Using Research to Advance Nursing Practice
Column Editor: Sandra L. Siedlecki, PhD, RN, APRN-CNS

Understanding Descriptive Research Designs and Methods

Sandra L. Siedlecki, PhD, RN, APRN-CNS, FAAN

When developing ideas for a research project, it is helpful for the clinical nurse specialist to know the various design options available and to understand when to use them. It can be confusing because the research terminology is not always consistent. The most common confusion arises when the writer confuses research designs with research methods (observation, survey).

In general, there are 2 major divisions of research: qualitative and quantitative. Categories of qualitative designs include phenomenology, grounded theory, ethnography, historical, case study, and narrative designs.[1] In contrast, categories of quantitative designs include either experimental or nonexperimental designs. The nonexperimental designs are descriptive, descriptive comparative, and correlation, whereas the experimental designs are quasi-experimental and experimental.[2] The purpose of this article is to discuss the use and utility of quantitative descriptive designs and descriptive methods and to explain procedures for defining variables, collecting data, and preventing issues that may affect internal and external validity of the study (Text Box).

Text Box: Internal and External Validity

- Internal and external validity speaks to how trustworthy the study results are.
- Internal validity is impacted by the structural characteristics of the study. The more rigorous the study, the more trustworthy the results will be.
- External validity refers to the ability to generalize the findings beyond the sample in the study. Multisite studies with significant sample sizes are more valid than single-site studies with smaller samples.

PURPOSE OF DESCRIPTIVE DESIGNS

The purpose of descriptive studies is to describe individuals, events, or conditions by studying them as they are in nature.[2] The researcher does not manipulate any of the variables but rather only describes the sample and/or the variables. Although a descriptive study can explore multiple variables, it is the only design that can also explore a single variable.[3] Descriptive studies look at the characteristics of a population; identify problems that exist within a unit, an organization, or a population; or look at variations in characteristics or practices between institutions or even countries.[4]

Author Affiliation: Senior Nurse Scientist and Clinical Nurse Specialist, Office of Nursing Research & Innovation, Nursing Institute, Cleveland Clinic, Ohio.

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Correspondence: Sandra L. Siedlecki, PhD, RN, APRN-CNS, 3271 Stillwater Dr, Medina, OH 44256 (siedles@ccf.org).

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Descriptive studies can be purely descriptive, or they can be descriptive comparative.[4] Trends over time can be explored using longitudinal data collection methods, whereas cross-sectional data collection methods provide an opportunity to describe and compare naturally occurring groups, such as gender, education, or age groups. There are 2 one-group descriptive comparative designs commonly seen in the nursing literature. These include the pre-post design and the existing group design.[5] There are 2 possible ways to look at pre-post data descriptively. The researcher can observe or survey the same group at 2 different times (Figure 1) and scores can be compared (using inferential statistics), or 2 different groups can be observed or surveyed at 2 different points in time and compared (Figure 2). Existing group comparisons look at 2 naturally occurring groups to see whether they differ on 1 or more variables. One example might be to see whether perceptions of nursing as a profession (abstract concept) differ based upon the highest level of nursing education (ADN, BSN, MSN, DNP). Although it is possible to look at differences between groups on some variables, descriptive comparative designs cannot establish cause and effect, nor associations or relationships.[5]

SPECIFIC AIMS

A descriptive study is hypotheses producing rather than hypothesis testing; thus, descriptive studies have specific

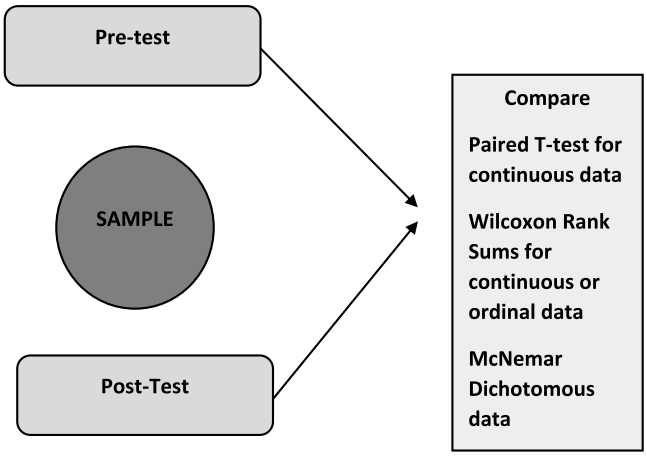

FIGURE 1. One-sample pretest/posttest.

aims and research questions, rather than hypotheses.[5] Research questions (Table 2) usually begin with "What" or "What is" but can also include "when," "where," and "how" questions. However, a descriptive design cannot answer "why" questions.

DEFINING THE VARIABLES

Descriptive studies can have any number of variables, including just 1 variable. The ability to have just 1 variable of interest is a unique quality of descriptive designs.[3] Because this is not a hypothesis testing design, there are no independent or dependent variables, rather just variables of interest. It is important, when defining variables, that the operational definition (measurement) is congruent with the conceptual definition for each variable. For example, defining pain conceptually as "a subjective experience described as a hurt" and measuring it by assessing changes in blood pressure or heart rate would not be appropriate. However, defining pain as a "physiological response to a painful stimulus" and measuring changes in blood pressure and heart rate would be an appropriate way to operationalize the variable.[5,6] Table 1 provides some examples of the common variables found in nursing studies.

