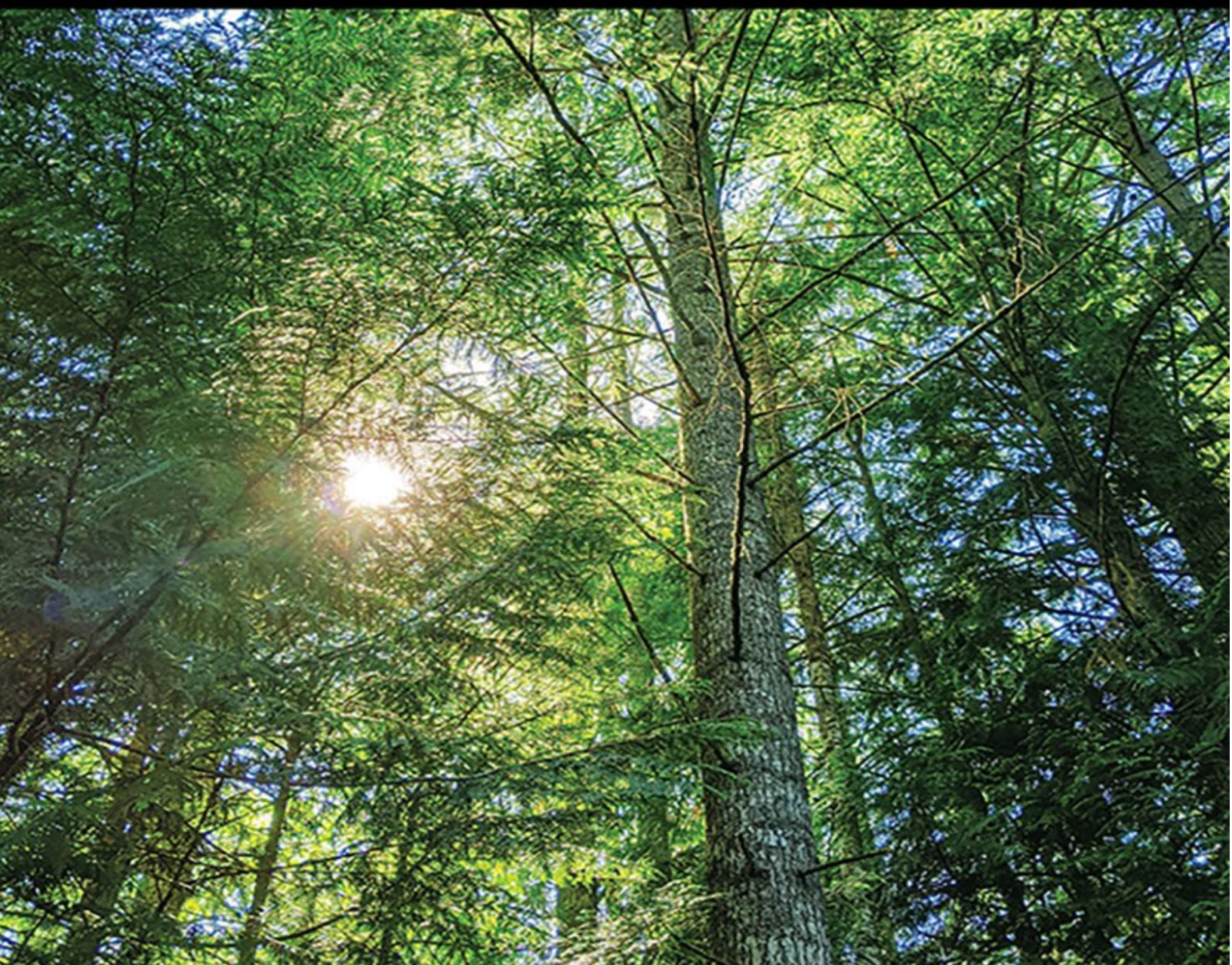
HANDBOOK OF RESEARCH METHODS IN Social Work

Edited by
MARGARET ALSTON • PENNY BUYKX
WENDY FOOTE • DAVID BETTS



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Sabretta Alford and Barbra Teater

INTRODUCTION

Quantitative methods are often used when asking research questions that seek to explain, describe, or evaluate a social phenomenon with the intent to generalize findings from a sample to a larger population. Researchers who use quantitative methods aim to develop and understand the general phenomenon by gathering data through the use of administrative records, survey instruments, and/or standardized measures. Quantitative data are either numerical (e.g., age, days of sobriety, years of education) or are turned into numerical data in order to aggregate across a sample (e.g., 1 = male; 2 = female; 3 = nonbinary; 4 = transgender), such as through percentages and frequencies of responses. Quantitative research aims to understand and generate knowledge of the real world.

