KIELHOFNER'S

RESEARCH *in* OCCUPATIONAL THERAPY

Methods of Inquiry for Enhancing Practice

SECOND EDITION

Renée R. Taylor

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Dedication

This book is dedicated to the memory of Dr. Gary Kielhofner (b. 2/15/1949, d. 9/2/2010). By nature a humanitarian, by identity a pacifist, and by profession an occupational therapy practitioner, researcher, and scholar, Professor Kielhofner stood as the foremost theorist in his day, and arguably to this day, in the field of occupational therapy. As exemplified by his Model of Human Occupation (MOHO) (Kielhofner, 2008), Professor Kielhofner's work epitomized evidence-based practice. This is supported by a developing body of research that points to MOHO as being the most evidence-based, client-centered, and occupation-focused conceptual practice model in the world (Haglund, Ekbladh, Thorell, & Hallberg, 2000; Law & McColl, 1989; Lee, 2010; National Board for Certification in Occupational Therapy, 2004). Most importantly, Professor Kielhofner put the priorities of occupational therapy clients, students, and practitioners before all other professional priorities, as was evident across all of his scholarly works. It is hoped that these priorities have shined through within this second edition of his work, written in
his honor.

Author Note

Deciding to assume editorship of the second edition of Gary Kielhofner's original text, *Research in Occupational Therapy,* was as difficult as it was daunting. The first edition of this text was highly informative, at the cutting edge of science, easy to read, and occupational therapy (OT) relevant, and it contained continuous examples derived from OT practice. Dr. Kielhofner selected contributing authors who stood at the top of their respective fields within occupational therapy, and their expertise in the various approaches to OT research was well portrayed. From my perspective, the first edition did not need much in the way of improvement.

At the same time, I recall a conversation that I had with Dr. Kielhofner early in 2010, before either of us knew he would leave the profession, and indeed this world, far too early. At that time, we decided that if a second edition were to be requested, we would work on it together. Thus, in this second edition, I retained as much of the original content and as many of the original contributors to the first edition as possible. At the same time, this edition reflects a combination of ideas for improvement the second time around. With all of this said, I truly hope that you will find that this edition lives up to its expectations and to its title, *Kielhofner's Research in Occupational Therapy.*

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Preface

Choosing to become an occupational therapist involves a commitment from each and every one of us to ensure that the profession's practice and scholarship stand at the cutting edge of rehabilitation science and innovation. This responsibility carries with it an effortful and disciplined practice of applying the theoretical underpinnings, infrastructural requirements, scientific methods, and practical means of disseminating research findings. Contributions represented within this second edition represent a collective effort on the part of many occupational therapy educators to make the process of learning and utilizing research in occupational therapy one that is relevant to practice, unintimidating, and, most importantly, motivating.

By definition, research represents a disciplined and systematic approach to the development, identification, and verification of new knowledge. It is governed by ethics and rules of conduct and is structured and rational in nature. In the field of occupational therapy, research involves testing theories and theoretical concepts as they are reflected in practice frameworks and in conceptual practice models. Moreover, research involves using assessments and other approaches to data collection to generate knowledge and to test innovative devices, technologies, and approaches to practice.

The focus of this book is the concepts, methods, and common practices that comprise the act of conducting research in the field of occupational therapy. Content in this text is balanced to ensure equal coverage from both quantitative and qualitative perspectives. The two original themes binding the first edition were retained in this volume. First, the chapters illustrate how research is fueled by creativity, represented in the ongoing development and discovery of new knowledge. The development of this knowledge and any associated skills or technologies contributes to the field's mandate to approach practice using the most humane, inclusive, contemporary, rigorous, and engaging methods possible. Second, specific efforts were made to demonstrate how research is both essential to and can support and improve occupational therapy practice. To this end, all of the examples and cases contained in this book emanate directly from the field of occupational therapy. Additionally, the chapters emphasize the usefulness of research in terms of building practitioners' knowledge base and credibility within and outside of our field.

Organization and Scope

This book offers a comprehensive guide to conducting applied research in the field of occupational therapy from quantitative, qualitative, and mixed perspectives. It is organized in terms of six sections. Given the breadth of material covered, the content is targeted toward a student–practitioner audience, and most topics are covered at a foundational level. Each of the six sections and chapters within each section may be read in isolation. However, readers will gain the most by reading the sections and chapters in the order in which they are presented.

The first section, *Research in Occupational Therapy: Basic Elements for Enhancing Practice,* emphasizes every therapist's professional responsibility to conduct practice that is informed by research and stresses the importance of evidence-based practice to advancing the field of occupational therapy. Basic content on what to look for when reading a published research study, including how to critically appraise research, is included. This section provides an overview of the aims and classifications of research and a discussion of the philosophical foundations of research. The importance of theory in the development of research and testing of concepts, assessments, and interventions is also emphasized.

The second section, *Laying the Groundwork for Evidence-Based Practice: The Steps of the Research Process,* covers six broad components of the research process: conducting a literature review, generating research questions and defining specific aims and hypotheses, selecting the research method, writing the research proposal, ensuring ethical review, and securing samples and performance sites.

The third section, *Qualitative Approaches: First Steps in Communicating With Language,* describes design considerations, approaches to the collection of qualitative data, contemporary methods for

analyzing qualitative data, and approaches to interpreting and reporting qualitative data.

The fourth section, *Quantitative Approaches: First Steps in Communicating With Statistics and Measures,* focuses on the same topics, but from a quantitative perspective. Chapters emphasize selection of the appropriate research design; measurement approaches; data collection; techniques for entering, storing, and managing data; statistical analysis; and meta-analytic studies.

The fifth section, *Descriptive, Exploratory, and Pilot-Study Research,* covers single-subject, and survey research.

The sixth section, *Additional Topics for the Developing Investigator,* covers needs assessment research, program evaluation research, participatory research approaches, the process for writing a literature review and writing up one's research findings, approaches to obtaining grant funding for research, mixed-methods designs, and outcomes research for evidence-based practice.

Conclusion

Each contribution to this book not only represents a level of expertise within the relevant topic area, but more importantly envelops the passion and dedication required for the conduct of science within the field of occupational therapy. The book was designed to offer a clear and comprehensive approach to conducting occupational therapy research at any level that is directed at improving our practice. After having read this edition, it is my sincere hope, and that of all of the contributors, that its contents will inspire a similar sense of passion, commitment, and dedication to the continual improvement of our field through the rigors involved in the application of science and discovery.

Renée R. Taylor

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I wish to thank Christa Fratantoro, Senior Acquisitions Editor at F. A. Davis, who believed in my work enough to support my assuming the sole editorship of the second edition of this text. Additionally, I wish to thank Roxanne Klaas, for her excellence and good sense in copy editing. I wish to thank all of the contributors to this second edition. Without their experience and excellence, this book would not have been possible. I also wish to thank three former University of Illinois at Chicago (UIC) occupational therapy students—Baily Zubel, Mary Pearson, and Phoebe Kinzie-Larson—for their editorial contributions, including some of the photography and figures. Finally, I wish to thank Nancy Peterson, Dana Bataglia, and Laura Horowitz for assisting with the editorial production of this text.

Contents

SECTION 1

Research in Occupational Therapy: Basic Elements for Enhancing Practice

CHAPTER 1

Occupational Therapy as an Evidence-Based Practice Profession

Renée R. Taylor • Gary Kielhofner • Nancy A. Baker

Learning Outcomes

- State why research is an obligation of the profession.
- Define the role of evidence-based practice in occupational therapy.
- Explain why evidence-based practice is necessary to the profession.
- Explain the importance of clinical expertise in evidence-based practice.
- Identify major ways in which research supports occupational therapy practice.
- Describe the major types of research that provide evidence about the nature and outcomes of occupational therapy.

Introduction

Why and to what extent is research important to a practice-based profession such as occupational therapy? If you are like many of us, this is a question that you have asked yourself at some time during the course of your development as a student or occupational therapist.

