CJNR, 2002, Vol. 34, No. 4, 129–137

Designer's Corner

Multidisciplinarity in Nursing Research: A Challenge for Today's Doctoral Student

Janet Bryanton, Susan Gillam, and Erna Snelgrove-Clarke

Doctorally prepared nurses entering today's research environment must be adept at transcending the research chasm that exists across disciplines and within nursing and be prepared to play leadership roles in multidisciplinary and nursing research. In order to fulfil these roles and meet the need for well-educated nurse scientists, doctoral students must be exposed to research from a multidisciplinary perspective and be able to think across disciplines so as to become familiar with the differences in design language. This paper compares research terminology across the disciplines of epidemiology, psychology, and nursing based on a sample of four research textbooks. It is apparent that although similarities exist, there is also diversity in the language used in research. Doctoral students preparing for comprehensive examinations must avoid becoming caught up in semantics and instead focus on the broad issues with each of the designs. With that knowledge, students will be not only more successful in their examinations but also more effective as leaders in nursing and multidisciplinary research.

Introduction

Romanow (2002), in his recent review of the Canadian health-care system, calls for the provision of better information to health-care

Janet Bryanton, RN, is Assistant Professor, School of Nursing, University of Prince Edward Island, Charlottetown, Canada, and a doctoral candidate in the School of Nursing, McGill University, Montreal, Quebec, Canada. Susan Gillam, RN, and Erna Snelgrove-Clarke, RN, are doctoral candidates in the School of Nursing, McGill University.

providers, researchers, and health policy-makers to guide their decision-making. To assist with the generation of this comprehensive and integrated knowledge base, "contemporary research...needs to consider the value of a multidisciplinary approach in answering critical health questions" (Mazure, Espeland, Douglas, Champion, & Killien, 2000, p. 717). Nurses are increasingly being recognized as valuable contributors to multidisciplinary research and "play a part in unravelling the emerging complexities of our understanding of health" (Hayes, 1996, p. 259). Nurses are exposed to research from other disciplines on various occasions, ranging from directly facilitating psychological or medical studies to assessing studies as members of ethical review boards. Nurses must be prepared to understand and assess these proposals, while valuing and understanding the differences and similarities that exist across the disciplines.

Even within nursing, nurses are involved in research across a broad spectrum of issues and must be armed with a transdisciplinary knowledge of research so that when a worthwhile research question is posed the most appropriate method is used to address it. Just as nursing has borrowed theories from other disciplines, so too nurses use research methodology that predominates in other disciplines. As well, nurses are increasingly publishing across a number of disciplines and utilizing evidence from multidisciplinary literature.

Doctorally prepared nurses entering today's research environment must be adept at transcending the research chasm that exists across disciplines and within nursing. Doctoral students must learn about and value research from different perspectives in order to advance patient care and the nursing/multidisciplinary research agenda. This paper explores the challenges this presents to doctoral students in preparing for their candidacy examinations and their future role as nurse scientists.

Examination Preparation

Preparation for candidacy examinations begins with the first course taken and continues throughout the intense pre-examination period. Today's doctoral students are wise to expose themselves to disciplines such as epidemiology, psychology, sociology, and statistics during their course work. This provides a strong knowledge base upon which to draw during the examination process, during dissertation work, and upon graduation. It can be argued that the design issue is purely one of semantics. However, identifying and using the correct design is key to addressing the research question clearly. Learning to understand the

Table 2 *Comparison of Bias Terminology for Quantitative Designs*

Medicine/Epidemiology: Rothman & Greenland 1998	Psychology: Campbell & Stanley, 1963	Nursing: Brink & Wood, 1998	Nursing: Burns & Grove, 1997
	History Maturation Testing	History Maturation Testing	History Maturation Testing
Selection Self-selection Diagnostic	Selection	Selection	Selection
	Mortality Regression Reaction effect	Mortality (attrition) Regression Reaction effect Diffusion or imitation of treatments Compensatory equalization of treatment Compensatory rivalry by respondents receiving treatments	Mortality (attrition) Regression Reaction effect Diffusion or imitation of treatments Compensatory equalization of treatment Compensatory rivalry by respondents receiving treatments
Information – Differential Misclassification – Non-differential Misclassification	Instrumentation	Measurement/ Instrumentation	Instrumentation

and cluster randomized trials. The nursing authors appear to have adopted Campbell and Stanley's (1963) terminology, including pre-test post-test, post-test only, Solomon four group, and factorial designs under experimental design (Brink & Wood, 1998; Burns & Grove, 1997). Burns and Grove add several others, including randomized control trial, randomized block, and crossover design. It is striking that even though there are similarities in nursing, terminology varies, as do the number of designs. What the doctoral student must focus on is that no matter what fine gradations and subtle differences exist in design language, experimental design has three important features: randomization, manipulation, and control (Brink & Wood).