Quantitative research is used by social scientists concerned with the study of people and society in which they observe phenomena or events that influence the lives of individuals. By doing so, they learn about a particular group called a sample population. Using scien- tific inquiry, quantitative research relies upon data measurements to examine questions about the sample population (Allen, 2017). This method focuses on data collection from the larger population and analysis of the data. Quantitative strategies aim to be objective, which helps the researcher describe the data rather than interpret them (Rahi, 2017). This chapter covers the essential parts of conducting quantitative research, including asking quantitative research questions, collecting data and defining variables, the purposes of quantitative research and quantitative research designs, and reliability and validity in quantitative research.

DEVELOPMENT OF A QUANTITATIVE RESEARCH QUESTION

A research question identifies precisely what you want to learn about your topic by specifying the variables of interest (described below). Good research questions serve as an essential guide to your study and should:

- focus specifically on the problem or issue;
- be possible to study using resources from primary or secondary sources;
- be answerable within a given time frame of practice constraints;
- be specific enough to be answered thoroughly;
- be clear and focused, indicating what the writer needs to do; and
- be relevant to your field of study or, more broadly, throughout society.

Quantitative research questions are objective in nature, not subjective, and should specify your variables of interest. The data are first gathered numerically on your variables of interest,

analyzed statistically, and then generalized to the sample population to assist in making data-driven decisions (Sukamolson, 2007).

In quantitative research, a ***variable*** is defined as an attribute of an object of study. Its numerical value can change or vary, for example, age or score on a depression inventory (Patel, 2009; Schoenfeld & Arcavi, 1988). Social science research often uses variables to determine whether changes in one attribute result in changes in another; for example, does the level of depression vary by age? It is important to note that all variables can be subject to change. If there is no variation, it is not considered a variable (Patel, 2009). Some attributes that can be variables include social class, education, age, employment status, employment type, and scores on standardized measures, such as depression, anxiety, or hope.

Within quantitative research, there are two types of variables – an independent variable (IV) and a dependent variable (DV). The researcher will ask questions that explore the relationship between the IVs and DVs, and in some types of quantitative research (e.g., causal research), the researcher will examine the cause (IV) and effect (DV) relationship. More specifically, the IV helps to explain the change in the DV (it is "the predictor" or "the cause"). This is sometimes called the "I control" variable as it can be held constant in a research study, and its value is independent of other variables in the study (Patel, 2009). The DV is impacted, caused, or influenced by the IV (it is considered "the outcome" or "the effect"). The value of the DV depends upon the change in the IV. Based on the key concepts described so far, here are some examples of quantitative research questions:

- What is the relationship between faculty sense of humor and student academic performance? Here, the IV is "sense of humor," and the DV is "academic performance."
- How does the implementation of a community-based mental health intervention impact the well-being of individuals experiencing homelessness in urban settings? Here, the IV is "community-based mental health intervention," and the DV is "well-being."
- Is a six-week motivational interviewing group program effective in reducing the number of alcoholic drinks an individual has per day? Here, the IV is the "six-week motivational interviewing group program," and the DV is the "number of alcoholic drinks per day."

Variables by Degrees of Specificity: Levels of Measurement

In scientific research, a variable is anything that takes on a different value in your dataset (e.g., test scores or age). Once the researcher has identified the variables of interest in their study, they must then determine how to "measure" (or collect data on) the variables. The type of measurement used will determine the type of data analysis and statistics that can be employed to answer the research question. The researcher will first define each variable in the study and then determine how to measure the variable. For example, if the research variable is ethnicity, a nominal and categorical variable, then the researcher will list all the possible ethnicities that could be present across the sample population. As this variable is nominal, the only meaningful statistics to be employed are the frequency and percentages of responses; we cannot calculate a mean or median score. However, if the variable of interest is a respondent's age, then the researcher can determine whether to treat the variable as a ratio (continuous) variable and ask respondents to record their age in years, or the researcher may decide to treat the variable as ordinal (categorical) and ask respondents to select their age from a range of ages (20–30; 31–40; 41–50, etc.). The level of measurement of the variable will determine the

statistical analysis used to answer research questions. There are four levels of measurement: nominal, ordinal, interval, and ratio.

- **Nominal:** A nominal scale classifies data according to category. The data cannot be ranked meaningfully in magnitude or degree (Patel, 2009). For example, a study may ask for respondents' identified gender or what their favorite car brand is. There are no assumptions that nominal variables have more or less value than any other choice.
- **Ordinal:** An ordinal scale classifies data according to rank. The data variables are ranked meaningfully in magnitude and degree (Patel, 2009). With ordinal data, it is fair to say one response is greater or lesser than another. Data are sequentially ordered to indicate a direction. For example, DEGREE OBTAINED is an ordinal measurement scale that corresponds to levels of accomplishment. The values indicate a direction of increasing DEGREE OBTAINED, such as none (value=1), HS Diploma (=2), Some College (=3), Associate's Degree (=4), Bachelor's Degree (=5), Master's Degree (=6), or Advanced Degree (e.g., PhD/JD/MD) (=7).
- **Interval:** An interval scale has quantitative values, and it assumes that the measurements are made in equal units. The data can be categorized, ranked, and evenly spaced. This scale does not have a true zero – only that attribute A is greater than attribute B. This is the most potent type of variable because you can do almost anything with it statistically (Patel, 2009). Some examples include TEMPERATURE, CREDIT SCORE, or TIME OF DAY (in a 12-hour clock).
- **Ratio:** A ratio scale has quantitative values. The data can be categorized, ranked, evenly spaced, and possess a true zero property, which means if there is zero of the variable, then the variable does not exist. This scale allows you to compare differences between numbers. Like interval scales, a ratio scale can be manipulated statistically (Patel, 2009). Examples of ratio scales are REACTION TIME IN A TASK, WEIGHT, or AGE.

