# Assessing Research Protocols: Mixed Methods Research

*By: Yelena Petrosyan,* MD

## Mixed methods: Definition

Mixed methods consists of the collection or analysis of both quantitative and qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of data at one or more stages in the process of research.

## The major mixed methods designs

### 1. The convergent parallel design

The convergent parallel design (convergent/triangulation design) occurs when the researchers use concurrent timing to implement the quantitative and qualitative studies during the same phase of the research process. The two methods in this design have an equal priority so that both play an equally important role in addressing the research problem. This design keeps the studies independent during the data collection and analysis and then mixes or merges the results during the overall interpretation.

#### *The purpose for the convergent design*

- To triangulate the methods by directly comparing and contrasting quantitative results with qualitative findings for corroboration and validation purposes;
- To illustrate quantitative results with qualitative findings to develop a more complete understanding of a phenomenon.

#### *Advantages of the convergent design*

- 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 data type.

#### *Challenges in using the convergent design*

- Much effort and expertise is required, particularly because of the concurrent data collection and the fact that equal weight is usually given to each data type. This can be addressed by forming a research team that includes members who have quantitative and qualitative expertise, or by training single researchers in both quantitative and qualitative research.

- Researchers need to consider the consequences of having different samples and different sample sizes when merging the two data sets. Different sample sizes may occur because the quantitative and qualitative data are usually collected for different purposes.
- It can be challenging to merge two sets of very different data in a meaningful way;
- It can be challenging 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.

## 2. The explanatory sequential design

The explanatory sequential design uses sequential timing. This design starts with the collection and analysis of quantitative data, which has the priority for addressing the study's questions. This first phase is followed by the subsequent collection and analysis of qualitative data. The second, qualitative phase of the study is designed so that it follows from the results of the first, quantitative phase. Finally, the researcher interprets to what extent and in what ways the qualitative results help to explain the initial quantitative results.

### *The purpose for the explanatory design*

- To use a qualitative strand to explain initial quantitative results;
- To use quantitative results about participant characteristics to guide purposeful sampling for a qualitative phase.

### *Advantages of the explanatory design*

- This design appeals to quantitative researchers, because it often begins with a strong quantitative orientation.
- Its two-phase structure makes it straightforward to implement, because the researcher conducts the two methods in separate phases and collects only one type of data at a time. Therefore, single researchers can conduct this design.
- This design lends itself to emergent approaches where the second phase can be designed based on what is learned from the initial quantitative phase.

### *Challenges in using the explanatory design*

- This design requires a lengthy amount of time for implementing the two phases;
- It can be difficult to secure institutional review board (IRB) approval for this design, because the researcher cannot specify how participants will be selected for the second phase until the initial findings are obtained.
- The researcher must decide which quantitative results need to be further explained.
- The researcher must decide who to sample in the second phase and what criteria to use for participant selection.

## 3. The exploratory sequential design

The exploratory sequential design also uses sequential timing. In contrast to the explanatory design, the exploratory design begins with and prioritizes the collection and analysis of qualitative data in the first phase. Building from the qualitative results, the researcher conducts a second, quantitative phase to test or generalize the initial findings. Finally, the researcher interprets how the quantitative results build on the initial qualitative results.

### *Purpose for the exploratory design*

- To generalize qualitative findings based on a few individuals from the first phase to a larger sample gathered during the second phase;
- The results of the first, qualitative method can help develop or inform the second, quantitative method;
- To develop and test an instrument because one is not available;
- To identify important variables for the quantitative study when the variables are unknown;
- To explore a phenomenon in depth and measure the prevalence of its dimensions.

### *Advantages of the exploratory design*

- Separate phases make the exploratory design straightforward to describe, implement, and report.
- The researcher can produce a new instrument as one of the potential products of the research process.

### *Challenges in using the exploratory design*

- The two-phase approach requires considerable time to implement, potentially including time to develop a new instrument.
- It is difficult to specify the procedures of the quantitative phase when applying for initial IRB approval for the study;
- Researchers should consider using a small purposeful sample in the first phase and a large sample of different participants in the second phase to avoid questions of bias in the quantitative study.
- Procedures should be undertaken to ensure that the scores developed on the instrument are valid and reliable.

## 4. The embedded design

The embedded design occurs when the researcher collects and analyzes both quantitative and qualitative data within a traditional quantitative or qualitative design. In an embedded design, the researcher may add a qualitative study within a quantitative

design, such as an experiment, or add a quantitative study within a qualitative design, such as a case study. In the embedded design, the supplemental study is added to enhance the overall design in some way.