Quasi-experimental designs are addressed by all sources except Rothman and Greenland (1998). It was Campbell and Stanley (1963) who provided the seminal work on these designs. Brink and Wood (1998) note that "since introduced by Campbell and Stanley (1963), quasi-experimental designs have been described as a taxonomy of strategies that compromise as minimally as possible the internal validity that is achieved by the true experiment" (p. 65). Cook and Campbell built further on this work in 1979 (as cited in Brink & Wood). Though there are subtle differences in terminology among the three sources, it is clear that nursing has very closely followed in the footsteps of these authors in quasi-experimental design language. Examples include non-equivalent control group, removed treatment pre-test post-test, and interrupted time series designs. What is essential for the doctoral student to understand is the key difference between experimental and quasi-experimental designs. If, for whatever reason, all three criteria for experimental design cannot be met, "quasi-experimentation represents a logical and useful framework to answer causal questions" (Brink & Wood, p. 65). The potential biases introduced by this design must also be taken into consideration.

Pre-experimental design is described by two sources, Campbell and Stanley (1963) and Brink and Wood (1998). It is evident that Brink and Wood use Campbell and Stanley's work, but have chosen to describe the individual designs under this category using different terminology. One more attempt to confuse the doctoral student! What must be remembered is that these designs are next in the hierarchy of designs, introducing further biases that threaten internal and external validity.

From here, the waters become muddier. Rothman and Greenland (1998) classify the next set of designs as non-experimental and include the major designs of epidemiology, the cohort and case-control designs. Campbell and Stanley (1963) do not address these two designs, while

differences in design language across disciplines is a challenge and ca be stressful to students as they attempt to consolidate a vast expanse c knowledge.

Comparison of Designs and Biases

To examine similarities and differences in terminology across disci plines, a sample of four research textbooks were reviewed: one fron medicine/epidemiology (Rothman & Greenland, 1998), one psychology classic (Campbell & Stanley, 1963), and two from nursing (Brink & Wood, 1998; Burns & Grove, 1997). Table 1 provides a comparison o design language and Table 2 a comparison of bias terminology acros these sources. It is beyond the scope of this paper to define each of the designs and biases. The reader is encouraged to refer to the origina sources for a detailed discussion of each.

Design Language

At first glance, a doctoral student preparing for comprehensive examinations might easily get lost in terminology and be unable to determine which source to use as the standard. Rather than attempting to distinguish right from wrong or getting lost in semantics, students would do well to put their energy into consolidating their understanding of the broader classifications of designs, the unique features of each design across the disciplines and within nursing, and how the choice of design will affect bias reduction and analytic strategies.

The most striking feature of Table 1 is that while there are certainly similarities in design terminology, there are numerous differences even within nursing. One could suggest that if 10 more texts were added to the table, the variation in terminology would be even more apparent. With respect to the broad research method, all sources include quantitative designs, while Rothman and Greenland (1998) and Campbell and Stanley (1963) do not mention qualitative research. This may be due to the predominance of the positivist/post-positivist paradigm in medicine and psychology, in particular with respect to Campbell and Stanley, who were writing at a time when the constructivist paradigm and qualitative research were not well recognized or accepted.

In relation to quantitative methodology, experimental design crosses all disciplines and is labelled as such. This is the only term that is consistent across the disciplines. Rothman and Greenland (1998) differ most notably in the types of experimental designs they present, which include clinical trials, field trials, and community intervention

Table 1 *Comparison of Selected Research Design Language*

Research Method	Medicine/Epidemiology: Rothman & Greenland 1998	Psychology: Campbell & Stanley, 1963	Nursing: Brink & Wood, 1998	Nursing: Burns & Grove, 1997
Quantitative				
Experimental	Clinical trials Field trials Community intervention and cluster randomized trials	Pre-test post-test Control group Solomon four group Post-test-only control group Factorial	Pre-test post-test Post-test only Factorial Repeated measures Solomon four group	Pre-test post-test control group Post-test-only control group Randomized block Factorial Nested Crossover Randomized control trial
Quasi-experimental	Not addressed	Non-equivalent control group Separate sample pre-test post-test Time series Multiple time series Recurrent institutional, etc.	Non-equivalent control group Removed treatment pre-test post-test Cohort cyclical Interrupted time series Patched up, etc.	Non-equivalent control group Untreated control group Removed treatment pre-test post-test Reversed treatment Interrupted time series, etc.
Pre-experimental	Not addressed	One-shot case study One-group pre-test post-test Static group comparison	Not addressed	One-group post-test One-group pre-test post-test Post-test-only non-equivalent groups
Other	Non-experimental – Cohort – Case control – Cross-sectional-prevalence – Ecologic – Proportional mortality	Correlational and expost facto	Survey – Correlational – Cohort	Correlational – Descriptive – Predictive – Model testing Comparative Descriptive – Cohort
Qualitative				
	Not addressed	Not addressed	Ethnography Grounded theory Phenomenology	Ethnography Grounded theory Phenomenology Critical social theory

