995) Model of Dropout from Distance Education Courses. Although Kember's model was limited to mostly undergraduate non-traditional students and individual DE courses, the idea of academic and social integration as embracing all facets of DE course offerings found reflection in this study. The quality of the program and academic experiences learning in the online environment, the importance of student support infrastructure, and student goal commitment were integral components of students' persistence in the ELHE program.

Program-Related Factors

Program.

Quantitatively, most of the participants were satisfied with their academic experiences, the relevance and usefulness of the program, and how the program met their needs. The amount of satisfaction, however, was the greatest among the graduated participants and the lowest among the Withdrawn/Inactive group. A multiple case study analysis revealed all participants had high quality experiences in the program. This quality was reflected in the scholarly character of the program, its high standards, clarity of expectations, relevance, good structure and the opportunity to learn from others. The challenging character of the program, its broad content, and focus on engaged learning also were recognized. Quality of interactions with students and their feedback differentially affected the participants' persistence. Those who successfully matriculated in the program received more meaningful and constructive peer feedback.

These findings were consistent with the limited research on the structure and content of a doctoral program and its impact on students' persistence. Usually students' academic experiences in the program were combined with other academic or institutional related factors, such as departmental orientation, relationship between course work and research skills, attitudes towards students, and student participation (Ferrer de Valero, 2001; Golde, 1998). Distance students usually are at a loss for recognizing and coping with such ambiguity, and must rely upon guidance from a concerned academic advisor or other students. In a few studies devoted to the quality of doctoral student experiences in DE programs (Huston, 1997; Sigafus, 1996; Wilkinson, 2002) the program structure was reported to be one of the contributing factors that positively affected students' experiences. Being able to anticipate or know the ''roadmap'' provided students with a sense of control. In a qualitative study of one course offered in the ELHE program (Ivankova and Stick, 2005), the focus of the program on engaged learning was cited as one of its quality indices. The participants believed they benefited more due to meaningful interactions between and among the students and instructors.

Online Learning Environment.

The quantitative results indicated a majority of the participants were comfortable learning in the online environment, were satisfied with their online learning

experiences, and believed learning was at least as effective as in a face-to-face classroom. The more matriculated in the program the participants were, the more positively they rated their online learning experiences. The qualitative findings revealed the participants were attracted by such characteristics of the online environment as its being location and time free, which allowed keeping both work and family schedules intact while taking classes. A second important characteristic was relative flexibility of learning at one's pace and time within the prescribed parameters of the course. However, the online format differentially affected the participants' persistence. For those who successfully matriculated in the program, the asynchronous format positively affected their progress, because, reportedly, it matched their learning style preferences. Factors impeding persistence included the non-real time format of the course related interactions and the focus on written versus oral communication.

These findings are supported by other studies that explored advantages and disadvantages of online learning, although not directly related to the issue of persistence. Flexibility to pursue education at personally convenient times was reported as a great advantage of learning at a distance (Quintana, 1996; Simonson, Smaldino, Albright, and Zvacek, 2000), while the learner-centered focus of online format was argued to lead to increased interaction and more active involvement (Chute, Thompson, and Hancock, 1999; Moore and Kearsley, 2005). The capacity to support interaction in an asynchronous format provided an opportunity for reflection and deliberation not found in any synchronous learning environment, including face-to-face classrooms (Anderson and Garrison, 1998; Berge and Collins, 1995; Hart and Mason, 1999). In addition, text-based communication contributed to a social ''equalizing'' effect with less stereotyping and more equitable participation (Harasim, 1990).

Virtual Community.

Statistically, ''virtual community'' did not contribute to the function discriminating among the participant groups. Overall, half of the participants were satisfied with the online community, and two-thirds of the participants believed they were able to establish long-term social relationship with their fellow-students online. Those who had withdrawn or were inactive in the program more negatively rated their community experiences. The qualitative analysis revealed that although the participants found the virtual community helpful, it was not a very important part of their academic experiences. No participant indicated a strong relationship between the community and his/her persistence in the program, because the community varied with each course, was limited to the

course activities, and depended on one's willingness to participate in it. However, within some courses students managed to create a supportive and encouraging environment, both at the academic and personal level. Thus, social integration for those students was bounded by a particular course and particular activities.

These findings, to some extent, contradicted extensive research on the topic of community building in the online learning environment. Hiltz (1998) argued it was possible for people with shared interests to form and sustain relationships and communities through the use of computer-mediated communication. Community building in such an environment was based on collaborative learning and cooperation between and among the participants (Curtis and Lawson, 2001; Harasim, Hiltz, Teles, and Turoff, 1995; Palloff and Pratt, 2003). However, these and other studies mostly explored community building in single distance courses. Although an established virtual community reportedly helped keep students in a course (Brown, 2001; Eastmond, 1995; Garrison, 1997; Hiltz, 1998; Ivankova and Stick, 2005; Palloff and Pratt, 2003), community development was not studied from the angle of students' persistence in the entire program, and specifically a doctoral program. The results from the current study were interpreted as meaning community was a transitory phenomenon and was viewed as one of many ''communities'' the participants functioned in.

Academic Advisor- and Faculty-Related Factors

Academic Advisor.

Although statistically an academic advisor did not have any significant effect on the participants' persistence in the program, about two-thirds of the participants were satisfied with the relationships they had with an academic advisor. More matriculated students had more positive experiences than the Beginning or Withdrawn/Inactive participants. Case study analysis showed that the quality of advising differed across the four participants. In the case of the graduated participant, the academic advisor's involvement was very high and was reflected in good professional advice, diligent feedback, and guidance with the dissertation. For another participant, who was approaching the dissertation stage in the program, advising was limited to providing knowledge of the process. The one, who had withdrawn from the program, had little exposure to advising, but what had been provided was deemed helpful and prompt. For the fourth participant, who was in the first half of the program, the academic advising experience was negative. Reportedly, there was lack of guidance, communication, and whatever little feedback was provided turned out to be of questionable value. Efficient academic advising also was associated with support and assistance in academic and personal problems, and encouragement toward earning the degree.

The fact that an academic advisor did not significantly affect students' persistence in this study was not consistent with other research on doctoral students' persistence. Ferrer de Valero (2001), Girves and Wemmerus (1988), Golde and Dore (2001), and Lovitts (2001) found that positive relations between a student and academic advisor were important for doctoral students' persistence in traditional campus-based programs. Doctoral students' withdrawal from a program was also reported to be due, in part, to inadequate or inaccurate advising, lack of interest or attention on the part of an advisor, and unavailability of an advisor (Bowen and Rudenstine, 1992; Golde, 2000). The inconsistencies of these findings might be explained by different doctoral student populations studied. Presumably, DE students were more self-sufficient and more focused on earning their degree. Being educational administrators in their professional lives, they might have been more organized and disciplined to persist in their efforts, and for many earning a doctoral degree was a necessary credential for keeping a job or getting promoted. In addition, there were other members of the program faculty always ready to provide the necessary guidance and assistance when an assigned academic advisor was not available.

Faculty.

In the quantitative analysis, ‘‘faculty’’ was found to significantly contribute to the function discriminating among the four groups as related to their persistence. The degree of satisfaction with different aspects of instructors’ teaching in the distributed environment varied. The participants were more satisfied with instructors’ accessibility and promptness of feedback, than the quality of their feedback and their willingness to accommodate to distance learners’ needs. The qualitative findings revealed that the quality of feedback depended on the readiness of faculty to teach online, their involvement with a course, and commitment to students. Students’ persistence was positively affected by support and encouragement they received from the faculty and their ability to provide personal assistance. Such responsiveness was especially important in the absence of any assistance or guidance from an academic advisor.

These findings were supported by other studies of doctoral students’ persistence. Lack of persistence in traditional doctoral programs often was attributed to lack of support and encouragement from a department and departmental faculty (Ferrer de Valero, 2001; Golde, 2000; Hales, 1998; Lovitts, 2001; Nerad and Cerny, 1993). Students who perceived support from their faculty were more likely to complete their degrees. However, little research has been conducted on the role of faculty in DE doctoral students’ persistence. For example, in Sigafus’s (1996) study faculty was cited as the most helpful source of support for those students.

Institution-Related Factors

Statistically ‘‘student support services’’ significantly affected the participants’ matriculation in the program. Although more than half of the participants were satisfied with the institutional support services, their satisfaction differed depending on the particular service. The degree of satisfaction was not always consistent across the three matriculated groups, with the exception of the Withdrawn/Inactive participants who were the least satisfied. The case study analysis revealed that although the participants differed in the type and number of services they used and this need depended on the student’s status in the program, the support infrastructure was friendly, convenient, and timely, and the procedures were convenient, smooth, and simple.

The importance of having a good support infrastructure for DE students was well established in the literature (King, Seward, and Gough, 1980; Moore and Kearsley, 2005; Rumble, 1992; Simpson, 2000). Availability and access to student support services were found to be a critical factor in distance students’ academic success (Biner, Dean, and Mellinger, 1994; Tinto, 1993; Voorhees, 1987). However, no studies were located that explored the role of institutional support infrastructure in doctoral students’ persistence in the distributed learning environment or programs like ELHE.

Student-Related Factors

Quantitatively, ‘‘self-motivation’’ had a significant effect on students’ persistence in the program. All participants, except for the Withdrawn/Inactive group, were highly motivated to pursue the doctoral degree via distributed means. Not surprisingly, the Graduates were the most motivated group, while the Matriculated group was more motivated than the Beginning group. The case study analysis revealed that motivation was a strong factor for successful matriculation in the distributed environment. Intrinsic motivation included love for learning, personal challenge, a life long dream, and experiencing the new learning format. Responsibility was sustained by the fact everybody’s work was being judged and evaluated by everybody in a class. Balancing work and studies was a challenge to motivation, but the unstructured process of dissertation work, perhaps, was the most daunting. Extrinsic factors also were important for staying on task; however, they were more important for male than female participants.

These findings were supported by other studies of doctoral students’ persistence with regards to their motivation to complete the degree. Ferrer de Valero, (2001), Lovitts (2001), and Reynolds (1998) demonstrated that self-motivation was an important factor in obtaining the doctorate in campus-based programs. Students who had a ‘‘never give up’’ attitude, or had positive views of themselves, were more likely to complete the doctorate, especially during the tenuous time between course completion and dissertation work. Motivation and assumption of the responsibility for the learning process were especially important for distance doctoral students. Intrinsic motivation was reported as a significant predictor of success for such students (Huston, 1997), while personal responsibility was found to be a contextual factor helping students matriculate successfully in the online environment (Scott-Fredericks, 1997).

External Factors

Based on the quantitative analysis, external factors, such as ‘‘family and significant other’’, and ‘‘employment’’ did not significantly affect students’ persistence in the ELHE program, although two-thirds of the participants reported being supported by family, significant others, friends, and employers in their efforts to study in the distributed environment. The graduated participants received the most support among the four groups; however, they also claimed to be the most challenged by pressing job responsibilities and work schedules. The qualitative findings revealed different participants had different sources of external support: for some it was family and employment, for others family and pets, and for some there was no apparent support from external sources.

These findings were partially consistent with previous research. Frasier (1993), Girves and Wemmerus (1988), and Siegfried and Stock (2001) also indicated marital status did not affect doctoral students’ persistence in campus-based programs. In the AHA Survey of Doctoral Programs in History (The American Historical Association, 2002), only 4% of the history major students indicated family reasons were among the most important factors causing them to drop out from doctoral programs. On the other hand, Golde (1998) found family commitments were crucial barriers leading some participants to quit the program. For traditional campus based doctoral students keeping priorities straight and balancing work and family is more difficult and might result in procrastination or withdrawal from the program. This study focused on doctoral students pursuing degrees in the distributed environment, which offered convenience, flexibility, and the opportunity to keep regular work and family schedules. Free from the constraints of the traditional classroom, DE students could establish priorities, choose suitable time for studies, and enjoy full-time employment. Limited research on the effect of external factors on doctoral students’ persistence in the distributed environment also suggested families, friends, and employers among the most helpful sources of support (Huston, 1997; Riedling, 1996; Sigafus, 1996).

Implications and Recommendations

Recognizing that many institutions of post-secondary and higher education offer graduate and professional degrees via distributed means, the results of this study are aimed at numerous stakeholders: policy makers and educational administrators, graduate program developers and instructional designers, institutional faculty and staff, and students, who currently pursue their doctoral degrees in the distributed environment or consider doing so. Knowing the predictive power of external and internal factors to students' persistence in the distributed learning environment may assist programs in developing strategies to enhance doctoral persistence and eventually degree completion. Specifically, the implications of this study include:

1. The scholarly and challenging character of the program, its relevance and applicability to students' professional activities, high standards and focus on an individual may lead to a more successful matriculation in the program. A distributed program meeting such requirements may have a greater potential for attracting promising applicants, nurturing their scholastic development, and ultimately improving their persistence and graduation rates.
2. To benefit from learning in the distributed environment, students need to be comfortable with technology and have good writing skills. Text-based learning should match their learning style preferences and they should be comfortable interacting with other students and instructors online. Students considering or applying to a distributed program should be informed upfront of the program format and what the expectations are in terms of performance.
3. Students benefit from online courses when an instructor acts as a facilitator of learning, is actively involved with the course, and provides the necessary encouragement and assistance. To fulfill this role, faculty should be prepared to teach online, be ready to provide constant and timely quality feedback, and be flexible to accommodate to distance learners' needs.
4. Institutional student support infrastructure should be in place to assist distance learners with all their needs, problems and concerns. Such infrastructure should include all possible services distance learners might encounter during their matriculation process. Of particular importance is prompt and qualified assistance with possible technology problems, obtaining the course materials, and gaining access to the library reserves and other resources.

5. Students who want to succeed in a distributed learning environment need to be highly motivated, disciplined and organized to successfully balance studies, work, and families. Students' intrinsic motivation should be supported and encouraged by the program quality, user-friendly online format, favorable learning environment, as well as external to the program factors. Extrinsic motivation also is important, but could be different in each particular case.
6. The quality and responsiveness of academic advising in distributed doctoral programs need to be at a high level. Students should receive professional advising and guidance from their academic advisor throughout the entire program. Reasonably consistent contact between a student and an advisor helps ensure a continued progress in a program. Assistance with academic problems and personal encouragement should be part of a distance advisor–advisee relationship.
7. Online community may enhance students' progress, if it is established and supported throughout the entire program. Faculty may take a lead in launching and facilitating informal interactions with the class alongside with other academic activities. Schools and departments also should reflect upon more strategies to virtually bring distance learners together, such as summer residencies, listservs, and virtual student organizations.

This study provided only one perspective on persistence in the distributed doctoral program—that of the students themselves, excluding other internal and external constituents. Also, the marginal reliability estimates of the two sub-scales measuring ''family and significant other'' and ''employment'' are recognized as the limitation to the related findings. Being the only research on students' persistence in a distributed doctoral program, this study leaves some unanswered questions and opens a door for future research on students' persistence in such environments. In-depth exploration of distance students' persistence might help their journey be less stressful and more efficient. The results would be productive for students, institutions, and society.

Notes

1. The study design was reported elsewhere (Ivankova, 2004; Ivankova, Creswell, and Stick, 2006).

2. A detailed explanation of the case selection procedure for the qualitative phase of this study was reported elsewhere (Ivankova et al., 2006).

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Appendix C The Development of Client Violence Questionnaire (CVQ)

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Source: Enosh, G., Tzafrir, S. S., & Stolovy, T. (2015). The development of Client Violence Questionnaire (CVQ). *Journal of Mixed Methods Research*, 9(3), 273–290.

Abstract

The purpose of this study was to develop, test, and validate a questionnaire for assessing social workers' exposure to client violence, which we call the Client Violence Questionnaire (CVQ). Following established procedures for scale development, four distinct stages of research were conducted, combining qualitative and quantitative methods. The contribution of this study is threefold—methodological, conceptual, and practical. The instrument offers practitioners and academic researchers the opportunity to apply the scale both for internal monitoring and knowledge sharing as well as further research. The development process of the CVQ scale demonstrates how the qualitative method can serve as a distinct research stage and at the same time support and enhance the quantitative one, thus contributing to the validity and applicability of the instrument.

Keywords

Scale development, workplace violence, social work

The phenomenon of client aggression and violence toward social workers has been documented in various parts of the world (e.g., Jayaratne, Croxton, & Mattison, 2004; Koritsas, Coles, & Boyle, 2010; Kosny & Eakin, 2008; Littlechild, 2005; Macdonald & Sirotich, 2005; Virkki, 2008). Professionals in human service occupations are being increasingly subjected to client-perpetrated violence (Koritsas et al., 2010; Virkki, 2008). Violence can take many forms, which include verbal abuse, threats, intimidation, actual physical attacks, and sexual or racial abuse (Harris & Leather, 2011). Wynne, Clarkin, Cox, and Griffiths (1997) suggest a broad definition of workplace violence that includes any incident or behavior in which people are abused, threatened, or assaulted in circumstances related to their work and that result in explicit or implicit threat to their safety, well-being, or health.

No organization is an island. The organization and its members affect the context in which they operate and are affected by it (Johns, 2006). Violence against service providers always occurs within a specific context. Studying client violence requires a measure that will make it possible to compare various contexts and contextual variables. Despite the frequency of client violence, its negative effects, and the need for effective prevention policy (Sarkisian & Portwood, 2003), the measurement instruments used to study this subject were developed either for specific contexts or other types and contexts of violence, or both (e.g., Gately & Stabb, 2005; Ringstad, 2005). Therefore, the goal of this study was to develop a behavior-based instrument that could be used to compare between different types of workplaces, services (health, tourism), sectors (public, private), and occupations (social workers, nurses, bank workers, hotel personnel). In the current study, we have developed and validated the instrument for one specific population: social workers.

Theoretical Background

Social workers are particularly exposed to client violence (Harris & Leather, 2011). However, the levels of exposure are not uniform across different types of social work. According to Jayaratne et al. (2004), social workers in public and nonprofit agencies are at higher risk for client violence than social workers in private practice. Indeed, mental health and child welfare workers' exposure to violence was reported as especially high (Scalera, 1995; Shields & Kiser, 2003). Winstanley and Hales (2008) found that residential social workers are particularly at high risk for client violence. Balloch, Pahl, and McLean (1998) presented contradictory findings of lower risk among home care workers. In Israel, most client violence toward social workers between the years 1998 and 2011 involved requests for financial support (Ministry of Social Affairs and Social Services [Israel], 2012). In 2002, almost 200 cases of client violence toward social workers were reported and an additional 50% are estimated as having never been reported. The most frequent type of aggression was verbal, followed by property damage and physical aggression (Levi, Sarig & Rubin-Shlager, 2004).

The reasons for social workers' exposure to client violence emanate from the omnibus nature of the context (Johns, 2006), including the nature of the profession and discrete aspects of the context, including task-related factors (the worker) and the social diversity of the clients. First, the profession involves daily interaction with voluntary and involuntary clients who are asked to discuss private, often sensitive topics (Shields & Kiser, 2003). The delivery of social services itself is risk related because it is tied to social control, for example, the authority to deny resources, usually because of lack of eligibility, may provoke aggression (Newhill, 1995). Second, the clients of social service agencies must often cope with high levels of frustration and many unmet needs (Shields & Kiser, 2003). Clients who exhibit poor judgment or lack of impulse control, or those whose history includes substance abuse or violent behavior, or clients with access to weapons were found as more prone to act violently (Shields & Kiser, 2003). In mental health settings, clients with acute psychosis or personality disorders were also found more prone to violence (Folger & Baron, 1996; Morisson, Lantos, & Levinson, 1998). Third, worker-related characteristics may play a role, for example, young professionals (Jayaratne et al., 2004) and inexperienced ones (Brady & Dickson, 1999) are more prone to client violence. Some claim that male workers are more exposed to violence (Jayaratne et al., 2004; Ringstad, 2005), whereas others maintain that it is female workers who are

more exposed (Lanza, 1996), particularly to sexual harassment (Koritsas, Coles, Boyle, & Stanley, 2007).

Exposure to client violence can be experienced as a traumatic event. It evokes strong feelings of anger toward the clients involved, as well as shock, fear, detachment, and anxiety (Jayaratne et al., 2004; Koritsas et al., 2010; Kosny & Eakin, 2008; Littlechild, 2005; Macdonald & Sirotich, 2005; Virkki, 2008) and compromises workers' effectiveness and standards of care (Koritsas et al., 2010). It diminishes work satisfaction (Harris & Leather, 2011) and may contribute to workers deciding to leave their profession or place of employment (Needham et al., 2005). Workers also report lack of sufficient support from supervisors and managers who tend to downplay the importance of the aggression, causing workers to feel threatened and hurt.

Despite the frequency of client violence, its negative effects, and the need for an effective prevention policy (Sarkisian & Portwood, 2003), the instruments used to study this subject were developed for specific contexts to measure other types of violence. To date, none were behavior-based instruments that could be used for measurement and comparison across contexts and professional boundaries. For instance, Ringstad (2005) used a modified version of the CTS-2, which was originally developed to measure conflicts between couples. Others have attempted to measure violence indirectly, using, for example, the Confidence in Coping with Patient Aggression Instrument (Gately & Stabb, 2005). Studies exploring exposure to violence among social workers have used different self-designed measures focusing on the unique characteristics of the setting and workplace (Jayaratne et al., 2004; Koritsas et al., 2010; Littlechild, 2005; Macdonald & Sirotich, 2005; Norris, 1990; Shields & Kiser, 2003). For instance, Koritsas et al. (2010) designed a questionnaire evaluating the frequency of exposure to specific predetermined types of client violence with respect to the unique setting in which the violent event occurred and clients' and workers' demographic characteristics. Their pilot questionnaire was given to health professionals, and after changes to it were made, it was administered to a large sample of Australian social workers. The authors used discriminate function analysis to determine which variables predict group membership (participants who were exposed to violence); however, reliability was not reported.

The purpose of this study was to systematically develop a behaviorally based, universal instrument measuring client violence. This study presents the process of instrument development and initial validation among a sample of Israeli social workers. We used a sequential mixed methods design (Creswell & Plano Clark,

2007), which we chose to maximize instrument fidelity and the appropriateness and utility of the instrument (Leech & Onwuegbuzie, 2010). The next section presents the empirical development of the scale.

Research Design and Method

Schwab (1980) suggested three stages for the development of an instrument. The first deals with devising an individual item for the measurement; then the individual items are combined into scales; and finally, the psychometric analysis of the measure is performed. A mixed methods design was selected to capitalize on the strength of both quantitative and qualitative approaches to help explain significant findings (Leech & Onwuegbuzie, 2010) and for its ability to address the research purpose with sufficient depth and breadth (Chen, 1997). The study was a sequential mixed methods design (Creswell & Plano Clark, 2007; Johnson & Onwuegbuzie, 2007; Teddlie & Yu, 2007). Achieving depth was essential to be able to shed light on the social workers' experience of client violence in their unique and distinct contexts, and breadth of research was necessary to provide generalized, quantified outcomes for different types of violence in different fields. Before constructing questionnaire items on the basis of previous research, an exploratory interview was conducted to assess the appropriateness of the concept to the particular work environment, culture, and context selected for the study.

In the first stage, qualitative semistructured, in-depth interviews were carried out to map the forms of client violence experienced by social workers. In the second stage, an instrument was developed on the basis of the interviews and validated using face validity and interrater reliability. In the third stage, the convergent validity was tested on a second sample of social workers by asking the respondents to comment on the questionnaire. In the fourth stage, data collection was conducted using questionnaires that had been modified on the basis of the results and respondents' comments. Regarding research ethics (Rea & Parker, 2012), in all the stages, participants were informed that they had no obligation to participate and were free to refuse or stop the interview at any stage. In the first two stages, since those were based on face-to-face interviews, anonymity could not be offered, yet identifying details were kept confidential; recordings of interviews were coded numerically, and the coding scheme relating recordings, transcriptions, and names were kept separately from the data, in a locked place. The third and fourth stages were based on questionnaires, and total anonymity was retained. The study was authorized by the university committee for ethical research on human beings.

Stage 1: Mapping the Forms of Client Violence

The goal of this stage was collecting direct descriptions of social workers' experiences to understand their unique perspective of client violence and explore basic patterns to their experiences (Boyatzis, 1998; Braun & Clarke, 2006).

Participants.

This phase used purposive sampling to recruit 38 male and female social workers who had experienced client violence over the preceding year. The interviewees were drawn from different fields of social work: welfare officers and general social workers from municipal social service departments, mental health social workers, workers from different agencies aiding drug victims, people with retardation, and the elderly population. Interviewees were recruited by approaching the agencies, presenting the study at staff meetings, and requesting voluntary recruits who experienced client violence to be interviewed. Recruits were informed that the study dealt with experiences of social workers service interactions with clients and their reactions to it. Of all the interviewees, 80% were women, a similar percentage to that of women employed by the Ministry of Social Affairs and Social Services, which was 76% as of 2007 (Central Bureau of Statistics, 2008).

Data Collection.

Qualitative data were collected through semistructured, in-depth interviews to study the participants' experiences, emotions, and behaviors, as well as the meanings they assigned to the violent occurrences. No predetermined categories were superimposed on the data (Kvale, 1996; Rubin & Rubin, 2005). The main goal was to facilitate a critical thinking process among the workers (Ben-Ari & Enosh, 2011; D'Cruz, Gillingham, & Melendez, 2007), thus allowing them to relate to their experiences both from an experiential perspective and a reflective one, as recommended when interviewing abuse victims (Enosh & Buchbinder, 2005). This method is similar to Buss and Craik's (1983) ''act frequency analysis'' approach to construct validity, in that it asked people to name acts—specific, intentional behaviors—related to client violence. The interview guide was constructed using an iterative process: It was modified after each of several interviews with the social workers until the final version was reached. Interviews were conducted by experienced graduate students who were trained in qualitative in-depth interviewing. Interviews were conducted at places indicated as

preferable by the interviewees (some were conducted at their workplace, some at the university facilities, and some at other locations) and lasted between 45 and 90 minutes. The interview recordings were transcribed to allow for later cross-sectional analysis.

Data Analysis.

Charmaz (2006) presents clear guidelines for the processes of separating, sorting, and synthesizing large amounts of data, by using qualitative coding. Those guidelines are in accord with the flexible framework of thematic analysis (Boyatzis, 1998; Braun & Clarke, 2006). These codes are initially written down as names or short phrases next to a word, line, or segment of the data (an interview transcription); later, the most significant or frequent codes are identified. After the categorization and analysis of the data and emergent themes, a theory explaining the studied phenomenon is proposed. Another phase of the interview analysis that we carried out included open coding, axial coding, and integration (Strauss & Corbin, 1998). Open coding refers to the stage during which the reviewer reads an interview while recording comments and questions; these will be reviewed after all the interviews in the study have been read and the reviewer has become initially acquainted with the new and vast inner worlds of the interviewees. In the second step, axial coding, the reviewer links the categories that emerged from the interview and tries to identify their subcategories; then, connections are found between the thoughts expressed by the interviewees and the previously identified categories and subcategories. At this stage, the reader also takes note of the distinctive manner each respondent addresses the subcategories of the study. In the final stage, integration, the reviewer assigns each thought to its corresponding category or subcategory and formulates broader categorizations. In the current study, three reviewers have analyzed the data, and sorted the themes, according to the principles presented above. Cases of disagreement were discussed and settled through conceptual clarification.

Trustworthiness and Credibility.

Qualitative research focuses on achieving trustworthiness and credibility and does not claim to produce absolute truths (Hammersley, 1995). In quantitative research, on the other hand, validity means truth (Angen, 2000). In qualitative research, the focus moves from validity to validation, from a definitive sense of reality to a process of validation between the researcher and reader in which one's subjective understanding is involved (Angen, 2000). The use of extensive

quotations in the researcher's analysis and presentation of a case enables the reader to evaluate whether different aspects of the data collected create consistently rich and thick descriptions (Lieblich, Tuval-Mashiach, & Zilber, 1998; Lincoln & Guba, 1985; Padgett, 1998). In addition, qualitative research does not aspire to generalize since the results of each study are uniquely influenced by its context and interviewees (Schofield, 1993).

Results of Stage 1

The data analysis yielded four themes, each representing distinct experiences of violence: verbal aggression, threats, aggression toward property, and physical violence. Illustrating these themes are the following excerpts from the participants' accounts. The participants' names were changed to protect their privacy.

Verbal Aggression.

Many of the participants reported abuse in the form of shouting, insults, and swearing; participants were also the target of various client incriminations. The participants described these experiences as unpleasant and disturbing, but they mostly evaluated the risk for physical attack as slight. Some examples of this kind of violence follow: ''He came up close to me, raised his hand, and started shouting and swearing at me.'' Another social worker described how a client came into her office while she was busy conducting a business call. When the social worker was done talking on the phone, the client "started swearing at me, really swearing . . . she knocked a chair on the floor and shouted that I wasn't paying attention to her, wasn't treating her well—only other people.'' Another example is described by the following social worker, talking about a client whose reality perception in the situation was in question:

> He started shouting at me with no relation to [in a way that had nothing to do with] the actual moment. He thought I was family or something. I managed to say, ''I can see you're upset. Please try to calm down.'' It was a mistake—he started screaming, ''How can you tell me to calm down? You should calm down. Who are you anyway?'' He swore at me really ugly swear words.

Threats.