The Case Example in this chapter provides just one illustration of why research is important to the occupational therapy field overall. Research provides insight into:

- The resolution of practice dilemmas
- The means to test innovations that improve people's well-being and functioning in a wide range of contexts
- Knowledge and guidelines that direct therapists in their everyday work
- A means of growth through developing new approaches to understanding and treating people with impairments
- Evidence that assures others (e.g., family members, employers, insurance companies, and other public institutions) about the impact of occupational therapy services, thus increasing public credibility

For greatest relevance to practice and to the profession, research should be conducted according to a theoretical framework. Figure 1.1 summarizes the dynamic relationships among theory, research, and practice. Each of these key elements of the profession influences the other elements. Theory and research evidence guide practice. Practice raises problems and questions to be addressed in theory and research. Research tests theory and practice, providing information about their validity and utility, respectively.

This chapter explores the role of research in supporting the theories that form the basis of the occupational therapy profession. You will learn the importance of research to clinical reasoning and other types of decision-making in practice. This involves defining evidence-based practice, explaining why it is necessary to the profession, describing the predominant ways in which research supports the profession, and emphasizing the importance of student and clinician involvement in and support of research-related activities.

A Profession's Research Obligation

Every health profession asks its clients and the public to have a level of confidence in the worth of its services. To justify that confidence, the

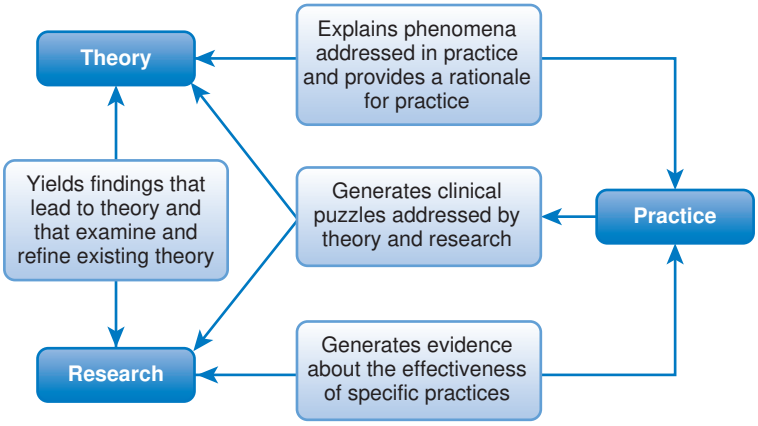

Figure 1.1 The dynamic relationship among theory, research, and practice.

profession must enable its members to offer high-quality services that will benefit clients. Thus, when health-care professionals provide services to clients, the knowledge and skills they use should be "justified in terms of a systematic and shared body of professional knowledge" (Polgar & Thomas, 2000, p. 3). This knowledge includes the underlying theory that informs practice and the tools and procedures that are used in practice.

Research is the means by which the profession generates evidence to test and validate its theories and to examine and demonstrate the utility of its practice tools and procedures. Therefore, our profession has an ongoing obligation to support occupational therapy professionals who choose to undertake systematic and sustained research.

Research for Professional Recognition and Support

The occupational therapy profession depends on societal support. This support ranges from subsidizing educational programs that prepare occupational therapists to reimbursing occupational therapists for their services. Societal support for the health-care professions cannot be assumed; the individuals who make public policy and decide what health-care services are needed increasingly rely on scientific evidence to determine where limited public and private resources should be directed. As a result, research is increasingly necessary to ensure that resources will be available to support the profession. Christiansen (1983) notes, "It seems clear that as administrators and policymakers render decisions about how health care providers are used and reimbursed, those disciplines with objective evidence of their effectiveness and efficiency will have a competitive advantage" (p. 197). He concludes that research is an economic imperative for the profession.

Without the development of a research base to refine and provide evidence about the value of its practice, occupational therapy simply will not survive, much less thrive, as a health profession (Christiansen, 1983; Christiansen & Lou, 2001; Cusick, 2001).

Evidence-Based Practice

The obligation of the profession to conduct research that refines and validates its knowledge base is paralleled by an obligation of individual therapists to engage in **evidence-based practice (EBP)** (Taylor, 2000). Evidence-based practice is an approach to practice that assumes the active application of current, methodologically sound research to inform practice decisions and treatment options in light of a client's preferences, expectations, and values (Sackett, 2002).

The process of evidence-based practice begins with a clinical situation that poses a unique question or challenge for the practitioner (Sackett, 2002). Using evidence-based practice, the practitioner engages in a highly deliberate, publicly transparent, and well-reasoned use of clinical research findings to inform decision-making about an individual client in an actual practice situation (Sackett, 2002). Those who approach clinical decision-making from an evidence-based perspective consider what clients value, prefer, and expect

CASE EXAMPLE

Dr. Kerstin Tham is an occupational therapist who specializes in the neurorehabilitation of individuals who have had a cerebrovascular accident (CVA), or stroke (Fig. 1.2). After working with a number of clients with many different kinds of impairments resulting from their CVAs, Kerstin observed that unilateral neglect was one of the most difficult and frustrating impairments to treat in occupational therapy.

Unilateral neglect is an impairment in which people no longer recognize half of their own bodies or perceive half of the world around them. As a consequence, people neglect these regions of the self and the world, for example, washing only one side of the body, eating only the food on one-half of a plate, and bumping into objects that they do not perceive to be present.

For answers, Dr. Tham turned to the existing evidence base, which consisted of a number of published journal articles citing research findings about various training approaches to treat people with unilateral neglect. The common finding, however, was that these approaches had *not* been shown to be very successful in improving the overall functioning of people with this problem.

Dr. Tham became convinced that the research describing unilateral neglect had one major flaw: It always examined how neglect appeared from the outside, that is, how it appeared to clinicians and researchers. The researchers never asked the individuals with CVA what it was like to experience the impairment. So, she decided to undertake research that would describe neglect **phenomenologically,** or from the point of view of the person who had it. Her goal was to provide insights into how to improve service provision to individuals with the impairment.

In a qualitative study in which she observed and interviewed four women over an extended period of time, Dr. Tham and her colleagues came to provide some startling insights into the nature of unilateral neglect (Tham, Borell, & Gustavsson, 2000). For example, they found that people with neglect felt that the neglected body parts were not their own or were not attached to their bodies. Their research described a natural course of discovery in which individuals with neglect came to understand that they had the impairment and were able to make sense of the strange and chaotic experiences of their bodies and the world.

In a subsequent investigation, Dr. Tham and a colleague went on to examine how the behavior of other people influenced the experiences and behaviors of a person with neglect (Tham & Kielhofner, 2003). She is continuing this line of research, which is providing a new approach to understanding and providing services to persons with unilateral neglect. Moreover, she and her doctoral students have expanded these ideas and are now examining the experience of persons with other types of perceptual and cognitive impairments following acquired brain injuries (Erikson, Karlsson, Söderström, & Tham, 2004; Lampinen & Tham, 2003).

Figure 1.2 Kerstin Tham, OT, PhD, is an occupational therapist and researcher.

from the health-care encounter, alongside their own ever-growing clinical experience, practical skill sets, and educational backgrounds (Sackett, 2002). Evidence may be used to shed light on:

- The anticipated course and outcome of a particular impairment, symptom, or diagnosis
- The relevance and accuracy of a selected assessment tool
- The nature, conduct, and expected outcome of a chosen intervention

Accordingly, whenever possible, practitioners should select intervention strategies and tools that have been empirically demonstrated to be effective (Eakin, 1997). This process requires practitioners to remain up to date with new developments in their practice areas. It also requires practitioners to develop the ability to conduct thoughtful and efficient literature reviews and possess knowledge about how to evaluate published research in terms of its quality and level of methodological rigor (Sackett, 2002).

The Canadian Association of Occupational Therapists' position statement on evidence-based occupational therapy is available online (Canadian Association of Occupational Therapists, Association of Canadian Occupational Therapy University Programs, Association of Canadian Occupational Therapy Regulatory Organizations, & the Presidents' Advisory Committee, 2009). It defines evidence-based occupational therapy as the client-centered enablement of occupation, based on client information and a critical review of relevant research, expert consensus, and experience.

Bennett and Bennett (2000) describe the process of how evidence-based practice informs clinical decision-making within occupational therapy. According to this approach, the clinical questions being considered must address the nature of specific clients and client groups, as well as their treatment contexts. This definition stresses that the relationship between clinician and patient is centrally important in clinical decision-making.

