

USING RESEARCH IN PRACTICE

A Case for Replication in Nursing—Part Two

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Part 1 of this article, appearing in an earlier issue of *Western Journal of Nursing Research*, addressed the importance of replication research to nursing practice and nursing science. Clinicians rely on replication to provide reasonable assurance against Type I errors and the consequent misutilization of research in practice. Researchers rely on replications to establish the reliability, validity, and generality of their data. The extent to which replication meets these needs varies according to the type of replication performed.

REPLICATION STRATEGIES

Despite widespread use of the term “replication,” the methodology of replication has not been comprehensively set forth in the nursing literature.

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Department Editor's Note: This is the second of two articles dealing with the subject of replication. The authors propose not only that replication of nursing studies is important for theory development but also that the current lack of replicated studies presents a major obstacle to the use of research in clinical settings. This article addresses various replication strategies; the first article addressed the importance of replication.

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Replication is often understood to be the duplication of a study, so that all the essential procedural elements are retained in the subsequent work (e.g., Fox, 1982; Polit & Hungler, 1983). The purpose of duplicating the original study is to demonstrate the "repeatability" of the findings. The definition of replication as duplication and the criterion of repeatability are simplistic, however, and obscure critical issues in replication research.

There are two means by which to arrive at a broader understanding of replication research. The first is to reconceptualize the *goals* of replication (Ackerman & Lohnes, 1981; Barker & Gurman, 1972; Finifter, 1975; La Sorte, 1972; Lykken, 1968; Sidman, 1960). The second means is to consider the full range of units of analysis available (Finifter, 1975; Sidman, 1960). Each of these will be discussed.

The goal of the classic replication study—a duplication of the initial work's procedures and conditions in order to repeat the results—is to confirm the original findings. This type of replication is also known as exact replication, literal replication, or identical replication. Exact replication requires that all the conditions of the original research be maintained; that is, there must be the same observer, the same subjects, the same procedure, the same measures, the same locale, and the same time. It is difficult to meet many of these demands—particularly the time requirement. Thus, exact replication can be thought of as an ideal type that is empirically unattainable (Finifter, 1975). Even if it were possible to conduct an exact replication, the findings would be equivocal. For example, a replication that systematically repeats error from the original study would not be conceptually informative.

A more realistic goal of replication is to repeat the original study under similar conditions, following the methods as closely as possible. This type of replication is known as approximate replication, virtual replication, or operational replication. The purpose of such a replication strategy is to determine whether the original findings hold up despite modest changes in research conditions. If the findings replicate, confidence in the reliability of the data is increased. If the findings fail to replicate, there may be errors or unspecified conditions that account for the results. Replication "failures" may also provide theoretical insights and suggest new directions for research.

In addition to approximate replication, research can be validated by systematic replication, sometimes called constructive replication. This is replication under distinctly new conditions. There is no intent on the part of the replicators to follow the design or methods of the earlier investigators; rather, the second investigative team begins with a similar problem statement but formulates new means to verify the first investigators' findings. The advantage of systematic replication over approximate replication is that it not only validates previous work but also extends the findings and tests the limits of generalizability.

Finifter (1975) defines another type of replication, pseudoreplication. It uses data gathered at the same time as the original study, thereby mimicking exact

replication; it also generates confidence information, thereby functioning as does approximate replication. Examples of pseudoreplication are internal consistency replication, random subsampling replication, and artificial data experiments.

Another framework, around which to develop a typology of replication research, centers on units of analysis. Finifter (1975) maintains that "units of analysis are strategically important because they are the data carriers; they are the vehicles we used for observing and generalizing our findings" (p. 124). Finifter defines three types of data bases for replication research: intraindividual units, intrasample subgroups, and intersample units. Sidman (1960) similarly categorized replication research by its data base: "intergroup" or "intersubject" when new subjects are used in the replication; "intragroup" or "intrasubject" when the original subjects are retained.

A cross-tabulation of the goals of replication research with the full range of data bases produces a useful taxonomy of replication strategies. For example, approximate replication can be done on intraunit data (stability replication), intrasample subgroups (spuriousness testing), or intersample data (generalization replications, the most common form; Finifter, 1975, p. 126). (See Finifter, 1975, or Sidman, 1960, for a complete discussion of replication typologies.)

Like all research, replication should be done methodically. Replication studies should be designed so that they revise earlier work in a progressive manner; departures from the original methods should be made in a stepwise fashion. Knowing the full taxonomy of strategies allows the replication researcher to select the type of study most appropriate at a given point in time for a particular line of research. Finifter (1975) argues convincingly that because "each class of strategies applies to different questions of reliability, validity, and generalizability of findings, the most convincing studies are those that ransack the taxonomy" (p. 127).

CONCLUSION

The model of replication strategies can be used to design tests of earlier studies and subsequently to verify, modify, or reject their underlying theoretical propositions. In this manner, nursing knowledge can be built. Fletcher (1980) has noted that "science is the art of scepticism and replication constitutes its everyday activity" (p. 67). Findings from unreplicated research are not available for use in practice until they have been scrutinized with appropriate skepticism and subjected to replication under varying conditions. Thus, to promote replication research is to advance the causes of both nursing science and research utilization.

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