The second form of violence described by participants included incidents involving clients who threatened them. It appears that clients' threats are experienced as more intimidating than general verbal aggression because of the unpredictability of the situation and the potential for escalation to physical violence. The threats may be directed toward the worker personally or toward the staff or department, generally. It seems that, in both cases, the participants

evaluate the risk of physical violence toward them as high, as illustrated in the following descriptions:

> She came to my office with her daughter; they were both nervous wrecks. . . . They continued shouting and saying things like they were going to burn the office down. . . . I know this client—she can be violent but it had never happened before.

The following example illustrates the emotional burden that accompanies the exposure to clients' threats:

> I was young and inexperienced and I guess he thought I was detached. He said, ''I know people like you. I eat people like you for breakfast, and you are full of yourselves.'' I don't remember the exact words he used but it was intimidating and a little bit frightening, and he also threatened me by saying he could get rid of people that he dislikes, or something like that. This threat was very frightening. I don't know if I thought he would do it . . . but it challenged my self-confidence as a therapist . . . the way he said it . . . it was cold, sadistic—with a laugh, or a smile. It shocked me. I don't know if it affected my decision to leave that year.

Aggression Toward Property.

Aggression toward property was the third form of violence described by the participants. It includes the flinging about of office equipment and chairs, kicking of furniture, or slamming doors. It seems these incidents were experienced as physical attacks although the participants were not physically hurt. In many cases this kind of aggression created a commotion drawing other staff members or security guards to come and intervene, as illustrated in the following accounts:

> The client decided that social services should pay his rent, which we couldn't do. One morning he came uninvited, with his wife. He entered my office and said, ''I want what's coming to me—now!'' I asked him to step out or else I would call security. . . . Then came the big outburst. He started pulling things out of my closet and flinging them like a child.

Another social worker describes a client flinging office materials around, and generally vandalizing the place: ‘‘This client . . . flew into a rage; first he shouted, then he started flinging about everything that was on the table. He kicked the chair and the table and screamed.’’

Physical Violence.

Physical violence was the fourth form of violence described. Only a few participants described physical attacks perpetrated against them by clients. These were characterized as traumatic and shocking and involved physical injury. The following social worker describes a situation of a battered woman, who was also an abusive mother, to whom the worker was trying to explain the consequences of her actions toward her children:

> In the course of this conversation, she simply attacked me—we both fell down on the floor, and she grabbed my neck and pulled my hair really hard. I will never forget that scene. Her brother-in-law tried to pry away her hands, but she was in such frenzy that she didn’t let go. The staff came in. I don’t remember how I got out of it. It was really traumatic.

The following is a description of a social worker who was cut with a knife by a young client. Although there were some warning signs, the worker did not heed them:

> She used to speak rudely to me—ask me what I was doing there, swearing when I curbed her behavior . . . . I was typing something and she asked to come into the office. I said okay and she sat with me, and we had a nice talk about Valentine’s Day and her friends—mean while she was playing with a retracting blade she had in her hand, sliding it back and forth. I wasn’t paying attention; I was busy . . . I wasn’t scared. Then she suddenly said —’’Maybe I’ll stab you.’’ She suddenly pulled out the blade and cut me.

Some participants described physical attacks that did not result in injuries but were experienced as highly intense, such as these:

It happened 3 years ago while I was working at a youth center. There was a young boy who couldn't stand me—I don't know why. I tried to get close to him, and then I tried to distance myself; nothing worked. One time I was in the office with another woman, a new staff member. This boy locked us inside somehow and went to the other side of the window, and he and a friend of his shouted and swore at us. They stood there and laughed, and no one knew we were locked in there. It was humiliating and frightening! I remember they threw things at us through that window. We were there for twenty minutes until someone noticed what was happening.

Stage 2: Scale Development

In the second stage, we developed the Client Violence Questionnaire (CVQ; see Schwab, 1980) and evaluated its content validity using expert judge interrater reliability ratings (see the appendix). Using the content from the interviews, we created 32 items, each describing specific behaviors and representing the four different content areas identified earlier. Following Hinkin's (1995) guidelines, the measures were shortened and items were kept as simple as possible. To examine the content validity and interrater reliability, a pretest questionnaire was administered to 43 social workers (supervisors and employees), academic staff, and social work students, acting as expert judges. All the respondents were asked to fill out the questionnaire and critique it and evaluate each question on a 7-point Likert-type scale (1 = not relevant, 7= most highly relevant) to ensure that it matched the dimension it was intended to measure, in terms of relevance and unidimensionality. In response to the concerns expressed by the participants about the length of the survey, we retained only the 14 most relevant items. The overall interrater reliability (measured as intraclass correlation; LeBreton & Senter, 2008) was $r = .86$, and the average score of relevance was 6.2.

Stage 3: Pilot Survey

In Stage 3, we examined the internal consistency, content validity, and convergent validity of the developed instrument (Schwab, 1980).

Participants.

The final version of the instrument was administered to a sample of 189 social workers occupying various positions including supervisorial ones throughout Israel. Participants were recruited by approaching the agencies, presenting the study at staff meetings, and requesting voluntary participation in the survey.

Procedure.

Data were collected by undergraduate social work students as part of a class exercise given at two campuses. The pollsters explained the goal of the study to the social workers, assured them of anonymity, and informed them that they had no obligation to participate and could withdraw at any point. After the respondents completed the questionnaires, each was asked to describe any reactions or thoughts evoked by the questions and to offer any suggestions for improvement. Those reactions were collected verbally and summarized by the surveyors. This qualitative component, which accompanied the quantitative one, enabled us to reevaluate several aspects of the instrument, especially the length of the recollection period addressed by the questionnaire (as will be described in the next stage).

Measures.

The Client Violence Questionnaire (CVQ) is a 14-item self-report measure that evaluates the frequency of social workers' exposure to four types of client violence experienced over the preceding year: verbal aggression, aggression toward property, threats, and physical violence. The items were assessed on a scale from 0 (*never*) to 6 (*six times and more over the previous year*); an additional score of 9 designated *never happened during the past year but happened before*. The total exposure score was calculated as the average of the items. Testing the reliability of an instrument assesses the degree to which data collected on that instrument are reproducible. The reliability correlation coefficient is the proportion of variance attributable to the true score of the latent variable (DeVellis, 1991). The CVQ was tested for internal reliability in two

ways. First, scales were examined using Cronbach's coefficient. Second, an α if Item Deleted analysis was conducted to determine whether internal reliability of each scale could be improved if one of the items were deleted, with the results that no substantial increase in a could be achieved. The scale presented satisfactory reliability (Cronbach's α = .81), above the minimum value of .70 for a newly developed scale (Nunnally, 1978). One caveat should be mentioned at this point: Given the low frequency of the phenomena, especially of property and physical violence, and the relatively small sample of the pilot study, those two subscales yielded an internal consistency below the acceptable level. For the same reason, it was not possible to conduct a factor analysis. To overcome this limitation and to further validate the scale, we conducted a second, more extensive survey, which will be reported in Stage 3.

The Brief Symptoms Inventory Subscales.

Twenty items assessing symptoms of distress were drawn from the Brief Symptoms Inventory (BSI; Derogatis & Melisaratos, 1983). The items used in this study comprise the four subscales of the BSI: paranoid ideation, interpersonal sensitivity, anxiety, and hostility. The original scale is a 53-item self-report measure that assesses 9 domains of psychological symptomatology. The BSI has been used and studied extensively in relation to traumatization in Israel (Dekel, Hantman, Ginzburg, & Solomon, 2007; Gilbar & Ben-Zur, 2002), as well as in relation to secondary/vicarious traumatization among social workers in Israel (e.g., Itzhaky & Dekel, 2008; Ron & Shamai, 2011); thus, it is an ideal tool for the construct validation of a measure of violence exposure. The items are rated on a 5-point scale of distress from 0 (*not at all*) to 4 (*extremely*). These domains seem related to the possible consequences of workers' exposure to client violence (Jayaratne et al., 2004; Koritsas et al., 2010; Kosny & Eakin, 2008; Littlechild, 2005; Macdonald & Sirotich, 2005; Virkki, 2008). The sub-scales of this frequently used scale presented good reliability with respect to the Israeli population (Cronbach's α = .73 for interpersonal sensitivity; .79 for anxiety; .75 for hostility; .73 for paranoid ideation; Gilbar & Ben-Zur, 2002). This study also found satisfactory reliability for those scales: α = .76, .81, .76, and .78, respectively.

Sociodemographic Questionnaire.

This questionnaire was designed specifically for this study to determine sociodemographic characteristics found as potentially related to exposure to client violence, namely, workers' gender, age, years of professional experience, and

area of expertise. Questionnaire respondents were also asked to provide details of birth place, family status, religion, and years of education.

Data Analysis and Results of the Pilot Survey.

The participants reported high rates of exposure to violence during the preceding year. Based on the rates of exposure over the last year, we have calculated the mean exposure. In order to calculate percentages of exposure to each form of aggression, for each form (verbal, threats, property, physical) we constructed new dichotomous variables, indicating 1 for those who experienced the specific form, and 0 for those who did not. Verbal aggression was the most frequent (165 reports, 87.3% of the sample). Threats were frequent (140 reports, 74.1% of the sample) as well as aggression toward property (111 reports, 58.7% of the sample); physical violence was the most uncommon (14 reports, 7.4% of the sample). The results indicate that the participants reported exposure to more than one form of violence. Bivariate correlations were calculated among the subscales, using Pearson's *r*. The four types of violence were correlated, although physical violence was the least correlated with the other types of violence (see Table C.1).

Construct validity assesses the extent to which scales that are designed to measure independent dimensions actually measure such underlying constructs. Construct validity may be perceived as composed of convergent and divergent validities. It can be determined by examining the extent to which a particular measure relates to other measures consistent with ''theoretically derived hypotheses concerning the constructs that are being measured'' (Carmines & Zeller, 1979, p. 23). We measured the convergent validity of the CVQ by examining its correlation with four specific measures of psychological distress taken from the BSI, including anxiety, paranoid ideation, interpersonal sensitivity, and hostility. We assumed that being exposed to violence would be correlated with higher levels of distress symptoms as measured by the BSI. Indeed, significant positive correlations were found between exposure to violence and all four psychological symptoms of distress (see Table C.2). Not surprisingly, the infrequently occurring phenomenon of physical violence in the first sample was not correlated with any symptom of distress.

TABLE C.1 ■ Estimates of Prevalence and Correlations of Exposure to Client Aggression: Pilot Survey

Type of client aggression	*N*[a]	%	Mean	*SD*	1	2	3	4
1. Verbal aggression	165	87.3	1.6	1.4	α = .78			
2. Threats aggression	140	74.1	0.76	0.85	.64***	α = .77		
3. Property aggression	111	58.7	0.30	0.77	.67***	.65***	α = .56	
4. Physical violence	14	7.4	0.04	0.16	.17*	.08	.25***	α = .42

Note: Total N = 189.

a. At least once over the last year. *$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Note: Total N = 189.

At least once over the last year.

$p \leq .05$. ** $p \leq .01$.

$p \leq .001$.

Stage 4: Second Survey

The goal of the second survey was to further examine the internal reliability, factorial structure, and divergent validity of the CVQ, especially given the relatively low rates of the phenomenon reported in the pilot survey. Furthermore, we modified the time dimension of the CVQ to reflect the comments we received from the respondents: In responding to the pilot survey, participants were asked to report on a period of 1 year. However, many complained that this was too long and recommended it be shortened. Thus, in the second survey respondents reported on a 3-month period.

Participants.

We based the analysis on a data set drawn from a homogenous set of agencies—the municipal social service departments. At the 34 agencies that received questionnaires during staff meetings, 645 participants responded (response rate of 74%); the gender ratio of the participants, 88% women and 12% men, closely reflects that of the Israeli social work profession. The average age of the respondents was 41.6 years (SD = 10.2), and the average tenure in their position was 9.6 (SD = 8.1) years.

Measures.

The 14 items of the CVQ mentioned above were also included in the second survey. The scale and all the subscales had reliability higher than .70 (verbal, α = .85; threat, α = .78; property, α = .90; physical, α = .92, entire scale, α = .89), surpassing the acceptable level recommended by Nunnally (1978) for a newly developed scale.

Workplace Aggression.

Two other measures of workplace aggression were included in the second survey to examine divergent validity. The first measured ‘‘aggressive culture at the workplace.’’ The instrument was a modification of the one described by Douglas and Martinko (2001). We used 4 items structured thus: ‘‘Staff members often confront each other verbally/physically/with insults/by threatening each other’’ (the form of aggression was changed for each item). The response scale ranged from 1 (*do not agree*) to 7 (*totally agree*). The second instrument was a 2-item scale measuring ‘‘client witnessing of coworker aggression’’: clients’ exposure to

aggression among staff members and clients' exposure to staff members' aggression toward other clients. The same response scale was used. The internal validity of the two scales was satisfactory (α = .70 and α = .78, respectively).

Data Analysis and Quantitative Results of Second Survey.

The descriptive results and intercorrelations of the second survey presented in Table C.3 reveal that verbal aggression was the most frequent (71.3%); 69.15% were threatened, 10.7% suffered from property violence, and 3.7% were physically attacked. Moreover, the results indicate positive relationships between all the four subscales of the CVQ.

TABLE C.2 ■ Brief Symptoms Inventory (BSI) Scores and Correlations With CVQ Subscales: Pilot Survey.

BSI	Mean (SD)	Verbal aggression	Threats aggression	Property aggression	Physical violence
Hostility	0.67 (0.68)	.275***	.260***	.301***	.132
Paranoid ideation	1.2 (0.85)	.269***	.276***	.294***	.106
Interpersonal sensitivity	1.0 (0.76)	.198**	.249***	.282***	-.004
Anxiety	1.2 (0.80)	.268**	.246***	.266**	.101
Total 4 BSI subscales	1.0 (0.68)	.297***	.301***	.327***	.084

Note: BSI = Brief Symptoms Inventory; CVQ = Client Violence Questionnaire. Total N = 189. *p<.05. **p <.01. ***p <.001.
Note: BSI = Brief Symptoms Inventory; CVQ = Client Violence Questionnaire. Total N = 189.

*p<.05.

p <.01.

p <.001.

To verify the factorial structure of the CVQ, a confirmatory factor analysis (CFA) was carried out with AMOS structural equation modeling software. Following Bollen's (1990) recommendation, we also examined the multiple indexes of the model fit. The selection of indexes was based on the recommendations of Hu and Bentler (1995), who use the following statistical procedures: c^2 statistic, comparative fit index (CFI), normed fit index (NFI), nonnormed fit index (NNFI), and root mean square error of approximation (RMSEA). Overall, c^2 was significant (c^2 = 260.7, *df* = 50, p <.001), indicating that the model does not adequately account for the observed covariation among the variables, as might be expected with this statistic's sensitivity to sample size (Bagozzi & Yi, 1988). In a similar vein, Loehlin (1998) and Bandalos (1996) note that the c^2 statistic used in

the CFA is very sensitive to sample size, so if the sample size is large enough, almost any hypothesis will be rejected. Nevertheless, the solution does a fairly good job of accounting for the data. The NFI and CFI are well above .90, which is the criterion used by many researchers as an indication of a very good fit (Bandalos, 1996). Also, the RMSEA of .08 suggests that the factor models represent a good approximation (Arbuckle & Wothke, 2001). It may be that the significant c^2 value is at least partly due to the large sample size, rather than to any substantial misspecification of the model. Examination of the standardized regression estimate weights indicates that all the 14 items were highly significant. Furthermore, given the higher number of respondents in this survey, we were able to calculate the reliability of the subscales.

To verify that the measure was not influenced by a mono-method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), we examined divergent validity by comparing the CVQ results with two other self-report measures of aggression: ''aggressive culture at the workplace'' and ''client witnessing of workers' aggression.'' The results indicated that the correlations between each of the CVQ subscales and each of the other two instruments were low, ranging from $r = .06$ to $r = .14$, which in turn confirmed that the measure was free of mono-method bias and that the divergent validity of the CVQ was satisfactory.

Discussion

One of the hindrances to conducting systematic studies is the lack of a relevant and appropriate measurement tool. This study adds to the accumulated knowledge about the underlying structure of being victimized and creates an effective and efficient instrument for measuring client violence. The purpose of this study was to develop, test, and validate a reliable questionnaire to assess social workers' exposure to client violence. In using a mixed methods research design (Creswell & Plano Clark, 2007; Johnson & Onwuegbuzie, 2007; Teddlie & Yu, 2007) to develop a quantitative assessment, we were able to consider the contextual factors of the phenomenon. Following established procedures for scale development (Schwab, 1980), three distinct stages of research were conducted. First, we carried out a qualitative examination of the phenomenon to elicit relevant content facets for the questionnaire; second, we constructed the questionnaire and requested experts to judge its relevance and applicability; third, we delivered the instrument to a pilot sample of respondents and examined the responses in terms of applicability, reliability, and convergent validity. As a fourth stage, we modified the instrument on the basis of the pilot survey and delivered the instrument to another (larger) sample for further examination of its reliability, factorial structure, and divergent validity.

TABLE C.3 ■ Estimates of Prevalence and Correlations of Exposure to Client Aggression: Second Survey

Type of client aggression	N^a	%	Mean	*SD*	*1*	2	3	4
1. Verbal aggression	597	71.32	1.49	1.54	$\alpha = .85$			
2. Threats aggression	618	69.15	0.74	0.90	.74***	$\alpha = .78$		
3. Property damage	588	10.70	0.19	0.71	.36***	.50***	$\alpha = .90$	
4. Physical violence	617	3.72	0.03	0.20	.20***	.31***	.35***	$\alpha = .92$

Note: Total $N = 645$.

a. At least once over the last 3 months.

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Note: Total $N = 645$.

At least once over the last 3 months.

$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

The contribution of this study is threefold—methodological, conceptual, and practical. Our methodological approach of adding qualitative processes to

quantitative ones allowed us to capture social workers' actual experiences of client violence. The qualitative process yielded four themes reflecting types of experiences prevalent in the client violence literature,[1] which we then used in the quantitative process to develop and test a behavior-based measurement tool. The conceptual perspective has been enhanced by using the participants' actual experiences to construct our measurement tool, and finally, it is now feasible to compare between various sectors, professions, workplaces, and cultures in different countries using a universal scale.

The development of the CVQ scale offers both practitioners and academic researchers a scale that can be used for internal monitoring, knowledge sharing, and further research. Practitioners will be able to apply the scale to track the level of violence experienced at each agency or by each team throughout an organization. Supervisors can compare agency and team average scores with those of other agencies and teams, and a careful analysis of the different factors may be able to reveal key weaknesses that prevent the delivery of high employee performance, and appropriate actions can be taken to reduce specific aspects of client violence. Academics will be able to use this scale as a potential starting point for comparing client violence across omnibus and discrete contexts (Johns, 2006) and tracking its causes and consequences.

The convergent and divergent validity of the scale and subscales shows that the measures ''act as though they measured the construct,'' as Nunnally (1978, p. 141) has put it. The convergent validity of the CVQ scale was examined by assessing associations between the CVQ scores and four subscales of the BSI, which tapped anxiety, depression, interpersonal sensitivity, and hostility. It was assumed that being exposed to client violence would predict higher levels of those four symptoms. Indeed, a strong positive correlation was found between the CVQ and the four BSI subscales, indicating convergent validity. Furthermore, the scale and subscales had high levels of internal reliability. To test divergent validity, we conducted several analyses of the interrelations between the scale and two other measures of workplace violence, ''aggressive culture at the workplace'' and ''client witnessing workers aggression.'' By testing divergent validity we can verify that a measure is not influenced by a mono-method bias (Podsakoff et al., 2003); indeed, the results showed that the CVQ had a low correlation with the other two measures which indicates lack of such bias.

In conclusion, this article has outlined the process of developing a quantitative instrument for client violence measurement. In the development process of the CVQ scale, we showed that in addition to its function as a research stage, the

qualitative method also adds to the quantitative stage by eliciting respondents' experiences and reactions to the quantitative questionnaire, thus contributing to the validity and applicability of the instrument.

Limitations and Future Research

The study has several limitations of note. First, the instrument reflects only the themes raised by our participants; it does not evaluate sexual violence, electronic media violence (using text messages, emails, etc.), or stalking. Future research may address these issues by integrating appropriate items into the scale and adding relevant subscales. Second, the instrument is currently limited to the social work arena. Future research should be conducted in order to examine and validate the instrument to other contexts, such as the health industry. Third, an interesting finding arising from the pilot study showed that two of four subscales had low internal reliability (specifically, ‘‘violence toward property’’ and ‘‘physical violence’’). This finding is not surprising given the small sample size of this pilot study and the scarce occurrence of these violent behaviors. Indeed, in the second quantitative study, which was repeated with a larger sample, all the subscales had high levels of reliability. Finally, data were collected within a single, unique national culture. This may cast some doubt on its universal generalizability. However, the Israeli environment provides researchers and practitioners with a convenient laboratory for studying and analyzing advanced workplace environments inasmuch as it is a ‘‘Maduradam’’ (microcosm) of the developed countries in Western Europe and North America (Harel & Tzafrir, 1999).

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The research was partially funded by the Israeli Ministry of Economics.

Note

1. Our interviewees did not address themselves to experiences regarded as sexual harassment, assault (Stanley, Goddard, & Sanders, 2002; Koritsas et al., 2010), or stalking (Regehr & Glancy, 2011).

Authors' Notes

The authors contributed equally to the article.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Appendix: The CVQ Questionnaire

Many workers encounter client violence directed at them. Please indicate how many times did it happen, over the last 3 months/year, that a client(s) did the following actions against you. If it happened in the distant past but not over the period of 3 months/year, please choose the last option—9.

	Never	Once	Twice	3 Times	4 Times	5 Times	6 Times or more	Did not happen over this period but happened in the past
1. A client shouted at you	0	1	2	3	4	5	6	9
2. A client insulted you	0	1	2	3	4	5	6	9
3. A client cursed you	0	1	2	3	4	5	6	9
4. A client slammed the door leaving the office	0	1	2	3	4	5	6	9
5. A client threw an item on the floor	0	1	2	3	4	5	6	9
6. A client kicked furniture	0	1	2	3	4	5	6	9
7. A client threatened to complain about you	0	1	2	3	4	5	6	9
8. A client threatened to damage your property	0	1	2	3	4	5	6	9
9. A client used a general threat like "you will hear from me . . ."	0	1	2	3	4	5	6	9
10. A client threatened to hurt you or your family physically	0	1	2	3	4	5	6	9
11. A client pushed you	0	1	2	3	4	5	6	9
12. A client hit you with a fist or a kick	0	1	2	3	4	5	6	9
13. A client hurt you in a way that required some minor medical attention (e.g., band-aid)	0	1	2	3	4	5	6	9
14. A client hurt you in a way that required some major medical attention (e.g., emergency room)	0	1	2	3	4	5	6	9

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Appendix D Evaluation of the effectiveness of robotic gait training and gait-focused physical therapy programs for children and youth with cerebral palsy: a mixed methods RCT

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Source: Wiart, L., Rosychuk, R. J., & Wright, F. V. (2016). Evaluation of the effectiveness of robotic gait training and gait-focused physical therapy programs for children and youth with cerebral palsy: A mixed methods RCT. BMC Neurology, 16(86)

Abstract

Background: Robot assisted gait training (RAGT) is considered to be a promising approach for improving gait-related gross motor function of children and youth with cerebral palsy. However, RAGT has yet to be empirically demonstrated to be effective. This knowledge gap is particularly salient given the strong interest in this intensive therapy, the high cost of the technology, and the requirement for specialized rehabilitation centre resources.

Methods: This is a research protocol describing a prospective, multi-centre, concurrent mixed methods study comprised of a randomized controlled trial (RCT) and an interpretive descriptive qualitative design. It is a mixed methods study designed to determine the relative effectiveness of three physical therapy treatment conditions (i.e., RAGT, a functional physical therapy program conducted over-ground (fPT), and RAGT+fPT) on gait related motor skills of ambulatory children with cerebral palsy. Children with cerebral palsy aged 5–18 years who are ambulatory (Gross Motor Function Classification System Levels II and III) will be randomly allocated to one of our treatment conditions: 1) RAGT, 2) fPT, 3) RAGT and fPT combined, or 4) a maintenance therapy only control group. The qualitative component will explicate child and parent experiences with the interventions, provide insight into the values that underlie their therapy goals, and assist with interpretation of the results of the RCT.

Discussion: n/a.

Trial Registration: NCT02391324 Registered March 12, 2015.

Keywords: Cerebral palsy, Robot assisted gait training, Physical therapy, Motor skills

Background

Cerebral palsy is the most common cause of childhood physical disability, affecting 2.0–2.5 in 1000 children [1]. It represents a group of disorders of movement and posture with impairments (e.g., muscle weakness, decreased selective motor control, alterations in muscle tone, and impaired postural control) that collectively affect functional mobility. Methods of mobility are highly variable in children with cerebral palsy. Approximately 65% of children with cerebral palsy use minimal or no assistive devices (leg braces, walkers, and/or wheelchairs) to walk (i.e., Gross Motor Function Classification System [GMFCS] Levels I and II) [2] while those in GMFCS Levels III–V require varying degrees of bracing, walkers, or wheelchairs for mobility. Walking abilities can change during the life course; young adults who were ambulatory as children may lose the ability to walk in early adulthood due to joint pain and walking inefficiency [3].

Walking has well-recognized physiological and functional benefits including prevention of muscle contractures [4], maintenance of bone density [5], and enhanced cardiovascular fitness [6]. Effective mobility, which can include ambulation or the use of assistive technology such as powered wheelchairs, confers psychological benefits by fostering children's abilities to interact with peers and explore their environments [7]. Walking is often emphasized because of the dominant societal beliefs about the symbolic value of walking that is associated with normalcy and reduction of the social stigma of disability [8].

Partial body weight support treadmill training (PBWSTT) has recently received attention to improve walking patterns and endurance of children with cerebral palsy [9]. This training facilitates repeated, partially controlled step-taking with a sling giving body weight support to allow greater freedom of movement. Repeated active movement is aligned with motor learning theory currently popular in rehabilitation practice as a means of inducing neuroplastic changes in the brain [10]. Motor learning approaches emphasize movements that involve affected neural networks for motor control through high intensity practice of motor tasks [10], feedback on performance through trial and error, and active engagement of the child/adult in producing and refining movement [11]. There is some evidence that PBWSTT may promote improvements in temporal aspects of gait, walking speed, and gross motor abilities in children in GMFCS Levels II to IV [12]. However, it is labour intensive since therapists need to provide extensive physical support including assistance with the reciprocal leg movements. This

limitation has sparked international interest in the potential of robot assisted gait training (RAGT) devices as a better approach to gait training in people with neurologic conditions.

RAGT devices such as the Lokomat® support an adult or child upright on a treadmill while using robotics to move his/her legs to simulate walking. The robotic device facilitates inter-limb coordination and gait cycle timing and provides variable degrees of body weight support and guidance, both of which can be decreased as the child progresses. The adjustable weight support allows the child to train at various walking speeds [13]. The biofeedback and virtual reality system (using an avatar that reflects force and movement generated by the child) gives a motivational environment with real-time feedback on force and position. RAGT is also purported to be more cost-effective than PBWSTT as far as personnel and labour [14] due to lower need for manual work by therapists. Early research evaluating the use of RAGT devices (usually the Lokomat®) in adults post stroke or spinal cord injury seemed promising [15], however recent RCTs have not found RAGT to be more effective than regular, gait-focused physiotherapy [9].

There have only been a few studies evaluating the effectiveness of RAGT with children and youth with cerebral palsy. Initial research was conducted with ambulatory individuals aged 4 to 20 years with cerebral palsy. In these small sample, one-group, pre-post intervention studies [16–20] participants showed improvements in gross motor skills (as measured by the Gross Motor Function Measure [GMFM] [21]), gait velocity and endurance[16,22], and gains were maintained for 6 months [18]. Participants improved equally on the GMFM Stand and Walk Dimensions (i.e., mean gains about 5 points in each after 12 sessions given over 3 weeks), suggesting an added effect on postural stability for standing skills [20]. Appreciable changes in motor performance were achieved after participation in a short but highly intensive Lokomat® program (i.e., 3 to 4 weeks, total of 12 to 16 sessions) [20,22]. GMFM Walk Dimension improvement was linked with total distance and time walked on the Lokomat® ($r = -0.75$, $p < 0.001$), [20] suggesting a dose dependency. However the lack of a control group in these studies precludes firm conclusions about the efficacy of RAGT. A recent small RCT with 52 children with cerebral palsy (GMFCS II/III) demonstrated no advantage of RAGT over a physical therapy program for walking speed or range of motion [23], however the authors cautioned against making firm conclusions due to several study limitations. Research in this area is generally comprised of studies that are methodologically weak (i.e., one group pre-posttest designs, small sample sizes that limit statistical power and often lack clear descriptions of

therapy protocols) [9]. Outcome measurement is often limited to the GMFM, which provides information on foundational motor skills, but does not measure impacts on functional abilities and participation.