After a clinical question is defined, the next step in the process involves conducting a literature review. During this review, practitioners must be cognizant of the quality and standards by which the research has been conducted. Then, match the evidence to each feature of the client's context, including the client as an individual, the client's desired occupation, and the client's environment. Within this process, the client acts as an active and engaged partner with the practitioner.

In 2002, Dysart and Tomlin surveyed 209 practicing occupational therapists to determine the extent to which they access, use, and apply clinically relevant research findings in practice (Dysart & Tomlin, 2002). Findings revealed that occupational therapy practitioners were using evidence in practice to a modest degree; more than one-half (57 percent) relied on one to five evidence-based treatment plans per year.

In sum, evidence-based practice requires an ongoing commitment from researchers to investigate problems and answer questions that emerge out of practice. Equally, it requires an enduring commitment from practitioners to access, evaluate, and use this research to inform their decision-making in everyday practice. It also requires the client's perspective and involvement (Bennett & Bennett, 2000). Evidence-based practitioners integrate their own expertise with the best available research evidence. The next section briefly examines some of the ways in which research provides evidence for practice.

Clinical Expertise and Evidence-Based Practice: A Collaborative Approach

Evidence-based practice integrates individual *clinical expertise* with the *best available external clinical evidence* from systematic research (Sackett, Rosenberg, Grey, Haynes, & Richardson, 1996). **Clinical expertise** refers to the proficiency and judgment that individual practitioners acquire through experience. Best available **external clinical evidence** refers to findings from highest available quality, clinically applied, research studies within the field's scientific literature.

It is clear from this definition that evidence-based practice relies on practitioners' clinical expertise when applying research evidence to practice. Sackett et al. (1996) state that neither clinical expertise nor the best available external evidence alone are enough for evidence-based practice; external clinical evidence can inform but can never replace individual clinical expertise. Clinical expertise is what determines whether the external evidence applies to the individual patient (i.e., whether and how it matches the client's clinical state, predicaments, and preferences).

Sackett, Straus, Richardson, Rosenberg, and Haynes (2000) later described evidence-based practice as the integration of *best research evidence* with *clinical expertise and patient values*. With this updated definition, the patient's values are acknowledged as an equally important and necessary ingredient in the practice of EBP as research evidence and clinical expertise (Fig. 1.3).

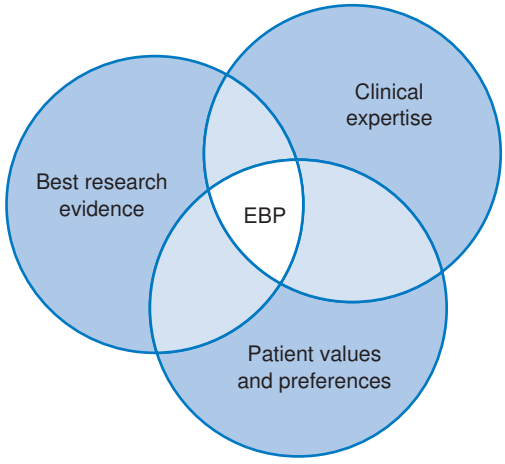

Figure 1.3 Evidence-based practice is the integration of best research practice, clinical expertise, and patient values and preferences.

The Role of Evidence-Based Practice in Occupational Therapy

Evidence-based practice evolved from the principles of evidence-based medicine (EBM), a concept that originated in the 1980s at McMaster University in Canada (Taylor, 1997). EBP emerged within health care and health education in the 1990s. It is now widely known that research evidence must be used as a primary foundation for informing occupational therapy practice (Stronge & Cahill, 2012).

Since the introduction of EBP in occupational therapy, there continues to be discussion about its implementation. There is an increasing recognition that the implementation of evidence-based practice is a complex process that may need to be adapted to ensure its applicability to occupational therapy. To implement EBP in occupational therapy, the synthesis of the available evidence with clinical expertise and judgment, as well as knowledge of the values and preferences of the clients, is critical (Graham, Robertson, & Anderson, 2013; Pighills, Plummer, Harvey, & Pain, 2013; Stronge & Cahill, 2012). Authors have also argued that the direct adoption of EBM and its established prescriptive guidelines may not adequately reflect the philosophical beliefs and the highly contextualized and dynamic nature of occupational therapy (Graham et al., 2013; Pighills et al., 2013; Stronge & Cahill, 2012).

Evidence-based occupational therapy is an offshoot of evidence-based practice that recognizes the range of sources and scope of evidence available to occupational therapists (Zimolag, French, & Paterson, 2002), including:

- Research evidence
- Information provided by the client for determining occupational priorities and capacities
- The knowledge that occupational therapists have gained from past experience

Based on those definitions, the essence of EBP may be summarized as follows:

- Evidence-based practice involves more than just the use of research evidence.
- Clinical expertise is as important to evidence-based practice as research evidence.
- Client input is vital to the decision-making process in evidence-based practice.
- Health-care decisions are also influenced by available resources.

For example, a client has had several acute episodes of low back pain that he states have led to decreased participation in work, play, and home activities. After assessment, it is clear that the client has low flexibility and endurance, and he reports high levels of pain. He has had several courses of physical therapy but continues to have problems. The client states that he would like to miss less work, improve his ability to play with his children, and improve his overall fitness level. The practitioner working with the client believes that a course of intensive work-related occupational therapy will benefit the client and provides him with the following information to help him make his decision: "Mr. Koifier, you have had chronic low back pain for 1 year now. Your physical therapy has helped some, but you continue to have trouble with home activities, and you feel that your overall fitness level is low. I would like to suggest a course of therapy in which you attend daily therapy lasting 4 hours a day. The therapy is designed to improve your flexibility, endurance, strength, and work ability. A recent study reported that this type of therapy was superior to a three-times-a-week physical therapy program in decreasing sick days, improving flexibility and endurance, and assisting people to getting back to leisure and sports activities. For example, there was a 17 percent greater decrease in sick days for people who received this type of therapy, a 29 percent increase in endurance, and a 17 percent decrease in pain. In addition, one in five clients in this type of intervention report the improved ability to participate in sports and leisure activities."

This type of evidence-based statement provides the client with information that will help him to make a more informed decision as to whether the

additional time and effort required to attend the more intensive program will be worth it.

How Research Supports Practice

Research supports practice in many different ways, including:

- Generating foundational knowledge used by therapists
- Proving the need for occupational therapy services
- Developing and testing the theories that underlie practice
- Generating findings about the process and outcomes of therapy

The following section examines each of these ways in which research supports and advances practice.

Generating Foundational Knowledge

Much of the background information that occupational therapists use on a daily basis stems from research. Often, a long history of investigation is behind what has become common knowledge. Knowledge of musculoskeletal anatomy, neuronal transmission, the milestones of child development, the nature of personality, and the etiology and prognoses of diseases has resulted from thousands of studies.

Over decades, investigators examined these phenomena, providing analyses that were subsequently verified or corrected by others. In time, this knowledge was accumulated and refined until it became part of the repository of knowledge that informs occupational therapy practice. This knowledge is ordinarily generated by individuals who are not occupational therapists; however, their research is important to occupational therapy practice.

Proving the Need for Occupational Therapy Services

Without clear identification of need, one can neither decide what services to provide nor accurately evaluate the value of any service. **Needs assessment research** determines what clients require to achieve some basic standard of health or to improve their situation (Witkin & Altschuld, 1995). It focuses on identifying gaps between clients' desires and their situations (Altschuld & Witkin, 2000).

Needs assessment is particularly important in identifying the nature and consequences of new types of disabilities and new circumstances that affect persons with disabilities, and in identifying problems not previously recognized or understood. For example, studies have indicated that HIV/AIDS increasingly affects individuals from underserved minority populations and individuals with histories of mental illness, substance abuse, poverty, limited education, and limited work experience (Centers for Disease Control and Prevention [CDC], 2001; Karon, Fleming, Steketee, & De Cock, 2001; Kates, Sorian, Crowley, & Summers, 2002). Research has also shown that although newer drug therapies have lowered AIDS mortality, the chronic and disabling aspects of the disease and its numerous associated conditions continue to pose challenges for those affected (CDC, 2001). Many people with HIV/AIDS struggle to overcome personal, financial, and social challenges that affect their desire to live independently and return to the workforce (McReynolds & Garske, 2001). In addition to these general characteristics of the AIDS population, a needs assessment study demonstrated that individuals' perceptions of needs differed by race, ethnicity, and gender (Sankar & Luborsky, 2003).