QUANTITATIVE RESEARCH METHODS: PURPOSES AND DESIGNS

Quantitative research aims to attain greater knowledge and understanding of the social world through the use of data that can be communicated through numbers and statistics. Although there are many studies of different phenomena, social conditions, and impacts of various programs and intervention methods, common quantitative research purposes and designs are exploratory, explanatory, descriptive, and predictive. These four purposes and accompanying designs are described in further detail below.

Descriptive Research

Descriptive research aims to systematically and accurately describe a situation, population, or phenomenon (Dulock, 1993). It answers the what, where, when, and how questions, not the why questions. A wide range of research methods can be employed to investigate and describe one or more variables using various research approaches. Unlike experimental research designs (discussed below), descriptive research does not manipulate or control variables; it only observes and measures them (Dulock, 1993). The goal is to seek an overall summary of

the observations, surveys, and case studies. Quantitative research is often descriptive, though qualitative research can also be used for descriptive purposes.

Descriptive research is a good choice when researchers aim to identify frequency, trends, characteristics, and categories (Dulock, 1993). It is most useful when the information about the topic is limited. It is essential to understand the "how," "when," and "where" something happens before we seek to understand "why" something happens. Table 14.1 provides an overview of the advantages and disadvantages of the descriptive research purpose.

Table 14.1 Descriptive research advantages and disadvantages

Advantages	Disadvantages
It allows the researcher to analyze facts to help develop a deeper understanding of the research problem	It can be difficult to generalize findings from the data
It enables the researcher to observe the behavior of people in natural environments	Often relies on naturalistic data, which may lack control or generalizability
It allows the researcher to explore the complex topic (i.e., service delivery in social work settings)	It is more concerned with the "what" rather than the "why" something happened

Descriptive research problem example

A social work researcher may want to understand the what, where, when, and how about the eating habits of OYR (One-Year-Residency) social work students. An example of a descriptive research question could be: "What are the eating habits of social work students who take classes in the evening?" The researcher would use a survey that may examine students' demographics, such as age, gender, race, family composition, and income, to understand the eating habits of OYR students. This provides a summary of the advantages and disadvantages of descriptive research. Other examples of exploratory research questions could include:

- What are the key demographic characteristics of individuals seeking counseling services at a community mental health center?
- What are the primary sources of stress reported by caregivers of elderly individuals with chronic illnesses?
- How do different cultural groups within a community conceptualize and define mental health?

Types of descriptive research designs

Surveys. Surveys allow for the collection of a large amount of data that can be stored and analyzed in future statistical inquiries. Surveys in quantitative research consist of a structured set of closed-ended questions that respondents will answer. The researcher can then aggregate the responses across the sample to report an overall summary and picture of the responses to the questions. A survey is the most common strategy in the social sciences (Dulock, 1993; Rahi, 2017), and typical uses of surveys include describing a country or region, gauging public opinions on a social topic, and evaluating service satisfaction within an agency. A good way to design a quantitative survey is to use online survey tools that offer a variety of question types so the researcher can choose which quantitative questions best fit the purpose of the study.

Surveys in descriptive research may include a client satisfaction survey or a list of preferences for services in a specific community.

Observations. Observations in quantitative research allow the researcher to gather data on a specific phenomenon or behavior without relying on the participant's response to a predetermined survey. This strategy involves the systematic observation and measurement of a phenomenon (Dulock, 1993) and hinges on gathering numerical data that can be expressed quantitatively. Observations in the social sciences can include observing a child's behavior in a classroom setting, religious practices at religious gatherings, or responses to clients in a social work agency waiting room.

Case studies. Case studies in quantitative research allow the researcher to describe the characteristics of the sample (person, group, organization, or event) (Rahi, 2017). They focus on a particular issue over time in one or more subjects (Dulock, 1993). This method is preferred when the researcher has little control over the events. An example could be the changes in the number of clients at a homeless shelter over a given period, including the reasons for their entry into the services.