Additional criticisms of RAGT include the inability of current RAGT systems to replicate the real-world demands of over ground walking [9]. For example, visual spatial and optical inputs differ and the consistent pace of the device does not offer the opportunity for training temporal aspects of gait (e.g., timing of hip flexion, swing, knee extension). Individuals with cerebral palsy may walk more effectively using deviations from the timing of typical gait patterns. The individual's reliance on the treadmill and/or robot to create the steps may be too passive thus is not consistent with the 'real world' demands of walking. Finally, prolonged focus and extreme efforts towards walking may take away from other important childhood activities and may not be the most efficient way to increase participation [24]. This line of critical thinking requires therapists to be mindful about the role of walking in cerebral palsy rehabilitation, to seek a full understanding of the impact of walking therapies, and to understand the values and perspectives of families in regards to walking especially as new and potentially compelling 'high tech' options become more widely available.

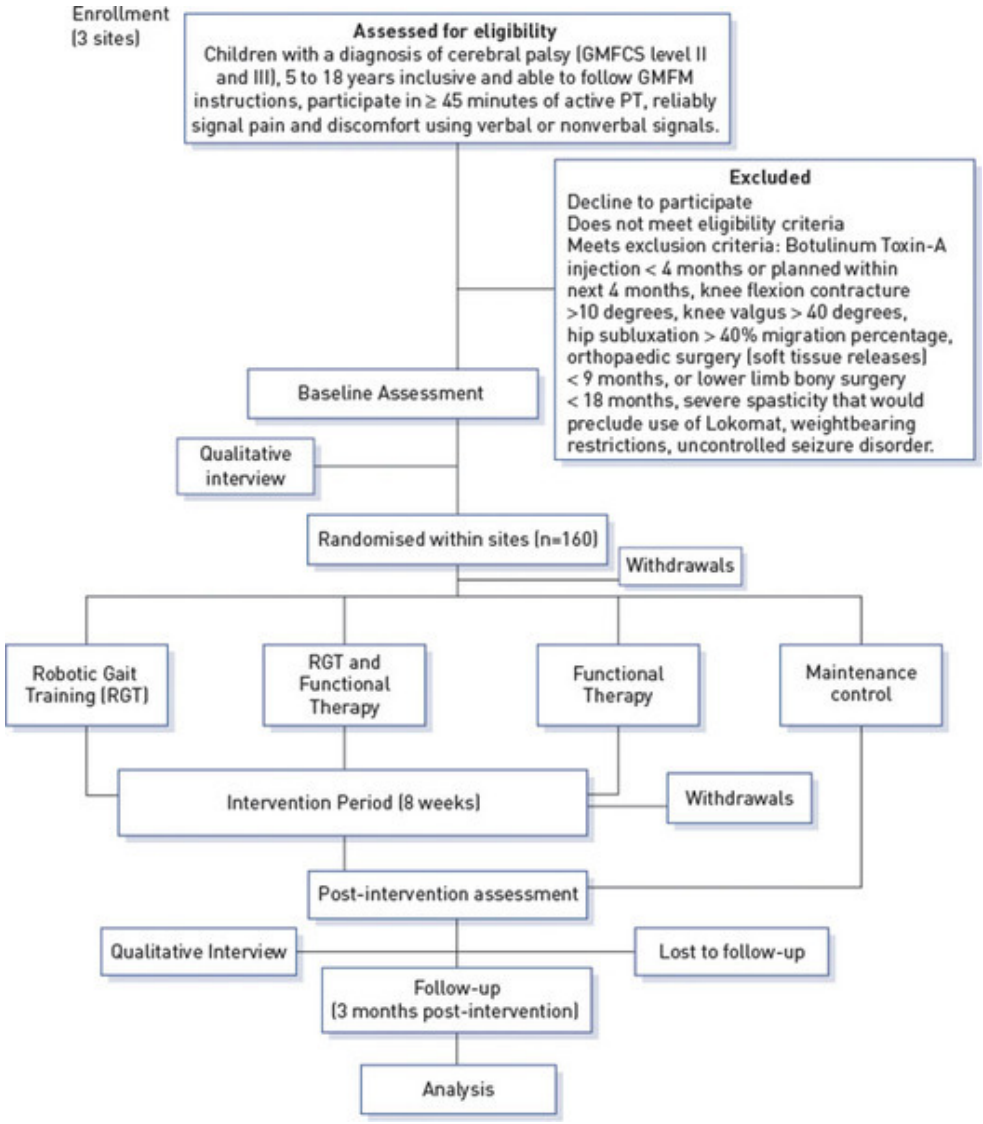
Methods/Design

This trial is a concurrent, mixed methods study [25]. Specifically, the quantitative arm is a multi-centre RCT with four groups (2^2 factorial design, i.e., RAGT absent/present, fPT absent/present) with two periods of post-intervention assessments (immediate and 3 months later) (See Fig. D.1 for Consort flow diagram). The RCT is linked with an interpretive descriptive [26] qualitative study arm. Methods for the quantitative and qualitative components are described separately.

Research questions

1. What is the comparative effectiveness of RAGT and a functional therapy program for improving gait-related motor skills of ambulatory children and youth with cerebral palsy?
2. Does combining RAGT and functional therapy result in greater improvements in gait-related skills of ambulatory children and youth with cerebral palsy than RAGT or functional therapy alone?
3. What are families' experiences with the interventions and perceptions of outcomes, and what are the associated implications for interpretation of the RCT results and use of RAGT and functional therapy?

Figure D.1 Consort flow chart


Enrollment
(3 sites)
Assessed for eligibility
Children with a diagnosis of cerebral palsy (GMFCS level II and III), 5 to 18 years inclusive and able to follow GMFM instructions, participate in ≥ 45 minutes of active PT, reliably signal pain and discomfort using verbal or nonverbal signals.
Excluded
Decline to participate
Does not meet eligibility criteria
Meets exclusion criteria: Botulinum Toxin-A injection < 4 months or planned within next 4 months, knee flexion contracture >10 degrees, knee valgus > 40 degrees, hip subluxation > 40% migration percentage, orthopaedic surgery (soft tissue releases) < 9 months, or lower limb bony surgery < 18 months, severe spasticity that would preclude use of Lokomat, weightbearing restrictions, uncontrolled seizure disorder.
Baseline Assessment
Qualitative interview
Randomised within sites (n=160)
Withdrawals
Robotic Gait Training (RGT)
RGT and Functional Therapy
Functional Therapy
Maintenance control
Intervention Period (8 weeks)
Withdrawals
Post-intervention assessment
Qualitative Interview
Lost to follow-up
Follow-up
(3 months post-intervention)
Analysis

Randomized controlled trial design

Inclusion criteria

1. Children with a diagnosis of cerebral palsy
2. GMFCS level II or III
3. Ages 5 to 18 years
4. Able to follow GMFM testing instructions, and to participate in a minimum of 45 min of active PT
5. Able to reliably signal pain, fear, and discomfort using verbal or nonverbal signals

Exclusion criteria

1. Botulinum Toxin (Type A)injection < 4 months or planned within next 6 months,
2. Knee flexion contracture > 10°
3. Knee valgus > 40°
4. Hip subluxation > 40% migration percentage
5. Orthopaedic surgery (soft tissue releases) within the last 9 months
6. Lower limb bony surgery < 18 months
7. Severe spasticity that interferes with use of RAGT device
8. Weight bearing restrictions
9. Seizure disorder not fully controlled by medication.

Sample size

The sample size of 144 children represents 9 children per age group (<13y; 13 to 18y), GMFCS strata, and intervention combination. An additional 16 participants will be recruited to accommodate an estimated 10% drop out rate (144/.9) for a total of 160. The 10% drop out rate was based on the current 7% drop out rate in the feasibility trial conducted at Holland Bloorview. Sample size calculations were based on pre- to post-intervention change on the primary outcome (Gross Motor Function Measure-66) (GMFM-66) [21] and a two-factor factorial design (F tests). For the GMFM-66 change score, assuming a Type I Error of 0.05 and 36 patients per group, the study will have 85 % power to detect an effect size of 0.25 for the RAGT group, 0.25 for the fPT group, and 0.25 for the interaction. Assuming a standard deviation (SD) of subjects of 10, these effect sizes correspond to an actual SD among appropriate means of 2.5. For the GMFM-66, Dimensions D and E, mean change scores of 5.3 (SD = 5.6) and 5.9 (SD = 7.1) have been reported after Lokomat® training [20] and 4.6 (SD = 7.1) for PT [27]. These numbers correspond to effect sizes of 0.9 (GMFM Dimension D), 0.8 (GMFM Dimension E) for the Lokomat®, and 0.6 (GMFM-66 score) for PT. However, a change of 3 points on the GMFM-66 is considered a clinically important difference [28]. Thus we have amplified our power to detecta small effect size (0.25) among groups. PASS [29] was used to calculate sample size. Recruitment will take place at the three sites: Holland Bloorview (Toronto, Canada), Glenrose Rehabilitation Hospital (Edmonton, Canada), and the Rehabilitation Institute of Chicago (Chicago, U.S.) over a period of 4 years.

Randomization

Following the screening assessment, participants will be randomly allocated to one of the four groups using computer-generated random sequence with varied block sizes to prevent randomization pattern prediction by investigators and ensure balanced group sizes. Age (<13y; 13 to 18y), GMFCS level (II and III), and site (Holland Bloorview, Glenrose Rehabilitation Hospital, Institute of Chicago) will be used as stratification variables to ensure group balance. The random sequence will be uploaded into the RedCap randomization module [30].

Blinding

Physical therapist assessors will be blinded to group allocation. The three site research assistants will e-mail an independent research assistant (not otherwise connected with the trial) to obtain the group assignment from the randomization module of a RedCap [30] database (as per the randomization schedule) once the child's baseline assessment has been completed. Group assignment will be conducted several days post initial assessment (parent is informed by phone of the child's group allocation). The data analyst will be blinded to group allocation. Blinding of child/parent to group is not possible given the nature of the interventions.

Treatment

There are three intervention groups: 1) RAGT, 2) RAGT+fPT, 3) fPT, and 4) one maintenance therapy control (CONT) arm. All three intervention groups will receive two 50-min sessions per week, separated by 2 or 3 days conducted over 8–10 weeks. This protocol meets the minimum recommended duration of 60 days for intensive interventions (as determined in a meta-analysis of PT treatments in cerebral palsy) [31]. In addition, 3 sessions per week may be very challenging for families and therefore the planned intensity and duration is also based on clinical feasibility.

The LOK and fPT sessions are built on current motor learning theory principles [32] and scoring of extent of their use (treatment fidelity) will be possible via use of the Motor Learning Strategy Rating Scale (MLSRI-20) [33] by an external PT assessor with videos from two sessions per child (4th and 8th sessions) [32]. The prompt scoring of the session video and review by the centre investigator will permit prompt feedback to the treating PT if motor learning strategy use levels do not reach the targeted minimum score of 40 %.

Children in all four groups may continue to participate in ‘maintenance therapy’ (commonly done by children with cerebral palsy between blocks of active therapy) if they are doing so prior to the study. This may include range of motion/stretching and basic isometric strength home program as well as up to 10 min per day of exercise bicycle **or** treadmill **or** general walking practice. Families will be asked to discontinue other active therapy during the trial.

At each site, pediatric physical therapists and physical therapy assistants with expertise working with children with cerebral palsy will be trained to provide RAGT and fPT intervention protocols. Each child will be assigned to a treatment team of two PTs who will share responsibility for the 8 to 10 week intervention phase. The use of a collaborative two-member team is consistent with current models of service delivery in which a physical therapist and physical therapy assistant or second physical therapist share responsibility for a child’s treatment. The team approach also permits maximum scheduling flexibility for the families. Strict guidelines regarding the approaches that may/may not be used have been developed for the fPT and RAGT interventions. Since all three interventions are manualized as well as menu- and goal-based, the consistency of treatment focus/content between PTs is maximized. This is especially important for the fPT

intervention due to increased potential for individual physical therapy variation given the wide breadth of treatment options available.

Children in the RAGT and RAGT+fPT groups will also be assigned a physical therapy assistant who will attend each RAGT session to assist with set-up/exit of the child in the Lokomat as well as with integrated use of other equipment, e.g., balls, beanbags. The assistant will not be required during the fPT sessions unless the treating physical therapist determines that their help is required for taller/heavier youth in GMFCS III to ensure therapist and child safety of movement for some or all intervention activities. The extent and duration of physical therapy assistant involvement will be documented in the child's session log.

RAGT

Participants will have one fitting visit/acclimatization session before the actual treatment sessions begin. Participants in the RAGT arm will receive two 50-min sessions per week. The study manualized RAGT walking protocol provides methods for progressing/tracking including a 5-min over ground walking session after RAGT to facilitate transfer of motor learning to usual walking devices [9]. The first RAGT walk will be 20 min, increasing, as able, to 45 min plus 5 min of over ground walking at the end [15]. The goal-based RAGT program uses a standardized approach to progressing body weight and guidance support and includes upper body activities while walking to encourage dual tasking and improved posture, and motor imagery practice. All robot settings and activities will be recorded in the session log.

fPT

Participants will have two 50-min sessions per week. The manualized motor-learning based protocol forms the basis for this intervention. Its focus is on balance (a key issue for children with cerebral palsy that cannot be addressed in the fully supportive RAGT device) and multi-plane gait-based motor skills. Each weekly fPT session will consist of 50 min of active treatment, a ‘dose’ equivalent to time spent in active treatment in the RAGT arm. The treatment program is menu-based. The physical therapist will choose areas that best link with the child’s goals and abilities [34] and document these in the session log. Techniques that focus exclusively on body structure changes will be not be permitted (e.g., inhibitive casting, kinesio taping, functional electrical stimulation).

RAGT+fPT group protocol

Participants will alternate between RAGT and fPT sessions for the duration of the 8 to 10 week intervention phase. Sessions will consist of two sessions of RAGT 1 week alternating with two sessions of fPT the following week. RAGT will always commence in week 1. The fPT will build on motor learning principles because the activities will allow the child to practice motor skills in a variety of different activities. The fPT sessions will augment and build on the previous week's RAGT work, and set the stage for the following week's RAGT sessions. Techniques focusing on body function/structure changes will be prohibited.

Monitoring co-interventions

Maintenance therapies such as home stretching and strengthening routines can be continued for all four groups throughout the study because these therapies have questionable efficacy [35–37] and will likely be equally used across all four groups as they are common PT recommendations. Mobility-based active therapy must be discontinued ≥ 2 weeks prior to baseline assessment. Throughout the 8–10 week intervention period and the 3-month follow-up period, parents of children in all four groups will be asked to report about other therapies received or physical activities participated in during the week. Use of other gross motor interventions will also be tracked by the treating physical therapists.

Outcomes

All study outcomes will be measured pre-/post-intervention (<10 days pre-intervention and post-completion), and at 3 m follow-up (+/-10 day window). Trained pediatric physical therapists with pediatric experience will be trained to conduct the assessments. Assessors will be assigned to a child. While inter-rater reliability of all of the selected measures is good to excellent, use of the same assessor will support a smaller minimum detectable change. This sensitivity is particularly important since the sample size was based upon a small (but clinically important) effect size. Prior assessment data will not be available to the assessor at the follow-up assessments. Assessments will be video-recorded and a random sample of 20% of the assessment's video-recordings will be scored by an independent assessor who will not be aware of assessment sequence order. This double scoring will be done through the study to flag any scoring issues and allow remedial action.

Primary outcome

The primary outcome measure is the GMFM-66 [21]. It has strong validity and responsiveness with children with cerebral palsy and has been used in prior RAGT studies. The GMFM-66 evaluation will be limited to Dimensions D (Stand) and E (Walk/Run/Jump).

Secondary outcomes

Secondary outcomes include higher level gross motor functioning (the Challenge Module) [38] for children in GMFCS level II, walking capacity [39, 40], gait quality [41] individualized goal attainment scores [42, 43], balance [44, 45], quality of movement [46], functional abilities [47], physical activity levels, self-efficacy for physical activity [48], participation (PEM-CY) [49], and quality of life [50, 51]. A list of included outcomes and associated measures are included in Table D.1.

Statistical analysis

Data will be described (e.g., means, standard deviations, frequencies) for each intervention group and each stratification variable. Graphical summaries will include mean plots and boxplots. Change scores (post minus pre, follow-up minus post) will be summarized for each outcome. For each change score and outcome, an ANOVA for the two-factor factorial design will test the effect of each factor (RAGT, fPT) and their interaction (RAGT* fPT) on mean change score. Confidence intervals (95% CIs) will be reported for the mean of each intervention group. Further, mixed-effects multiple linear regression models will be developed for each outcome with centre as a random effect, centre by intervention as an interaction (to assess centre effect), and other important variables (e.g., age and GMFCS level) as covariates. Variables will be dropped from the model one at a time if $p > 0.05$, and residual diagnostics will assess model fit. This modeling will allow us to assess the effect of the interventions in the presence of important variables that were not balanced across intervention groups by randomization and also can easily deal with incomplete observation times. All main analyses will be based on intent-to-treat with secondary analyses of those with >80% adherence to their intervention. R[52] will be used for statistical analysis by a data analyst blinded to intervention group.

TABLE D.1 ■ Outcome measures

Outcome	Outcome measures
Gross motor abilities	GMFM-66 (Dimensions D- Stand & E–Walk/Run/Jump) [21] Challenge Measure (GMFCS level II) [38] and GMFM Dimensions D and E with aids and orthoses (GMFCS III) [21]
Walking capacity/gait	1- [39] and 6-Minute Walk Test [40], Bloorview Barefoot Gait Assessment (scored from video) [41]
Individualized goal attainment	Canadian Occupational Performance Measure (COPM) [42] and Goal Attainment Scale (GAS) [43]
Standing and Walking Balance	Pediatric Balance Scale [44], Quality FM (Stability from GMFM-66 video) [46], Activities Balance Confidence Scale [45]
Functional abilities	PEDI-CAT [47]
Physical Activity levels	Accelerometry (5 days)
Physical Activity Self-efficacy	Self-Efficacy for Physical Activity [48]
Participation	Participation and Environment Measure for Children and Youth (PEM-CY) [49]
Quality of life	Kid Screen [50] and Students' Life Satisfaction Scale (SLSS) [51]

Data and Safety Monitoring (DSMB)

An independent DSMB will assess any reports of adverse events and will recommend to the researchers if the trial should continue, be modified or stopped. The DSMB will consist of three representatives from Toronto, Edmonton, and Chicago. Teleconferences will be scheduled annually.

Interpretive description (Qualitative Component)

While RCTs are the gold standard for evaluating cause and effect relationships between interventions and patient outcomes [53] there is growing recognition that a broader paradigmatic view of research methodologies is necessary since RCTs do not serve well in the analysis of the complex descriptions of human perspectives and experiences[54–57]. Knowing *why* interventions do or do not work is as important as knowledge of effectiveness if interventions are to be successfully transferred into 'real world' clinical settings [53, 58]. Rich contextual information from qualitative research can provide insight into how patient values and previous occurrences affect their experience with the interventions, their adherence to the study protocols, their impressions about the importance of the outcomes achieved, and the reasons why they choose to participate or not in clinical trials [54–57].

The three **objectives** of the concurrent qualitative component are to explicate:

1. Child and parent experiences with the trial interventions and the values and previous experiences that shape their perceptions.
2. The mobility related outcomes that are important to families and factors that influence these views.
3. Child and family values, experiences and contextual factors that influenced participation in the trial, including the follow-up period.

Design

Interpretive description [59], a methodology designed for conducting rigorous qualitative research within the health professions, will be the framework for the qualitative component of this study. Interpretive description is focused on "generating new knowledge pertaining to the subjective, experiential, tacit and patterned aspects of human health experience . . . so that we have sufficient contextual understanding to guide future decisions that will apply evidence to the lives of real people" [26]. It provides a 'design logic model' for qualitative studies so that the results are meaningful and applicable to clinical practice.

Sample selection

Since the goals of parents and children may differ[60] and be informed by different values regarding the importance of walking [61], both will participate. The inclusion of parents and children will allow us to gain a greater understanding of family dynamics and shared understandings [62] that affect their experiences in the trial. We will invite a subset of child-parent dyads from each of the active interventions in the RCT and seek maximum variation in this purposive sample by ensuring an equal number of children in the two age groups (i.e., under and over 13) and both GMFCS levels, as well as a diversity of cultural and socioeconomic status (critical for objective #2). We will recruit families from all three sites since factors that affect trial participation may vary between provinces and centres based in Canada and the United States. In addition, parents of children who were eligible but declined to participate in the RCT will be invited to participate in the qualitative component to address objective #3. The estimated sample size is based on theoretical understanding of the complexity and variability of the data. We anticipate that a sample of 18 RCT participant child-parent dyads (6 dyads from each site) and 3 parents from each site who declined participation in the RCT will be adequate to address the three objectives of the qualitative component. Our estimate is based on similar qualitative research with families with children with cerebral palsy [63–65] and is considered to be a relatively large sample for this type of research [26].

Data collection

Individual interviews with parents (and their children for those in the RCT) will be conducted. Parents will participate in 45–60 min semi-structured, individual interviews conducted by one member of the research team. Participating parents of children in the RCT will be interviewed at 2 points within the trial (Fig. D.1): i) after identifying their individualized goals, prior to receiving the intervention, and ii) within 1 month of intervention completion.

Children from the RCT will participate in individual interviews at the end of their intervention. While interviewing children can pose some logistical challenges, if adapted techniques are employed, children have the potential to share rich narratives [62, 66]. A customizable "tool box" of age-appropriate child-friendly techniques [61] including photographs and comic captioning, vignettes, and sentence starters will be used in a 30–45 min semi-structured interview with the child without the parent present. The use of "concrete materials" in interviews with children has been found to improve the quality and depth of the interview exchange [67].

Data management and analysis

Interviews will be digitally audio-recorded, transcribed verbatim by a professional transcriptionist, de-identified and imported into NVivo for data management. Data sources will be digital recordings, transcribed text of all interviews, and field notes created by the interviewers. The data management strategy described by Knafl [68] will be used to analyze the data. Two researchers will collaboratively identify general coding categories. Transcripts will be analyzed as they are transcribed to ensure that the emerging results inform the concurrent theoretical sampling and data collection process [69]. The researchers will meet to establish consensus on the coding. Data will be transferred to index cards and organized by general codes. The two researchers will identify subthemes and the RA will conduct the remaining coding of excerpts into subthemes in NVivo [70]. This process is recommended for interpretive descriptive studies [59] as it involves immersion in the data prior to any specific coding and emphasizes theorizing, synthesizing, and re-contextualizing [26]. Field notes will not be coded but will aid data interpretation, as they will contain interviewer impressions and observations during the interviews.

Enhancing credibility

1. **Methodological triangulation**—The use of multiple methodologies or data sources will add rigor, depth, complexity, and richness to any research study [71]. The results of this concurrent qualitative component will provide essential context and meaning to the interpretation of the change scores from the RCT.
2. **Maximal variation in sampling**—Ensuring variability on the factors that likely influence family perspective such as child age, GMFCS level, treatment condition and site will enhance credibility of the data. Lack of attention to this variation may result in inaccurate claims about groups that were not included in the sample [72].
3. **Audit trail**—Recording of methodological decisions and their rationale as made throughout the qualitative study will let us include reasoning in the final report so that the consumers can judge adequacy of decision-making [26].
4. **Peer debriefing**—A summary of the qualitative data analysis process will be reviewed and discussed by all members of the research team mid-analysis stage (i.e., once general themes are identified) and after identification of sub-themes. Team members not involved directly in the analysis will be encouraged to ask critical questions about methods, decisions and interpretation to facilitate reflection among the team members conducting the analysis. Peer debriefing sessions will be documented [53].

Discussion

It is critical to know if children with cerebral palsy benefit from RAGT more than over-ground walking training programs and maintenance therapy alone. The results of this trial will provide important insight into the relative effectiveness of RAGT and functional physical therapy. We will measure a broad range of outcomes that could potentially be affected by RAGT, and we anticipate that the trial will provide information needed to guide clinical practice related to RAGT for children with cerebral palsy.

RAGT is currently used clinically at the Edmonton and Chicago sites and is used only for research in Toronto. We anticipate that we may encounter some challenges at recruitment at the two sites where RAGT is used clinically. Our primary concern is related to possibility of parents' preference for clinical use of RAGT over the possibility of being randomly allocated to a control group. To mitigate this risk, we may inform parents of group allocation following the screening assessment and then will allow some flexibility in the timing of the baseline assessment. This flexibility will allow families to schedule according to group allocation. They may decide to access clinical RAGT after the control period and during the summer months, when many families request therapy. In addition, children in the control group will be able to access their choice of therapy upon completion of the study to mitigate the risk of dropouts due to allocation to the control group.

The qualitative component will enhance the interpretability of the quantitative data through data triangulation [73]. In addition, the inclusion of a qualitative component in this RCT will serve three key purposes. Firstly, it will provide insight into the subjective experience of children and their parents with the trial interventions and how their values regarding quality of gait and previous therapy may have shaped those experiences. Understanding these experiences is highly relevant to the implementation of gait-related interventions in clinical practice to ensure that children and parents are engaged, able, and motivated to participate in therapy. Research in this area is lacking.

Secondly, the qualitative findings will provide valuable information about the outcomes of mobility interventions that are important to families. While RAGT replicates a 'typical' gait pattern with the hope that this will transfer into over ground walking, some research suggests that compensatory movement patterns may be more efficient for individuals with cerebral palsy [74]. Indeed, there is a

lively philosophical debate regarding the assumption that individuals with disabilities always strive to appear or feel more ‘normal’ [75]. While dominant cultural views and traditional approaches in pediatric rehabilitation have focused on quality of gait, many individuals with disabilities, therapists and researchers insist that improved functional abilities and participation in meaningful activities and social roles are more important outcomes. These may be achieved using alternate methods of mobility, atypical gait patterns, or compensatory approach to rehabilitation. Thus, in addition to understanding the impact of RAGT impact on gait outcomes, functional mobility and participation in meaningful activities, it is important to elucidate the factors that influence child and parent goals related to mobility.

Finally, the qualitative component will allow us to examine reasons families chose to participate or not in the trial. For example, previous research suggests that parents may want to pursue sophisticated interventions for their children because they align with their conceptualization of good parenting and the importance of ‘doing something,” [61]. It is also possible that contextual factors such as challenges with travel, time commitment, and managing family life or conflict with values around walking may preclude some families’ participation. This information is useful regarding the feasibility of implementing the interventions in clinical practice and for interpreting trial outcomes.

Abbreviations

CONT: control group; fPT: functional physical therapy; GMFCS: gross motor function classification system; GMFM: gross motor function measure; MLSRI: motor learning strategy rating instrument; PBWSTT: partial body weight supported treadmill training; RAGT: robot assisted gait training; RCT: randomized, controlled trial; SD: standard deviation.

Acknowledgments

Dr. Wiart is supported by the Canadian Child Health Clinician Scientist Training Program (CCHCSP) and the Women and Children's Health Research Institute through the generous support of the Stollery Children's Hospital Foundation. Dr. Rosychuk is salary supported as an Alberta Innovates – Health Solutions (AIHS, Edmonton, Canada) Health Scholar. Dr. Wright holds the Holland Bloorview Kids Rehabilitation Hospital Foundation Chair in Pediatric Rehabilitation. This work was supported by the Canadian Institutes of Health Research [funding reference number 137074]. Funding agencies had no role in the design of the study and the writing of this manuscript.

The authors would like to acknowledge the co-investigators of this study who reviewed the initial proposal: Dr. John Andersen, Dr. Darcy Fehlings, Dr. Danielle Levac, and Dr. Shanon Phelan.

Authors' contributions

LW led the qualitative study design, participated in the design of the quantitative component and led the drafting of the manuscript. RR wrote the analysis section for the quantitative component. VW led the quantitative design, participated in the qualitative component and contributed to the preparation of this manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Ethics approval and consent to participate

This study protocol has been approved by the Health Research Ethics Board at the University of Alberta, Edmonton, Alberta, Canada, and the Research Ethics Board at Holl-and Bloorview. Approval is under way at the time of writing at the Rehabilitation Institute of Chicago. Children aged 9 years and older will provide assent (or consent at Holland Bloorview if they have the capacity to do so) and parents/guardians of children under 18 years of age will provide signed, informed consent.

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Appendix E Reconciling Data From Different Sources: Practical Realities of Using Mixed Methods to Identify Effective High School Practices

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Source: Smith, T. M., Cannata, M., & Haynes, K. T. (2016). Reconciling data from different sources: Practical realities of using mixed methods to identify effective high school practices. *Teachers College Record*, 118, 1–34.

Background/Context*:* Mixed methods research conveys multiple advantages to the study of complex phenomena and large organizations or systems. The benefits are derived from drawing on the strengths of qualitative methods to answer questions about how and why a phenomenon occurs and those of quantitative methods to examine how often a phenomenon occurs and establish generalizable, empirical associations between variables and outcomes. Though the literature offers many strategies, designing mixed methods research can be challenging in large scale projects when trying to balance reliability, validity, and generalizability. By supporting the findings with multiple forms of evidence mixed methods designs lend greater validity than mono-method ones. However to draw on the comparative advantages of these two paradigms, researchers must grapple with the challenges of working with more than one method.

Focus of Study*:* This paper discusses the benefits and challenges of collecting and interpreting mixed methods data in a large scale research and development project. Drawing on existing frameworks, we reflect on our strategies of mixed

methods design, data collection, and analysis. We discuss the quandaries faced by researchers when discrepant findings emerge.