Together, these studies indicated that individuals with HIV/AIDS would potentially benefit from an individualized intervention designed to help them achieve independent living and employment as they envisioned it. These studies provided a foundation on which to propose a study of that type of occupational therapy intervention (Paul-Ward, Braveman, Kielhofner, & Levin, 2005).

Developing and Testing Occupational Therapy Theory

Every profession makes use of theories that underlie and explain its practice. By definition, the explanations offered by a theory are always tentative. By testing these explanations, research allows theory to be corrected and refined so that it provides increasingly useful explanations for practice. Ideas about how research refines and tests theory have evolved over the centuries, but research remains the primary tool by which a theory can be improved.

Practice theory research explains problems that therapists address and justifies approaches to solving them that are used in therapy. Consequently, the testing and refinement of such theories through research contributes to advancing practice. Therapists should always judge and place their

confidence in the explanations provided by any theory in relation to the extent to which that theory has been tested and developed by research.

The motor control model provides one example of how research tests theory with implications for practice. Occupational therapy practice for individuals with central nervous system damage has been guided by the motor control model, which is a theory of how people control movement. Toward the end of the 20th century, this model, which previously saw the control of movement as being directed exclusively by the brain, began to change. A new conceptualization (Mathiowetz & Bass-Haugen, 1994, 2002) argued that movement is a result of the interaction of the human nervous system, the musculoskeletal system, and the environment. This theory emphasized the importance of the task being performed and the environment (e.g., the objects used) in influencing how a person moves. The implication of this theory was that the tasks chosen and the objects used in therapy would have an impact on recovery of coordinated movement.

Occupational therapists conducted research that illustrated clearly that the nature of the task being done and the environment do affect the quality of movement (Lin, Wu, & Trombly, 1998; Mathiowetz & Bass-Haugen, 1994; Wu, Trombly, & Lin, 1994). These and other studies (Ma & Trombly, 2002; Trombly & Ma, 2002) now provide evidence that tasks involving meaningful objects and goal-oriented activities positively influence performance and motor learning.

A wide range of research can be used to test and develop theory. In fact, no single study can ever test all aspects of a theory. The types of studies that are typically used to examine and develop theory include:

- Studies that aim to verify the accuracy of the concepts by asking whether there is evidence to support the way a concept describes and/or explains certain phenomena
- Studies that ask whether there are relationships between phenomena as specified by the theory
- Studies that compare different groups of participants on concepts that the theory offers to explain the differences between those groups
- Studies that examine the potential of the theory to predict what will happen

Over time, as the evidence accumulates from such studies, informed judgments can be made about the accuracy and completeness of a theory. Findings from such research typically lead to alterations in the theory that allow it to offer more accurate explanations. Because the theories used in occupational therapy typically seek to explain problems that therapists encounter in practice and how therapists attempt to solve those problems, these types of studies directly inform practice.

Providing Evidence About the Nature and Outcomes of Therapy

Many types of studies examine the various aspects of occupational therapy practice and its outcomes. These are typically studies that:

- Are undertaken to develop and test assessments used in practice
- Examine the clinical reasoning of therapists when they are making decisions about therapy
- Determine the outcomes that result from therapy
- Examine the process of therapy (i.e., asking what goes on in therapy)
- Use participatory methods to investigate and improve services in a specific context

Studies That Test Assessments Used in Therapy

A number of interrelated forms of inquiry are used to develop and test assessments used in the field; the aim of **assessment research,** sometimes referred to as **psychometric research,** is to ensure the dependability of those methods (Benson & Schell, 1997). Dependable assessments are reliable; that is, they yield consistent information in different circumstances, at different times, with different clients, and when different therapists administer them. A dependable information–gathering method must also be valid, providing the information it is intended to provide. Studies that examine whether an assessment is valid are typically those that:

- Ask experts whether the content of an assessment is coherent and representative of what is intended to be gathered
- Analyze the items that make up an assessment to determine whether they coalesce to capture the trait they aim to measure
- Ask whether the assessment correlates with measures of concepts that are expected to concur and whether it diverges from those with which no relationship is expected
- Determine whether they can differentiate between different groups of people

In addition to studies that examine the reliability and validity of assessments, there are studies that examine their clinical utility. Such studies may

ask therapists and/or clients whether they find the assessments informative and useful for identifying problems and making decisions about theory. The development of any assessment ordinarily involves a series of studies that contribute to the ongoing improvement of the assessment over time.

Studies of Clinical Reasoning

Occupational therapists work with clients to identify their problems and choose a course of action so clients may manage their problems and improve their functioning through engaging in occupations. Research that examines how occupational therapists identify problems and make treatment decisions is referred to as **clinical reasoning research** (Christiansen & Lou, 2001; Rogers, 1983; Schon, 1983). Investigations that examine clinical reasoning constitute an important area of research in occupational therapy.

One of the most influential studies of clinical reasoning, by Mattingly and Flemming (1994), identified different types of reasoning that characterized occupational therapy practice. Their research has served as a framework for understanding how occupational therapists make sense of and take action with reference to their clients' problems and challenges in therapy.

Outcomes Research

Outcomes research is concerned with the results of occupational therapy. Investigations that examine the outcomes of occupational therapy services include:

- Investigations of specific intervention strategies or techniques
- Studies of comprehensive occupational therapy programs
- Inquiries that examine the occupational therapy contribution to an interdisciplinary program of services (Kielhofner, Hammel, Helfrich, Finlayson, & Taylor, 2004)

The study of occupational therapy techniques and approaches helps refine the understanding of these discrete elements of practice. This type of research examines outcomes specific to an intended intervention. Such studies may also seek to determine the relative impact of different techniques or approaches, such as comparisons between individual versus group interventions.

Studies of comprehensive occupational therapy programs ask whether an entire package of services produces a desired outcome. Such studies typically examine the impact of services on such outcomes as independent living, employment, and enhanced school performance. A well-known example of this type of research is a study by Clark and colleagues (1997), which documented the positive outcomes of an occupational therapy program for well elderly individuals. Finally, studies that examine the effect of interdisciplinary services can also document the impact of the occupational therapy component of such services.

Inquiry Into the Processes of Therapy: Mechanisms of Change

It is important not only to understand whether interventions work but also *why* they work or do not work. This approach is often referred to as **process research** or **formative research.** This approach involves understanding the **mechanisms of change,** that is, the processes by which an intervention creates change in a client. Studies that examine the effect of interventions are increasingly focusing on identifying the underlying mechanisms of change (Gitlin et al., 2000). Often, an important prelude to designing intervention outcome studies is to examine what goes into therapy in order to improve upon services before they are more formally tested.

An example is a study by Helfrich and Kielhofner (1994) that examined how clients' occupational narratives influenced the meaning they assigned to occupational therapy. This study showed how the meanings of therapy intended by therapists were often not received by or in concert with clients' meanings. The study findings underscored the importance of therapists having knowledge of their clients' narratives and organizing therapy as a series of events that enter into those narratives. Such studies of the process of therapy provide important information about how therapy can be improved to better meet clients' needs.

Participatory Research

A new and rapidly growing approach to investigation is **participatory research.** This approach involves researchers, therapists, and clients doing research together to develop and test occupational therapy services. Participatory research reverses the traditional role in which the occupational therapist decides on what research questions to answer and what procedures to use. Instead, it relies on the client to drive, or heavily influence, these decisions. Participatory research embraces the idea of partnership in which all the constituents work together and share power and responsibility to investigate, improve, and determine the outcomes of service. It also involves innovation in which

new services are created to respond to problems that are mutually identified by researchers, therapists, and clients.

This type of research is especially useful for contributing knowledge that practitioners can readily use and that consumers will find relevant to their needs. An example of this kind of study involved developing and evaluating a consumer-driven self-management program for individuals with fatigue and other impairments associated with chronic fatigue syndrome. This program provided clients an opportunity to learn self-advocacy skills, energy conservation, and other ways to improve their quality of life, functional capacity, coping skills, and resource acquisition (Taylor, 2004).