Exploratory Research

Exploratory research examines a given question but does not offer conclusive solutions to the issue. This method is often used to examine a problem that has not yet been clearly defined and is therefore used to figure out the nature of the problem (Engel & Schutt, 2016). It also tends to tackle issues where little research has been done. A researcher can use this approach when tackling a general topic where there is little to no pre-existing knowledge, for example, examining how people stay socially connected during a pandemic. It is not intended to provide conclusive evidence but rather to better understand the issue.

Exploratory research seeks to gain insight and a deeper understanding of the research program, clarify concepts, and form hypotheses (Swedberg, 2020). Even though exploratory research is often qualitative in design, an exploratory study with a large sample size using quantifiable data can also be ***quantitative***. Additionally, researchers may change direction when new data and insights are revealed, thus leading to new or follow-up research questions. Therefore, exploratory research is often examined to explore the "what, how, and why" of an issue. The goal is to learn "What is going on here?" or "How do people make sense of these experiences?" and "Why do people act the way they do?" According to Swedberg (2020), exploratory research is the initial piece that forms the basis of more conclusive research and helps determine the future research design, sampling, and data collection method. Table 14.2 provides an overview of the advantages and disadvantages of the exploratory research purpose.

Exploratory research problem example

Exploratory research questions are designed to help understand more about a particular topic of interest where there is currently little knowledge. They can help connect ideas to understand the groundwork of your analysis without adding any preconceived notions or assumptions. For example, researchers were curious during the COVID-19 pandemic about how older adults stayed socially connected. Researchers were asking "what, how, and why" questions in relation to social isolation and loneliness among older adults by providing online questionnaires to older adults to fill out, where they were asked questions about their social contacts (e.g., family, friends, neighbors), the quality and type of social contact (e.g., phone, in-person, online),

Table 14.2 Exploratory research advantages and disadvantages

Advantages	Disadvantages
Lower cost to conduct the study	Findings are often not inclusive of all research groups
Allows flexibility and for the research to adapt to the changes in the study	It does not provide much quantitative data, only qualitative; the interpretation of the results can be biased
Effective in laying the groundwork for future studies	The small sample size may not represent the target population or be generalized to a larger population
Often very cost- and time-effective, allowing researchers to utilize pre-existing resources to guide the research before committing to heavier analyses	Findings do not translate to decision-making on the practical level

and a measurement of social isolation and loneliness. The researchers explored whether certain types and qualities of contacts were related to more or less social isolation and loneliness (Teater et al., 2021). Other examples of exploratory research questions could include:

- What are the barriers and facilitators for Asian Americans in seeking mental health services?
- What are the key factors contributing to an increase in homelessness in New York City?
- To what extent are migrant families aware of services in their community?

Types of exploratory research designs

Examples of exploratory designs include primary research and secondary research. Primary research aims to gather information directly from the source about the participants' opinions or preferences regarding the research study. The researcher can gain valuable insight into behavior and decision-making processes when there is a direct interaction between the target population (Stebbins, 2001; Swedberg, 2020). This involves surveys, polls, interviews, and focus groups. Secondary research gathers information to help the researcher better understand the target population and trends related to the research study. This involves information already collected and includes reviewing data from online searches and reports or reading books and/or journal articles (Stebbins, 2001; Swedberg, 2020).

Explanatory Research

Explanatory research explores the relationship between two or more things (i.e., variables) and aims to ascertain why or how a particular problem occurs to predict future occurrences. This can also be explained as the "predictor and outcome" or "cause and effect" model, which investigates existing data, patterns, and trends that have not been previously studied but are being explored to see if one (or more) variable(s) influence, impact, or cause another variable. For this reason, this can be referred to as correlational and/or causal research. Cohen et al. (2017) posit that explanatory design helps to find the reason behind a particular occurrence. It explains the situation through correlational and/or causal relationships and provides insight

into how we may build, elaborate, or further test a theory (Rahi, 2017). The main goal of explanatory research is to identify the relationship between variables to help explain why something occurs or under what conditions things happen.

Explanatory research problem example

A professor has been teaching research methods and statistics to master's-level social work students during the past year as part of a two-semester class. The first semester is a writing-intensive class in which the students work on research proposals. The second semester is a data analysis class. The professor analyzed the grades and noticed that students' grades were significantly higher in the first semester than in the second semester. A researcher would be interested in explaining what causes this pattern. Other examples of explanatory research questions could include:

- What is the relationship between the number of alcoholic drinks per day and depression (as measured through a standardized depression inventory)?
- What is the relationship between the average hours of sleep per night and academic performance (as measured by the final percentage grade in the class) among master's-level social work students taking research methods?
- To what extent does engagement in after-school activities (participation or not) influence a teenager's self-esteem (as measured by a standardized self-esteem measure)?

Explanatory research helps to uncover the "why" and "how" questions, leading to a better understanding of the unresolved issue and providing clarity for future studies. Table 14.3 provides a summary of the advantages and disadvantages of explanatory research.