***The purpose for the embedded design***

- To include qualitative data to answer a secondary research question within the predominantly quantitative study;
- To improve recruitment procedures;
- To examine the process of an intervention;
- To explain reactions to participation in an experiment.

***Advantages of the embedded design***

- This design can be used when the researcher does not have sufficient time or resources to commit to extensive quantitative and qualitative data collection because one data type is given less priority than the other.
- By the addition of supplemental data, the researcher is able to improve the larger design.
- Researchers using an embedded design can keep the two sets of results separate in their reports or even report them in separate papers.

***Challenges in using the embedded design***

- The researcher needs to have expertise in the quantitative or qualitative design used in addition to expertise in mixed methods research.
- The researcher must specify the purpose of collecting qualitative (or quantitative) data as part of a larger quantitative (or qualitative) study.
- It can be difficult to integrate the results when the two methods are used to answer different research questions.

**Sampling issues**

- Some 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.

**Analytic and interpretive issues**

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 integrated results may be challenging because of the unequal emphasis placed on each dataset by the investigator or team, the accuracy or validity of each dataset, and whether philosophies related to quantitative or qualitative research can or should be combined.

## Integration of Qualitative and Quantitative data

### *Merging data*

- By reporting results together in a discussion section of a study, such as reporting first the quantitative statistical results followed by qualitative quotes or themes that support or refute the quantitative results.
- The conversion or transformation of one data type into the other so that both can be analyzed together:
    - Quantitative data are numerically coded and included with quantitative data in statistical analysis.
    - Quantitative data are transformed into narrative and included with qualitative data in thematic analysis*.*

### *Connecting data*

- This integration involves analyzing one dataset (e.g., a quantitative survey), and then using the information to inform the subsequent data collection (e.g., interview questions, identification of participants to interview). In this way, the integration occurs by connecting the analysis of the results from the initial study or phase with the data collection from the second study or phase.

### *Embedding data*

- The researcher may embed a supplemental qualitative data within a larger quantitative (e.g., experimental) design or embed a quantitative data within a larger qualitative (e.g., narrative) design. The embedded nature occurs at the design level, in that the embedded method is conducted specifically to fit the context of the larger quantitative or qualitative design framework.

## A checklist for reviewing NIH mixed methods application

### *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)?

## References

Creswell, J. W., & Plano Clark, V. L. (2007). Designing and conducting mixed methods research
(Chapter 4 Choosing a mixed methods design). Thousand Oaks: Sage Publication.
Cohen, D., & Crabtree, B. (2008). *Robert Wood Johnson, qualitative research guidelines project*.
Retrieved from http://www.qualres.org/.
Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research*
(2nd ed.). Thousand Oaks, CA: Sage.
Frechtling, J. (January, 2002). *The 2002 user friendly handbook for project evaluation*.
Washington D.C.: National Science Foundation. Retrieved from
http://www.nsf.gov/pubs/2002/nsf02057/start.htm.
Levin J. S., Glass, T. A., Kushi, L. H., Schuck, J. R., Steele, L., & Jonas, W. B. (1997).
Quantitative methods in research complementary and alternative medicine, *Medical Care*, *35*,
1079-1094.
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 Policy, 13(2), 92-98.
Tashakkori, A., & Creswell, J. W. (2007). The new era of mixed methods. [Editorial]. Journal of
Mixed Methods Research, 1(1), 3-7.
Caracelli, V. J., & Greene, J. C. (1993). Data analysis strategies for mixed-method evaluation designs. Educational Evaluation and Policy Analysis, 15, 195-207.
Greene, J. C. (2007). Mixed methods in social inquiry. San Francisco: John Wiley & Sons.
Morse, J., & Niehaus, L. (2009). Mixed method design: Principles and procedures. Walnut Creek, CA: Left Coast Press.
O'Cathain, A. O., Murphy, E., & Nicholl, J. (2010). Three techniques for integrating data in mixed methods studies.BMJ, 341, c4587.
Song, M., Sandelowski, M., & Happ, M. B. (2010). Current practices and emerging trends in conducting mixed methods intervention studies in the health sciences. In: A. Tashakkori & C.
Teddlie (Eds.), Handbook of mixed methods in social & behavioral research (2nd ed., pp. 725–
747). Thousand Oaks, CA: Sage.
National Institutes of Health. Best practices for mixed methods research in the health sciences,
2010.