Summary

This chapter introduces the necessity of research for the occupational therapy profession and emphasizes that research gives clients and the public reason to have confidence in occupational therapy services and outcomes. Research also provides the rationale for administrators and policymakers to support occupational therapy services.

The chapter also examines the evolution of evidence-based practice and its applications in occupational therapy. Additionally, this chapter covers the types of research most often conducted by occupational therapists, ranging from needs assessment to theory development, to psychometric research, to clinical outcomes studies and participatory research. Each of the key elements of the profession (research, theory, and practice) influences the others. Theory and research evidence guide practice. Practice raises problems and questions to be addressed in theory and research. Research tests theory and practice, providing information about their validity and utility, respectively.

Other chapters in this text explain the nature, scope, design, methods, and processes of research and illustrate the wide range of tools that researchers use for their inquiries. Throughout the text, as you encounter multiple discussions of how research is performed, it is important not to lose sight of *why* it is done. Remember Yerxa's (1987) observation that "Research is essential to achieving our aspirations for our patients and our hopes and dreams for our profession" (p. 415).

Review Questions

1. Describe three approaches to occupational therapy practice that have been informed by research. Provide specific examples.
2. What are some likely consequences if research is not conducted or used to enhance occupational therapy practice?
3. How did evidence-based practice originate? What is the difference between evidence-based medicine and evidence-based practice in occupational therapy?
4. Compare and contrast participatory research and outcomes research in occupational therapy, describing the utility of each in context.
5. How does needs assessment research differ from practice theory research? Describe two different practice situations in which each of these approches would be appropriate, and explain why they would be appropriate.

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CHAPTER 2

Classifications and Aims of Research

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Learning Outcomes

- Compare and contrast the three ways of classifying research: major methodological approach, research design, and research purposes.
- Describe the basic characteristics of quantitative research and the relevance of this approach to occupational therapy research and practice.
- Delineate the key aspects of qualitative research and explain their role in occupational therapy and practice.
- Explicate the utility and benefits of the following research designs, including their limitations: quasi-experimental studies, single-subject studies, field studies and naturalistic observation, survey studies, and psychometric studies.
- Differentiate among basic research, applied research, and transformative research.

Introduction

Research studies are almost as varied as they are numerous. Even within a specific field such as occupational therapy, there is considerable diversity in terms of the different topics and approaches to investigation. For example, studies may differ along such dimensions as:

- The sample size, or number of study participants (from one to hundreds or thousands)
- What participants are asked to do (being observed versus undergoing complex interventions)
- How information is gathered (following participants in their ordinary activities and context versus taking measurements in a laboratory setting)
- How the data are analyzed (identifying underlying narrative themes versus computing statistical analyses)

One way to appreciate the diversity of research is to examine the different ways it is classified and to understand the aims of the different approaches. Research may be classified in terms of major methodological approach, design, and the underlying purpose for the research.

Another important aspect of the diversity of research is the value system and worldview that underlies the selection of a particular approach. This underlying value system drives decisions about whether an approach to a particular research question is useful and valid. For example, is a study more valid if the researcher is blinded to the experiences of the subjects? Or is it more valid if the researcher personally identifies with the subjects' experiences? Depending on whom you ask, the answers to these questions are bound to be vastly different. These differences are deeply rooted in the underlying beliefs and traditions of knowledge discovery to which each researcher adheres. The belief system that underlies a researcher's data collection approach, measurement instruments, and orientation to analysis is often referred to as the philosophical foundation of research.

This chapter examines the three different ways to define and classify research: (1) by major methodological approach, (2) by design, and (3) by aim, or purpose, of the research.

Defining and Classifying Research

The three major ways in which to define and classify research are (Table 2.1):

- Major methodological approach
- Research design
- Research purposes

Major Methodological Approach

One of the broadest ways to classify research is to examine it in terms of the two major methodological approaches: qualitative and quantitative

CASE EXAMPLE

Kate is an entry-level student enrolled in a research methods course at a large, research-intensive university. She is working on an assignment in which she must explain the major types of research in occupational therapy and their aims. Then, she will choose one approach to research and explain the philosophical foundation that underlies that particular approach.

Kate visits the university library and retrieves various journal articles containing studies with vastly different experimental designs and approaches to data collection. In some studies, the researchers have made every effort to restrict the amount of information that both they and subjects have about the research process, so that there is no chance that the effects of any treatment that is given are influenced by advanced knowledge or expectations about the outcome.

In other studies that Kate encounters, researchers and subjects not only know the type of treatment that the subjects are receiving, but they are collaborators in producing the treatment. One example is a chronic illness self-management program in which participants helped develop a treatment protocol in order to manage their own chronic illnesses and symptoms. Still another study reveals how a researcher with a particular disability joins a focus group that includes other individuals with the same disability to detail and plan a persuasive way to document their experiences with environmental barriers within their communities.

After reading through the different studies and their approaches, Kate realized that some researchers designed their studies in such a way that subjectivity and personal bias were minimized by strict standardization procedures and careful distancing of themselves from the subjects. By contrast, others immersed themselves in the lives of those they studied and detailed how their personal histories and subjective experiences shaped and informed their investigations. Still other investigators invited study participants to be equal partners in the research enterprise. Previously Kate had stereotyped research as a dry and rather boring topic of study, but she immediately became enthused to learn more about the various ways to approach science within the field of occupational therapy. Her plan was to learn about the different classifications and purposes of research and then to examine her own thoughts and feelings about how these underlying worldviews and belief systems might correspond philosophically with the various approaches.

Table 2.1 Ways to Define and Classify Research

Classifications	Examples
Major methodological approach	Qualitative methods
	Quantitative methods
Research design	Experimental and quasi-experimental studies
	Single-subject designs
	Field studies and naturalistic observation
	Survey studies
	Psychometric studies
Research purposes	Basic research
	Applied research
	Transformative research

research methods. The terminology suggests these methods differ by the presence or absence of quantification. However, it is important to note that these two broad categories of research are also distinguished by important philosophical differences (Crotty, 1998). The following discussion describes the origins of these research methods and their differing assumptions, approaches to rigor, and research foci, as well as examines how researchers using these approaches gather, analyze, and interpret data.

Quantitative Research

Quantitative research is an approach to research that is characterized by objectivity. Researchers create and test theories using standardized and predetermined designs, measures, sampling approaches, and procedures. Quantitative approaches test one **hypothesis** (a structured statement of anticipated results of the study) or more and translate reports and observations into numerical data that are analyzed using statistical

approaches. The aim of quantitative methods is to discover the rules or laws underlying the objective world as a basis for scientific prediction and control (Guba & Lincoln, 1994). Quantitative researchers make every effort to enforce rigor by limiting the influence of subjective bias and other actions and events that interfere with an accurate interpretation of the data. It is helpful to consider historical and contemporary examples of quantitative research in occupational therapy.

Historical Examples. Research in the occupational therapy field began to develop in earnest in the mid-20th century. At that time, occupational therapy practice was dominated by an approach that emulated medicine's emphasis on scientific methods developed in the physical and life sciences, such as chemistry and biology (Kielhofner, 2009). Not surprisingly, the research that began to appear around this time was quantitative in nature. The following two examples of research, reported in the *American Journal of Occupational Therapy,* are characteristic of the period:

- Drussell (1959) reported a descriptive study to investigate whether the industrial work performance of adults with cerebral palsy was related to their manual dexterity, as measured by the Minnesota Rate of Manipulation Test (MRM). The MRM is a standardized measure of manual dexterity originally used for testing workers' ability to perform semiskilled factory operations. Work performance was measured with a widely used industrial measure, the Service Descriptive Rating Scale. In this study, both tests were administered to 32 adults with cerebral palsy who were enrolled in an adult vocational training program. The results of the study indicated that the two measures were positively correlated. This finding was interpreted as indicating that the MRM could be a valuable tool in assessing vocational potential for this population.
- Cooke (1958) reported results of an experimental study that investigated whether adding a weight to the dominant upper extremity of patients with multiple sclerosis would improve their coordination. The rationale was that the addition of weight would mitigate patients' intention tremors and thus increase coordination. In this study of 39 patients in a physical rehabilitation program, the subjects were tested with and without a weighted cuff using the MRM (used in this study as the measure of coordination). The results of the study failed to support the hypothesis that the addition of a weight would improve coordination. In fact, the opposite was observed; subjects scored significantly lower when wearing the weighted cuffs. This author concluded that the addition of the cuff slowed the speed of movement, negatively affecting coordination.