Table 14.3 Explanatory research advantages and disadvantages

Advantages	Disadvantages
Increase knowledge of a given topic; help fill in the gaps in existing analyses; provide information on the reasons behind phenomena that can predict future occurrences	May lack conclusive results in preliminary explanatory design
Flexible design, often replicable, provides an indication of how two or more things (variables) are related and influence or impact one another	May aid the quantitative findings in helping to elaborate further or test a theory; however, results can be biased and not always true among other samples or populations
Often cost- and time-effective, allowing researchers to utilize preliminary resources to guide the research	Coincidence can be mistaken for causal relationships, making ascertaining the causal variable and the effect challenging

Types of explanatory research designs

Predictive research. Predictive research mainly predicts future outcomes, consequences, or effects by examining the effect of one or more IVs on a DV. Researchers attempt to predict something that has not yet been tested based on the analysis of existing phenomena or

previous research results (Waller & Fawcett, 2013). Predictive research seeks to create or craft a model in which preceding studies can predict future outcomes. For example, if the study shows that the IV influences the DV, then we can conclude that when the IV is present in the future, the DV will react in a particular way (Cranmer & Desmarais, 2017).

Predictive research provides certain advantages to the social work researcher. Prediction provides improved insight into how an IV and DV relate and interact with one another. Prediction offers a benchmark for designing models in social work research – what will happen in the future if certain variables are present – and helps to generate insight into complex human behavior.

Specific analytical tools for predictive research include:

- **Linear regression**, which is among the most widely used methods in statistical analysis (see Figure 14.1). Regression analysis estimates relationships among variables and helps researchers design models. It is intended to be used in analyzing data among a range of continuous variables (interval or ratio). It seeks to find key patterns in extensive data and is often used to determine to what extent factors influence outcomes (Baždarić et al., 2021).

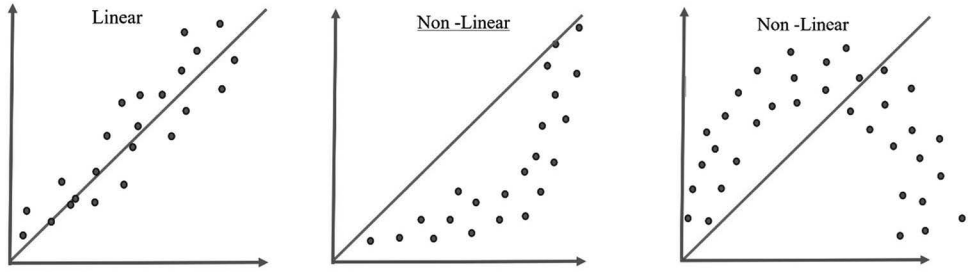

Figure 14.1 Correlational regression linear data graphs

- **Decision trees** are classification models that partition data into subgroups based on categories of variables. This helps researchers understand the path to their decisions (Magerman, 1995).

Correlational research design. Correlational research allows the researcher to investigate relationships between two or more variables to determine to what extent they are related (Seeram, 2019). This process does not involve controlling or manipulating them. Correlational research focuses on the strength and direction of two or more variables (see Tables 14.4a and 14.4b). In statistics, the "r" refers to the Pearson *r* correlation coefficient, which measures the strength and direction of linear relationships (Obilor & Amadi, 2018). The direction of the correlation can be positive, negative, or no correlation (see Figure 14.2). The correlation coefficient measures the association for interval/ratio variables, reflecting the strength and direction of a linear association between two interval/ratio variables. This measure ranges from -1 to +1 (Seeram, 2019). A value of ±1 indicates a perfect degree of association between the two

variables. As the correlation coefficient value approaches 0, the relationship between the two variables will be weaker. The sign of the coefficient indicates the direction of the relationship; a + sign indicates a positive relationship and a - sign indicates a negative relationship (Seeram, 2019).

Table 14.4a Strength of correlation coefficients

Very strong relationship	Strong relationship	Moderate relationship	Weak relationship	Very weak or No relationship
r = .8 to 1.0	r = .6 to .8	r = .4 to .6	r = .2 to .4	r = .0 to .2

Table 14.4b Direction of correlation coefficients

No association between the two variables	Perfect positive association (as IV increases, DV increases or as IV decreases, DV decreases)	Perfect negative association (as IV increases, DV decreases, or as IV decreases, DV increases)
r = 0.0	r = +1.0	r = -1.0