Research Design*:* The data come from a large, mixed methods case study focused on the practices that explain why some high schools in large urban districts are particularly effective at serving low income students, minority students, and English language learners. Undertaken in several phases, the work included sequential and concurrent designs. Incorporating a sequential explanatory design element, we first used quantitative data to identify schools in the district that were more and less effective at improving student achievement in English/language arts, mathematics, and science. We then used a combination of interviews, focus groups, surveys, classroom observations, and district administrative data—in a concurrent design—to try to understand what differentiated between the most and least effective schools in the district.

Conclusions*:* Based on our analyses, we provide examples of when mixed methods data converge, when they diverge but are complementary, and when they diverge and introduce a methodological quandary for researchers who must confront seemingly discrepant findings. In so doing, we discuss the tradeoffs encountered between the study design and the implications as we confronted them during analysis and suggest ways to balance the methodological demands of complex research studies. Seemingly discrepant findings, while challenging to reconcile, when considered for their potential complementarity, actually lead to a more complete understanding of the phenomena under study.

Introduction

Researchers increasingly recognize the comparative benefits of mixed methods (Collins, Onwuegbuzie, & Sutton, 2006; Greene, Benjamin, & Goodyear, 2001; Greene, Caracelli, & Graham, 1989; Johnson & Turner, 2003; Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 2010). Mixed methods are particularly useful when studying complex phenomena and large organizations or systems. They are also useful when trying to understand nuanced differences in the role of context, practice, and processes. Mixed methods draw on the strengths of qualitative methods in answering questions about how and why a phenomenon occurs (e.g., the history, context, and the enactment of programs and policies), while also capitalizing on the strengths of quantitative methods to examine how often a phenomenon occurs and establish generalizable, empirical associations between variables and outcomes (Murnane & Willett, 2010). The combination of these methods can help us to better answer questions about what, when, and how much a certain phenomenon occurs. Drawing on the comparative advantages of these two paradigms, mixed methods designs lend greater validity than mono-method designs because the findings are supported by multiple forms of evidence.

Mixed methods also have the potential to provide greater understanding of complex phenomena in large organizations as independent research projects verify findings or contradict earlier findings and demand further attention (Morse, 2003). Indeed, recognizing the potential benefits of mixed methods research, there has been precipitous growth in the use of a combination of quantitative and qualitative methods (i.e., what Teddlie and Tashakkori, 2006, and others refer to as “quasi-mixed designs”). Even the Institute for Education Sciences has called for mixing methods in causal studies (i.e., randomized field trials) in order to better understand the conditions under which an intervention is effective (Easton, 2014).

With the growth in use of mixed methods, researchers planning to use mixed methods designs could benefit from more examples of real world applications, focusing on both the benefits and challenges of implementing a mixed methods design. For example, despite progress in describing how to combine qualitative and quantitative data, most of the discussion of triangulation design has focused on using the two forms of data to validate each other. While the role of mixed methods in enhancing the validity of inferences is important, it is only one facet of how mixed methods can be used to build understanding of a phenomenon. Further, focusing on enhanced validity as the primary role of mixed methods can

raise unsolvable problems when the data suggest discrepant findings. In this paper we draw upon existing frameworks for mixed methods research, and a large mixed methods case study aimed at identifying the practices of effective schools, to discuss the quandaries faced by researchers when discrepant findings emerge. Our data are organized around three "points of interface" (Morse, 2010) of the qualitative and quantitative data we collected: points of convergence that provide greater validity to the qualitative findings, points of intended divergence when we used qualitative and quantitative data to understand different aspects of the same topic, and points of unexplained divergence that caused us to look more deeply at the likely meaning of both forms of data.

Each example illustrates the different ways in which qualitative and quantitative data can be related and what we learned about effective practices in high school from using a mixed methods approach. This paper makes a contribution as it operationalizes the challenges of mixed methods research within the context of a large research project. Much of the guidance on conducting mixed methods research is found in books and articles that focus on the methodology itself. This literature includes many examples of how to apply the methodology, but the space for the examples is necessarily brief and often takes the form of ideal types (Creswell & Plano Clark, 2010; Greene et al., 1989; Morse, 2003). This paper, due to the grounding in a large research project intended to identify practices of effective high schools, keeps the research purposes in the foreground while illustrating the methodological issues in mixed methods research.

Review of Mixed Methods Research Design

Methodologists have provided multiple conceptual frameworks for mixed methods designs. Greene et al.'s (1989) framework focuses on five distinct purposes for mixed method evaluations: triangulation, complementarity, development, initiation, and expansion. Other researchers have offered more specific guidance for mixing quantitative and qualitative data (Creswell & Plano Clark, 2010; Tashakkori & Teddlie, 2010), including what Teddlie and Tashakkori refer to as mixed models—studies that have two types of questions, data, and interpretations and that are mixed throughout. As with good research practice in general, these frameworks call for research questions to drive the methodological choices, starting in the design phase. The configuration of the mixed methods design would, ideally, be made a priori (Yoshikawa, Weisner, Kalil, & Way, 2008), paying attention to the strengths of each design in terms of the research questions posed and the analyses planned (Johnson & Onwuegbuzie, 2004). For example, Yoshikawa et al. (2008) advocate for the planned use of integrated

methods throughout each stage of a mixed methods study, including an iterative, cumulative approach to analysis, rather than designing the analysis strategy after the data have already been collected.

Although the literature suggests a number of different ways to design mixed methods studies (Creswell & Plano Clark, 2010; Creswell & Plano Clark, 2007; Teddlie & Tashakkori, 2006), most designs can be broken down into two main categories: concurrent and sequential designs, as shown in Table E.1.

Mixed methods designs are differentiated in three main ways: the timing of when qualitative and quantitative data are collected, the relative weight given to the qualitative and quantitative types of data, and the methods of forging connections or interactions between the various forms of data (Creswell, 2009). Mixed methods studies can be designed to be concurrent—collecting both quantitative and qualitative data at the same time—or sequential—collecting and analyzing either qualitative or quantitative data first before collecting the other type. Results from the first type of data can then inform what is collected in the second type of data, usually by making decisions about sampling, research questions, and instruments. For example, sequential explanatory designs first collect quantitative data to identify overall patterns and then use qualitative data to explain and describe those patterns, whereas in sequential exploratory designs, qualitative data is first collected to inform a theory or hypothesis generation that is then tested with quantitative data. Sequential designs can be a particularly powerful means to take full advantage of the strengths of both qualitative and quantitative data. However, project time frames, and the complexities of accessing research sites and participants, can constrain researchers' ability to capitalize on the benefits of these designs. Sequential designs also implicitly weight one type of data as more important than the other as the first data collected informs design and content decisions for the second data collection. The relative weight given to qualitative or quantitative data is another key dimension in which mixed methods research designs vary (Creswell & Plano Clark, 2010). Convergent/triangulation designs place equal weight on both forms of data, while embedded and sequential designs place more weight on one type (which one is emphasized depends on the particular design) and transformative designs can give either equal or unequal weight to the different forms of data (Creswell & Plano Clark, 2010). Such transformations entail when quantitative data are qualitized into narrative data that can be analyzed qualitatively or qualitative data are quantitized into numerical codes that can be represented quantitatively (Creswell & Plano Clark, 2010; Tashakkori & Teddlie, 1998).

TABLE E.1 ■ Different Approaches to Mixed Method Designs

Design type	Quantitative data	Qualitative data	Which data are privileged	How data are integrated
Sequential explanatory	Collected and analyzed first	Collected and analyzed second, informed by Quantitative analysis	QT	Interpretation of entire analysis
Sequential exploratory	Collected and analyzed second, informed by Qualitative analysis	Collected and analyzed first	QL	Interpretation of entire analysis
Sequential transformative	Data collected as either Qualitative or Quantitative, but transformed into the other for analysis		Varies	Guided by social science theory
Concurrent triangulation	QT data collection leads to QT data analysis	QL data collection leads to QL data analysis	QL and QT given equal weight	Results from QT analysis compared with results from QL analyses
Concurrent embedded	QT data collection leads to QT data analysis	QL data collection leads to QL data analysis	Either QL or QT data are given more weight than the other	Results from QT analysis compared with results from QL analyses
Concurrent transformative	Data collected as either Qualitative or Quantitative at the same time, but analyzed together		Varies	Guided by social science theory

Note: Adapted from "Research Design: Qualitative, Quantitative and Mixed Methods Approaches (Third Edition)" by J. W. Creswell (2009). Sage Publications, Inc.

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How the qualitative and quantitative data interact when analyzed is another key dimension that differentiates mixed methods designs. Some argue that explicitly integrating the data during analysis is what defines a true mixed methods research design (Creswell & Plano Clark, 2010). Yet how to make this work, particularly in triangulation designs in which researchers seek convergence and corroboration of results from different methods of study of the same phenomenon (Greene et al., 1989), remains a challenge, and developing more strategies for examining how data converge is a priority for mixed methods researchers (Creswell & Plano Clark, 2007). Comparatively few authors describe the myriad challenges and decisions they face when designing mixed methods studies or collecting and analyzing the data (Burch, Heinrich, Farrell, Good, & Stewart, n.d.). However, the many advantages of using the two paradigms must be balanced with the challenges of figuring out when and how in the research process to "mix" the two.

The prototypical question for mixed methods is the extent to which the results converge (Creswell & Plano Clark, 2010). Convergence and triangulation for greater validity are common terms used in many typologies of mixed methods

research (Bryman, 2006; Creswell & Plano Clark, 2010; Greene et al., 1989). Yet this focus on triangulation as the method to ensure convergent findings can constrain many of the advantages that mixed methods can provide. What, for example, are researchers to do when the findings are discrepant or contradictory? When this perennial challenge presents itself, the methodological literature on mixed methods offers researchers limited guidance. Further, the emphasis of mixed methods as a source of convergence or triangulation for greater validity overlooks the value of mixed methods research for taking advantage of the nonoverlapping strengths and weaknesses of qualitative and quantitative methods to push for deeper understanding of complex phenomena (Woolley, 2009). Simply using mixed methods for triangulation requires collecting quantitative and qualitative data on the same concepts (Creswell & Plano Clark, 2010), yet the benefits of using both quantitative and qualitative data are maximized when they capture different types of information—qualitative, focused on understanding how and why, and quantitative, focused on patterns and how much. The goal of using both qualitative and quantitative data is not always to get the same picture of a phenomenon with different methods, but to get a fuller, more nuanced picture using multiple perspectives (Tashakkori & Teddlie, 2003).

This paper builds on the strengths of mixed methods research by drawing out the complexity of phenomena to paint a more comprehensive picture of what makes high schools effective. Our work suggests that discrepant findings, while challenging to reconcile, can point to a more complete understanding of the phenomena under study. This paper draws upon existing frameworks for mixed methods research and a large mixed methods case study to identify practices of effective schools, to discuss the quandaries faced by researchers when discrepant findings emerge.

Background on the Research Project

The data for this paper come from a large mixed methods case study focusing on the practices of effective schools. Specifically, this project was designed to identify the combination of essential components—and the corresponding programs, practices, processes, and policies—that explain why some high schools are particularly effective at serving low income students, minority students, and English language learners.

This work included several phases, including both sequential and concurrent aspects of mixed methods designs. The first phase involved intensive data collection in four high schools in one large, urban district to identify the practices

that distinguish higher value-added (HVA) high schools from lower value-added (LVA) schools (see VARC, 2014, for a description of how we estimated value added). Incorporating a sequential explanatory design element (1) to our study, we first used quantitative data to identify schools in the district that were more and less effective at improving student achievement in English/language arts, mathematics, and science by estimating school-level value-added models based on student achievement data for 9th, 10th, and 11th graders in mathematics, science, and English/language arts. Two schools were selected with relatively higher VA results and two schools were selected with relatively lower ones. We then used a combination of interviews, focus groups, surveys, and classroom observations—in a concurrent design—to try to understand what the HVA schools were doing that contributed to their success and distinguished them from the LVA schools in the same district. Table E.2 includes demographic information for the four case study schools. In addition, since all four schools were in the same district, many resources and organizational characteristics were similar, with the notable exception that Valley, one of the LVA schools had recently been identified as a "turnaround" school that provided additional resources and a merit pay incentive for teachers.

The research findings from this mixed methods study became known as the "design challenge" that guided a collaborative design process to develop school-based innovations and centered on the distinguishing characteristics of HVA and LVA schools identified in the case study work. Identifying the right distinguishing characteristics, as well as why they work in a particular context, is critical to designing innovations that have a chance of success in other sites. This, combined with the need to draw on the complementarity of methods, led us to use a mixed methods approach to bring the strengths of qualitative and quantitative methods to bear.

TABLE E.2 ■ Demographic Characteristics and Performance Indicators of Case Study High Schools

School characteristics	LVA schools		HVA schools	
	Mountainside	Valley	Lakeside	Riverview
Enrollment	700–1200	>1500	700–1200	>1500
Percent Black	>50%	<20%	<20%	<20%
Percent Hispanic	<40%	>75%	>75%	41%–75%
Percent economically disadvantaged	60%–75%	>75%	>75%	<60%
Percent Limited English proficient	<7%	>7%	>7%	<7%
2010 Graduation rate	<80%	<80%	>85%	>85%
2011 State rating	Academically Unacceptable	Academically Acceptable	Academically Acceptable	Academically Acceptable
Value-added rank within district, all subjects, all students (out of 13 total)	13	11	1	3

Note: LVA = lower value-added, HVA = higher value-added. The state accountability rating and graduation rate were the most recent data available at the time of school selection. Demographics represent the composition of the schools at the time of our visits (2011–2012). The value-added ranks are derived from 3 years of data of school-level value-added in math, science, and reading. The most recent year was 2010–2011.

Note: LVA = lower value-added, HVA = higher value-added. The state accountability rating and graduation rate were the most recent data available at the time of school selection. Demographics represent the composition of the schools at the time of our visits (2011–2012). The value-added ranks are derived from 3 years of data of school-level value-added in math, science, and reading. The most recent year was 2010–2011.

Methodology: Data Collection Design

Our knowledge of the comparative advantages of the mixed method research convinced us that a mixed methods design was most likely to capture the complex phenomena at the school and district levels as well as the role that context, programs, practices, processes, and policies played in distinguishing between high- and low-value-added high schools.

Our data collection was guided by a framework of eight essential components that emerge from the literature on effective schools at all levels. This framework emphasizes that it is not the adoption of any individual program or practice that leads to school effectiveness, but the integration and alignment of school processes and structures across these eight components (e.g., Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010; Murphy, Elliott, Goldring, & Porter, 2006). The essential components include learning-centered leadership, rigorous and aligned curriculum, quality instruction, personalized learning connections, culture of learning and professional behavior, connections to external communities, systemic performance accountability, and systemic use of data.

After using value added analysis (a quantitative method) to identify the schools for the case studies, we implemented a concurrent mixed methods design. This included analysis of quantitative data from schools across the district (including teacher, student, and parent surveys and administrative data on student discipline, attendance, and course taking patterns).

The design also included the collection of additional data that included both quantitative and qualitative data—classroom observations, individual interviews and focus groups, observation of administrative meetings, and shadowing of students throughout the school day. These were collected in the four case study schools in three different waves during the 2011–2012 school year. Focus groups (with students, teachers, student activity leaders, district parent liaisons) and interviews (with principals, assistant principals, guidance counselors, support personnel, teachers, students, and district personnel) were complemented with the collection of school and district artifacts (see Table E.3). Data collection primarily focused on 9th and 10th grade students and teachers in English, mathematics, and science, although we balanced this focus with other data from key staff and a cross-section of the school (e.g., teacher focus groups spanned all grades and subject areas) to gain a comprehensive understanding of our schools.

We summarize key aspects of the data collection modes below (see Cannata, Taylor Haynes, & Smith, 2013, for a more detailed description).

Interviews and Focus Groups

To identify the combination of practices that make some high schools in their urban district particularly successful, we interviewed all principals, assistant principals, guidance counselors, and deans of instruction (when applicable). The instruments were developed around our conceptual framework of eight essential components of effective schools. Six teachers in each of the mathematics, English/language arts (ELA), and science departments were interviewed (and observed) in each school, for a total of 18 teachers per school. All department heads and content area coaches in the three targeted subjects were interviewed and a sample of other support personnel were also interviewed.

We conducted three types of focus groups. First, teachers who were not sampled for individual interviews were invited to participate in focus groups. Second, we conducted focus groups with students. Students were selected on the basis of grade and course selection patterns. We focused on students in grades 10–12 because of their familiarity with their high schools. Student focus groups were organized to include one focus group of students taking primarily "advanced" courses, one of students taking primarily "general" courses, and one of students enrolled primarily in "remedial" or classes "for repeaters." Students were identified based upon the convenience of their schedules, with the goal to have a cross section of students in each focus group that is broadly representative demographically of students within that course selection pattern.

TABLE E.3 ■ Types and Amounts of Data Collected by Wave

Data type	Wave 1	Wave 2	Wave 3	Total
Interviews	80	82	56	218
School administrators	4	15	2	21
Teachers	72	0	1	73
Deans of instruction	0	3	2	5
Department heads/lead content teachers	0	21	0	21
Guidance counselors	0	15	0	15
Support personnel	0	24	11	35
Students	0	0	37	37
Focus groups	22	0	14	36
Students	11	0	1	12
Teachers	11	0	0	11
Student activity leaders	0	0	12	12
District parent liaison	0	0	1	1
Observations	138	128	51	317
Classroom periods	138	128	8	274
Students shadowed	0	0	37	37
Faculty/school administrative team meetings	0	0	6	6
Total				571

Note: Teachers and other school personnel may have participated in more than one type of data collection. For example, some individuals may have been interviewed as both a teacher and in their role as a department head or lead content teacher. Similarly, a teacher may have participated in a general teacher focus group in Wave 1 and then the student activity leader focus group in Wave 3 due to his or her role as an athletic coach.

Note: Teachers and other school personnel may have participated in more than one type of data collection. For example, some individuals may have been interviewed as both a teacher and in their role as a department head or lead content teacher. Similarly, a teacher may have participated in a general teacher focus group in Wave 1 and then the student activity leader focus group in Wave 3 due to his or her role as an athletic coach.

As our initial, post Wave 1, data analysis had highlighted the important role of student extracurricular activities in engaging students, we also conducted focus groups with teachers and other adults who supervised these activities in Wave 3 to learn more about how they were manifested in the school (a form of sequential exploratory design).

Classroom Observations

We observed and videotaped a total of 274 class periods of ELA, math, and science across the four case study schools. The same teachers who participated in the interviews were also observed. We used an observational tool called the CLASS-S (Pianta, Hamre, & Mintz, 2011) to turn the observational data into a quantitative measure that assesses teacher-student interactions in the classroom. We observed and coded the following domains and dimensions using the CLASS-

S framework: emotional support (positive climate, negative climate, teacher sensitivity, regard for adolescent behavior), classroom organization (behavior management, productivity, instructional learning formats), and instructional support in the classroom (content understanding, analysis and problem solving, quality of feedback, and instructional dialogue), and student engagement.

Surveys and Administrative Data

We collaborated with the district to add survey items that measure key study constructs into their annual survey cycle and to obtain survey data from students, teachers, and principals that pertain to further understanding the processes, programs, and practices that might explain school effectiveness. The surveys were administered by the district across all schools in the district, not just in the four case study high schools. The student survey was administered to 9th, 10th, and 11th grade students in November 2011. A total of 10,827 high school students completed surveys, representing approximately 60% of enrolled students. Response rates in the four case study schools ranged from 55% to 77%. The student survey measured the following constructs: academic engagement, personalization, parent press toward academic achievement, peer support for academic achievement, student sense of belonging, student study habits, school-wide future orientation, school climate, disaster preparation, academic press expectations, academic press challenge, student responsibility-participation, student responsibility-school culture, school safety, bullying, and parent connections.

The teacher survey was administered in January 2012. Five hundred and seventy-seven teachers completed the survey across all high schools, for an overall response rate of 44%. Response rates within the four case study schools varied considerably, ranging from 30% to over 60% of teachers. Principle component factor analyses were performed separately on each of the proposed survey constructs. Constructs included: bullying, data use, efficacy, instructional program coherence, personalization-social, school leader instructional support, teacher-principal trust, teacher-teacher trust, supporting quality instruction, systemic performance accountability, supportive and shared leadership, expectations for postsecondary education, personalization-school action, teacher accountability, teacher outreach to parents, teacher-parent trust, and time to collaborate.

For the teacher and student surveys data reported below, scales were created for the factors identified above. School level means for each scale are reported in

each table, with significance level calculated through ordinary least-squares (OLS) linear regression on school dummy variables for our case study schools, with comparison group as the remaining students or teachers in the district (12 other schools).

Data Coding and Analysis

For the interviews, focus groups, and observations conducted in our four case study schools we employed a multi-stage approach to analyze researchers' field notes. Field notes were kept in two forms: personal interaction forms (Miles & Huberman, 1994), which were completed by researchers within 24 hours of conducting an interview or moderating a focus group; and school level analysis forms (SCAFs; Miles & Huberman, 1994), which were completed by the members of each school's research team together during each of the three week-long visits. These served as inputs for generating a cross-school comparison matrix that compared schools across the essential components that guided our work. These three types of documents provided the basis for engaging in the iterative process of refining our instruments and planning our Wave 2, and then Wave 3, field visits. Our analyses were guided by our core research questions: What are the distinguishing characteristics between HVA and LVA schools? How did these differences develop and how are they enacted and supported?

To conduct an in-depth cross case analysis, a team of 19 people systematically coded the interview and focus group data using NVivo, a software program used for qualitative analysis (QSR International, 2012). We used the analytic technique of explanation building (Yin, 2009) to understand how and why the essential components developed (or did not develop) in our schools. This iterative process involved continuously refining claims about the school as additional evidence was examined. The following guiding principles framed our analytic work: focusing on answering our core research questions; discerning findings that could lead us to a "design challenge" in the district; establishing a process that is rigorous, systematic, allows for tracking back of claims to the data/evidence, and allows us to return to the data and evidence for each finding; and maintaining the essential components as an analytic frame.

To meet these principles, the work was organized into four cases handled by four to six team members for each school. All but one team member had first-hand experience collecting the fieldwork data in that school. The school-based teams were responsible for coding and analyzing all data collected about that school and writing a comprehensive case report. Using an emergent, inductive approach to

coding, every member of a school team read through seven to eight key transcripts that were selected in advance to include the SCAFs and comparison tables created after each visit, the principal transcripts, and those from selected teacher and student focus groups. The school team then met to develop an emergent coding framework that was grounded in the data (Glasser & Strauss, 1967). In addition we used an a priori coding scheme of our essential components and cross-cutting enabling supports (e.g., goals, trust, locus of control, structures that support or inhibit goals, rigor and academic press, student culture of learning, and student responsibility). The general approach was to look at each school as a system. Our analyses centered on understanding each school in depth, while maintaining a focus on the essential components within each school, as well as additional enabling supports that emerged. School case teams met weekly throughout the summer for about 4 hours each week. In between meetings, team members coded interview and focus group transcripts.

We also held cross-case comparison meetings involving all four school teams every other week for approximately 3 hours. The purpose was twofold: to ensure that definitions were being applied consistently and reliably across schools in the coding process and to flag emerging findings about each school to begin to make comparisons across schools. Once all interview and focus group data were coded, school case teams developed a narrative of each essential component. Coders worked to provide a thorough, well-supported set of claims about the facilitators and inhibitors of essential components, as well as the practices and policies through which these were enacted. These cases formed the basis of a detailed analytic report (Cannata, Taylor Haynes, & Smith, 2013) and the basis for the comparisons described here. The case reports included both quantitative and qualitative data.

Toward Understanding the Benefits and Challenges of Our Design: Examples of Data Triangulation

To illustrate how we triangulated observation, interview, and survey data across the higher and lower value-added schools, we describe our findings across three main constructs of effective schooling in this district context: student ownership and responsibility, quality instruction, and personalized learning connections. These areas are highlighted because they illustrate three main ways in which we found the qualitative and quantitative data interacted: convergence of data around the main differentiating characteristic of student ownership and responsibility; greater understanding of complex relationships around quality instruction in

schools by exploring potential discrepancies in the interview/focus groups and classroom observations; and unresolved discrepant findings around differences in personalized learning connections. The main advantages of triangulating across these different forms of data include: (a) the enhanced validity of our conclusions when they are supported by multiple forms of evidence (as evidenced in the data on student ownership and responsibility) and (b) the ability to compare qualitative data to external benchmarks. We see this advantage in the instructional support data in our study, as both the interview and focus group data point to qualitative differences between the HVA and LVA high schools, while the observation data, as coded using the CLASS-S instrument, highlights the absolute low level in all schools. Further, triangulating across multiple stakeholders, both within and across schools, helped us develop a holistic picture of the four schools within the context of their district, leading us to conjecture how the distinguishing characteristics we identified may have led to differences in value added achievement. These three components illustrate issues in which mixed methods research can provide mutually supporting information, as well as instances in which the data were contradictory.

Student Ownership and Responsibility: An Ideal Case of Convergent Findings

Both the qualitative and quantitative data suggest that what differentiated the two HVA schools from the two (LVA) schools were practices that helped students take ownership and responsibility for their own academic success. Through interviews and focus groups, the qualitative data indicated that teachers and other adults in the HVA schools scaffolded students' learning of both academic and social behaviors to guide them in assuming ownership and responsibility for their academic success. The HVA schools also developed an integrated system of academic press (the encouragement of students to achieve) and support (resources to foster academic success). This involved promoting self-efficacy by changing students' beliefs and attitudes and engaging them to do challenging academic work. Thus, we considered self-efficacy and engagement (both cognitive and behavioral) to be indicators of student ownership and responsibility, while academic support and press are strategies used to develop student ownership and responsibility. While our data do not permit causal claims, our findings are consistent with the broader literature on student engagement, self-efficacy, and academic press (Appleton, Christenson, & Furlong, 2008; Archambault, Janosz, Fallu, & Pagani, 2009; Bandura, 1997; Cohen, 2006; Fredricks, Blumenfeld, &

Paris, 2004; Klem & Connell, 2004; Libbey, 2009; Marks, 2000; Pajares & Urdan, 2006; Walker & Greene, 2009; Zimmerman, 2008).

It is important to note that while student ownership and responsibility were identified based on quantitative and qualitative measures at the student level, the qualitative data indicated that student ownership and responsibility resulted from concerted school-level efforts. In particular, teacher interviews and focus groups and administrator interviews provided evidence that, in the HVA schools, teachers and other adults in the school scaffolded learning of both academic and social behaviors that guided students in assuming ownership and responsibility of their academic success. Both of our HVA case study schools provided this scaffolding through integrated strategies of academic press and academic support. In some cases, due to recent improvements in Valley after being categorized as a turnaround school, we describe how Valley and the two HVA schools differ from Mountainside. Our qualitative data suggest that both HVA schools had stronger and more systemic practices, policies, and resources to establish an academically rigorous school environment in which students were pressed to achieve and supported in doing so. Indeed, the administrator and teacher interviews and teacher focus groups in one HVA school highlighted how the school focused explicitly on increasing student ownership and responsibility for their learning. The efforts to increase student ownership and responsibility focused on building a culture that holds students accountable for their learning and supports them through systematic but personalized interventions. Lakeside's levers for academic press were the Lakeside Code, a set of expectations for students and teachers; Learning Time, a lunchtime tutorial system; assignment logs, a shared template for students to monitor their progress; and the Intervention Committee, which provided support and procedures to raise the expectations for student success in all classes. The student focus groups reinforced the importance of these practices as students describe the Lakeside Code as the expectations they must adhere to and frequent use of assignment logs and tutorials.

The other HVA school, Riverview, also showed evidence of a strong student culture of learning from the student focus groups, at least among the honors students who took the initiative to form study groups, tutor each other, and work collaboratively to master challenging material, often after school. Although this culture of learning was heavily influenced by parental press for high academic standards, the teacher interviews and focus groups provided evidence of concerted strategies to increase student engagement to achieve school-wide rigor. The school established academic press and support by highlighting its success with AP/honors courses to encourage more students to take those courses, with a

concerted effort to keep the quality high. This outreach, which was targeted particularly at low-income and minority students, was described in interviews and focus groups as a key lever to provide greater learning opportunities for a broad spectrum of the student population. One teacher illustrated this philosophy when she said the faculty was committed to taking students who are not "honors students" and making them into honors students.

In contrast, the two LVA schools did not demonstrate a systemic focus on academic press and support. One reported characteristic shared by the LVA schools was a "culture of multiple chances," in which students could get several opportunities to make up for failure. While participants reported both positive and negative aspects to this practice, the limited student accountability it fostered supports the premise that academic press is a key difference between HVA and LVA schools. While all four schools provided credit recovery and other opportunities for students to make up failed assignments or courses, Lakeside and Riverview both were able to resolve the tension between supporting students and holding them accountable in ways that did not lower rigor. In contrast, LVA schools had only isolated examples of teachers pressing students and helping them take ownership of their academic success.