The characteristics of these two studies—quantification of the variables under study through use of standardized measures, use of experimental conditions in the second study, and statistical analyses (descriptive in the first study; inferential in the second study)—are hallmarks of quantitative research. Since these studies were conducted, the use of more complex experimental designs, including pre- and postintervention testing, randomization of study participants, and test development, has developed in occupational therapy. Nevertheless, the underlying logic of the research designs used in these two historical studies is similar to that of contemporary quantitative research in occupational therapy.

Contemporary Example. Let's examine a contemporary example of a quantitative research study. The study is a randomized clinical trial involving clients with trigger finger, a painful condition affecting the flexor tendon of a digit in which the digit locks or catches, as if a finger were wrapped around the trigger of a gun. A particular splinting approach is being tested on an experimental group, and a placebo splint is given to a control group. This is considered a randomized clinical trial because subjects are assigned to either the experimental or control group without knowing the condition to which they are assigned. When a researcher is not allowed to know which kind of splint has been given to a particular subject, it is often referred to as **blinding.** When subjects are not allowed to know the kind of treatment they are receiving, it is also called blinding. When both researchers and subjects are not permitted to know which treatment a particular subject is receiving, it is referred to as a **double-blind study.** The hypothesis of this study is that subjects receiving the experimental splint will demonstrate a decreased frequency of trigger finger compared with controls within a 1-year period.

Qualitative Research

Qualitative research is an approach that aims to describe and explain individuals' subjective experiences, actions, interactions, and social contexts through various approaches involving interviewing, note-taking of events and actions, examining written and visual documents, and making audio and video recordings. Qualitative research is an umbrella term for a range of methodologies

originating from the fields of anthropology, sociology, philosophy, and psychology. Today, these methods are widely used in the health sciences. Many researchers in occupational therapy have embraced these methodologies to study occupation and practice issues, viewing them as congruent with the profession's philosophical orientation (Hammell, 2002).

Qualitative research is generally divided into ethnographic, phenomenological, and narrative inquiry approaches, each of which represents a somewhat different standpoint. **Ethnography** emphasizes the societal and cultural context that shapes meaning and behavior. **Phenomenology** focuses on how people experience and make sense of their immediate worlds, using the people themselves as co-researchers, and **narrative inquiry** seeks to understand how people construct storied accounts of their and others' lives and of shared events (Rice & Ezzy, 1999). The following section provides historical and contemporary examples of these kinds of approaches to qualitative research.

Historical Examples. Qualitative research began to appear in occupational therapy literature during the 1980s. At that time, there was a resurgence of interest in ideas about occupation, its meanings and significance for health upon which occupational therapy practice was founded (Kielhofner, Braveman, et al., 2004). This led occupational therapists to seek relevant research designs for exploring the meanings and contexts of people's everyday lives, occupations, and experiences of illness, disability, and therapy, and to argue for the use of qualitative designs in occupational therapy (Kielhofner, 1982a; 1982b; Krefting, 1989; Yerxa, 1991). Early examples of qualitative research published in occupational therapy most commonly used ethnographic designs, originating in anthropological fieldwork methods, of which the following is an example.

This study examined the daily life experiences of 69 adults with developmental delay who were discharged from state hospitals to residential facilities as part of the deinstitutionalization movement. In this study, the project team (anthropologists, sociologists, and clinicians) followed the study participants over a 3-year period, participating with them in their daily life events in the five residential facilities where they lived. Researchers recorded observational data in field notes, conducted ongoing open-ended interviews with the residents, and videotaped them.

Analysis of the data from this field study resulted in several publications (Bercovici, 1983; Goode, 1983; Kielhofner, 1979, 1981). Kielhofner (1979) reported how the participants experienced and organized their behavior in time. He described how the participants did not progress through the usual life events that tend to demark maturation (e.g., graduating high school, marriage, and parenthood). Rather, their lives were largely unchanged over time, with the result that the participants tended not to be future oriented; they did not expect things to change, nor did they make plans for achieving change in their lives. Hence, he argued, among other points, the participants ". . . have ceased to become in the sense of the dominant culture, and from their own point of view, they are off the career time track. They are, in a sense, 'frozen in time.'" (Kielhofner, 1979, p. 163).

Another feature of how these study participants experienced their lives uniquely was that, unlike many other members of American culture, they had a surplus of time and a deficiency of things to do to fill up their time. As a result, they did not experience long periods of waiting for events to occur with the impatience or frustration that characterized the investigators' reactions. Rather, waiting was something that helped to fill time. These and other findings pointed out that these adults approached the organization of their daily activities and their lives in a radically different way from mainstream American culture (Kielhofner, 1981).

This study highlights the emphasis of ethnographic research on illuminating the social and cultural context of human action and its meaning. It also illustrates the use of this type of research in examining how changes in health policy and services can impact people. Since this study was conducted, qualitative research in occupational therapy has diversified, using phenomenological, narrative, and, more recently, participatory approaches. It has also expanded in focus to explore occupational therapists' clinical reasoning and practice issues in many settings, as well as the everyday lives and occupations of clients of occupational therapy services.

Contemporary Examples. One contemporary example of an ethnographic study involves perceptions of safety among 54 underserved children attending third grade at a public school within an impoverished neighborhood. In this study, the children are provided with cameras and asked to take photos of anything that makes them feel unsafe. Once the photos are printed, the children are asked to write captions under each photo describing the unsafe scene or object. The photographic data gathered in this study are then organized by themes

representing the societal and cultural contexts that shape the children's perception of safety within their immediate neighborhoods.

An example of a phenomenological study involves a study of 14 parents of young children with past-year juvenile criminal records. In this study, a researcher seeks to understand the personal experiences and perceptions of the parents from their points of view. The central research question is: "Describe your experience as a parent of a child who has had a conviction within this past year." Subsequent interview questions include: "How has the conviction affected your relationship with your child? How has the conviction affected relationships within your immediate family? Within your extended family? Has the conviction affected you socially? In your community? Has it affected you at work? Has it affected you financially? What other effects have your child's conviction had on your life?"

In this study, data are analyzed from the perspective of Kornfeld (1988). The first phase is **epoche,** in which the researchers write down all of their personal assumptions, biases, and stereotypes of how the parent co-investigators might answer these questions and then throw them away. This symbolic process reminds the researcher to ignore preconceived notions and focus on striving to understand the participants' experiences. In the second phase, the questions are administered to the parents in a seamless interview fashion, recorded, and transcribed verbatim. Each interview is listened to in full and analyzed in depth, with the ultimate goal of clustering and synthesizing categories to discover themes for each participant and for all the participants together.

Ciuffetelli-Parker (2013) conducted a narrative inquiry of poverty in a primary school community in Canada. Conceptualizations of poverty were analyzed by gathering brief stories, referred to as small narrative discourses, about the experience of living in poverty from shared dialogues between teachers and community members. As anticipated, the stories reflected that many participants held what were referred to as deficit conceptualizations of the children served by the school district. In order to overcome this biased and unhelpful way of viewing the children, participants learned to challenge and cross-examine the meanings behind their own stories in order to create new awareness and new understandings of poverty and education (Ciuffetelli-Parker, 2013).

Comparing Quantitative and Qualitative Research

Although they share the similar objectives of developing and evaluating new knowledge about one or more phenomena, quantitative and qualitative research differ in some fundamental ways. Table 2.2 summarizes these differences, which are also depicted in Figure 2.1.

