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Best practices in mixed methods for quality of life research

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Introduction

There is a growing priority in all areas of health research to develop new methodologies to improve the quality and scientific power of data, and this is leading to an extraordinary surge in methodological diversity. This diversity reflects the nature of the problems facing health sciences and health care delivery, such as disparities among populations, age groups, ethnicities, and cultures; poor adherence to recommended treatments; behavioral risk factors contributing to disability and health; and the translation of research findings into applied settings. The diversity in methodology also signals a growing acceptance of behavioral and social science perspectives in clinical research, the formation of interdisciplinary research teams, and use

of multi-faceted approaches. Such approaches are important to investigations of complex health problems, which call for incorporating patient and family point of view, and cultural models of illness and health.

Contributing to this interest in methodological development has been the increased methodological sophistication of mixed methods research, and practices related to combining quantitative and qualitative research. Researchers are using approaches such as in-depth interviews, field observations, and patient records to understand individual experiences, participant involvement in interventions, and barriers to and facilitators of treatment. These qualitative approaches are often combined with data from clinical trials, surveys of attitudes and beliefs, economic or medical data to better understand health problems [1]. Evidence in the published literature attests to the current use of mixed methods approaches in health-related research, from cardiology [2], pharmacy [3], family medicine [4], pediatric oncology nursing [5], mental health [6, 7], disabilities [8] and nutrition [9], in both clinical settings [10] and in the social context of daily activities and relationships [11].

Scientists and clinicians working in the area of quality of life broadly, and more specifically in health outcomes assessment, have found mixed methods to be increasingly important for both theoretical and methodological reasons. Quality of life researchers often examine questions that have multiple epistemological, scientific, and clinical foci and are faced with integrating diverse perspectives, types of evidence, and audiences or stakeholders. Data may range from biological data from a patient's clinical record, to health care delivery indicators and costs, to household and community-level outcomes such as loss of productivity, and regional or national policies. The journal *Quality of Life Research* has a long-standing commitment to publishing high-quality research that brings both qualitative

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and mixed methodologies to bear on these complex and multi-faceted research questions.

In their 2010 editorial in *Quality of Life Research*, Ring and colleagues [12] noted the growing use of qualitative methods to capture “the subtlety and distinctions experienced by patients” and discussed the growing use of both quantitative and qualitative methods to capture the complexity of quality of life assessment. However, they also note the need for methodological rigor, and therefore the development of sufficient numbers of well-informed teachers, mentors, and collaborators, as well as journal and grant reviewers.

A study of funded NIH investigations revealed a dramatic increase of terms such as “mixed methods” or “multi-methods” in their abstracts since 1996 [1]. However, despite the expanding interest in mixed methods research, no guidelines for “best practices” existed to assist scientists developing applications for funding or to aid reviewers assessing the quality of mixed methods investigations. In November 2010, The Office of Behavioral and Social Sciences Research (OBSSR) of the National Institutes of Health (NIH) commissioned the development of a resource that would provide guidance to NIH investigators on how to rigorously develop and evaluate mixed methods research applications, as well as to guide peer review, and program initiatives at NIH to maximize the contribution of mixed methods in health research. This review summarizes key recommendations from “Best Practices for Mixed Methods Research in the Health Sciences”, available at http://obssr.od.nih.gov/scientific_areas/methodology/mixed_methods_research.

Purpose

The guidelines are framed with a definition of mixed methods as a research approach or methodology (1) focusing on research questions that call for real-life contextual understandings, multi-level perspectives, and cultural influences, (2) employing rigorous quantitative research assessing magnitude and frequency of constructs and rigorous qualitative research exploring the meaning and understanding of constructs, (3) utilizing multiple methods (e.g., intervention trials and in-depth interviews), and (4) intentionally integrating or combining these methods to draw on the strengths of each. Mixed methods researchers use and often make explicit diverse philosophies of science, from the strictly positivist perspectives common in the biological and natural sciences to the more post-positivist or constructivist perspectives of many of the social and behavioral sciences. Researchers who hold different philosophical positions may find mixed methods research to be challenging because of the tensions created

by their different beliefs [13], but this may also represent an opportunity to transform these tensions into new knowledge, through the integration of a variety of theoretical perspectives.

Mixed methods research begins with the assumption that investigators, in understanding the social and health worlds, gather evidence based on the nature of the question and theoretical orientation, with inquiry targeted toward various sources and many levels that influence a given problem (e.g., policies, organizations, family, individual). Quantitative (mainly deductive) methods are ideal for measuring pervasiveness of “known” phenomena and central patterns of association, including inferences of causality. Qualitative (mainly inductive) methods allow for identification of previously unknown processes, explanations of why and how phenomena occur, and the range of their effects. Mixed methods research, then, is more than simply collecting multiple forms of qualitative evidence (e.g., observations and interviews) or quantitative evidence (e.g., surveys and diagnostic tests). It involves the intentional collection of both quantitative and qualitative data and the combination of the strengths of each to answer research questions.

In mixed methods studies, investigators intentionally integrate or combine qualitative and quantitative data, to maximize the strengths and minimize the weaknesses of each. This idea of integration distinguishes current views of mixed methods from older perspectives in which investigators collected both forms of data, but kept them separate or casually combined them rather than using systematic integrative procedures. “Meta-inference” is the term used to describe the purposeful consideration of the total evidence about the questions of interest, provided by both types of data, as well as the combined analyses [13]. Meta-inference may identify contradictory as well as confirmatory elements of the evidence, and lead to new understanding of the phenomena under study.