METHODS OF DATA COLLECTION

Descriptive studies use observation or survey data (Figure 3). The research question and feasibility issues will influence the method selected (Table 2). There are inherent limitations and risks to validity associated with each method. However, both also offer feasible and cost-effective means of obtaining data quickly and easily.

Observation

One of the most frequently used methods of collecting descriptive data is through observation of individuals or groups of individuals.[6] Although this may sound like a qualitative method, it differs from observation used in qualitative designs, because the variable of interest has a quantitative value. Perhaps, a good example might be the use of the World Health Organization handwashing observation tool that quantifies handwashing behaviors.[10] The ability to describe observed behavior as a quantitative variable is a strength of this method of obtaining data. A limitation is that observation can be time intensive and requires considerable training and monitoring of data collectors. Training is essential, for observers, because inaccurate data collection threatens the validity of the research findings because of either systematic or random error.[6]

Systematic error is due to an inaccuracy in the observation process or measurement tool.[5] Systematic error can be consistent or intermittent. Systematic error can also occur as a result of "drift" (a slow change that occurs because of time passing). An example of systematic error might be a scale that consistently weighs everyone 5 lb heavier than they actually weigh. In this example, frequent calibration of the scale would prevent this error.

Random error during observation occurs by chance, causing measurements to be inconsistent. Random errors are difficult to predict and prevent.[5] An example might be blood pressure readings that can differ from nurse to nurse on the same patient because of variations in technique. Researchers can minimize this effect through (1) education, training, and auditing of data collectors and their techniques and (2) having data collectors take 3 consecutive blood pressure readings and record the average of the three.

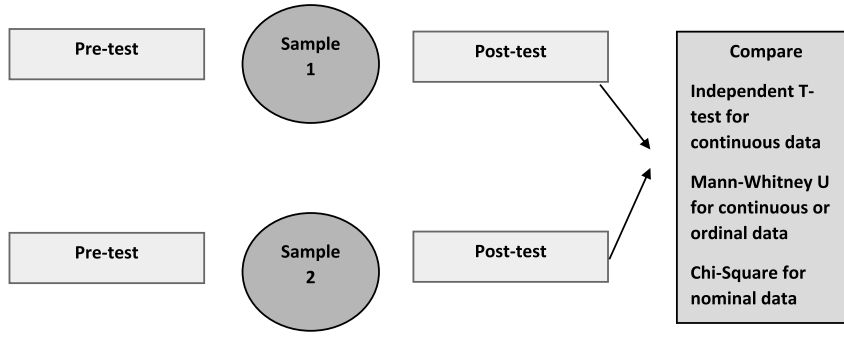

FIGURE 2. Two-sample (independent sample) pretest-posttest design.

Table 1. Conceptual and Operational Definitions

Concept	Conceptual Definition	Operational Definition
Age	Chronological age	Age in years
Pain	A subjective experience perceived as a hurt or uncomfortable sensation	Score reported by patient on a Numerical Pain Rating Scale
Preoperative anxiety	A vague subjective feeling of dread or foreboding occurring in patients before a surgical procedure	Score on the Hospital Anxiety and Depression Scale[7]
Depression	A mood disorder that is expressed by subjective feeling of sadness, loss of energy or motivation, and a disinterest in life	Score on the Center for Epidemiology Studies Depression Scale[8]
Successful dieting	Dieting that meets realistic weight loss goals consistently over a year	Number of months in the past year with at least a weight loss of 2 lb
Pain-related disability	The inability to perform activities of daily living due to pain in the past week	Score on the Pain Disability Index[9]

Survey

The second approach to data collection for a descriptive study is survey. Survey methods use questionnaires to elicit information from subjects (respondents). This is useful when the researcher is interested in perceptions, beliefs, attitudes, or opinions.[6] Methods of survey administration include verbal (in-person or over the phone), written (mailed or distributed questionnaires), or electronic (email and electronic surveys). The advantages of survey methods for data collection are that it can be relatively inexpensive and easy to do.[11] However, the reliability of the items within the survey and the subject's willingness to answer items honestly are potential threats to internal and external validity and are a major study design limitation.

Validity Issues Associated With Survey Methods of Data Collection

Sample size and sampling techniques also impact the external validity of a descriptive study. Probability sampling is the preferred method of obtaining a representative sample. Probability sampling requires a random selection of respondents from a list of all eligible respondents.[11] If the sample is not representative of the population (nonrandom sample), then the findings cannot be generalized (external validity issue) beyond the sample, to the larger population. This would be a major study limitation.

Measurement issues impact the internal validity of a study. For the data collected to be valid, the measure(s) must be both valid (measures what it is supposed to measure) and reliable (measures the same way each time).[5] Researcher-created questionnaires and scales are usually suspect, unless the developers provide evidence of content and/or construct validity, factor analyses, or other appropriate psychometric evaluation of the measure before its use.