Research Design

Research can also differ by its basic design. **Research design** refers to the fundamental strategy or plan of how the research will be structured. Research designs each have their own inherent logic. Although an exhaustive list of all research designs would not be practical, this discussion addresses the most common designs

Table 2.2 Key Differences Between Quantitative and Qualitative Research Methods

Characteristic	Quantitative Research	Qualitative Research
Origin	Physical and life sciences	Study of people different from the investigator (e.g., anthropology, philosophy, sociology)
Assumptions	Objective reality contains stable, preexisting patterns or order that can be discovered	Social reality is dynamic, contextual, and governed by local meanings
Aims	To discover natural laws that enable prediction or control of events	To understand social life and describe how people construct social meaning
Approach to Rigor	Maintain objectivity	Authentically represent the viewpoints of the individuals studied
Data Presentation	Numbers (statistics)	Textual, "thick" descriptions in language of participants
Data Analysis	Describes variables and their relationships and tests hypotheses in order to test theory	Identifies meaning, patterns, and connections among data; describes experience/social scene; produces theory "grounded" in the data

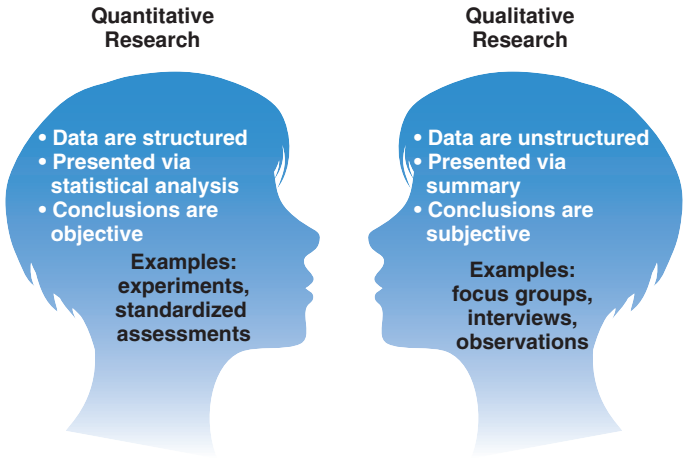

Figure 2.1 The fundamental differences between quantitative and qualitative research.

found in occupational therapy investigations. They include:

- Experimental and quasi-experimental studies
- Single-subject studies
- Field studies and naturalistic observation
- Survey studies
- Psychometric studies

Experimental and Quasi-Experimental Studies

Experimental and quasi-experimental studies fit within the quantitative research tradition. Studies using these designs seek to examine the effects of an experimental manipulation (e.g., an occupational therapy treatment approach) of some characteristic or set of characteristics of the research subject. The basic characteristic of all experimental research is that the investigator manipulates an **independent variable** (the antecedent variable that is expected to produce an effect) in order to affect a **dependent variable** (the variable in which a specific outcome or effect is observed, or not observed). Experimental and quasi-experimental designs aim to provide evidence that the independent variable is the cause of changes or differences in the dependent variable.

Experimental and quasi-experimental designs are specific blueprints for how to conduct an experiment (Campbell & Stanley, 1963). The fundamental aim of experimentation is to control, as much as possible, for extraneous influences **(confounding variables)** that could lead to an incorrect conclusion about the influence of the independent variable on the dependent variable. For example, in the study described earlier that compared the effects of an experimental splint with a control-condition splint on the past-year frequency of trigger finger in a sample of hand therapy clients, the amount of fine motor activity performed when wearing and not wearing the splint is one confounding variable that could affect the findings. It is possible that individuals performing excessive activity would experience more symptoms, irrespective of treatment condition. Similarly, it is possible that individuals performing significantly less activity with the affected hand would show different effects from the splint than those performing an average amount of activity.

In a true **experimental design,** two or more groups of participants are randomly assigned to different levels (or experimental conditions) of one or more independent variables. A **level of an independent variable** is an experimental condition that reflects the degree to which the variable is introduced to the subject.

Let's consider a study of the effects of one independent variable on one dependent variable. In this scenario, we will examine the effects of three different doses of a particular medication on spasticity. The independent variable would be represented as the medication, and the three levels (or conditions) of that variable would be represented as "high dose," "low dose," or "no dose." Accordingly, subjects would be divided into three respective groups, with the first group receiving a high dosage of the medication, the second receiving a low dosage, and the third group (control group) receiving no medication. Each condition represents a level, or dose, of the medication variable.

An important characteristic of all experimental studies and many quasi-experimental studies is the inclusion of a **control group.** A control group is

an experimental condition to which a group of subjects is assigned as a basis for comparison with the **experimental group** (or groups). Subjects in the experimental groups receive the condition of primary interest (in this example, medication). Subjects in the control group do not receive the condition of primary interest. Sometimes subjects in the control group receive a **placebo** (a substitute for the condition or treatment that is intended to have an effect, but in reality has no effect). Groups of subjects receiving a placebo condition are referred to as **placebo control groups.** When used in an appropriate context, placebo controls offer a more rigorous test of an independent variable because they rule out **expectancy effects,** or the possible psychological effects of knowing one is receiving a treatment, on actual treatment outcomes.

A simple example of an experimental study in occupational therapy is a study in which one group of clients on an inpatient neurorehabilitation unit is randomly assigned to receive therapy focusing on self-care training using serial repetition and rehearsal of the tasks. A second group does not receive any hygiene training. In this study, the dependent variable would be represented as the level of independent self-care performance. The independent variable would be the presence or absence of the self-care training (two levels). The aim of the experiment would be to attribute any differences in self-care independence (dependent variable) between the two groups to the independent variable (receipt of training).

In this example, it is important to consider a potential confounding variable: The dependent variable may have been influenced by the initial level of functioning of participants. If one group was generally better functioning than the other group at the beginning of the experiment, the difference in functioning could account for differences in self-care independence, raising questions about whether the training had any effect. We might find this difference between the two groups whether or not they received occupational therapy services.

Thus, the primary difference between an experimental study and a quasi-experimental study is that in an experimental study, subjects are randomly assigned to the different conditions to achieve equivalent groups. **Random assignment** to groups means that neither the subjects nor the researchers are allowed to choose the group to which subjects are assigned. Instead, a specific statistical or mathematical method is used to assign subjects to groups. Depending on the number of groups and on other issues involving demand for rigor, random assignment to groups may be completed using a number of different strategies, ranging from tossing a coin to sophisticated computer-generated techniques.

Quasi-experimental designs follow the same logic as experimental designs but lack the degree of rigor found in true experimental designs (Shadish, Cook, & Campbell, 2002). Both designs typically involve the experimental manipulation of an independent variable of interest in order to measure the effects on a dependent variable. In terms of rigor, however, the primary difference between experimental and quasi-experimental designs is that of randomization. In a quasi-experimental study, subjects are not randomly assigned to a condition. Instead, subjects either remain in a single group and are studied at various time points before and after the experimental manipulation **(time-series designs)** or they end up in different groups as a matter of convenience (i.e., **pretest–posttest nonequivalent group designs**) or for other practical purposes, such as the need to test two groups known to differ on the characteristic of interest even before the study begins.

Following is an example of the pretest–posttest nonequivalent group design: A researcher compares two groups of subjects to test the effects of a year-long self-management program for individuals with chronic pain combined with a new medication versus the effects of the self-management program alone. A pain self-rating scale is administered prior to and after the intervention. The researcher chooses not to blind subjects to the condition but instead provides full disclosure to subjects and allows them to select in which condition they would like to participate. As a result, subjects with higher levels of pain more often choose the self-management program with the new medication. Thus, the researcher begins the study with two groups that are not equivalent in terms of the outcome to be measured, which is pain severity.

Occupational therapy researchers sometimes undertake less rigorous quasi-experimental research because true experimental research can be difficult to undertake in real-life contexts. This is often the case in community-based research, such as the study undertaken by Professor Gary Kielhofner and his colleagues (Kielhofner, Braveman, et al., 2004) that compared the effects of a work rehabilitation program based on the Model of Human Occupation (Kielhofner, 2008) with a less intensive standard educational intervention; the researchers investigated the effects of the two programs on independent living and employment (dependent variables).