Because of the concurrent and exploratory nature of the study design, the surveys were not designed to focus explicitly on student ownership and responsibility. Still, four items on our student survey capture aspects of student ownership and two focus on academic press. Of the items on student ownership, one is focused on cognitive engagement and three on behavioral engagement. The academic engagement scale captures whether students get bored in class, find the work interesting, look forward to their classes, and work hard to do their best in class. The behavioral engagement measures are: study habits, responsibility-participation, and peer support for academic achievement. The study habits measure captures the extent to which students study and do homework. The peer support measure captures whether students and their friends support each other academically by talking about what they did in class, preparing for tests together, helping each other with homework, and similar behaviors. For the academic press expectations scale, students were asked the extent to which they agreed with the following statements: my classes really make me think; my teachers expect me to do my best all the time; and my teachers expect everyone to work hard. In general, students agreed with these statements. The academic press challenges scale included items about the difficulty of class work, tests, and teacher questions and asked how often students felt challenged. Student surveys were administered district-wide to understand students' perceptions.

In general, survey responses indicated stronger student responsibility and engagement at the HVA schools than at LVA schools (see Table E.4), though the evidence was not entirely consistent. Scale averages for Riverview were significantly higher than the district average, with the positive difference largest for study habits and participation and narrower for academic engagement. This is consistent with our qualitative finding of a strong student culture of learning at Riverview. At Lakeside, the academic engagement and participation scale averages were significantly higher than district means, but the scales on study habits and peer support for academic achievement were lower. Results for the LVA schools were significantly lower in some areas and significantly higher in others.

One survey result worth noting was that student perceptions of academic press were mixed at HVA schools. Riverview's scale averages exceeded the district mean for the category, but Lakeside had lower averages. While the differences are small (less than 10% of a *SD*), they were statistically significant in most cases. Valley also showed some significantly lower scores on the academic press scales.

The student survey also asks whether students participated in credit recovery, tutoring, and preparation for college entrance exams, and responses may help understand the student perspective on academic press and support. For example, Mountainside students were most likely to report participating in credit recovery, suggesting less press "to do well the first time," whereas the lower participation rates at the HVA schools suggest greater academic press. On the other hand, students in the HVA schools were more likely to participate in PSAT, SAT, and ACT preparation activities, suggesting more school-wide press to attend college. The effectiveness of Lakeside's Learning Time tutoring program is evident in the high percentage of students who get tutoring.

TABLE E.4 ■ Student Survey Data on Academic Press and Student Ownership

	LVA schools		HVA schools		District mean (*SD*)	Scale range
	Mountainside	Valley	Lakeside	Riverview		
Academic engagement	2.43***(–)	2.52***(+)	2.51**(+)	2.49***(+)	2.48 (0.52)	1–4
Peer support for academic achievement	2.87***(+)	2.72***(–)	2.77**(–)	2.89***(+)	2.79 (0.54)	1–4
Student study habits	2.84***(+)	2.67***(–)	2.71***(–)	2.85***(+)	2.76 (0.56)	1–4
Student responsibility: participation	3.21***(–)	3.51***(+)	3.53***(+)	3.60***(+)	3.44 (0.73)	1–5
Academic press: expectations	3.04***(–)	3.13	3.07***(–)	3.12	3.11 (0.53)	1–4
Academic press: challenge	2.98	2.95***(–)	2.97**(–)	3.01*(+)	2.99 (0.60)	1–4

Note: LVA = lower value-added; HVA = higher value-added. Statistical significance was calculated based on mean comparisons tests between each case study school's mean scale rating compared to the mean from the district's other 12 schools.

*p <.05. **p <.01. ***p <.001.

***Note*:** LVA = lower value-added; HVA = higher value-added. Statistical significance was calculated based on mean comparisons tests between each case study school's mean scale rating compared to the mean from the district's other 12 schools.

p <.05.

p <.01.

p <.001.

TABLE E.5 ■ Percent of Students Participating in Select School Programs

	LVA schools		HVA schools		District average
	Mountainside	Valley	Lakeside	Riverview	
Tutoring	58***	43*	75***	26***	44
PSAT, SAT, ACT Prep	28***	12***	37***	34***	25
Credit Recovery	12***	8**	8	5***	7

Note: LVA = lower value-added; HVA = higher value-added. Statistical significance was calculated based on mean comparisons tests between each case study school's mean value compared to the mean from the district's 12 other schools.

*p <.05. **p <.01. ***p <.001.

Note: LVA = lower value-added; HVA = higher value-added. Statistical significance was calculated based on mean comparisons tests between each case study school's mean value compared to the mean from the district's 12 other schools.

p <.05.

p <.01.

p <.001.

TABLE E.6 ■ Student Engagement Measures by School

	LVA schools		HVA schools		
	Mountainside	Valley	Lakeside	Riverview	Combined
CLASS-S classroom observations: Student engagement	4.39**	4.58	4.83*	4.88*	4.67

Note: LVA = lower value-added; HVA = higher value-added. The CLASS-S data came from observations of 603 20-minute segments of classroom observations. Classrooms in English/language arts, mathematics, and science were observed. The observational rating is on a scale of 1-7. The shadowing data come from 1,360 5-minute segments of shadowing students throughout their core subject classes. Tests for statistical significance were computed by comparing the school value to the value of the other three schools combined.

*p <.05. **p <.01. ***p <.001.

Note: LVA = lower value-added; HVA = higher value-added. The CLASS-S data came from observations of 603 20-minute segments of classroom observations. Classrooms in English/language arts, mathematics, and science were observed. The observational rating is on a scale of 1-7. The shadowing data come from 1,360 5-minute segments of shadowing students throughout their core subject classes. Tests for statistical significance were computed by comparing the school value to the value of the other three schools combined.

p <.05.

p <.01. ***p <.001.

The CLASS-S observational data also presented evidence on student engagement. Consistent with the qualitative and survey data, the classroom observation data suggested higher student engagement in the two HVA schools and lower student engagement in one LVA school, with the other LVA school near the mean.

Finally, we also examined administrative course-taking data as another indicator of academic press (see Table E.7). We hypothesized that schools with a greater climate of academic press would have more students taking advanced courses and passing Advanced Placement (AP) exams. These data supported the finding that Riverview and, to a lesser extent, Lakeside, were more successful in getting students to take advanced courses and exams. Not surprisingly, given the fieldwork, Riverview had the highest percentage of students taking at least one AP course and passing an AP test. The other HVA school, Lakeside, had relatively low AP participation, although slightly more AP course-takers took the test than at Riverview. Both HVA schools had higher AP exam pass rates than the LVA schools. A recent increase at Valley in the percentage of students taking and passing an AP test buttressed findings from fieldwork about recent academic improvements. Enrollment patterns in honors and other advanced courses revealed a few differences among the schools, including mixed results in this area for the LVA schools. Valley experienced a drop in enrollment in advanced courses. Mountainside experienced a decrease in AP-related categories. Riverview showed an increase and had a total of 72% of students taking any

advanced course (AP, honors, other advanced course), compared to around 51% in the other three schools.

TABLE E.7 ■ Course-Taking Patterns by Percentage of Students for Most Recent Three Years and Change Over Time

	LVA schools		HVA schools		
	Mountainside	Valley	Lakeside	Riverview	District mean
Most recent 3 years					
Taking any advanced class	51	50	53	72	58
Taking Honors	47	45	48	70	51
Taking AP Class	20	21	14	34	23
AP Takers who take the exam	31	38	55	53	42
AP Testers who pass	11	12	25	65	28
Two-year change					
Taking any advanced class	5	–8	10	–1	8
Taking Honors	4	6	13	–1	7
Taking AP Class	–6	5	4	1	5
AP Takers who take the exam	–2	7	3	2	5
AP Testers who pass	–6	17	16	0	6

LVA = lower value-added; HVA = higher value-added. These percentages represent the percent of all students in the school, although the availability of AP courses is not even across grades. The data on the most recent 3 years is an average of 2008–2009, 2009–2010, and 2010–2011. The change over time data reflect changes from 2008–2009 to 2010–2011.

LVA = lower value-added; HVA = higher value-added. These percentages represent the percent of all students in the school, although the availability of AP courses is not even across grades. The data on the most recent 3 years is an average of 2008–2009, 2009–2010, and 2010–2011. The change over time data reflect changes from 2008–2009 to 2010–2011.

To summarize, the results show an overall pattern of convergence between findings of different indicators, both quantitative and qualitative, of student ownership and responsibility between the HVA and LVA schools. Although there were some instances that appeared to diverge from the other findings, the prevalent pattern is one of differentiating the HVA and LVA schools. Further, many of the potentially discrepant cases were easily explained by the qualitative findings, such as the placement of Valley as a school on a turnaround trajectory and thus often straddling the HVA/ LVA line, the high use of tutoring at Lakeside, and the student culture of learning and AP course enrollment at Riverview. Other instances of potentially discrepant findings, such as with the student shadowing data, can be attributed to problems with sample selection and timing of the shadowing data collection.

Quality of Instructional Support in Classrooms: When Divergence Is Not Bad

While our most direct measure of instructional quality came from videotaping 9th and 10th grade ELA, mathematics, and science classes and then coding them as quantitative data using a rubric, we also interviewed teachers about their vision of high quality instruction, including any barriers they saw to implementing the practices they described as part of their instructional vision. As noted above, we coded our videotaped observations of classroom instruction using the CLASS-S protocol. To highlight how divergent findings across methods in a mixed methods study are not always an adverse result, we compare quantitative codes for two dimensions of the instructional support domain, Content Understanding and Analysis and Problem Solving, to teacher interview data across our four case study schools. While there are other aspects of instruction that we coded for using the CLASS-S, we focus here on these two domains of the Instructional Support dimension because they highlight aspects of instruction in which the study schools are in the upper end of the midrange of the coding rubric (content understanding domain) and the lower end of the midrange on the coding rubric (problem solving domain). The quantitative coding from the CLASS-S suggest that while the HVA schools score higher, on average, than the LVA schools, the differences are relatively small.

Content understanding, as measured by the CLASS-S, focuses on both the depth of lesson content and the approaches used to help students comprehend the framework, key ideas, and procedures. Indicators of content understanding that we coded for include: demonstration of depth of understanding, effective communication of concepts and procedures, demonstration of background knowledge and misconceptions, and effective transmission of content knowledge and procedures. On average, HVA schools had slightly better average content understanding than LVA schools, although all four schools had average scores in the midrange (4.37 to 4.68) and the differences were not statistically significant. A mid-level score on content understanding could be reflective of cases in which "class discussion and materials communicate a few of the essential attributes of concepts/procedures, but examples are limited in scope or not consistently provided" (Pianta et al., 2011).

The Analysis and Problem Solving dimension of the CLASS-S assesses the degree to which the teacher facilitates students' use of higher level thinking skills, such as analysis, problem solving, reasoning, and creating through the application

of knowledge and skills. We coded for indicators including: opportunities for higher level thinking, problem solving, and metacognition. On average, analysis and problem solving scores across the four case study schools were low—between 2.4 and 3 on the 1–7 point scale—this difference amounted to about half of a standard deviation. In other words, while the HVA schools had higher average analysis and problem solving scores than did the LVA schools, all four schools were at the lower end of this measure, suggesting that the typical classroom had few opportunities for students to engage in higher order thinking through inquiry and analysis.

While results from teacher interviews were broadly consistent with the cross-school patterns found in the CLASS-S ratings, they did not suggest how low the observation scores were going to be on the analysis and problem solving rubric. When asked about what they consider to be high quality instruction, multiple stakeholders at the HVA schools named higher order thinking skills. Teachers (i.e., the same ones that were videoed) mentioned using questioning strategies or problem solving activities (discovery learning, inquiry-based instruction) to reach higher order learning, although most also indicated this was a continuing struggle to do well. In contrast, teachers in the LVA schools viewed students' lack of background knowledge as the reason they struggle in their classes, rather than attributing it to their instruction. Interview data from the LVA schools suggested a lack of understanding of how to foster higher order thinking skills and what higher order thinking actually "looks like" in the classroom.

In a complementary manner, the interview data helped us understand some of the perceived barriers that teachers in the LVA schools see as inhibiting their ability to emphasize higher order thinking in their classroom instruction. This information was valuable to us in our project as it could inform the design of professional development to help teachers improve these skills. The teacher interviews, alone, however, would not have uncovered the relatively low degree to which teachers facilitate students' use of higher level thinking skills, on average, in both HVA and LVA schools. By triangulating the observation and interview data we gained confidence in the between-school differences that we saw; although if we had focused our study solely on interviews, we might have overestimated the degree to which teachers in the HVA schools were actually applying elements of quality instruction.

In summary, our CLASS-S coding of videotaped classroom observations across the dimensions of content understanding and analysis and problem solving suggested low overall implementation of strategies to develop higher order

thinking skills in classrooms. Although on average the HVA schools performed better on these measures, the results did not match up to the variation in rhetoric around high quality teaching (e.g., discovery learning, inquiry-based instruction) provided by teachers. The interviews in the LVA schools identified teacher efficacy issues that would be critical to address in any reform focusing on strategies to promote higher order thinking. This is a clear example of where divergent findings based on analyses across different modes of data collection were informative to our project goals, rather than simply raising issues of cross method "validity." Teachers' tendency to cite students' prior knowledge or current behavior as barriers to implementing more rigorous instruction is not a factor that we would have ascertained with an equivalent level of detail through survey or observation data. This analysis of the different data sources underscores the notion that divergent findings are not necessarily problematic, but rather permit complementary discoveries about the phenomena under investigation.

Personal Learning Connections: A Methodological Quandary Made of Divergent Findings

The construct of *personalized learning connections* assesses the strength of connections between students and adults in schools and the degree to which these connections allow teachers to provide more individual attention to their students (Lee & Smith, 1999). A school investing in personalized learning connections would also be developing students' sense of belonging to school (Walker & Greene, 2009). We would expect the personalized learning connections to span a continuum from strong and robust interactions that lead to connectedness, to weak or nonexistent interactions that lead to isolation and, potentially, alienation (Crosnoe, Johnson, & Elder, 2004; Nasir, Jones, & McLaughlin, 2011).

Interviews across a wide range of school stakeholders in each case study school suggest that building and sustaining strong adult-student relationships was "a priority" for fostering student engagement and success; however, actual responses and inferred dispositions about adult-student connections differed across schools. Participants at Lakeside reported extremely positive teacher and student chemistry and described the Lakeside code and learning time as the overarching mechanisms promoting such connections. The code and learning time were consistent with the school's dominant focus on academic responsibility—though students also came to hang out with teachers and get to know them socially. At Riverview, there was evident leadership in the efforts to meet different students' needs. Through interviews, the administration at Riverview reportedly based

employment on teachers' commitment to activities that would help develop strong adult-student relationships. This strategy appeared to pay off as faculty reportedly sponsored many clubs and encouraged student involvement. Riverview interviews and focus groups of adult participants suggested a commitment to the idea that relationships mattered for low-income students who would "go a mile for a teacher."

By contrast, student interviews suggested that the nature of relationships at Riverside followed a "school within a school" pattern, with students enrolled in honors or AP courses benefiting the most from access to teachers. This pattern was consistent with the principal's reported goal of closing social gaps in the school as well as academic gaps. Although classified as an LVA school, Valley had a concerted focus on addressing social development needs, but only a stated attention to academics. Teachers were expected to "do what it takes" to develop relationships with their students, including working outside class—and faculty seemed to have solidly bought into this personalization goal. Multiple participants, however, noted low levels of rigor at the school. Some teachers seemed to emphasize developing relationships with students, rather than making academic demands. At Mountainside, only some school personnel were intentional and systematic about building and maintaining relationships. The dissolution of the school's mentoring program belied participants' view that relationships with kids were a key aspect of practice. Diminished personalization practices also seemed to be a function of the school's significant teacher turnover rate. The interview data confirmed that the emphasis on personalization varied by value-added status, with Lakeside and Riverview placing more emphasis on concerted interactions between students and adults than Valley and Mountainside, the two LVA schools.

In contrast to the interview data, the teacher survey data tell a less consistent story, not always aligned with the value-added rankings of the four case study schools or the pattern that emerged from the qualitative data (see Table E.9). Personalization-structural support (three items; alpha = .76) includes items from the teacher survey that indicate how often the teacher organizes school supports, such as parent-teacher meetings and referrals to community organizations, for students that are struggling. Lakeside (HVA) was the only one of our case study schools that had a substantively different score from the district average (although this difference was not statistically significant). The structural supports identified through the interviews were only weakly validated here with the teacher survey data. Teacher responses to structural supports items related to personalization in the other three schools, one HVA and two LVA, were similar to the district

average. These findings led us to look closer at the structural supports for personalization that schools reported having in place, particularly Riverview.

Personalization-extra help (5 items; alpha = .76) refers to the extent to which teachers or other school staff provide extra help to students who are struggling. Here, the results generally parallel those suggested by our interview data. Lakeside, Riverview, and Valley all have scores above the district average, while Mountainside scored below the district average, although the differences were not statistically significant. This suggests that the extra help for struggling students in our four case study schools was not very different, at least from the teachers' perspective, from other schools in the district.

Personalization-social (five items; alpha = .77) refers to the extent to which teachers report knowing their students personally, such as their academic aspirations, their home life, and who their friends are. There is little alignment between teacher responses to these items and what we saw in our interview data, suggesting that the personalization strategies that came across strongly in interviews with adults in Lakeside and Riverview may not be universally enacted across teachers in these schools.

Another form of triangulation is the comparison of teacher survey responses to student survey responses. The "Personalization" scale derived from student survey data (see Table E.10) includes items that capture how many adults in the school were willing to give extra help with homework, care about students' academic achievement, provide advice about graduation requirements, and help with students' personal problems. The student sense of belonging scale comprises items measuring the extent to which students viewed people in the school as a family, felt like they fit with the school, and felt that people cared if they were absent. Consistent with teachers' survey responses, there do not appear to be systematic differences between higher and lower value-added schools on student perceptions of the level of personalization (five items; alpha = .88) and student sense of belonging (six items; alpha = .71), although Riverview is lower than the district average on personalization and higher on student sense of belonging. These results are striking in their inconsistency with our interview data, which suggest strong organizational supports in place in Lakeside for personalization of students' academic needs and in Valley for students' need for extra help.

We then triangulated our coded classroom observation data with our interview and survey data. The personalization construct is most proximally measured by the Emotional Support domain of the CLASS-S rubric, as it is designed to

measure the degree to which teachers are organizing their classroom environment to build strong connections with students. Results should parallel results of the personalization—social construct from the teacher survey and the personalization construct from the student survey. The Emotional Support domain measures these characteristics: positive climate, negative climate, teacher sensitivity, and regard for adolescent perspective. In general, HVA schools had higher ratings for the Emotional Support dimensions than LVA schools, with these differences statistically significant in all areas except positive climate.

As coded using the CLASS-S rubric, positive climate reflects the emotional connections and relationships among teachers and students, and the warmth, respect, and enjoyment communicated by verbal and nonverbal interactions. Indicators of this dimension included positive relationships, positive affect, positive communications, and respect. School average scores ranged from 4.4 to 5 (the upper end of the midrange) (see Table E.8). Consistent with the personalization scales from the student surveys, Lakeside, Riverview, and Valley had similar average positive climate scores, while Mountainside had the lowest ratings. The differences between the HVA and LVA schools were not statistically significant for positive climate.

TABLE E.8 ■ CLASS-S Scores by School

	LVA Schools		HVA Schools		
	Mountainside	Valley	Lakeside	Riverview	Combined
Emotional Support					
Positive Climate	4.40***	4.91	4.93	4.94	4.82
Negative Climate	6.24	6.17***	6.53**	6.63***	6.36
Teacher Sensitivity	4.34***	4.69	4.96**	4.96*	4.74
Regard for Adolescent Perspectives	2.90***	3.23	3.49*	3.43	3.26
Organizational Support					
Behavior Management	5.05***	5.25*	5.91***	5.61	5.44
Productivity	5.07**	5.15**	5.68***	5.56*	5.34
Instructional Learning Formats	4.33*	4.40*	4.76*	4.79**	4.55
Instructional Support					
Content Understanding	4.49	4.37*	4.60	4.68	4.52
Analysis and Problem Solving	2.42**	2.58	3.03***	2.78	2.70
Quality of Feedback	3.85	3.75*	4.26***	3.85	3.91
Instructional Dialogue	3.18	3.23	3.57**	3.22	3.30

* for $p < .05$, ** for $p < .01$, and *** for $p < .001$. Statistical significance was calculated based on mean comparisons tests between each case study school's mean rating compared to the mean from the other schools combined.

for $p < .05$,

for $p < .01$, and

for $p < .001$. Statistical significance was calculated based on mean comparisons tests between each case study school's mean rating compared to the mean from the other schools combined.

Negative climate encompasses the overall level of negativity among teachers and students in the observed class. This variable has been reverse coded, so a higher score reflects a less negative climate. Indicators of negative climate include negative affect, punitive control, and disrespect. On average, HVA schools had better negative climate ratings than the LVA schools, and this difference was statistically significant. The range in average scores, however, suggests that the typical classroom in any of the case study schools does not have a negative climate.

The teacher sensitivity domain of the CLASS-S codes for teacher's responsiveness to the academic and social/emotional needs and developmental levels of individual students and the entire class, and the way these factors impact students' classroom experiences. Indicators of teacher sensitivity included awareness, responsiveness to academic and social/emotional needs and cues, effectiveness in addressing problems, and student comfort. Although each of the schools scored in the midrange on this dimension, HVA schools had better teacher sensitivity scores than LVA schools, and this difference was statistically significant.

To summarize, across the broad construct of personalized learning connections, we found that the data on personal learning connections across interview, observation, and survey data were divergent. The interview data are consistent with our labeling of the schools as high and low value-added. The personalized learning connections constructs related to the quantitative coding of observations using the CLASS-S observation rubric are also, for the most part, consistent with the HVA and LVA rankings of the case study schools, although the average school level codes fell in a fairly narrow band, in the midrange. The teacher survey data suggest little difference across the four schools and do not differentiate the schools by value-added ranking.

The divergence in data on personal learning connections presents a methodological quandary of how to reconcile the differences. Viewing each source of data as a piece of the puzzle, rather than just evidence of cross-method validity, supports a more nuanced understanding of the differences in personalization across the schools. Each data source provides additional,

complementary insight into the presence and variation of personalization across our case study schools. Had we collected only two of the three data sources, we would have missed part of the story. For example, if we had examined survey data alone, we would not have identified strong differences between the schools in personalized learning connections across schools. The interview data, while not entirely consistent with the survey or observation data, suggest ways in which each of the schools is working to support the development of personalized learning connections between adults and students in different ways. Examples of this include the differences in the nature of teacher-student relationships at Riverview characterized by students as differing by student track (e.g., honors and AP versus on-level courses), and the emphasis at Valley on adults addressing students' social development needs over academics.

TABLE E.9 ■ Teacher Survey Data on Personalized Learning Connections

	LVA schools		HVA schools		District mean (*SD*)	Scale range
	Mountainside	Valley	Lakeside	Riverview		
Personalization - Structural Support	3.09	3.11	3.16	3.10	3.08 (0.45)	1–4
Personalization - Extra Help	2.78	2.91	3.03	2.92	2.83 (0.69)	1–4
Personalization - Social	3.27	3.18	3.18	3.25	3.25 (0.72)	1–5

Note: LVA = lower value-added; HVA = higher value-added. Statistical significance was calculated based on mean comparisons tests between each case study school's mean scale rating compared to the mean from the district's other 12 schools.

*p <.05. **p <.01. ***p <.001.

Note: LVA = lower value-added; HVA = higher value-added. Statistical significance was calculated based on mean comparisons tests between each case study school's mean scale rating compared to the mean from the district's other 12 schools.
*p <.05. **p <.01. ***p <.001.

TABLE E.10 ■ Student Survey Data on Personalized Learning Connections

	LVA schools		HVA schools		District mean (*SD*)	Scale range
	Mountainside	Valley	Lakeside	Riverview		
Personalization	2.88	2.83	2.85	2.79***(–)	2.85 (1.02)	1–5
Student sense of belonging	2.74	2.74	2.75	2.77***(+)	2.75 (0.52)	1–4

Note: LVA = lower value-added; HVA = higher value-added. Statistical significance was calculated based on mean comparisons tests between each case study school's mean scale rating compared to the mean from the district's other 12 schools.

*p <.05. **p <.01. ***p <.001.

Note: LVA = lower value-added; HVA = higher value-added. Statistical significance was calculated based on mean comparisons tests between each case study school's mean scale rating compared to the mean from the district's other 12 schools.

ppp <.001.

Discussion and Implications

Our goal has been to highlight the advantages and challenges of collecting and interpreting mixed methods data in a large scale research and development project. To do so, we have highlighted three different points of interaction of data sources: points of convergence that provide greater validity to the qualitative findings; points of intended divergence when we used qualitative and quantitative data to different ends around the same topic; and points of unexplained divergence that caused us to look more deeply at both forms of data. These examples illustrate the methodological issues—both advantages and disadvantages—that arise when mixing qualitative and quantitative data in the context of a large research project.

The advantages of our having used mixed methods far outweighed the disadvantages. These include increasing construct validity of our findings when they are supported by multiple forms of evidence, and enhancing trustworthiness of the analysis by providing a fuller more-rounded account (Gorard & Taylor, 2004), reducing bias, and compensating for the weakness of one method through the strength of another. Another advantage of using multiple methods was our ability to compare qualitative data to an external benchmark.

Perhaps the most important advantage, however, of our using mixed methods is the complementarity of findings derived from different modalities and methods. As Greene et al. (2001) suggest, the use of mixed methods allows researchers to draw upon the complementarity of the qualitative and quantitative paradigms to better understand the social phenomena under investigation. As noted by Gorard and Taylor (2004), this complementarity is far more important than mutual validation as two or more observations or methods should be expected to yield different results: “We cannot use two or more methods to check up on each other in a simple way. The methods should be complementary, producing different aspects of the reality under investigation and then put together, or they could be designed to generate dissonance as a stimulus to progress” (Gorard & Taylor, 2004, p. 9).

We found that the complexities and nuances that emerged from looking at the programs, policies, and practices that differentiated HVA and LVA schools by using multiple methods were pivotal in helping us look beyond seemingly simple or obvious reasons for why one school was performing better than another. The multiple methods employed in our study allowed us to see schools from multiple

perspectives (e.g., administrators, guidance counselors, teachers, coaches, students) as well as through multiple modes of qualitative and quantitative data collection (i.e., interview, focus group, observation, survey, student assessment, and student shadowing). Although costly and time consuming, mixing methods helped us to ask questions and attempt answers that were more useful to us in the development stage of intervention work than would have been the case had we relied upon a single mode or method of research. By triangulating across data from different sources and modes we increased the likelihood that we have actually identified enduring—rather than transitory—aspects of a school environment as their quality drivers.

The challenges of taking a mixed methods approach became apparent when data collected from multiple perspectives and multiple modes did not converge. While we sought to design data collection instruments to assess the same underlying constructs, each data source had its own strengths and weaknesses. The surveys were used to collect representative data systematically, helping to improve reliability, although lower than desired response rates may have biased our results. In addition, our survey questions had to be determined far in advance of the field work in order to get them cleared by our Institutional Review Board and for our district partners to include them in their survey administration. We relied on items that had been previously shown to be reliable and valid, which is less costly and time consuming than developing items and field testing them for our specific study. Items taken from other studies, however, were not always an exact match for the constructs that were the focus of our investigation. By adding three cycles of interviews to the survey data, we could more easily adapt questions to our constructs, and follow up when new ideas as theories emerged. Further, the semistructured interviews allowed the interviewer to probe responses in ways that can help uncover the "how" and the "why" behind why a program or practice might be effective (or not), rather than just unearthing its existence. Although the self-reports from school stakeholders in interviews and surveys did not always align with what was observed in classrooms, the combined analysis of data from multiple methods, rather than just one, two, or three, allowed us to move beyond a surface understanding of what makes some schools more effective than others.

Creswell and Plano Clark's (2010) typology of triangulating mixed methods data offers a useful way of framing the relative trade-offs that researchers must consider in analyzing their data: (a) the timing of when the qualitative and quantitative data are collected; (b) the relative weight ascribed to one paradigm over the other; and (c) the means by which the data are integrated. Each trade-off presented us with tangible challenges in collecting and analyzing our data. The

first challenge was planning the timing for each component of the research design. We sought to design data collection instruments that would assess the same underlying constructs so that there would be consistency across data sources. Each instrument type had its own strengths and weaknesses. The surveys would allow us to collect consistent, representative data across all high schools in the district, not just our four case study schools. This would allow us to compare student and teacher responses in our case studies schools to the other schools in the district. In addition, the survey questions had to be formulated in advance of our conducting the field work so the district could include them in their survey administration. This meant that we were not able to maximize the potential benefits of using emergent findings based on fieldwork to develop or refine survey items. Yet considerations of time loom large for researchers in deciding what items and scales to use. The same temporal considerations are not as relevant to qualitative data collection since the methodology lends itself to developing and refining interview questions iteratively. Qualitative instruments are more easily adapted, and follow up, should there be confusion or a need to dig deeper, more easily obtained. However, the issue of timing arose again as we were faced with analyzing hundreds of interview and focus group transcripts and observation data to inform the next wave of data collection. Thus our three qualitative data collection waves had the advantage of a sequential design, even if our qualitative and quantitative data collection and analysis had to be concurrent.