The use of mixed methods is most suitable when a quantitative or qualitative approach, by itself, is inadequate to develop multiple perspectives and a complete understanding about a research problem or question. Researchers may seek to view problems from multiple perspectives to enhance and enrich the meaning of a singular perspective. They also may want to contextualize information, to take a macro picture of a system (e.g., a hospital) and add in information about individuals (staff or patients). Other reasons include to merge quantitative and qualitative data to develop a more complete understanding of a problem; to develop a complementary picture; to compare, validate, or triangulate results; to provide illustrations of context for trends; to examine processes/experiences along with outcomes; or to have one database build on another.

Design and methods

There is no rigid formula for designing a mixed methods study, but the following general steps should provide some guidance, especially for an investigator new to mixed methods. Preliminary considerations include considering philosophy and theory, resources (e.g., time, financial resources, skills), and the research problem and reasons for using mixed methods.

Clarification of study aims and research questions that call for qualitative, quantitative, and mixed methods is important, to incorporate these into the reasons for conducting a mixed methods study. It is also critical to determine the methods of quantitative and qualitative data collection and analysis (when it will be collected, what emphasis will be given to each, and how they will be integrated or mixed), and select a mixed methods design that helps address research questions and the data collection/analysis/integration procedures. After collecting and analyzing the data, meta-inference allows the researcher to interpret how the combined quantitative and qualitative approaches contribute to addressing the research problem and questions, and to report findings while making explicit the contribution of the mixed methods approach.

Basic considerations:

- **Theoretical and conceptual orientation:** The choice of a mixed methods design should be informed by one or more theoretical and conceptual orientation(s) that supports the overarching science and needs of the study.
- **Fixed versus emergent mixed methods designs:** In a fixed design, the methods are predetermined at the outset, because the investigators have made the specific decision to mix qualitative and quantitative approaches. In an emergent (or cyclical) design, the methods emerge during the process of the research.
- **Timing and analytical logic:** Qualitative and quantitative data may be collected concurrently, which may be attractive in studies where time in the field is costly, or limited due to a time-sensitive phenomenon of interest. Alternatively, a sequential approach may be useful for single investigators who have ample time to stretch data collection over a lengthened period, or if results from an initial phase inform a subsequent phase.
- **Priority:** In some mixed methods studies, the quantitative and qualitative research is equally emphasized. In other studies, priority is given to either the quantitative or the qualitative research.
- **Point of interface:** The “point of interface,” or the point where mixing occurs, differs depending on the mixed methods design [14]. This “point” may occur

during data collection (e.g., when both quantitative items and qualitative open-ended questions are collected on the same survey), during data analysis (e.g., when qualitative data are converted or transformed into quantitative scores or constructs to be compared with a quantitative dataset), and/or during data interpretation (e.g., when results of quantitative analyses are compared with themes that emerge from the qualitative analysis).

Mixed methods designs

There are three basic types of mixed methods designs [15], but more complex designs are commonplace and are driven by the specific questions and aims in the particular investigations.

- **Convergent (or parallel or concurrent) designs** are used when the intent is to merge concurrent quantitative and qualitative data to address study aims, the data analysis consists of merging data which are collected concurrently, and comparing the two sets of data and results.
- **Sequential (or explanatory sequential or exploratory sequential) designs** allow one data collection activity to build on the results from the other. Qualitative data may be collected to help to explain in more depth the mechanisms underlying the quantitative results. Conversely, initial exploratory qualitative data collection and findings may be used to design a quantitative instrument for use with a larger population.
- **Embedded (or nested) designs** use quantitative and qualitative approaches in tandem and embed one in the other to provide new insights or more refined thinking. For example, in-depth interviews could be embedded within an intervention to understand how experimental participants experience the treatment.

Issues and special considerations

In mixed methods research, methodological and logistical issues arise that need to be anticipated, including resources. Because multiple forms of data are being collected and analyzed, mixed methods research requires extensive time and resources to carry out the multiple steps involved in mixed methods research, including the time required for data collection and analysis. In teamwork, different approaches as well as different analytical or writing styles might emerge. Leaders need to anticipate the challenges and benefits of a team approach to mixed methods research, and the “Best Practices” contains a section specifically on building a mixed methods research team.

Challenges specific to concurrent designs (i.e., merging quantitative and qualitative research) include having adequate sample sizes for analyses, using comparable samples, and employing a consistent unit of analysis across the databases. For sequential designs (i.e., one phase of qualitative research builds on the quantitative phase or vice versa), the issues relate to deciding what results from the first phase to use in the follow-up phase, choosing samples and estimating reasonable sample sizes for both phases, and interpreting results from both phases.

Issues arise during data analysis and interpretation when using specific designs. When the investigator merges the data during a concurrent design, the findings may conflict or be contradictory. A strategy of resolving differences needs to be considered, such as gathering more data or revisiting the databases. For designs involving a sequential design with one phase following the other, the key issues surround the “point of interface” in which the investigator needs to decide what results from the first phase will be the focus of attention for the follow-up data collection. Making an interpretation based on embedded results may be challenging because of the unequal emphasis placed on each dataset by the investigator.

To explain mixed methods research plans to funders in persuasive ways within page limitations, organizing information into a table or presenting a figure of the mixed methods procedures can aid in conserving space while clearly identifying the expected contribution of each activity, as well as the benefits of the integrated analysis and interpretation [4]. Page and word limitations also affect publication of mixed methods studies in scholarly journals in which word limitations call for creative ways to present material.

Conclusions

The “Best Practices for Mixed Methods Research in the Health Sciences” expands on the topics we have reviewed here, and contains additional sections on building teams, writing an NIH R Series (research) application, development of Career, Training and Program Project applications, criteria for review, and suggestions for future activities. We look forward to the continued discussion fostered by the growing interest in mixed methods and congratulate the

journal *Quality of Life Research* for their early and consistent contribution to this important conversation.

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