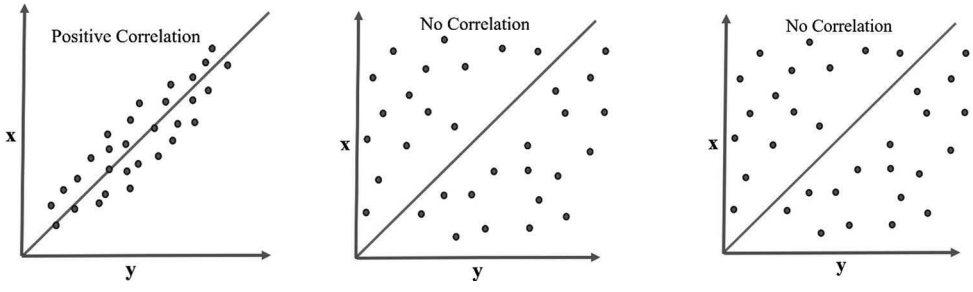

Figure 14.2 Correlational data graphs

Usually, when analyzing data, the most common types of correlation measurements are the Pearson r correlation, Kendall rank correlation, and the Spearman correlation. The specific statistic used is based on whether the data are normally distributed (use of a parametric test) or not normally distributed (use of a non-parametric test).

Parametric versus non-parametric tests. Parametric data have a normal distribution from which the sample was taken. When plotted, the data take the shape of a symmetrical bell-shaped curve. This is often called the Gaussian distribution. The advantage of viewing data of this type is that the researcher can draw conclusions from the values within any part of the distribution curve (Grech & Calleja, 2018). These distributions are considered to be parameters, such as the mean (average) and standard deviation (the average amount that the values tend to deviate from the mean). Non-parametric data do not follow a specific distribution (Altman & Bland, 2009). The advantages of non-parametric tests are they can be used when

the sample sizes are very small, few assumptions can be made about the data, they are useful in analyzing data in ranks or categories, and they are easier to analyze and interpret compared to a parametric test.

A disadvantage of parametric data is that it relies solely on the normal distribution of data, which may not be met in all circumstances. If the assumptions are violated, the results of the parametric tests may become unreliable. Another disadvantage is that the sample size is always very large. This may make it difficult for the researcher to undertake the entire test. However, validating the data won't be easy if the sample size is too small. Therefore, non-parametric testing would be the only suitable option.

Types of correlational statistical tests. The use of the common types of correlation measurement, the Pearson *r* correlation, Kendall rank correlation, and the Spearman correlation, will be based on whether the data are normally distributed (parametric) or not (non-parametric). Each is described below:

- **Pearson *r* correlation** is a parametric test that is the most commonly used correlation statistic to measure the extent of the relationship between linearly related variables. For example, a researcher wants to measure social work students' age (x) and how many hours they spend studying daily (y). The Pearson *r* correlation measures the degree of the relationship between these two variables (Cohen et al., 2009). As referred to in Figure 14.2, a positive correlation would indicate a very strong (.8) or positive (r = +1.0; direction) correlation between the age of social work students and how many hours a day they spend studying, or indicate a very weak (r = .0 to .2) or no correlation (r = -1.0; direction) between the age of social work students and how many hours a day they spend studying.
- **Kendall rank correlation and Spearman rank correlation** are non-parametric tests that measure the strength and direction between two ranking variables (ordinal) (Alvo, 2014; Zar, 1972). Kendall's rank is preferred over Spearman's rank when the sample size is small with many tied ranks.

***Experimental research design*.** Experimental designs allow researchers to examine whether there is a cause-and-effect relationship between variables. Using statistics, correlational and experimental research can formally test hypotheses and/or predictions (Rahi, 2017). Results can be generalized to a larger population based on the researcher's sampling. The experimental design also refers to how participants are assigned to different groups. One of the most common ways is dividing participants into two groups: the experimental group and the control group, introducing the change (IV) in the experimental group and withholding the IV from the control group. Three primary experimental design methods are used to collect data: pre-experimental research design, true experimental research design, and quasi-experimental research design (Apuke, 2017; Bloomfield & Fisher, 2019;).

Pre-experimental research design. The pre-experimental design allows the researcher to include one or more experimental groups to be observed against a treatment (IV) presumed to cause change. The goal is to understand whether further investigation is needed to explore these groups. It does not have a control group. Table 14.5 reports the advantages and disadvantages of this type of research design.

Some examples of pre-experimental designs include the following:

- **One-group, post-treatment design** is when only a single group is examined. Testing is done once after the treatment or intervention has already occurred. For example, a researcher would like to examine social work students' attitudes and preparedness towards individuals with disabilities after they have taken an introduction to disabilities in social work practice.
- **One-group, pre-post treatment design** is when only a single group is examined. However, testing is done before and after the exposure or intervention has already occurred. The researcher can now compare the mean scores of the pretest with the mean scores of the posttest to see if there is a change in attitude and preparedness before and after taking the Introduction to Disability course.

Table 14.5 Table of pre-experimental designs advantages and disadvantages

Advantages	Disadvantages
Suitable for beginners	Difficult to obtain an initial sample of subjects
Establishes time order of variables	Subject to many threats to validity.
Can show how relationships emerge	Repeated measures may influence subjects' behavior.
Efficient to conduct in the natural environment. Involving less human intervention	Difficult to rule out rival hypotheses or explanations.
Reveals individual-level changes	Difficult to keep the same subjects over time

True experimental design. True experimental designs, also referred to as randomized control trials, aim to establish cause-and-effect relationships (Apuke, 2017; Williams, 2007). A true experimental design consists of a control group, an experimental group, a variable that can be manipulated (IV), and a randomized distribution of individuals to the experimental and control groups (Thyer, 2009).