Our approach to mixing the multiple methods was to use a coordinated model for the explicit reason that we needed to accomplish both quantitative and qualitative data collection within a single year so that the identified difference between HVA and LVA schools could inform the design for our collaborative improvement work with our partner district. While we would have valued being able to collect one type of data first and then use the analyses of that data type to inform the inquiry and method of data collection of the subsequent data collection, both the scale and tight time frame of our data collection did not allow it. For example, we could have first collected teacher and survey data to identify differences between the HVA and LVA schools, and then used the interviews and focus groups of administrator, teachers, and students to understand the origin of these differences and how they work in their particular school context. We could have also staged the survey and interview data in the opposite order—using interviews, focus groups, and classroom observations to develop a hypothesis for the components and practices that distinguished the HVA and LVA schools and then using data that could be collected from surveys to test the hypotheses. However, having a single year of intensive data collection simply did not allow for either of these

scenarios. Instead, our best option was to choose a concurrent design and use triangulation and complementarity to draw the most out of the data.

Our second challenge was to identify the relative weight we would ascribe to qualitative versus quantitative data, which became salient as we tried to reconcile our seemingly discrepant data. As we learned from the results of the analysis of personalized learning connections, discrepant findings are not always a problem (Erzberger & Kelle, 2003). What one can learn from observing teachers is substantively different from what one learns from interviewing teachers. What one learns from shadowing students to understand their experience of school is one thing, but those learnings are enhanced if one also interviews them about what was observed through shadowing. What surfaces in one-on-one interviews with core content teachers can be broadened and more fully illuminated by also conducting focus groups with support personnel (e.g., guidance counselors and school drop-out prevention specialists) and teachers who coach or run academically focused after-school activities.

Our third challenge was how to integrate the qualitative and quantitative data. As our description of analyzing the data on personal learning connections demonstrated, the complementarity model did not provide a good methodological frame because the triangulation of research results led to a situation in which the different findings did not neatly fit together. Erzberger and Kelle (2003) indicate that in such instances the complementarity model does not provide a good methodological frame. It is most important to do due diligence and check whether the research methods were "adequately applied" (Erzberger & Kelle, 2003, p. 475) to rule out the possibility that the inconsistencies between qualitative and quantitative findings can be explained as the result of mistakes made in data collection or analysis methods or the possibility that the discrepancies are a result of inadequate theoretical concepts that were applied. Erzberger and Kelle recommend examining the methodology used including the sampling, research instruments, and the data analysis process to rule out the first possibility. Low response rate on teacher surveys and the sampling process for students in the shadowing component may have contributed to divergent findings.

While enhanced validity and credibility of inferences is often the focus of triangulation designs, such focus limits the potential advantages of collecting data from multiples sources via different methods. When, as in the case of student ownership and responsibility, the findings from different data sources converge to provide a coherent portrait, the issues of triangulation design are less relevant. When findings diverge, however, as was the case with quality of instructional

support in classrooms, researchers must confront questions of how to best reconcile such differences. When findings do not neatly converge or are ostensibly contradictory, as was the case with personal learning connections, researchers are presented with the quandary of how to reconcile such results. In these instances, the desired complementarity does not exist and does not result in a convergence of findings. To leverage the full benefits of mixed methods, a triangulation design that does not discount one paradigm in deference to another holds the potential to facilitate deeper understanding of a complex phenomenon. Further, the sequential nature of our field visits allowed us to test what we were finding in interviews and focus groups in the beginning of the year with additional interviews and focus groups with additional informants.

Through this paper, we have sought to weigh the strengths and challenges of mixed methods research in drawing out the complexity of phenomena to paint a more comprehensive picture rather than one more narrowly constrained to searching for convergence in findings. Our work serves as a reminder that seemingly discrepant findings, while challenging to reconcile, when considered for their potential complementarity, actually lead to a more complete understanding of the phenomena under study. Researchers undertaking mixed methods research stand to benefit from additional robust examples of how other researchers have tackled mixing different modalities and methods. This so-called "testing" of how to mix methods will help inform researchers of real quandaries and their resulting solutions. We can all benefit from additional studies describing how researchers undertake complex, multimodal, mixed methods research.

Research Note

This research is funded by the Institute of Education Sciences (R305C10023). The opinions expressed in this article are those of the authors and do not necessarily represent the views of the sponsor.

Note

1. As suggested in Table E.1, sequential explanatory designs are those in which quantitative data are collected and analyzed first and the qualitative data are collected and analyzed second and informed by the quantitative data. In such cases, the quantitative data are privileged.

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Appendix F Understanding Transitions in Care from Hospital to Homeless Shelter: a Mixed-Methods, Community-Based Participatory Approach

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Source: Greysen, S. R., Allen, R., Lucas, G.I., Wang, E. A., & Rosenthal, M. S. (2012). Understanding transitions in care from hospital to homeless shelter: a mixed-methods, community-based participatory approach. *Journal of General Internal Medicine*, 11, 1484–1491.

BACKGROUND: Coordinated transitions from hospital to shelter for homeless patients may improve outcomes, yet patient-centered data to guide interventions are lacking.

OBJECTIVES: To understand patients' experiences of transitions from hospital to a homeless shelter, and determine aspects of these experiences associated with perceived quality of these transitions.

DESIGNS: Mixed methods with a community-based participatory research approach, in partnership with personnel and clients from a homeless shelter.

PARTICIPANTS: Ninety-eight homeless individuals at a shelter who reported at least one acute care visit to an area hospital in the last year.

APPROACH: Using semi-structured interviews, we collected quantitative and qualitative data about transitions in care from the hospital to the shelter. We analyzed qualitative data using the constant comparative method to determine patients' perspectives on the discharge experience, and we analyzed quantitative data using frequency analysis to determine factors associated with poor outcomes from patients' perspective.

KEY RESULTS: Using qualitative analysis, we found homeless participants with a recent acute care visit perceived an overall lack of coordination between the hospital and shelter at the time of discharge. They also described how expectations of suboptimal coordination exacerbate delays in seeking care, and made three recommendations for improvement: 1) Hospital providers should consider housing a health concern; 2) Hospital and shelter providers should communicate during discharge planning; 3) Discharge planning should include safe transportation. In quantitative analysis of recent hospital experiences, 44% of participants reported that housing status was assessed and 42% reported that transportation was discussed. Twenty-seven percent reported discharge occurred after dark; 11% reported staying on the streets with no shelter on the first night after discharge.

CONCLUSIONS: Homeless patients in our community perceived suboptimal coordination in transitions of care from the hospital to the shelter. These patients recommended improved assessment of housing status, communication between hospital and shelter providers, and arrangement of safe transportation to improve discharge safety and avoid discharge to the streets without shelter.

Background

Homelessness has been rising in the US since the 1980s, and has worsened during the economic downturn over the last five years.[1,2] In 2009, an estimated 1.5 million individuals, or 1 in 200 Americans, experienced homelessness at some point during the year.[3] This trend has important consequences for US hospitals, as these individuals have much higher use of acute care services such as inpatient admissions and emergency department (ED) visits.[4–6] These high-use patterns likely play an important role in mediating disproportionate morbidity and early mortality for patients in this vulnerable population.[7,8]

The recent rise in homelessness has also created an increase in demand for shelter beds across the US[9], and healthcare for individuals accessing these services has become an increasingly important concern. In 1996, there were approximately 40,000 homeless assistance programs nationally, providing a broad range of services including 150,000 health-related contacts per year.[10] As the number of these programs specifically focused on emergency shelter or supportive housing has increased from 15,890 to 20,525 in the last 15 years, transitions between this growing "shelter system" and the healthcare system have also become increasingly common, especially for acute care. By 2010, approximately 7% of all homeless individuals and 13% of newly-homeless individuals seeking shelter from one of these programs were received directly from a hospital.[11] These transitions are often marked by inadequate coordination of care, which may further perpetuate high rates of acute care services.[12,13]

Recognizing the importance of these transitions, many communities have called on hospitals to become more engaged in efforts to combat homelessness, through improvements in discharge planning and integration with local housing assistance programs. Despite these efforts, there are no data from homeless patients regarding barriers they perceive to safe and supportive transitions in care. These data are needed to integrate systems of care and implement community plans. Accordingly, we conducted a patient-centered, community-based project with two objectives: to understand patients' experiences of transitions from hospital to a homeless shelter, and to determine aspects of these experiences associated with perceived quality of these transitions.

Methods

Study Design

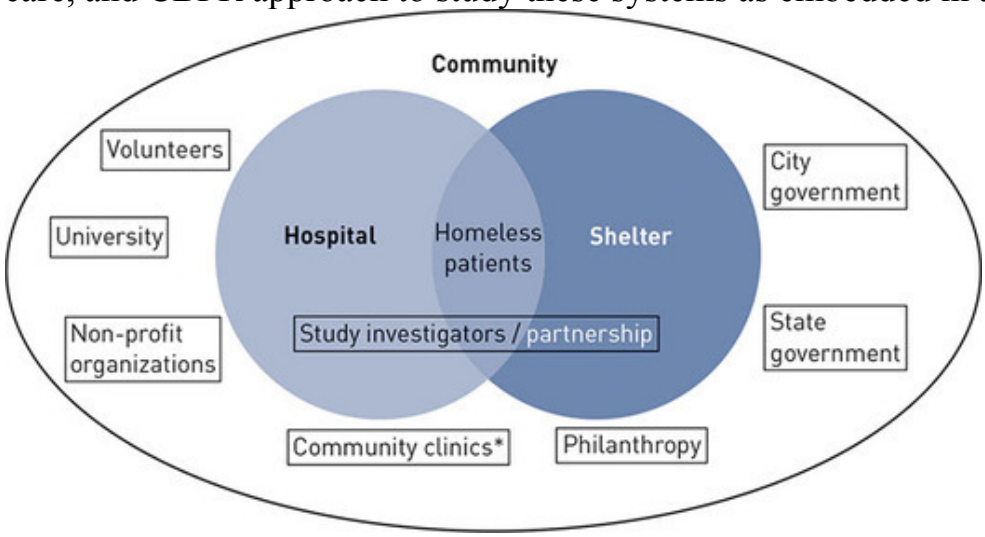
Using a community based participatory research (CBPR) approach,[16, 17] we created a partnership between Yale-New Haven Hospital (YNHH), the largest hospital in our community, and Columbus House, the largest homeless shelter in New Haven, Connecticut. Columbus House is a not-for-profit organization that provides emergency shelter, transitional housing, permanent supportive housing, and community outreach services.[18] In addition to Columbus House, there are two smaller homeless shelters in New Haven; one serves only men[19] and the other serves only women.[20] YNHH is a not-for-profit teaching hospital and, like many teaching hospitals, provides a large proportion of acute care for homeless patients in the community it serves. While homelessness is a major problem for the New Haven community, rates of homelessness in New Haven are similar to many other major U.S. cities.[9, 21]

CBPR is an approach which "engages multiple stakeholders, including the public and community providers, who affect and are affected by a problem of concern"[22] and "aims to combine knowledge with taking actions, including social change, to improve health."[23] Accordingly, university researchers and Columbus House personnel collaborated in all aspects of the research project, including study design, data collection, data analysis and dissemination. Further, we identified a diverse range of key stakeholders in our community for participation in our project, including: homeless individuals; city and state government officials; clinicians and administrators at our hospital; and clinicians and administrators at the Federally Qualified Health Center (FQHC) closest to the homeless shelter. Through a series of discussions with these key stakeholders, we identified the common characteristics of the missions for each, and described how the two systems of care, hospitals and shelters, were embedded in our community (see Fig. F.1).

We began our process of identifying research questions and project goals within this framework through direct engagement with these stakeholders. The primary investigator for the project (SRG) conducted extensive pre-study fieldwork by attending meetings held by the Healthcare for the Homeless group at the FQHC in New Haven, volunteering clinically each week at Columbus House in their small on-site clinic, and attending meetings of the Homeless Advisory

Commission for the City of New Haven. Issues related to transitions in care from the hospital (emergency department (ED) or inpatient) to the community were the most common topics discussed in these experiences, and were clearly identified as the most important task for hospitals and healthcare providers in the City's 10 Year Plan to End Homelessness. After further discussion with case managers, social workers, and executive staff at Columbus House, we felt that we had strong consensus that transitions in care were a top priority for providers of community-based assistance to the homeless population in New Haven. During ten individual brief interviews and one focus group with homeless individuals staying at Columbus House, we asked if they had recently accessed acute care and, if so, did they think we could improve the process. When they endorsed that improvement in this area was needed, we asked about specific topic areas we should include in our survey instrument.

Figure F.1 Conceptual model for shelter and hospital as overlapping systems of care, and CBPR approach to study these systems as embedded in a community.



*Examples include federally qualified healthcare center and veterans administration clinics.

As a result of our fieldwork and these discussions, we determined that our first research priority would be to generate patient-centered data about transitions in hospital care from individuals actively seeking shelter in our community. To obtain these data, we collaboratively designed a survey instrument for semi-structured interviews with individuals at Columbus House shelter.

Survey Instrument

We drafted our survey instrument and then incorporated feedback from nine individual interviews and three focus groups composed of key community stakeholders above. The survey contains 20 multiple choice questions, assessing basic demographic information, frequency of acute care visits, transportation to and from the hospital, ED, or hospital course, assessment of housing status by hospital staff, hospital discharge and disposition. We also asked two open-ended questions about acute care and transitions to explore perceptions and experiences of participants. We piloted the final survey with individuals staying at Columbus House, shelter staff, and clinicians to ensure face validity. The Yale University Institutional Review Board approved the research protocol.

Data Collection

Prior to data collection, the principal investigator trained five undergraduates from the Yale Hunger and Homelessness Action Panel[24] in survey administration and data collection. After training, these student-research assistants observed several interviews performed by the principal investigator, and each was then observed performing at least one separately by the principal investigator. Research assistants recruited participants and obtained informed consent from individuals staying at Columbus House who reported they had accessed acute care at an area hospital in the past year. Specifically, we recruited individuals on eight weekday nights distributed across a two month period from April–May 2010. On each recruitment night, during the "house meeting," Columbus House staff introduced the researchers to all individuals staying at the shelter that night. We invited participation from all individuals who had sought care at an emergency room in the last 12 months and created a list of names of volunteers. We conducted interviews consecutively from this list by reading each question aloud to individual participants, and marking their responses to multiple-choice and open-ended questions. We offered these individuals (hereafter "participants") a $20 gift card as compensation for their time and effort.

Data Analysis

Using qualitative survey data from open-ended questions, we employed the constant comparative method of qualitative data analysis.[25] A multi-disciplinary team of four study authors with expertise in homelessness, hospital discharge planning, community-based participatory research, and qualitative methods

independently coded the open-ended responses and met as a group to resolve discrepancies through negotiation. We developed codes iteratively, and refined them to identify conceptual segments of the data.[26] The team reviewed the code structure throughout the analytic process, and revised the scope and content of codes as needed. The final code structure contains 15 codes, which we subsequently integrated into one overarching theme and three recurring themes on recommendations for improvement. Themes from this qualitative data guided our approach to analysis of quantitative data.

Using quantitative survey data from multiple choice questions, we performed frequency analysis to describe participant characteristics including age, race, gender, reported length of homelessness, setting of care (inpatient care vs. ED care only), assessment of homelessness by hospital staff, post-discharge transportation planning, time of discharge and immediate disposition. Given participant concerns that emerged from the qualitative data about safety and inability to access the shelter on the first night after discharge, we designated staying on the streets the first night after discharge as an outcome of high interest. We used SAS version 9.2 (Cary, NC) for quantitative analysis.

Data Presentation to Community and Feedback

Consistent with qualitative and CBPR methods, we presented data from our project, as it became available, to study participants and key stakeholders in our community (Fig. F.1).[16] [17] From each group, we sought input on the accuracy of our findings and recommendations for implementing changes in the care of homeless individuals by area hospitals and shelters. This feedback process was critical for shaping our interpretation and presentation of data collected from study participants in the context of the community to which they belong.

Results

Data From Semi-Structured Survey of Homeless Participants

Ninety-eight shelter clients (82% response rate) participated in the study. Participants reported they were 80% (78/98) male, 42% (39/98) black, 41% (38/98) white, and 16% (16/98) Hispanic. Average age was 44 years (range 18–65) and average reported length of homelessness was 2.8 years. Sixty-one percent (60/98) reported three or more total visits to an area hospital for acute care in the preceding year (Table F.1).

Using qualitative analysis, we found homeless participants perceived an overall lack of coordination between the hospital and shelter at the time of discharge. Participants described how expectation of suboptimal coordination exacerbates delays in seeking care, and made recommendations for improvement which we grouped according to three recurrent themes: 1) Hospital providers should consider housing a health concern; 2) Hospital and shelter providers should communicate during discharge planning; and 3) Discharge planning should include safe transportation (Table F.2).

TABLE F.1 ■ Participant Characteristics

Characteristic	Total N = 98
Age	Mean: 44 years
<30	17 (17%)
30–39	12 (12%)
40–49	37 (38%)
50–59	26 (27%)
≥60	6 (6%)
Race	
Black	39 (40%)
White	38 (39%)
Hispanic	15 (15%)
Other	6 (6%)
Gender	
Male	78 (80%)
Length of homelessness	Mean: 2.8 years
<6 months	28 (29%)
6–12 months	20 (20%)
13–36 months	28 (29%)
> 36 months	22 (22%)
Setting for most recent acute care visit	
Inpatient admission	52 (53%)
Emergency Department	46 (47%)
Acute care visits in last 12 months*	
1	23 (23%)
2	23 (23%)
3	11 (11%)
4–5 visits	22 (22%)
>5 visits	17 (17%)

*Data missing for 2% of participants

Data missing for 2% of participants

Expectation of Suboptimal Coordination Exacerbates Delays in Seeking Care.

Given their experiences with hospital care, many participants reported they were likely to delay in seeking care. One participant explained, “I didn’t want to go wait in the ER just to find out ‘we can’t do nothing for you now . . . here’s an appointment to follow up later.’” Sixty percent of participants (59/98) reported

that they had delayed visiting a hospital after they knew they needed care and of these, 44% (26/59) indicated they had done so because they were concerned they would not get the care they needed. Additionally, 42% (25/59) indicated they had delayed seeking care because they were concerned that they would not be able to find shelter for the night once discharged. (Table F.3).

Recommendation 1: Hospital Providers Should Consider Housing a Health Concern.

Participants expressed that hospital staff would be better able to address health concerns of participants if they asked about housing status and other social determinants of health. One participant explained, "They [hospital providers] should be more worried about whether people have a safe place to stay beyond just physical or medical needs." Quantitative data revealed only 44% (43/98) of participants reported that hospital staff assessed their housing status during their most recent acute care episode (Table F.3). Additionally, participants suggested that hospital providers "should ask more questions and give more referrals or resources for help," including long-term or supportive housing options. Only 22% (22/98) reported that hospital staff discussed long-term housing as part of discharge needs.

TABLE F.2 ■ Qualitative Themes and Recommendations

Overarching theme: Expectation of suboptimal coordination exacerbates delays in seeking care.
Recommendation 1: Hospital providers should consider housing a health concern.
Recommendation 2: Hospital and shelter providers should communicate during discharge planning.
Recommendation 3: Discharge planning should include safe transportation.

Recommendation 2: Hospital and Shelter Providers Should Communicate During Discharge Planning.

Participants reported that even if hospital staff addressed their need for safe transportation and a safe place to stay after discharge, they still might not be able to gain access to shelter for the night. In the words of one participant: "Sometimes miscommunication between the hospital and shelter is a problem–they send you there, but you can't get in." Only 19% (19/98) of participants

reported that once they arrived at the shelter, shelter staff discussed their last hospital care or discharge instructions with them.

Recommendation 3: Discharge Planning Should Include Safe Transportation.

Participants were particularly concerned about the safety of public transportation or walking if discharge occurred after dark. One participant explained: “They should make sure people don’t leave late at night and that they have a safe ride to a safe place to stay.” Sixty-seven percent (66/98) of participants stayed at a shelter on the night of their discharge, 17% (17/98) stayed with friends, family, or had another arrangement, and 11% (11/98) stayed on streets the first night after discharge (Table F.3). While most study participants reported discharge before dark, 27% (27/98) reported discharge after dark for their most recent acute care episode. Furthermore, 59% (58/98) reported no safe post-discharge transportation plan. Among those who did have a transportation plan, 13% (13/98) took public transportation, 10% (10/98) got a ride from someone they knew, and 14% (14/98) took a taxi (Table F.3).

TABLE F.3 ■ Participant Responses to Selected Survey Items

Survey question	Number (%)
Have you ever delayed or avoided seeking care at an area hospital?	Yes = 59 (60 %) No = 39 (40%)
Why did you delay? (n = 59)*	Afraid I wouldn't get care = 26 (44%) Afraid I wouldn't find shelter = 25 (42%) Afraid of what I'd learn about my health = 17 (29%) I felt unwelcome at hospital = 11 (19%) Afraid I might be harmed by hospital care = 6 (10%)
Did shelter staff discuss your hospital care and discharge instructions with you?	Yes = 19 (19%) No = 79 (81%)
How did you get from hospital to shelter?	58 (59%) walked 14 (14%) taxi 13 (13%) public transportation (bus) 10 (10%) got a ride 3 (3%) not sure
During your most recent hospital visit, was your housing situation discussed before you were released?	Yes = 43 (44%) No = 55 (56%)
During your most recent hospital visit, what time were you released from the hospital?	Before dark = 72 (73%) After dark = 26 (26%)
During your most recent hospital visit, where did you go immediately after you were released?	Shelter = 66 (67%) Family, friend, or other = 21 (21%) Streets = 11 (11%)

*Includes only participants answering "yes" to screening question about delay in seeking care; response choice was "choose all that apply" so percentages total >100 %

Includes only participants answering “yes” to screening question about delay in seeking care; response choice was “choose all that apply” so percentages total >100 %

Community Feedback and Actionsin Response to Recommendations

Through feedback during our data dissemination efforts, we gained insights into local systems issues for hospitals and shelters. Senior leaders in both institutions reported that initiatives over the last decade to address related issues had all lapsed, due to limited funding or limitations of individuals working in single institutions without broader support from larger, inter-organizational groups. Therefore, in response to our findings, an ad hoc committee composed of shelter and hospital staff formed to explore ways to ensure timely communication and coordination of discharge care for homeless patients, beginning with their initial

presentation and culminating in safe transfer to the shelter at discharge. Initially, two emergency beds at Columbus House were reserved nightly for this purpose, but staff at both hospital and shelter quickly discovered that while these two beds provided the critical piece for appropriate discharge plans, they did not meet the needs of patients who need recuperative care. Furthermore, the logistics of such an informal arrangement were not sustainable without formalized protocols and funding.

These realizations led to the establishment of a formal Respite Task Force, which convenes monthly at Columbus House and is comprised of 17 members representing the hospital, shelter, FQHC, university, community organizations, and state government. Medical respite care is defined by the National Health Care for the Homeless Council as, "acute and post-acute medical care for homeless persons who are too ill or frail to recover from a physical illness or injury on the streets, but who are not ill enough to be in a hospital,"[27] and has been shown to improve outcomes for homeless patients,[28, 29] including permanent supportive housing.[30] The overall goal of the Columbus House Respite Task Force is to explore policies and procedures necessary to establish the first respite care center in New Haven.[31] Finally, to ensure funding for continued collaboration with healthcare providers, Columbus House successfully applied for external funding that provides for the training and deployment of two shelter-based patient navigators to help homeless patients with post-discharge coordination of care.[32] Columbus House and Yale-New Haven Hospital have also partnered as leaders in a statewide application to create systems of care that would improve healthcare for patients who are homeless or are at risk for homelessness. This program enables partnerships between hospitals and community-based organizations to improve care while reducing costs, and is one of several Medicare innovations funded by the Affordable Care Act.[33]

Discussion

Homeless individuals describe several important barriers to more effective care through integration of hospitals and shelters as overlapping systems of care. First, the majority of participants reported they were not asked about housing while in the hospital; nor were they asked about hospital care while in the shelter. These findings suggest that these issues were not prioritized within each system–hospital providers focused on healthcare, while shelter providers focused on housing, without significant overlap. Our group also recently reported that lack of housing assessment is associated with lower performance of key discharge components by hospital staff (such as discussing costs of medications or diet recommendations), which may result in low-quality discharge instructions for these patients.[34] Thus, a first step to better systems integration may be increased awareness among providers at hospitals and shelters, and increased efforts to engage patients who utilize both systems in discussions about relationships between health and housing status.

Second, even once hospital providers identified housing issues among hospitalized patients in our study, deficits in coordination and communication between the two systems may have resulted in patients being discharged to the shelter, only to be turned away because the discharge occurred too late in the day. Such system failures are worrisome because of the high rate of victimization in this population,[35, 36] especially among women and the elderly,[37,38] and they are associated poor health outcomes.[39] These failures are also important because they represent missed opportunities to improve outcomes of care. Previous studies have shown that homeless patients with more robust social support networks report less victimization and improved health outcomes.[40] Furthermore, discharge from hospital has been described as a "critical time" to address homelessness, and there is evidence to suggest that timely interventions may reduce time to supportive housing.[41] Data from our community suggests that hospitalization is a precipitating event for loss of housing for 5% of individuals experiencing homelessness at a given point in time.[21]

Our findings have important policy implications at several levels. At the level of individual communities, many have called on healthcare providers to integrate hospital-based and shelter-based care.[15] Indeed, the New Haven 10-Year Plan to End Homelessness specifically aims to "Improve discharge planning from local hospitals by making connections to appropriate case management and community services upon admission of a homeless individual to the hospital."[42] At the level of

the healthcare system, many studies have shown that a small number of high-utilizers of acute care account for a disproportionate share of overall costs for programs such as Medicare and Medicaid.[43, 44] Targeted interventions to improve the coordination of care for these most vulnerable, high-use patients can both improve patient outcomes and reduce overall costs of care.[45,46] Our work underscores the need for community engagement in order to successfully implement such interventions across the healthcare system. Finally, these efforts in the healthcare system and individual should be seen in the broader context of a growing movement to eradicate homelessness as an extreme manifestation of disparities in health in developed nations.[2], [47], [48]

The CBPR to research has several advantages for acting on these implications. First, by prioritizing community participation and action as important "results," CBPR enables researchers, healthcare providers, and community members to engage in rapid cycles of learning and application together in real-time. This allowed us to innovate by discussing best practices identified in the literature,[14, 49] in light of our own results, adapt these practices for our community, and continue to re-assess and adjust. Second, given community feedback about the importance of creating sustainability alongside innovation, we cultivated relationships between organizations and laid the groundwork for lasting collaboration through shared priorities. Thus, the project has continued to grow even as leadership for the project has changed due to career transitions of the initial project leaders (SRG and RA). Finally, beyond the relationships and collaborations built around this specific project, continued development of CBPR as a key community initiative within the Yale School of Medicine has created a broader infrastructure for community-focused collaboration. As these collaborations grow, they contribute to an environment where trust and mutual respect between community leaders and university researchers can facilitate improved health and healthcare for the most vulnerable populations within our community.

These advantages notwithstanding, our study has several limitations. First, data from our semi-structured interviews about experiences during prior hospitalizations may be subject to recall bias. We attempted to limit this bias by focusing on only the most recent acute care visit, and by interviewing only patients with a visit in the past year. Second, we recruited patients from one community; the experiences of homeless individuals in other communities may differ significantly and our results may not be generalizable outside the community we sampled. Third, our sample was predominantly male (80%) and while this is similar to national (62–67%)[2, 9] and state (70%)[15] population estimates for single, homeless adults, the percentage of women and families among the

homeless is rising, and deserves specific attention in future research. Fourth, although we sought direct participation by homeless individuals in the framing of our research project, refining survey questions, and giving feedback on results, we recognize that using a more strict application of CBPR methodology, even greater participation is possible. Continuing work from this project can build on this initial experience and increase participation by homeless individuals in ongoing implementation and evaluation of a respite facility in New Haven. Finally, we did not collect outcomes of the transitions in care our participants experienced, so we cannot describe the clinical impact of poorly-coordinated transitions. Nonetheless, we believe that our results identify important areas for future research and key areas for improvement in the transition care provided to these vulnerable patients. Our results can also provide a framework on which to build more collaborative relationships between hospitals and shelters in our community and others.

In conclusion, homeless patients described barriers to high-quality transitions in care from the hospital to the shelter, related to inadequate coordination between providers in both settings. Health care providers should strive to consistently assess housing status and arrange safe transportation, especially after dark, to improve discharge safety of homeless patients and avoid discharge to the streets without shelter. Improved integration of hospitals and shelters as overlapping systems of care within a community may improve the quality of transitions and outcomes of care for homeless patients who rely on these institutions.

Acknowledgements:

The authors gratefully recognize the contributions of the members of our community who made this project possible. First, we thank the individuals experiencing homelessness who participated in pre-study and post-study focus groups, in addition to those who directly contributed to data collection by enrollment in the study. Similarly, our study would not be possible without the specific contributions of the staff at Columbus House including: Alison Cunningham, Malynda Mallory, Preston Fox, Kevin Guess, and Ron Dunhill. We would also like to thank members of the Yale Robert Wood Johnson Foundation (RWJF) Steering Committee on Community Projects, the Yale New Haven Hospital Department of Social Work (Paula Crombie and Kathleen Tynan-McKiernan), the Cornell-Scott Hill Health Center Homeless Healthcare program and the Yale Homelessness and Hunger Action Panel.