Brink and Wood (1998) describe the cohort design under a classificatio of survey design and Burns and Grove (1997) mention the coho design in passing under what they classify as the comparative descrip tive design. Case-control designs are not addressed by any of the thre latter sources. While epidemiology draws heavily on cohort and case control designs in the study of disease outcomes and exposures, thes are not widely recognized by the other disciplines. It is important t remember that these designs are non-experimental, as there is n manipulation or intervention, but they have the capability of providin some evidence of causation (Rothman & Greenland). They compar groups based on outcome or exposure. These designs bring with ther their own set of biases and distinct language such as odds ratios, rela tive risk, sensitivity, and specificity. Nurses who have been educate across disciplines conduct studies using these designs, and doctoral stu dents must be well versed in the language in order to critically apprais the literature for use in practice.

Correlational designs are described by Campbell and Stanle (1963), Brink and Wood (1998), and Burns and Grove (1997) but are nc mentioned by Rothman and Greenland (1998). Burns and Grove mak clear distinctions between three levels of correlational designs based o an increasing ability to determine causation, while the others do no Campbell and Stanley describe correlational designs as a separate clas sification, as do Burns and Grove, while Brink and Wood describe thi design under the classification of survey design along with cohor design. What is most important for the doctoral student to remember i that correlational designs are non-experimental and primarily examin relationships between variables. There is no clear agreement on th degree to which this design can predict or determine causation. Thes designs are valuable when variables are inherently or ethically non manipulable or when the state of knowledge is such that there is littl evidence that relationships exist between the variables of interest (Brin & Wood; Burns & Grove).

Bias Terminology

Table 2 presents a comparison of bias terminology across the fou sources. In accordance with the discussion of design language, it i apparent that there are similarities and differences in the language use to describe biases. Epidemiology appears to vary the most with respec to this terminology, labelling the three overall classifications of biase as selection, information, and confounding. These are similar to th biases of instrumentation and selection noted in the other three sources

but they also have their inherent differences based on the cohort and case-control designs. It is evident that the biases described by Campbell and Stanley (1963) have been adopted by nursing and then added to based on the work of Cook and Campbell in 1979 (as cited in Brink & Wood, 1998). Examples include history, maturation, testing, instrumentation, selection, and mortality. It is interesting to note that Brink and Wood acknowledge selection, measurement, and confounding bias in their discussion of cohort design but the discussion is brief and they use the term measurement rather than information bias. What is most important for doctoral students to understand is that each design has certain potential biases that threaten internal and external validity and, no matter how they are labelled, they must be understood so that they can be controlled for as much as possible in designing studies and assessed for in critiquing research reports.

Conclusion

This paper has outlined different research design and bias terminology used across the disciplines of epidemiology, psychology, and nursing based on a sample of four research textbooks. It is apparent that although similarities exist there is also a diversity in design language being used in research today. Nursing has borrowed most extensively from psychology but it appears that epidemiology is also making an impact in the nursing research literature. Doctoral students preparing for comprehensive examinations must avoid getting caught up in semantics and instead focus on the broader issues that exist with each of the designs. With that knowledge, students will not only be more successful in passing those dreaded exams but will also be more effective as leaders in nursing and multidisciplinary research.

References

Brink, P., & Wood, M. (1998). *Advanced design in nursing research*. Thousand Oaks, CA: Sage.

Burns, N., & Grove, S. (1997). *The practice of nursing research: Conduct, critique, and utilization*. Philadelphia: Saunders.

Campbell, D., & Stanley, J. (1963). *Experimental and quasi-experimental designs for research*. Boston: Houghton Mifflin.

Hayes, P. (1996). Advances in technology and multidisciplinary research. *Clinical Nursing Research, 5*(3), 259–260.

Mazure, C., Espeland, M., Douglas, P., Champion, V., & Killien, M. (2000). *Journal of Women's Health and Gender Based Medicine, 9*(7), 717–724.

Romanow, R. (2002). *Building on values: The future of health care in Canada*. Saskatoon, SK: Commission on the Future of Health Care in Canada.

Rothman, K., & Greenland, S. (1998). *Modern epidemiology*. Philadelphia: Lippincott/Williams & Wilkins.

Authors' Note

Correspondence should be directed to Janet Bryanton, School of Nursing, UPEI, 550 University Avenue, Charlottetown, Prince Edward Island C1A 4P3 Canada. Telephone: 902-628-4344. E-mail: jbryanton@upei.ca