An example of a true experimental design could be a social work researcher testing a parenting program to determine whether parents participating in the program have increased knowledge of their child's social and emotional development. First, the researcher will randomly assign participants to the experimental **(A)** and control groups **(B)** and ask participants in both groups to complete a pretest of knowledge of the child's social and emotional development. Next, the experimental group **(A)** would receive the parenting program intervention, while the control group **(B)** would not receive the intervention. Finally, at the end of the parenting program, the researcher would give both groups **(A/B)** the same measure as a posttest to see if there was a change in knowledge of the child's social and emotional development from pretest to posttest. If a change occurred after the intervention (e.g., the experimental group had higher levels of knowledge compared to the control group), the researcher can assume the parenting program caused this change. Table 14.6 introduces some advantages and disadvantages of true experimental designs.

Quasi-experimental design. Quasi-experimental designs aim to establish a cause-and-effect relationship between the IV and DV, like a true experiment, but do not rely on randomization to the experimental and control groups. Among the most common types of

Table 14.6 True experimental designs advantages and disadvantages

Advantages	Disadvantages
Precise control of extraneous and independent variables, allowing a cause-and-effect relationship to be established	The artificiality of the setting may produce unnatural behavior that does not reflect real life, i.e., low ecological validity
The statistical nature of the experimental design makes it highly credible and accurate	It can be too accurate, making it difficult to obtain a complete rejection or acceptance of a hypothesis because the required proof standards are difficult to reach
Easy to understand and replicate	It is expensive to set up and can be very impractical
Conclusive	-

quasi-experimental designs are pretest-posttest designs, time-series designs, and non-equivalent group designs (Campbell & Riecken, 1968; Cook, 2015; Maciejewski, 2020; Reichardt, 2009; Thyer, 2009).

An example of a quasi-experimental research design could include a social work researcher who would like to test whether an Early Childhood Disabilities course would increase the knowledge of social work students before graduation. The selection criteria would be that students must be in their last semester, the sample must be at a specific school of social work that offers the course, students must be enrolled in the Early Childhood Disabilities course **(experimental group-A)**, and students must be enrolled in either a Human Behavior course or a Practice Lab course **(control group-B)**. Students taking the Early Childhood Disabilities course **(A)** and students not taking the Early Childhood Disabilities course **(B)** will complete a pretest before the start of the semester. At the end of the semester, the researcher would give both groups **(A/B)** the same measure as a posttest to determine if there was a change in scores between the pretest and posttest scores of both groups **(A/B)**. If a change occurred at the end of the semester, the researcher can assume the Early Childhood Disabilities course has increased the knowledge of social work students entering graduation. However, if there was no change between the pre/posttests, the researcher can assume that other factors (i.e., experience and having a family member) may have influenced the scores. Table 14.7 summarizes the advantages and disadvantages of quasi-experimental designs.

RELIABILITY AND VALIDITY IN QUANTITATIVE RESEARCH

Reliability and validity are concepts used for evaluating the efficacy and quality of research and indicate how well a method or technique measures something (Fitzner, 2007; Roberts & Priest, 2006). **Reliability** indicates the consistency of measurement. For example, you get the same results repeatedly when you retest under the same conditions (Fitzner, 2007). Using the same measurement tool allows for testing consistency. Applying different testing tools during retesting influences the instrument's reliability and produces unwanted variations in the study. This outcome undermines the strength of the research findings. **Validity** indicates that you are accurately measuring what you want to measure. Validity of measurement can be estimated under three main types of validity: construct validity, content validity, and criterion validity, which can be justified using statistical methods. Reliability is necessary but can be insufficient

Table 14.7 Quasi-experimental designs advantages and disadvantages

Advantages	Disadvantages
Can replicate an experiment and provide a high level of evidence without randomization.	Randomization is not used, which can limit the study's ability to conclude a causal association between an intervention and an outcome.
Can choose several designs that can adapt to their study	Confounding environmental variables are more likely to occur
Can be used when there are ethical reasons why participants can't be randomized	Must wait for the change to happen
The participant does not influence the effectiveness of the research	Participants are aware they are being studied – less internal validity.
-	It can only be used when conditions vary naturally.

for validation. For example, although a scale or questionnaire may have been reliable, it might not have been valid (Roberts & Priest, 2006).