We would also like to thank RWJF and the US Department of Veterans Affairs for funding through the Clinical Scholars program. The Yale Clinical Center for Investigation also supported the specific efforts of this program to develop community-based participatory research projects. Additionally, Dr. Wang is supported by the National Heart, Lung, and Blood Institute (NHLBI, K23 HL103720).

Data from this paper were presented at the 2011 Annual Meeting of the Society of General Internal Medicine and recognized with the Mack Lipkin Sr. Award for best presentation by an Associate Member.

Conflict of Interest:

The authors declare that they do not have a conflict of interest. The contents of this article are solely the responsibility of the authors and do not necessarily represent the official views of the RWJF, the VA, or the NIH.

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Appendix G Mixed Methods in Intervention Research: Theory to Adaptation

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Source: Nastasi, B. K., Hitchcock, J., Sarkar, S., Burkholder, G., Varjas, K., & Jayasena, A. (2007). Mixed methods in intervention research: Theory to adaptation. *Journal of Mixed Methods Research*, 1(2), 164–182.

The purpose of this article is to demonstrate the application of mixed methods research designs to multiyear programmatic research and development projects whose goals include integration of cultural specificity when generating or translating evidence-based practices. The authors propose a set of five mixed methods designs related to different phases of program development research: (a) formative research, Qual →/+ Quan; (b) theory development or modification and testing, Qual → Quan →/+ Qual → Quan . . . Qual → Quan; (c) instrument development and validation, Qual → Quan; (d) program development and evaluation, Qual →/+ Quan →/+ Qual →/+ Quan . . . Qual →/+ Quan, or Qual

→← Quan; and (e) evaluation research, Qual + Quan. We illustrate the application of these designs to creating and validating ethnographically informed psychological assessment measures and developing and evaluating culturally specific intervention programs within a multiyear research program conducted in the country of Sri Lanka.

Keywords: *mixed methods; intervention research; evaluation research; culture specificity*

Authors' Note**:** The initial phases of this work were funded by grants to the first author from the Society for the Study of School Psychology and the State University of New York at Albany. An earlier version of this article was presented at the annual meeting of the American Educational Research Association, San Francisco, April 2006. Address correspondence to Bonnie K. Nastasi, PhD, Director, School Psychology Program, Walden University, 155 Fifth Avenue, Suite 100, Minneapolis, MN 55401; e-mail: bnastasi@waldenu.edu or bonnastasi@yahoo.com.

Given the current emphasis on both evidence-based practice and culturally competent practice, it is critical for researchers and interventionists to identify models for developing culturally appropriate evidence-based practice (e.g., Ingraham & Oka, 2006; Nastasi & Schensul, 2005). Mixed methods designs applicable to intervention research can take a number of forms depending on the specific purpose or stage of the project (for an indepth discussion of mixed methods designs, see Tashakkori & Teddlie, 2003). Most mixed methods discussions (e.g., Creswell, 2003; Tashakkori & Teddlie, 2003) do not cover multiphase evaluation projects in detail, nor do they address the potential role of mixed methods designs for developing culturally appropriate practices in applied fields such as education and psychology. Morse (2003) discussed the application of mixed methods designs across individual studies within a program of research but did not present an integrative multiphase model for conducting programmatic research. Furthermore, although qualitative research designs (e.g., ethnography) are well suited for understanding culture and context, the integration of qualitative and quantitative methods to facilitate development of culture-specific instruments (e.g., psychological assessment tools) and interventions has received minimal attention (see Hitchcock et al., 2005).

We propose that the process of program development research is best characterized by a recurring sequence of qualitative and quantitative data collection culminating in a recursive qualitative-quantitative process depicted as

Qual → Quan → Qual → Quan . . . (Qual→ ←Quan). Qualitative methods (Qual) are used to generate formative data to guide program development, followed by quantitative evaluation (Quan) to test program effectiveness. Application in another setting can be facilitated by subsequent qualitative data collection (Qual) leading to program design adapted to the new context and participants, which is then followed by quantitative data collection (Quan) to test program outcomes. This sequence can occur across multiple settings and participant groups. Following initial adaptations to local context, program implementation and evaluation can be characterized by a recursive process (Qual→←Quan) in which collection of both qualitative and quantitative data inform ongoing modifications as well as implications for future program development and application.

The purpose of this article is to demonstrate the application of mixed methods research designs to multiyear programmatic research and development projects, whose goals include the integration of cultural specificity into development of an evidence base for practice. In particular, we illustrate the application of mixed methods designs to the development and validation of ethnographically informed psychological assessment measures, and the development and evaluation of culturally specific intervention programs.

A Heuristic Model: Theory to Adaptation

We propose a general heuristic for depicting multiyear research and development projects as an iterative research↔intervention process (see Figure G.1), based on the Participatory Culture-Specific Intervention Model (PCSIM; Nastasi, Moore, & Varjas, 2004). The research process begins with formative data collection to test the proposed conceptual model based on existing theory and research. At this stage, qualitative research methods are used to identify and define the constructs/variables specific to a particular culture or context (e.g., individual and environmental factors that explain/predict mental health, violent behavior, or academic achievement in a specific cultural group). Findings from the qualitative research are used to construct a modified model and develop assessment and intervention tools to test the model. Quantitative research methods are then used to test the model, for example, using instrument validation techniques and/or experimental or quasi-experimental designs. Evaluation research involves the triangulation of qualitative and quantitative methods to examine acceptability, integrity, and effectiveness of intervention methods as both a formative and summative process. The application of research as an ongoing formative evaluation process can assist in systematic modification of the intervention model and program design to meet context-specific needs (e.g., application of intervention to particular school or community). Summative research provides evidence of program effectiveness and informs application and translation to other settings. As interventions are applied to multiple populations and settings, the iterative use of mixed methods can help to inform adaptations and development of a general intervention model.

Applying Mixed Methods Designs to Multiyear Research and Development Projects: An Illustration

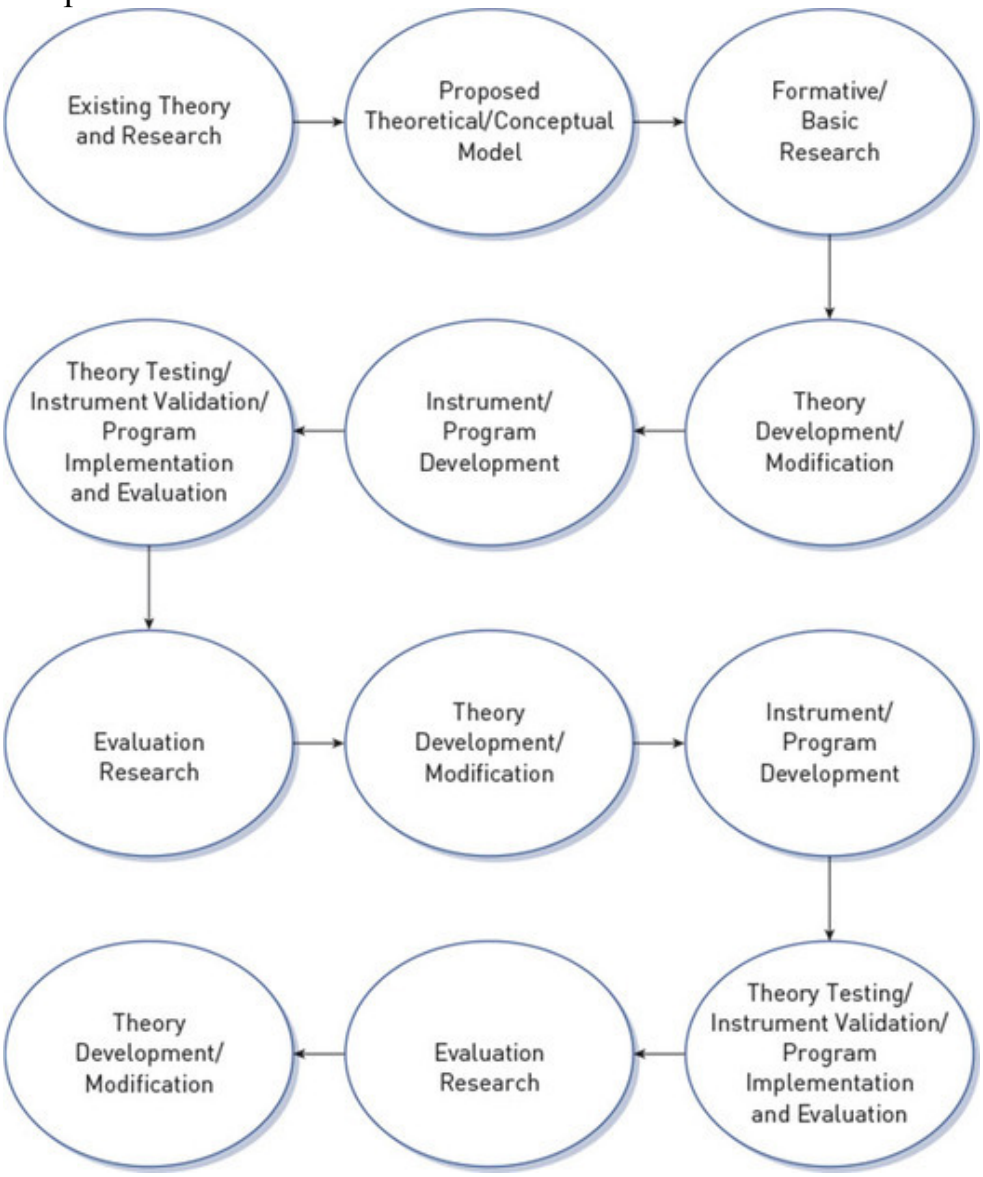
As depicted in Figure G.1, the multiple purposes for research within any given multiyear project (e.g., formative research, instrument development, evaluation research) necessitate the use of mixed methods designs. Drawing on the general model (Figure G.1), we propose a set of five designs applicable across various phases of the theory→adaptation process (see Table G.1). The remainder of this article is focused on description and illustration of these five designs, based on our own intervention research experiences across an ongoing multiyear project, the Sri Lanka Mental Health Promotion Project (SLMHPP). (Although Figure G.1 provides the heuristic for depicting the theory to adaptation process of program development, the remainder of this article is focused on representing the five designs depicted in Table G.1. For other examples of the application of mixed methods to multiyear research and development projects, see Nastasi et al., 1998–1999; Nastasi, Schensul, Balkcom, & Cintrón-Moscoso, 2004; Schensul, Mekki-Berrada, Nastasi, & Saggurti, in press; Schensul, Nastasi, & Verma, 2006; Schensul, Verma, & Nastasi, 2004.)

In the SLMHPP, conducted in the Central Province of Sri Lanka, we applied various mixed methods designs to (a) conduct formative research, (b) develop and test culture-specific theory, (c) develop and validate culture-specific instruments, and (d) develop and evaluate a culture-specific intervention program. Attempts to further test and modify culture-specific theory and mental health programming in India and other Sri Lankan contexts are ongoing. Although we attempt to represent the use of mixed methods for specific purposes or phases in the theory→adaptation process, the distinctions across phases are artificial (as reflected in Figure G.1). Thus, for example, formative research and theory development phases overlap as do theory testing and instrument development. Furthermore, the phases are not always sequential but may occur concurrently or recursively. (As noted throughout, some of the findings from various phases of the project have been published or presented elsewhere. This article, however, reflects an integration of the work within a multiphase mixed methods framework.)

Formative/Basic Research Phase: Qual →/+ Quan

The application of mixed methods to the formative phase of intervention research is characterized by sequential or concurrent collection of qualitative and quantitative data (see Table G.1). In SLMHPP, we used a sequential process in which initial qualitative data collection informed theory development and design of psychological measures. These mea-sures were then used to collect quantitative data on a larger and more representative sample and, thus, extend and confirm formative research findings.

Figure G.1 Mixed Methods in Intervention Research Process: Theory to Adaptation



As an outgrowth of a project focused on sexual risk among Sri Lankan youth, researchers from the United States developed knowledge of the Sri Lankan youth

and educational cultures, identified the need for mental health services, and formed partnerships with professionals and community members. A formative research study was conducted in Sri Lanka in 1995 to examine individual and cultural constructs related to mental health of the school-aged population in the country and to assess the need for mental health services in the schools (Nastasi, Varjas, Sarkar, & Jayasena, 1998).

TABLE G.1 ■ Mixed Methods Designs Applied to Multiyear Research and Development Projects

Project Phase	Design	Types of Data Collected in SLMHPP
Formative/basic research	Qual →/+ Quan	Focus group interviews Individual in-depth interviews Key-informant interviews Participant observation Archival materials (e.g., school records) Cultural and historical literature Popular mental health literature and popular media Secondary data analysis (qualitative and quantitative data from previous project on sexual risk among older adolescents and young adults from same community)
Theory development or modification and testing	Qual → Quan →/+ Qual → Quan . . . Qual → Quan	Development of culture-specific theory and quantitative psychological measures (self- and teacher report) based on formative research data
Instrument development and validation	Qual → Quan	Administration of psychological measures to 600 students and 100 teachers Instrument validation and theory testing through combined factor analysis of quantitative (psychological measure) data and reanalysis of qualitative formative data Further theory development through parallel formative research in India (qualitative interviews)
Program development and evaluation	(a) Qual →/+ Quan →/+ Qual →/+ Quan . . . Qual →/+ Quan; or (b) Qual→←Quan	Program development based on formative research data Formative program evaluation (program monitoring): Participant observations Teacher interviews/meetings Session logs (teachers and observers) Teacher session evaluations Student session evaluations Staff field notes Student products (from session activities)
Evaluation research	Qual + Quan	Experimental pre-post control group design (summative program evaluation): Pre-post student and teacher psychological measures Postintervention teacher interviews Final session student evaluation activity Reanalysis of formative evaluation data

Note: Qual = Qualitative methods; Quan = Quantitative methods; → = followed by [sequential design]; + = concurrent with [concurrent design]; →/+ = sequential or concurrent; →← = recursive, interactive; SLMHPP = Sri Lanka Mental Health Promotion Project.

Note: Qual = Qualitative methods; Quan = Quantitative methods; → = followed by [sequential design]; + = concurrent with [concurrent design]; →/+ = sequential or concurrent; →← = recursive, interactive; SLMHPP = Sri Lanka Mental Health Promotion Project.

Underlying the work was a conceptual model of mental health based in ecological-developmental theory (Bronfenbrenner, 1989). A major assumption of the model is that critical individual and cultural factors influence mental health. That is, mental health sta-tus of an individual is influenced by (a) *personal vulnerabilities* due to personal and family history (e.g., early school failure, family alcoholism), (b) *social-cultural stressors* (e.g., community violence), (c) the extent to which the individual possesses *culturally valued competencies* (e.g., academic competence, social skills), (d) culture-specific *socialization practices* (e.g., school discipline practices) and *cultural agents* (e.g., family, teacher, media) responsible for promoting the development of competencies, (e) *personal resources* (e.g., problem-solving skills) for coping with daily stresses and major life changes, and (f) *social-cultural resources* available to youth (e.g., peers, family, mental health facilities) to facilitate coping. This conceptual framework has been applied to the development of mental health programs in schools within the United States (Cowen et al., 1996; Nastasi et al., 1998; Nastasi, Moore, & Varjas, 2004; Roberts, 1996).

Formative research data, collected in 18 schools in the Central Province of Sri Lanka, were used to develop an understanding of the individual and cultural factors (described above) that influenced mental health of youth in Sri Lanka. Qualitative data collection methods included 51 focus group interviews with students (33) and teachers (18), individ-ual interviews with school principals and teachers, participant observation in schools, archival materials such as school discipline reports, historical and cultural literature, popular mental health literature, and popular media. In addition, secondary analysis of qualitative (in-depth interviews) and quantitative (ethnographically informed psychological measures) data from the previous sexual risk project (Nastasi et al., 1998–1999) focused on older adolescents and young adults from the same community.

Findings

The primary qualitative data provided culture-specific definitions of the major mental health constructs (e.g., stressors, competencies) and the basis for elaboration of the pro-posed conceptual framework (i.e., identification and definition of factors specific to Sri Lanka; Nastasi et al., 1998). Findings from this formative stage also suggested gender differences and similarities in definition of mental health as described by the adolescent students (Sarkar, 2003).

Competencies.

Both male and female adolescent students argued that a socially com-petent individual is respectful to others, loyal, trustworthy, helpful, and caring. They also suggested that such a person advises or guides others, and is socially responsible (e.g., loves her or his country, works for its development). However, friendliness was viewed as an important quality only by the female students. (Unless otherwise indicated, the qualitative findings presented in this section are drawn from Nastasi et al., 1998, and Sarkar, 2003).

Student definitions of academic competencies were directly associated with high academic achievement and striving for maximum performance in academics. An academically competent person is one who is "good at studies as well as at extracurricular activities." In defining behavioral competence, students identified good behavior, humility, and obedience as the most important qualities of a behaviorally well-adjusted person. Students argued that such an individual follows rules, obeys laws of the land, and does not harm the country. Showing respect to the elders was another critical feature of behavioral competence as indicated by the students irrespective of their gender.

Adjustment difficulties.

Students recognized several adjustment difficulties among Sri Lankan adolescents. For example, smoking, substance abuse, and suicide were viewed as major adjustment difficulties. Suicide rate was reportedly high among the adolescents in Sri Lanka (Nastasi et al., 1998), and the concern for adolescent suicide was reflected in the interviews with students as well. Female respondents indicated that they suffered from anxiety, whereas male respondents described that they felt restless due to the uncertainty of their future. Students from both genders argued that academic adjustment difficulties were primarily related to poor academic achievement or concerns about performance. These included neglecting studies, academic failure (e.g., failure in the examination), and performance anxiety (e.g., "worry about results in the examination").

Social adjustment difficulties among the Sri Lankan students included aggression, neglecting responsibilities or duties, and being untrustworthy and not helpful to others. Sri Lankan boys also described engagement in criminal activities such as stealing, robbing, and joining gangs as forms of social adjustment problems. Sri Lankan girls suggested that interfering in others' personal affairs and slandering or stigmatizing others were indicative of social adjustment difficulties.

Stressors.

Academic stressors identified by students included academic failure, rigorous examination processes, high level of academic pressure with limited opportunities for recreation or leisurely activities, parental or societal pressure for high academic achievement, high level of competition in academics, and uncertainty about the future due to limited access to higher education and high rate of unemployment. Only about 2% of students are allowed access to university study and economic prospects are limited for the rest.

Major family stressors included alcoholism of parents (mainly fathers), poverty or financial difficulties, domestic violence, parental fights, parental divorce or separation, and separation from parents. Students also considered lack of care and attention from parents and abandonment by parents as stressors. Adolescents discussed parentification of children (e.g., children assume household responsibilities in absence of their parents). This was particularly visible in the families where mothers were working in the Middle East. Adolescents also described the physical and sexual abuse of the children in absence of their mothers. Both Sri Lankan males and females spoke of restrictions on male-female interaction in their culture as problematic.

Students also identified financial problems and poverty as major social stressors. In addition, male students spoke of war, terrorism, and injustices in the society as other social problems. Unemployment was another problem that was cited frequently by male students as social stressors. On the contrary, girls did not mention unemployment as a problem. This may be linked to the societal emphasis on the role of men as the primary providers of the family. Furthermore, girls identified gender inequity (such as lack of freedom for women and differential expectations for men and women) and sexual harassment as social stressors specific to their gender. The male students indicated that the ethnic conflicts within Sri Lanka were a major concern for them. In addition, male students exhibited concern about the political violence and the widespread corruption in the country.

Students suggested death of loved ones, loss of relationships, betrayal, and misunder-standings as relationship stressors. According to them, peer ridicule, fighting with friends, and being ignored or neglected by friends hurt their feelings. In addition, fighting with parents, being pushed by the parents to study without recreation, or the controlling behavior of the parents strained the adolescents' relationships with their parents. Despite these relationship concerns, adolescents viewed peers and parents as potential sources of support in the event of relationship stressors.

Vulnerability.

Students also indicated poverty, lack of family support, alcohol and drug abuse, and academic failure as major personal history factors that made them vulnerable to mental health problems. A striking gender difference was noted in reports of anxiety, nervousness, and health problems, which were restricted to female respondents.

Socialization.

When describing socialization processes and agents, adolescents from Sri Lanka argued that the educational system played an important role in the process of socializing youth. Students discussed the cultural emphasis on high academic achievement and the resultant pressure on adolescents for academic study with limited time for recreation. Students also indicated heavy reliance on tuition classes (private tutoring) for additional academic support that could be related to the prime importance of academic performance. In addition, adolescents indicated the Sri Lankan society valued and underscored the importance of professional jobs (e.g., doctors, engineers). Performance on standardized examinations at Grades 10 (O/L, ordinary level) and 12 (A/L, advanced level) determined admission to government-funded colleges and one's major area of study (those with highest scores were admitted to medicine, then engineering, etc.).

Cultural norms.

With regard to cultural norms, students suggested that society reinforces high levels of respect for elders in Sri Lanka. This norm influences parent-child relationships and may explain reported social and emotional distancing between adults and children. Students also indicated a restriction on male-female interaction. They talked about parental and societal disapproval of relationships between boys and girls. Respondents, particularly females, described the lack of freedom or independence of girls, in contrast to the boys, who were considerably more independent. Among other prominent cultural norms, Sri Lankan adolescents spoke about arranged marriage (i.e., parents arrange and/or approve marriage) and the practice of dowry.

Data collected at this formative stage not only contributed to development of culture-specific theory but also contributed to development of culture-specific assessment, intervention, and teacher training materials that continued over a period of 5 years. The subsequent steps also reflect mixed methods designs.

Theory Development/Modification and Testing Phase: Qual → Quan →/+Qual → Quan . . . Qual → Quan

The process of theory development and testing can be depicted as a sequence of quali-tative data collection to inform theory development, followed by testing theory quantita-tively and modifying theory through qualitative data collection conducted sequentially or concurrently, followed by quantitative methods to test modified theory, and so on. The repeated application of mixed methods across cultures, contexts, and populations can be used to develop theory that reflects both universal and culturally specific constructs. In the SLMHPP project, we developed a culture-specific framework for conceptualizing the individual and social-cultural factors related to mental health (see previous formative stage). The combined use of qualitative and quantitative data analysis informed theory development. This work is reflected in the next section on instrument development. In addition, subsequent qualitative data collection in Calcutta, India, helped to extend theory development to another Asian country (Sarkar, 2003). Ongoing work will examine the application within posttsunami contexts within Sri Lanka.

Instrument Development and Validation Phase: Qual → Quan

A number of sources suggest that assessment of abstract psychological phenomena will differ by culture (see Hitchcock et al., 2005); and this is the case when assessing self-concept (Harter, 1999). Instrument development in the SLMHPP project was predicated on the application of mixed methods to instrument development, using a sequential qualitative-quantitative design to develop culturally relevant measures. Qualitative research methods were used to gather data to inform instrument development. Quantitative methods were subsequently employed to conduct instrument validation. As discussed later, this approach has the potential to yield findings that quantitative or qualitative approaches, by themselves, cannot yield. In the SLMHPP, we employed a sequential qualitative-quantitative design to develop culture-specific instruments designed to assess psychological constructs related to mental health. The process of instrument development and validation illustrated in this section overlaps with the process of theory development and testing, which involves a repeated Qual → Quan design as described in the preceding section.

Psychological instruments were developed based on the aforementioned findings on culturally valued competencies, generated via formative research, and self-concept theory of Harter (1999). Harter suggested that positive adjustment requires congruency between culturally valued expectations and self-rated competencies. For example, a male United States–based researcher would typically be in a culture that values skills with statistical analysis over, say, cross-stitching. If this researcher believed he had adequate skills with statistics, there would be congruency between his perceived competencies and what is valued. Meanwhile, his competency with cross stitching would likely have no impact on the valence of his self-beliefs.

The investigators entered the context with this general theory of self-concept, believing that Sri Lankan adolescent mental health concerns might be tied to disparities between their perception of their competencies and what is valued in the culture. To clarify, we made limited a priori guesses as to what competencies might be valued but did assume that congruence between values and self-beliefs would indicate positive adjustment and vice versa. An example of an a priori expectation we did make was that an adolescent would be experiencing distress if she did not consider herself to be a strong student. Recall that Sri Lankan society places great expectations on educational achievement; indeed, it was believed that a student can shame family members by not performing well on exams, which are high-stakes in nature because they are a gateway to postsecondary education. Other a priori expectations were that Sri Lankan adolescents would have culturally specific stressors, coping mechanisms, support structures, and ways of expressing emotions related to stress. It also was believed that some of these phenomena would be gender-specific. Qualitative data collected during the formative research phase (see previous section) provided the basis for testing these assumptions and developing culture-specific understanding of key constructs.

Two types of scales were developed via a series of individual studies combining ethno-graphic and factor analytic techniques. The first scale type (a total of five scales were developed) assesses the relationship between culturally specific competencies and values (Nastasi, Jayasena, et al., 1999a). The second scale type (a total of seven scales) includes culturally specific scenarios that adolescents should find stressful (based on formative data), and follow-up items to assess how adolescents might respond to such stress (i.e., emotionally and via active coping, seeking support, or maladjusted behavior; Nastasi, Jayasena, et al., 1999b). Scales in the latter type were used as outcome measures for an exploratory evaluation of

an intervention tailored to the needs of Sri Lankan youth (in the forthcoming evaluation design).

The work presented in the *Journal of School Psychology* (Hitchcock et al., 2005) illustrated a mixed method approach for this sort of Qual → Quan instrument development and validation. The article offered a detailed illustration of the approach using the responses 611 Sri Lankan adolescents provided to five ethnographically informed psychological measures. Such instruments offer a key connection between the primary methodologies used (i.e., ethnographic and factor analytic approaches) as they are predicated on qualitative inquiry, can translate these ideas into quantitative data and allow for the application of factor analysis. If the qualitatively derived constructs are comparable to factor analytic results, then triangulation across methods is achieved and a standardized measure can be developed that is sensitive to culturally specific phenomena. The illustration of this approach used data from an ethnographically informed psychological measure of self-concept, which, again, was predicated on Harter's (1999) work.

The scales were back-translated (e.g., English → Sinhala → English to ensure accuracy of meaning), piloted, and refined after obtaining input from local experts with knowledge of the target culture. They were then administered to students (n = 611; 315 males, 296 females), Grades 7 to 12, ages 12 to 19, across six schools that represented the range of the student population in terms of ethnicity, religion, and socioeconomic status. A reanalysis of data from focus groups and individual interviews (i.e., with students, parents, and school personnel) and archival information from the culture (e.g., newspapers, school documents, etc.) resulted in the identification of the range of responses to various target questions/issues. Examples of these might be as follows: describe a stressful school scenario, or describe a stressful home scenario, and so on. Qualitative analyses inform the generation of psychological constructs to explain the variation of responses and in turn the development of psychological measures that are highly targeted toward the context of interest.

Secondary analyses of quantitative data were conducted because prior analyses of qualitative data (Sarkar, 2003) indicated that the constructs identified via the factor analyses might be gender specific (Hitchcock et al., 2006). Factors from the first self-concept measure (self-rating of competencies and behaviors) were used to develop subscale scores. MANOVA analyses were performed to test for gender differences. Statistically significant differences were found, as expected, on the Suitable Behavior subscale. Furthermore, structured means analyses demonstrated that the Unsuitable Behavior scale was different for boys and girls.

That is, boys and girls appeared to recognize the Unsuitable Behavior construct but report on it in different ways. To summarize, no gender differences were evident on the Personal/Interpersonal Needs construct. Girls reported higher values on the Suitable Behaviors construct, suggesting they engage in suitable behaviors more often than boys. Boys and girls differed on how they answered Unsuitable Behavior items. This last finding is probably due to the fact that the (quantitative) construct/factor is formed by items that deal with joining gangs, carrying weapons, and substance abuse; and the qualitative data indicate that these behaviors are only relevant to males. Meanwhile, female behavior is more rigid and less permissive. Of course, cross-method data triangulation was needed to reach the conclusions and to develop a scale that is sensitive to both gender and culture.

As noted previously, this mixed method approach to scale development yielded insights to Sri Lankan youth culture that could not have been obtained with singular approaches. The formative ethnographic work provided the initial identification of culturally relevant constructs. These constructs in turn generated items that could be administered to hundreds of students (of course, it is generally inefficient to apply qualitative methods when working with larger samples). Analyses of responses provided additional insights into the culturally relevant constructs via cross-method triangulation, clarification of how the constructs appear in quantitative factors, and the opportunity to apply statistical tests of null hypotheses to verify presumed gender differences. One result of SLMHPP is an assessment battery that can be used for future work, and as noted below, this general method also yielded culturally specific outcome measures that can be employed in randomized controlled trials testing culturally specific interventions.

Recall that the second set of scales we developed assessed how Sri Lankan adolescents might respond to culturally specific stressors. Hypothetical stressors were identified via a series of group and individual interviews with stakeholders in the culture, specifically, stu-dents, administrators, teachers, and parents (see formative research phase). Three types of stressors emerged from the data: academic, family, and social. Respondents also noted that stressors might be dealt with via emotion-focused coping (or lack thereof), problem-focused strategies, and seeking support from others.