Finally, individuals who complete surveys may be different from those who do not complete surveys (external validity threat), and subjects may not answer honestly (internal validity

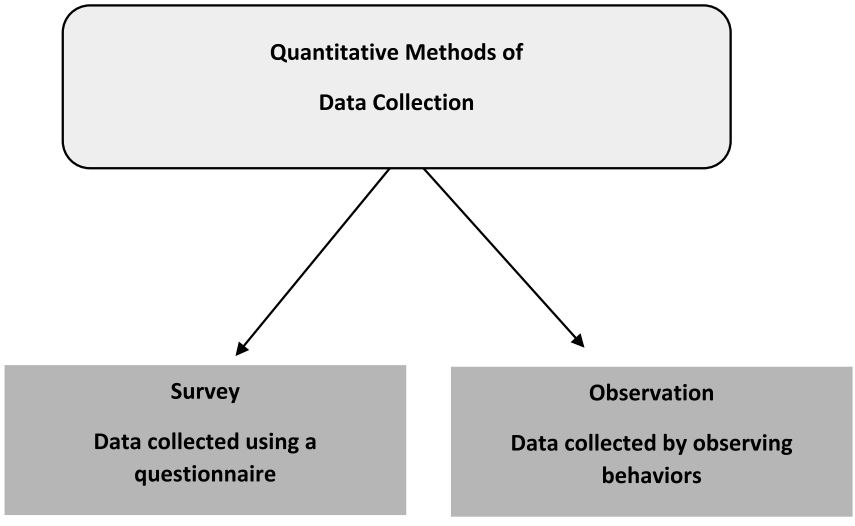

FIGURE 3. Quantitative descriptive data collection methods.

Table 2. Descriptive Research Questions

Simple Descriptive	
Research questions	How often do nurses wash their hands in a 12-h shift?
Variable(s) of interest	Frequency of handwashing
Population	Nurses in the United States
Sample	Nurses at 1 large US medical center
Groups	One group
Method	Observation or survey
Research questions	What do nurses think is most satisfying about their profession?
Variable(s) of interest	Factors affecting professional satisfaction
Population	Nurses in the United States
Sample	Nurses from 3 local hospitals in the United States
Groups	One group
Method	Survey
Descriptive Comparative	
Research questions	What are the difference in career satisfaction between nurses with and without a BSN?
Variable(s) of interest	Career satisfaction
Population	Ohio nurses
Sample	Nurses from 6 local hospitals in northeast Ohio
Groups	Two groups (BSN and no BSN)
Method	Survey
Research questions	How has nurses' reported career satisfaction changed comparing this year to last year?
Variable(s) of interest	Career satisfaction
Population	US nurses
Sample	Nurses at a large urban healthcare organization in northeast Ohio
Groups	Two groups (this year and last year)
Method	Survey
Research questions	How does a leadership class impact self-efficacy scores for nurses?
Variable(s) of interest	Self-efficacy
Population	Nurses who attended a leadership class
Sample	Nurses who attended a leadership class
Groups	Two groups (pre and post)
Method	Survey

threat). This is not something the researcher can easily control but is a study limitation.

Protection Against Bias

Bias is everywhere. Bias can be due to the researcher's bias, the instruments used to measure a variable, the sampling plan, the subjects themselves, the data, and even the statistical tests. To minimize bias, the first step is to identify sources of bias and put into place methods that will minimize their effect on the outcome of the study.[5]

ANALYSIS OPTIONS

Simple Descriptive Analysis Options

For simple descriptive designs using observation or survey, the data are described by measures of central tendency (mean, median, mode, standard deviation) and/or reported as frequencies and percentages.[5,6]

Descriptive Comparative Options

In contrast, descriptive comparative designs include both descriptive and inferential statistics. Inferential tests can be either parametric or nonparametric depending upon the level of data and the data distribution.[5] There are 2 one-group descriptive comparative designs commonly seen in the nursing literature. These include the 1-sample, pre-post design (Figure 1) and the 2-sample, pre-post design (Figure 2). The researcher uses inferential statistics (parametric and nonparametric) to look at differences between groups (pre-post).[5] Table 3 provides a brief overview of parametric and nonparametric test options for determining differences between groups in descriptive research designs.

CONCLUSION

Descriptive studies have an important place in the nursing research toolkit. They lay the foundation for later quasi-experimental and experimental studies. The clinical nurse specialist should also consider this design option when

Table 3. Parametric and Nonparametric Statistical Options for Determining Differences

	Sample Characteristics	
Level of Measurement	1 Sample	2 Samples
Categorical or nominal level data	McNemar	χ^2
Ordinal level data or interval or ratio level data that are not normally distributed	Wilcoxon signed rank	Mann-Whitney *U*
Interval or ratio level data (continuous) that are normally distributed	Paired *t* test	Independent *t* test

evaluating a new intervention, service, or educational program. Finally, before instituting a program or process to address a clinical or environmental issue in a healthcare facility, it might be wise to conduct a descriptive study to determine whether the issue really exists and the extent of the issue. This 1 step can identify those issues in need of a solution and can ultimately save an organization time, money, and resources.

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