Researchers may use the terms in slightly different ways, but two common types of validity are of particular interest: Internal Validity and External Validity. **Internal Validity** is the degree to which we can make causal inferences about the relationship between variables (Fitzner, 2007; Roberts & Priest, 2006; Yu & Ohlund, 2010). For example, did the IV cause the change or outcome? **External Validity** is the degree to which causal relationships can be generalized to other settings, populations, and times (Fitzner, 2007; Yu & Ohlund, 2010). Table 14.8 summarizes reliability and validity.

Table 14.8 Comparison of reliability and validity

-	Reliability	Validity
Importance	The extent to which similar measurement results can be reproduced when the research is repeated under the same conditions.	The extent to which the measurements reflect what they are supposed to measure.
Assessment	Checking the consistency of the results over time, between observers, and within the test.	The results correspond to established theories and similar measures of the same concept by checking how well the measures have appropriate relationships.
Relatability	Reliability is not always valid; the results may not be reproducible if incorrect.	Validity is generally reliable. If a test produces accurate results, it can be reproducible.

Threats to internal and external validity are impossible or extremely difficult to control for all possible outcome complications that may influence/affect the participants in a research study.

However, ethical obligation dictates that all threats to the study's validity must be considered and accounted for throughout the research design process (Yu & Ohlund, 2010). While the researcher is expected to account for all issues that may have influenced or altered the results, some are hesitant, fearing that acknowledging the threats may discredit their work. However, threats must be identified so the researcher can evaluate the effectiveness of the research study and determine alternative conclusions from the data as appropriate. Below is a list of threats to internal and external validity:

- **History** refers to many events other than the IV that occur between a pre- and post-measurement of the DV (Bigby & Atkinson, 2010; Yu & Ohlund, 2010). For example, a week before the end of the study, all students are told that there will be no exam review. The participants are stressed on the exam date, and their performance may suffer.
- **Maturation** refers to the many conditions internal to the participant that change as time passes (Christ, 2007; Yu & Ohlund, 2010). For example, most social work students are new to the research class during the pretest. Three months later, their productivity has improved because of the time spent working on practice analyses.
- **Instrumentation** refers to changes in measuring the DV (Christ, 2007; Yu & Ohlund, 2010). For example, the instrument used to measure a participant's performance may change over time (observers may become bored or tired).
- **Testing** refers to how the pretest influences the posttest outcomes (Christ, 2007; Yu & Ohlund, 2010). For example, student scores were higher at the end of the study because the same test was administered. Due to familiarity with the pretest or the fact that many were aware of the study, many participants achieved high results.
- **Subject attrition** refers to when participants are lost from the study. The group equivalence formed at the start of the study may be destroyed. For example, 25 percent of student participants provided unusable data. Most of the student participants were from Group B. Therefore, comparing the control group with the treatment group was challenging.
- **Selection bias** refers to the groups that are not comparable at the beginning of the study (Christ, 2007; Yu & Ohlund, 2010). For example, high scores were placed in Student-Group A, and low scores were placed in Student-Group B. However, since there were already differences between the groups at the study's baseline, improvements may have been due to reasons other than the intervention/treatment.
- **Mortality** refers to any change due to participant loss from comparison groups or participants dropping out of the study (Christ, 2007; Yu & Ohlund, 2010). For example, in a two-group study of 50 participants each, if 17 drop out of Group A and six drop out of Group B, the two groups may no longer be suitable for comparison.
- **Statistical regression** means that any change is due to the tendency for high or low scores to move toward the mean when retested (Christ, 2007; Yu & Ohlund, 2010). For example, student-participants sometimes perform very well or poorly on a measure because of chance factors (e.g., luck) or, on the first test, everyone scores high, then the second and third test scores eventually go toward the mean.
- **Sampling bias** refers to the sample not being a representation of the population. For example, the student-participant sample only has three people with previous experience in a clinical practice course (Bhandari, 2020). Their characteristics (thought processes) make them very different from the other student population entering social work school and taking clinical classes.

- **Experimenter bias** means that any change in the participant's performance can be attributed to the experimenter (Bhandari, 2020). For example, before providing students with the survey, the professor of the research class unintentionally stressed the importance of the study. As a result, the students worked extra hard to reduce their anxiety levels during the study.

SUMMARY

Social work research is fundamental to increasing knowledge of theories and explanations of phenomena in social work practice. According to research methodology, research methods are used to develop a study that allows for specific analysis and understanding. Quantitative methods and analysis can be good practice for conducting social work research, which involves gathering a large amount of quantitative data to generalize findings to the larger population. It can also be a good starting point for new researchers using computational data analysis and reporting methods. This process allows new researchers to analyze the data quickly, even with large sample sizes (Kelley et al., 2003; Queirós et al., 2017). However, the limitation of using quantitative techniques in social work research is that data can be misunderstood, logically flawed, misused, or overused, and not fully address the full nuance of the issue (Queirós et al., 2017; Schneider, 2013). When a researcher considers using quantitative methods for research, it is essential to consider the advantages and disadvantages of each question, method, specificity, and nature of the research study.

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