To assess how students might respond to hypothetical culturally specific scenarios, seven scenarios were generated from prior qualitative analyses conducted in the formative research phase (see Table G.2) and presented as vignettes in the ethnographically informed psychological measures (Nastasi et al.,

in press). A series of follow-up items were generated, also from prior qualitative analyses of the formative data, to assess how students might respond to these scenarios and the resulting scales were used as outcome measures to evaluate the effects of a culturally specific intervention (more on this below). Each scenario (and follow-up item) was translated into the primary language of the group, using a back translation method (e.g., English → Sinhala → English) to ensure accuracy of meaning. The instruments were then administered to 120 Sri Lankan students coming from urban and suburban areas, a range of socioeconomic status (SES) levels, and different ethnic groups.

With the exception of the demographic questions, each item utilized a 3-point response format (i.e., *a lot, some, not at all*), and adolescents were asked to rate themselves on a set of culturally defined items capturing perceptions of stress and coping. To assess reactions to each scenario, students were asked to respond to items that assessed their emotional responses; coping strategies; social support (i.e., emotional or instrumental help from others); and behavioral, emotional, or health-related difficulties resulting from stressful experiences such as alcohol abuse, suicidal ideation/attempts, aggression toward peers, and physical symptoms such as headaches or stomachaches.

Qualitative analyses generated the a priori expectation that students would, if faced with the hypothetical stressors, identify with the indicators of adjustment difficulties, coping strategies, and social supports listed in the measure. Note, however, that it was anticipated that factors would likely include a mix of feelings, coping, support, and adjustment difficulty items. To verify these expectations, principal component analyses (PCAs) were conducted (Nastasi et al., in press). Across all scenarios, the analyses yielded the following factors: Adjustment Difficulties—Externalizing, engaging in acting-out behaviors labeled "undesirable/unsuitable" in the culture; Social Support, perceived effectiveness of social resources (family, peer, school/mental health personnel); and Feelings of Distress, affective reactions (e.g., sad, angry, confused) without active coping. The analyses yielded scales that were consistent with qualitative expectations. Furthermore, the factor analyses indicated variation in reactions to stressors as a function of stressful situations and raised questions about the cultural meaning of suicide. Overall, these factors are largely consistent with qualitative findings, providing additional evidence that the three constructs for responding to the scenarios presented above are valid in Sri Lankan youth culture. To assess the reliability of these scales, alpha coefficients computed separately by scenario indicated good to excellent internal consistency (alphas ranging from .70 to .95).

TABLE G.2 ■ Hypothetical Scenarios for Assessing Coping With Stressors

Academic Scenarios
Scenario #1
You are currently studying for O/L exams. Your mother is a doctor and your father is an engineer. Your parents want you to be a doctor, so it is important you do well on your O/Ls. You attend tuition 7 days a week and spend all of your free time studying. You have no time to visit with friends or for recreation.
Scenario #2
You have failed A/L exams by a few points and are concerned about your future. You want to be an engineer. Your family cannot afford to send you to private school or to study abroad. You are not sure what you should do.
Scenario #3
You are in a mathematics class with 50 other students and the teacher is explaining a new topic in math. You don't understand but don't ask the teacher because the other students will get at you for using class time.
Relationship Scenario
Scenario #4
You have been having a secret love affair. You and your boy/girlfriend just broke up. You cannot talk to your family or your teacher about it. You have trouble sleeping. Your parents and teachers have asked you what is wrong but you cannot talk to them. You do not know what to do. Meanwhile one of the prefects who searched your school bag found a love letter and gave the letter to the class teacher. The class teacher called your parents. The parents and teacher forbid you to communicate with your lover.
Family Scenarios
Scenario #5
You are living on the street with your family. You have a school uniform but no shoes. You usually feel hungry and sleepy at school, but are a very good student. You like to do handwriting and ask the teacher for her lunch bag to practice writing. After school, you and your sisters and brothers beg on the street.
Scenario #6
Your mother has been working in the Middle East for about a year. She sends money home regularly for the family, but there is little direct communication with the children. You are the eldest child and have been taking care of the four younger children. Your father has brought a stepmother from the village to live with you to help with household tasks. When you object to the stepmother living in the house, your father beats you severely. Because of the severe abuse, you are considering leaving home. Some of your friends have already left home and have formed a gang and invited you to become a member.
Scenario #7
It [is] the day before a big exam in school. You [come] home from school and, when you [enter] your home, your father is yelling at your mother. Your father has been drinking arrack. He asks your mother for dinner. She says that dinner is not ready because she had to find money to buy rice. Your parents start arguing about money. When your mother serves dinner, the rice is overcooked. Your father starts yelling and throws the rice on the floor. Your mother says, "I'll cook more," and begins to cry. Your father tells you to clean up the mess he has made. Your mother says that you should study, not to clean up the mess that your father has made. Your father then starts beating your mother.

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Note: O/L = ordinary level; A/L = advanced level.

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Note: O/L = ordinary level; A/L = advanced level.

Program Development and Evaluation Phase: Qual →/+ Quan →/+ Qual →/+ Quan . . . Qual →/+ Quan; Alternatively, Qual→←Quan

Mixed methods applied to program development and evaluation (see Table G.1) is characterized by repeated sequential or concurrent use of qualitative and

quantitative methods, to design, modify, and evaluate the program. For example, formative qualitative and quantitative data inform program design, and formative evaluation through concurrent or sequential qualitative and quantitative data collection during program implementation informs program modification or adaptation to meet local needs. Alternatively, this process might be characterized as an interactive or recursive process, in which qualitative and quantitative data collected on an ongoing basis inform program design, formative evaluation, and modification/adaptation.

The formative research phase of the SLMHPP provided the basis for designing a mental health promotion program (Nastasi, Varjas, et al., 1999), which was pilot tested in one school in the Central Province of Sri Lanka. The researchers employed a randomized-controlled trial to test the effectiveness of the program, and concurrent and sequential qualitative-quantitative data collection for the purposes of formative evaluation, program monitoring and adaptation, and outcome evaluation. The program consisted of 18 sessions conducted each weekday over a 4-week period with 60 students in Grades 7 through 12. Sessions were cofacilitated by teachers (from participating school) and teacher educators (from participating local university). Students engaged in individual, small group, and large group activities designed to facilitate identification of cultural expectations, stressors, coping mechanisms, and social supports in key ecological contexts (community, family, school, peer group); development and practice of culturally appropriate coping strategies; and participation in peer support activities. An example of the cultural specificity of the program was the sequence of ecological contexts in which students were encouraged to identify stressors and social supports. In contrast to typical social-emotional learning curricula designed for the U.S. population, the SLMHPP curriculum focused on the self only in relationship to others (with minimal focus on the self in isolation) and began with an exploration of self within the community/societal context and progressing to increasingly more intimate contexts such as school, peer group, and family. Typical programs in the United States begin with focus on self-identity (and self-care), progress to self within interpersonal relationships (caring for others), and conclude with self within society/community (community service).

During program implementation, researchers collected formative evaluation data for each session that focused on examining program acceptability, cultural relevance and social validity, integrity, and immediate impact. The data collection tools included participation observation of curriculum sessions and weekly teacher training meetings; key informant interviews with teachers, students, and school administrators; session evaluation forms completed by students, teachers,

and observers; and session products (e.g., student narratives, visual depictions of stressors and supports within ecological contexts; more detailed information about evaluation methods and tools can be obtained from the first author). These data were reviewed after each session and used to inform curricular adaptations and ongoing teacher training and support. Subsequent data collection provided feedback about the success of adaptations and teacher training and support. Thus, an iterative process was reflected in the ongoing integration and application of qualitative and quantitative data to inform decision making during program implementation.

Evaluation Research Phase: Qual + Quan

Application of mixed methods to evaluation research can be characterized by concurrent use of multiple qualitative and quantitative data collection methods to facilitate data triangulation and evaluate programs in a comprehensive manner. Comprehensive approaches to program evaluation extend beyond traditional notions of evaluating effectiveness to assessment of program acceptability, social validity (application to daily life) and cultural specificity (relevance and appropriateness to cultural background and experiences of participants), integrity or quality of program implementation, immediate and long-term outcomes, and sustainability and institutionalization of program efforts (see Nastasi, Moore, & Varjas, 2004). Furthermore, comprehensive evaluation includes data collection from multiple informants and interpretation from multiple perspectives.

A concurrent qualitative-quantitative design was reflected in the evaluation of the SLMHPP pilot program. As described above, formative evaluation (reflecting an iterative mixed method design) addressed issues of acceptability, social validity and culture specificity, integrity, and immediate program impact. In addition, outcome evaluation was conducted using a prepost control group design (N = 120; 60 experimental, 60 control) with concurrent qualitative and quantitative data collection. Outcome measures included student pre-post self-report measures (culture-specific psychological measures designed from formative data; described in an earlier section), student feedback reflected in final session products (resulting from structured session activity designed for evaluative purposes), and postintervention group interviews with program implementers (teachers and teacher educators).

We used a series of null-hypothesis significance tests and estimates of effects to analyze program impacts, supplemented by analysis of qualitative data collected during program implementation. A 2 × 2 multivariate analysis of covariance

(MANCOVA; controlling for pretest scores) was performed for each of the stressful scenarios (depicted in Table G. 2) to test for intervention effects and gender by intervention group. Tests of the overall MANCOVA were significant for Scenarios 4 (romantic relationship), 5 and 6 (family scenarios); follow-up tests indicated a significant Group × Gender interaction for those scenarios (Nastasi et al., 2006). (The full presentation of outcome data is beyond the scope of this article. Please contact the first author for more information.)

The quantitative outcomes indicated that the SLMHPP may have heightened the awareness of girls, but not boys, to the potential feelings of distress and limited helpfulness of social support, particularly with regard to situations in which they may have limited control. In addition, exploratory analyses of anticipated responses to complex family stressors (parental alcohol abuse and domestic violence) suggests that the intervention may have heightened girls' awareness of the potential negative impact of such stressors for them personally, that is, internalizing adjustment difficulties. However, the intervention may also have heightened girls' sense of responsibility for resolving complex family problems. The quantitative results were consistent with qualitative data collected during the intervention sessions and during the formative research phase. For example, the heightened sense of responsibility resulting from complex family problems such as absent mother or family alcoholism was evident also in qualitative depictions of stressful situations. These findings have important implications regarding the need for gender specificity in mental health promotion and social-emotional learning programming, and the need for addressing context specificity (e.g., family vs. peer contexts) of coping.

Program acceptability data indicated that students responded positively to activities and opportunities to discuss common stressors and ways of coping. Observations and student reports indicated enjoyment of opportunities to be creative; curriculum activities provided opportunities to express themselves through drawing, writing, role-playing, and discussion. Teachers responded well to on-site support and ongoing skills training. They generally responded favorably to the curriculum; these responses seemed to be influenced by student responses and participation (Bernstein, 2000). For example, teachers reported satisfaction with the program when students showed interest and enjoyment and seemed to benefit from activities. Teachers reported gaining a better understanding of the lives of their students and perceived themselves in a new role as facilitator of students' social-emotional development. These perceptions were consistent with students' favorable reports of emotional support from teachers during the program. Furthermore, in follow-up interviews after program

completion, teachers reported that students (both those who had participated in the program and those who were nonparticipants) sought them out for emotional support in the larger school context.

Keep in mind that the initial piloting of the intervention was a small, exploratory study designed to obtain preliminary findings on the effects of a culturally specific intervention. Hence, multiple analyses were conducted using promising outcome measures but nevertheless are still in a development phase. The number of analyses elevate the possibility of making a Type I error, and in all cases the tests were underpowered. In addition, the program was implemented in one school in one community of Sri Lanka and thus the results may not be generalizable to all students and schools within the country. Despite these limitations, the data yield important findings that can be used to guide future intervention work and larger experimental investigations.

As an extension of this work, Nastasi and Jayasena are currently engaged in developing long-term recovery programs for students and parents living in tsunami-affected coastal communities of Sri Lanka. The ongoing data collection using mixed methods designs as described herein is providing information about the applicability of the intervention program to address context-specific stressors such as natural disasters and to extend the program by involving parents as agents for promoting children's mental health. For example, the adapted intervention program included focus on coping with environmental stressors such as natural disasters (Nastasi & Jayasena, 2006). (For more information on this work, contact the first author.)

Implications: Mixed Methods Designs in Intervention Research

The work presented in this article illustrates the application of mixed methods designs to the development and evaluation of culturally specific psychological assessment measures and interventions. In this work, formative qualitative data collection was used to identify culturally relevant constructs and develop a culturally specific model of mental health. This model and the qualitative data were then used to develop assessment measures and an intervention program. Mixed methods were used to validate the assessment measure and evaluate the acceptability, integrity, social validity, and outcomes of a pilot intervention. For example, the combination of qualitative analysis of ethnographic data and factor analysis of quantitative data was used to validate scales to measure constructs related to self-concept and coping with stress, which in turn could serve as outcome measures for interventions. Similarly, the evaluation of intervention outcomes was informed by both quantitative indices and qualitative data collected during program implementation. Furthermore, mixed methods were used to monitor and adapt the program to meet context-specific and individual needs of students and teachers. Finally, a new cycle of mixed methods research was instituted to adapt the program model to a new population and context (i.e., students and parents living in tsunami-affected communities).

The repeated application of a recursive research↔intervention process using mixed methods can facilitate the development of culture-specific interventions and translation of evidence-based practices to diverse populations and settings. Using a mixed methods approach, researchers can engage local stakeholders (e.g., community members, educators, school administrators) in developing intervention programs that address local cultural, contextual, and population needs (e.g., community violence, drug abuse among middle school students, poor academic performance within a school district); adapting programs across multiple settings (e.g., adapting a sexual risk education program across grade levels and diverse student populations); and translating evidence-based practices to new contexts and populations. The successful application (or translation) of evidence-based interventions developed through randomized-controlled trials to naturalistic settings requires research to identify the conditions necessary for ensuring established program outcomes (see National Institute of Mental Health, 2001). Mixed method designs, as described in this article, are particularly relevant to the comprehensive evaluation of conditions necessary for effective intervention

and can thus help to facilitate translational research (e.g., extension of the worked portrayed herein to tsunami-affected areas as described above).

The illustration presented here reflects a multiyear effort to develop and test theory, instruments, and interventions that are specific to culture and context, with the purpose of demonstrating the application of mixed methods designs across the multiple phases of research and development projects. The designs can of course be applied to shorter term and more focused efforts to develop culturally and contextually appropriate interventions. Moreover, as the illustration suggests, the process of ensuring cultural specificity is ongoing through the multiple stages of program design, implementation, evaluation, and translation. Mixed methods designs provide an important mechanism for facilitating development of culturally sensitive interventions and evidence-based practices.

Finally, this article also contributes to the development of multistage program evaluation models. Bamberger, Rugh, and Mabry (2006) and Stufflebeam (2001) noted that mixed methods evaluations are complex and can take the form of multistage projects. However, there appears to be a dearth of examples of such projects in the literature. We have attempted to address this shortcoming here, while advancing mixed methods conceptual frameworks to help others think through how to plan multiphase evaluation projects that use mixed methods.

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Glossary

Case-selection variant
in an explanatory sequential design occurs when the researcher places priority on the second, qualitative phase and explores one or more cases occurring from the initial quantitative phase.

Closed-ended questions
re used in research to collect quantitative data. These questions are based on predetermined response scales or categories.

Combination mixed methods questions
are research questions about mixing the quantitative and qualitative data in a mixed methods study in which the researcher makes explicit both the methods and the content of the study.

Conduct and evaluate a mixed methods study
involves using good-quality evaluation criteria, such as collecting and analyzing both qualitative and quantitative data, intentionally mixing the two data strands, organizing the procedures into designs, and framing the procedures within theory and philosophy.

Constructivism,
which is typically associated with qualitative approaches, is based on understanding or meaning of phenomena and is formed through participants and their subjective views.

Content-focused mixed methods research questions
are research questions about mixing the quantitative and qualitative data in a mixed methods study in which the researcher makes explicit the content of the study and implies the research methods.

Convergent design
is a mixed methods design in which the researcher collects and analyses two separate databases—quantitative and qualitative—and then merges the two for the purpose of comparing the results or adding transformed qualitative data as numeric variables into the quantitative database.

Critical realism

is a theoretical or philosophical position that integrates a realist ontology (there is a real world that exists independently of our perceptions, theories, and constructions) with a constructivist epistemology (our understanding of this world is inevitably a construction from our own perspectives and standpoint).

Data collection decisions for the mixed methods case study design
involve determining the boundaries for a case and deciding on criteria for distinguishing among cases if data are collected on multiple cases, employing rigorous quantitative and qualitative data collection through a convergent core design, and aligning multiple cases in order to facilitate cross-case comparisons.

Data collection decisions for the convergent design
include who will be selected for the two data samples, the size of the two data samples, the design of the data collection questions, and the format and order of the different forms of data collection.

Data collection decisions for the explanatory sequential design
include who the participants in the second phase of data collection should be, what sample sizes to use for both data strands, what data to collect from one phase to the other and from whom, and how to secure institutional review board (IRB) permissions for the two data collections.

Data collection decisions for the exploratory sequential design
include the determination of samples for each data collection phase, the decisions about what results to use from the first phase, and, if a middle phase is used, how to design a rigorous instrument or other quantitative approach or tool.

Data collection decisions for the mixed methods evaluation design
include using multiple sampling strategies, using multiple data collection forms, addressing issues with longitudinal designs, and developing a programmatic objective that binds the multiple projects together.

Data collection decisions for the mixed methods experimental design
include providing reasons for the collection and timing of the qualitative data, taking steps to reduce the potential for introducing bias if the qualitative data collection occurs during the trial, and determining what collected qualitative data will best augment the experiment.

Data collection decisions for the mixed methods participatory-social justice design

relate to how to refer to study participants, how to implement inclusive sampling procedures, how to actively involve participants so the data collection will be credible to the community, how to use culturally sensitive instruments, and how to provide benefits to participants and the community.

Data-transformation variant

is a variant of the convergent design that occurs when researchers implement the convergent design using an unequal priority, placing greater emphasis on the quantitative strand, and employing a merging process of data transformation.

Definition of core characteristics of mixed methods research

is the collection and analysis of both qualitative and quantitative data (based on research questions), the mixing (or integrating or linking) of the two forms of data, the organization of these procedures into specific research designs, and the framing of these procedures within philosophical worldviews and theoretical lenses.

Dialectical pluralism

is a philosophy "metaparadigm" for conducting mixed methods research that is based on the principles of respecting different views, collaborating with stakeholders, and using strategies that emphasize fairness, discussions, equal power, and trust.

Digital tool development variant

in an exploratory sequential design consists of a qualitative exploration to understand what questions and measures needed to be asked of participants, the use of this qualitative data to help design a digital tool that might actually work, and then the test of the tool in practice.

Early procedural development period

in the history of mixed methods is the period in which writers focused on methods of data collection, data analysis, research designs, and the purposes for conducting a mixed methods study.

Emancipatory theory

in mixed methods involves taking a theoretical stance in favor of underrepresented or marginalized groups; examples include feminist theory, a racial or ethnic theory, a sexual orientation theory, or a disability theory.

Emergent mixed methods designs
are found in mixed methods studies when the use of mixed methods arises due to issues that develop during the process of conducting the research.

Expanded procedural development period
in the history of mixed methods involves authors advocating for mixed methods research as a separate methodology, expanding on the methods of mixed methods research, and extending the field to many disciplines and countries.

Explanatory sequential design
is a two-phase mixed methods design in which the researcher starts with the collection and analysis of quantitative data, which is then followed by the collection and analysis of qualitative data to help explain the initial quantitative results.

Exploratory sequential design
is a three-phase mixed methods design in which the researcher starts with the collection and analysis of qualitative data, which is then followed by a design phase of translating the qualitative findings into an approach or tool that can be tested quantitatively. Then, in the third phase, this approach or tool is tested quantitatively. This means that the approach or tool will be grounded in the views of participants.

Fixed mixed methods designs
re found in mixed methods studies in which the use of quantitative and qualitative methods is predetermined at the start of the research process and researchers implement the procedures as planned.

Follow-up explanations variant
is a variant of the explanatory sequential design in which the researcher places priority on the initial quantitative phase and uses the subsequent qualitative phase to help explain the quantitative results.

Formative period
in the history of mixed methods began in the 1950s and continued up until the 1980s. This period saw the initial interest in using more than one method in a study.

Fully integrated variant

in a convergent design occurs when the quantitative and qualitative strands of a study interact with each other during implementation instead of being kept separate and independent.

Inferences in mixed methods research
are conclusions or interpretations drawn from the separate quantitative and qualitative strands of a study as well as from across the quantitative and qualitative strands ("meta-inferences").

Integration
is a major feature of mixed methods research. It involves the point in the research procedures where the qualitative research interfaces with the quantitative research.

Intent of a design
is the outcome that the researcher hopes to attain by mixing the two databases.

Interactive, system-based approach
to design is a type of mixed methods design in which the quantitative and qualitative strands of a mixed methods study interact with each other in the goals, conceptual framework, methods, validity, and research questions of the study.

Intercoder agreement in qualitative research
involves having several individuals code (and develop themes) for a transcript and then compare their analysis to determine whether they arrived at the same codes and themes or different ones.

Intervention-development variant
is a variant of the exploratory sequential design in which the researcher collects qualitative data to help develop an intervention that would work with the study participants and be meaningful to them.

Interview protocol
is a form used in qualitative research to collect qualitative data. On this form are questions to be asked during an interview and space for recording information gathered during the interview. This protocol also provides space to record essential data about the time, day, and location of the interview.

Joint display

is a figure or table in which the researcher arrays both quantitative and qualitative data so that the two sources of data can be directly compared. In effect, the display merges or connects the two forms of data.

Level of interaction

is the extent to which the quantitative and qualitative strands of a mixed methods study are kept independent or interact with each other.

Methods-focused mixed methods research question

is a research question about mixing the quantitative and qualitative data in a mixed methods study that is written with a focus on the methods of the mixed methods design.

Mixed methods case study design

is a type of complex mixed methods study in which both quantitative and qualitative data collection and their results are used to develop a case or multiple cases for further analysis and comparisons.

Mixed methods data analysis

consists of analytic techniques applied to both the quantitative and the qualitative data as well as to the mixing of the two forms of data concurrently and sequentially in a single project or a multiphase project.

Mixed methods experimental (or intervention) design

is a complex mixed methods approach in which the researcher combines the collection and analysis of both quantitative and qualitative data and integrates the information within an experimental quantitative research design.

Mixed methods evaluation design

is a type of complex mixed methods design in which one or more core designs are added into the steps of an evaluation procedure.

Mixed methods interpretation

involves looking across the quantitative results and the qualitative findings and making an assessment of how the information addresses the mixed methods question in a study.

Mixed methods participatory-social justice design

is a type of complex mixed methods design in which the researcher adds a core design to a theoretical framework.

Mixed methods purpose statement
conveys the overall purpose of the mixed methods study and includes the intent of the study, the type of mixed methods design, quantitative and qualitative purpose statements, and the reasons for collecting both quantitative and qualitative data.

Mixed methods research questions
are questions in a mixed methods study that address the mixing or integration of the quantitative and qualitative data.

Mixed methods study titles
include the study topic, the participants, and the research site. They foreshadow the use of mixed methods and the type of mixed methods design that the researcher will use.

New variable development variant
of an exploratory sequential design is where the researcher identifies new variables, new measures, or a new conceptual or theoretical framework in the initial qualitative phase of the research. Then this new variable (measure, etc.) is used in a subsequent quantitative analysis.

Nonprobabilistic sampling
involves selecting individuals who are available and can be studied.

Observational protocol
is a form used in qualitative research to collect observational data. On this form, the researcher records a description of events and processes observed as well as reflective notes about emerging codes, themes, and concerns that arise during the observation.

Open-ended questions
are used in research to collect qualitative data. These are questions in which the researcher does not use predetermined categories or scales to collect the data.

Paradigm debate period
in the history of mixed methods developed during the 1970s and 1980s when qualitative researchers were adamant that different assumptions provided the foundations for quantitative and qualitative research.

Parallel-databases variant

is a variant of the convergent design in which two parallel strands are conducted independently and are only brought together during the interpretation phase of the study.

Philosophical assumptions
in mixed methods research consist of basic beliefs or assumptions that guide a research study.

Point of interface
is a point in the research process of a mixed methods study when the quantitative and qualitative strands are mixed or integrated.

Postpositivism
is often associated with quantitative approaches. Researchers make claims for knowledge based on (1) determinism or cause-and-effect thinking; (2) reductionism, by narrowing and focusing on select variables to interrelate; (3) detailed observations and measures of variables; and (4) the testing of theories that are continually refined.

Pragmatism,
which is typically associated with mixed methods research, focuses on the consequences of research, on the primary importance of the question asked rather than the methods, and on the use of multiple methods of data collection to inform the problem(s) under study.

Priority
is the relative importance or weighting of the quantitative and qualitative methods in addressing the research problem in a mixed methods study.

Probabilistic sampling
(or random sampling) means that the researcher selects a large number of individuals who are representative of the population or who represent a segment of the population.

Purposeful sampling
(or purposive sampling) means that researchers intentionally select (or recruit) participants who have experienced the central phenomenon or the key concept being explored in the study.

Qualitative data analysis software programs

perform some combination of the following qualitative functions: store text documents and visual data for analysis; enable the researcher to block and label text segments with codes so that they can be easily retrieved; organize codes into a visual, making it possible to diagram and see the relationship among them; and search for segments of text that contain multiple codes.

Qualitative purpose statements

convey the overall qualitative purpose of the study and includes a central phenomenon, the study participants, the research site for the study, and the type of qualitative design in the study.

Qualitative research questions

focus or narrow the qualitative purpose statement and are stated as a central question and several subquestions. The central question and subquestions are concise, open-ended questions that begin with words such as *what* or *how* to suggest an exploration of the central phenomenon.

Qualitative study titles

state a question or use literary words or phrases, such as metaphors or analogies. Qualitative titles include several components: the central phenomenon (or concept) being examined, the study participants, and the site at which the study will occur. In addition, a qualitative title might include the type of qualitative research being used, such as ethnography or grounded theory.

Qualitative validity

means assessing whether the information obtained through the qualitative data collection is accurate through such strategies as member-checking, triangulation of evidence, searching for disconfirming evidence, and asking others to examine the data.

Quantitative purpose statements

convey the overall quantitative purpose of the study and includes the variables in the study, the study participants, and the site for the research.

Quantitative reliability

means that scores received from participants are consistent and stable over time.

Quantitative research questions and hypotheses

narrow the quantitative purpose statement through research questions (that relate variables) or through hypotheses (that make predictions about the results of relating variables).

Quantitative study titles
convey how investigators compare groups or relate variables. Primary variables are evident in the title, such as the topic, the study participants, and possibly the site for the research study.

Quantitative validity
is validity in quantitative research addressed at two levels: the quality of the scores from the instruments used and the quality of the conclusions that can be drawn from the results of the quantitative analyses.

Questionnaire variant
is a form of a convergent design in which the researcher includes both open- and closed-ended questions on a questionnaire and the results from the open-ended questions are used to confirm or validate the results from the closed-ended questions.

Reflection and refinement period
in the history of mixed methods is characterized by intersecting themes: a current assessment of the field and refinements in methods to develop the rigor and systematic approach of mixed methods across disciplines and fields.

Research problems suited for mixed methods
are those in which one data source may be insufficient, results need to be explained, exploratory findings need to be generalized, a second method enhances a primary method, a theoretical stance needs to be described, and/or an overall research objective can be best addressed with multiple phases or projects.

Social science theory
is positioned at different phases of a mixed methods study and provides a framework or theory from the social sciences that guides the nature of the questions asked and answered in a study.

Statement of the problem
conveys a specific problem or issue that needs to be addressed in a mixed methods study and the reasons why the problem is important to study.

Strand

is a component of a mixed methods study that encompasses the basic process of conducting quantitative or qualitative research: posing a question, collecting data, analyzing data, and interpreting results based on that data.

Standards for evaluating a qualitative study

depend on the stance taken by the researcher. Qualitative researchers differ in the criteria they use, such as philosophical criteria, participatory and advocacy criteria, or procedural, methodological criteria.

Standards for evaluating a quantitative study

often reflect the type of quantitative research design and the methods of data collection and analysis.

Survey-development variant

is a form of the exploratory sequential design in which the initial qualitative phase plays a role in helping to define the measures and the questions on a survey instrument. Then, after an instrument is developed, it is administered to a sample.

Theory (or conceptual framework or theoretical rationale)

is a general explanation of what the researcher hopes to find in a study. In quantitative research, it is used deductively to make and test predictions of the results. In qualitative research, it is often used inductively to provide an overall explanation of what will be or was found in the study.

Timing

is the temporal relationship between the quantitative and qualitative strands within a mixed methods study.

Transformative worldview is a

philosophy used in mixed methods that gives primacy to the values of human rights as a foundation for mixed methods research.

Transforming qualitative data

into quantitative data involves reducing themes or codes to numeric information, such as dichotomous categories.

Typology-based approach

is an approach to mixed methods design that emphasizes the classification of useful mixed methods designs and the selection and adaptation of a

particular design to a study's purpose and questions.

Validity in mixed methods research
involves employing strategies that address potential issues in data collection, data analysis, and data interpretations that might compromise the merging or connecting of the quantitative and qualitative strands of the study.

Worldview
in mixed methods research is composed of the beliefs and assumptions about knowledge that informs a study.

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