In this study, services were delivered to residents in the facilities where they lived. Random assignment was not feasible because delivering different types of services to people living in the same house was likely to create other situations that would bias the results. For example, if a person in one group shared information and resources he received from services with a roommate who was not receiving those services, it would lead to **contamination effects** (an unanticipated confound in which subjects in an experimental condition share aspects of a treatment with subjects in a control condition, influencing outcomes for subjects in the control condition). Similarly, a human subjects review board might determine that it would be unethical to administer services that are expected to be superior to one group of individuals but not to another group, particularly when both groups are living in the same household, making the potential injustice of the situation apparent to everyone involved.

Consequently, for this study, a quasi-experimental design was chosen. All residents in one setting received the same services (the work rehabilitation program based on the Model of Human Occupation) and were compared with residents of another setting who received usual services (a standardized educational intervention). This type of design opens the experiment to alternative explanations for any differences in independence or employment found other than the services received, such as group personality, types of people in each house, and house staff. However, it was the most rigorous design practicable in this context. Thus, despite their limitations, quasi-experimental designs are valuable when demands and constraints within the health-care system prevent the use of random assignment.

Single-Subject Studies

Experimental and quasi-experimental designs rely on comparisons of averages in groups. Individual variation in response to an intervention is not a focus of such studies. For that reason, practitioners sometimes find large-group experiments to have limited relevance to decision-making about what services or strategies would be best for an individual client. **Single-subject designs** follow the logic of experimentation but examine the impact of interventions on single subjects who serve as their own controls. Single-subject designs allow a researcher to measure changes in single subjects as they undergo varying treatment conditions within an actual practice setting.

Single-subject designs generally involve two major strategies that allow the subject to represent both a control and an experimental condition(s):

- Gathering baseline data over time during which the experimental condition is absent and then gathering data over time during which the experimental condition is present
- Gathering data during alternating periods in which the experimental condition is present or withdrawn

Quantitative data are gathered on the dependent variable during the different experimental and control phases, and the data are analyzed both visually and using statistics designed for single-subject experimentation.

For example, consider a researcher who wants to study the dosing effects of an antiviral medication commonly used to treat HIV/AIDS on the signs, symptoms, and viral load associated with a much less common and relatively new virus. Because of the low incidence of the novel virus, the researcher only has access to small groups and must study one subject at a time. The researcher might choose to employ a single-subject design that begins with an observational baseline period of no medication, followed by a period of high-dose medication, then by a period of low dosage, and finally by a follow-up period of no medication. This design would offer the researcher the opportunity to measure viral load, signs, and symptoms in the presence and absence of the medication at four different time points: time 1 (observational baseline), time 2 (high dosage), time 3 (low dosage), and time 4 (observational follow-up).

Because single-subject designs follow an experimental logic, they should not be confused with qualitative studies that may involve a single participant. Both types of studies are characterized by a sample of one, but their underlying logic is different. Qualitative research that includes only one study participant follows the logic of qualitative methodology. In this instance, the judgment is made that one participant is of sufficient interest or adequately characterizes the phenomena under question. Thus, additional participants are not necessary to inform the qualitative goals for the study.

Field Studies and Naturalistic Observation

Field studies and naturalistic observation are forms of research that take place in actual settings. Investigators study events as they happen and individuals in their natural context. Both qualitative and

quantitative research methods make use of this type of design.

In qualitative **field studies,** investigators seek to gain an insider's view of the phenomena under study through intensive and extended immersion. Field study is a broad term referring to data collection outside of the laboratory and in a naturalistic setting. Investigators typically collect data in multiple ways (e.g., gathering documents and artifacts; informal interviewing and observation) over an extended period of time. Researchers also use their growing appreciation of the phenomena under study to continuously evolve the types of data collected, the methods for acquiring data, and who is sought out as a source of data.

Naturalistic observation refers to quantitative research that takes place in natural settings. Such research aims to study the phenomena "undisturbed" by laboratory conditions or experimental procedures. For example, naturalistic observation can be used to study specific behaviors as they occur in classrooms, hospitals, or nursing homes. In naturalistic observation studies, the observer seeks to make "unbiased" observations of how events or behaviors actually take place. The investigator does not participate in the events under study but rather seeks to be as unobtrusive as possible. Data are typically collected using a coding procedure determined prior to beginning the research, which enables the behavioral observations to be recorded in a manner that can be enumerated. Naturalistic observations generally seek to determine the kinds of behaviors that occur, their frequency, the conditions under which they occur, and so forth. Investigators may use a time-sampling approach in which observations are recorded at specific time intervals that are chosen randomly or according to some logical schema. For example, in a naturalistic observation of aggressive behavior among adolescents living in a group home to treat conduct disorder, a researcher might choose to record observations of aggression during times when the aides have reported that the aggressive behavior is most likely to occur: during group sports games, during mealtimes, and before bedtime.

Survey Studies

Survey studies investigate unknown characteristics in a defined population according to a nonexperimental design. They are often conducted with large samples (i.e., hundreds or thousands of subjects). Survey studies are used to investigate such things as conditions or needs within a defined community or the extent of disease or disability in a population. Generally, survey research aims to randomly select the sample so the findings can be generalized to the population from which the sample was chosen.

Survey research is implemented either through the use of mailed questionnaires or electronic technologies such as the Internet. For example, surveys can be conducted through web-based survey sites to which selected subjects are directed using an e-mail or other type of invitation to participate. Questionnaires are usually designed to gather quantitative data, although open-ended questions may be asked to elicit qualitative responses that are used to supplement quantitative findings.

Other survey research methods include telephone and face-to-face interviews. When surveys follow the logic of quantitative research, the investigator uses a structured interview protocol so that all the participants respond to the same standardized questions. In qualitative surveys, the investigator is more likely to use an interview guide that allows participants to influence the direction of the interview but also emphasizes strategies for probing in order to elicit the respondents' perspectives.

Psychometric Studies

Psychometric studies are specifically designed to investigate the properties of clinical assessment tools or data collection instruments that are intended for use in research. Psychometric research is largely quantitative, although qualitative methods are sometimes used to determine the type of content that should go into an assessment before it is developed as well as to examine its clinical utility. Strictly speaking, this type of research is aimed at determining the validity and reliability of these instruments. Following quantitative logic, instruments with known validity and reliability provide objective measurement of the variables under study.

Validity refers to whether an instrument measures what it is intended to measure. Because instruments are designed to operationalize an underlying concept or construct, this aspect is often referred to as **construct validity.** For example, construct validity would define the likelihood that an assessment that was intended to measure empathy in parents of children with disabilities accurately estimated all of the parental values, communications, and behaviors associated with empathy. There are many methods of determining validity, including concurrent validity and predictive validity.

Concurrent validity follows the logic that an instrument designed to capture a variable should show an association with another variable that is theoretically expected to be related to it. Returning to the example of the assessment of empathy in parents of children with disabilities, concurrent validity would be estimated if the researcher elected to compare the strength of the relationship between scores on this measure with scores on another general measure of empathy among adults within the general population.

Predictive validity asks whether a measure of some characteristic (e.g., ability to perform activities of daily living) is able to predict some future outcome, such as whether a person is able to perform those activities with or without assistance. Thus, studies designed to test expected associations, or predictions, provide evidence on behalf of the validity of an assessment tool or data collection instrument.

Reliability refers to whether a given instrument provides stable information across different circumstances. Thus, studies designed to test reliability might examine whether a given instrument is reliable, for instance, when multiple raters use the instrument to gather data and when data are gathered on more than one occasion (referred to as **interrater reliability** and **test–retest reliability,** respectively).

There are a number of examples of psychometric research in occupational therapy. Some of these include but are not limited to the development of observation-based performance measures such as the Assessment of Motor and Process Skills (Assessment of Motor and Process Skills, 2012; Fisher, 1997) and interview-based tools such as the Canadian Occupational Performance Measure (COPM; Carswell et al., 2004) and the Occupational Performance History Interview II (Kielhofner, Mallinson, et al., 2004).

Research Purposes

Research can be differentiated according to its underlying purpose. There are three underlying purposes of research: (1) basic, (2) applied, and (3) transformative. Within the field of occupational therapy, each purpose reflects a different viewpoint regarding how information generated from research informs practice and advances the science of our field.

Basic Research

Basic research, sometimes referred to as basic science, includes investigations that are undertaken, primarily in a laboratory or other controlled setting, for the purposes of understanding some phenomena or testing a model or theory that explains some phenomena. For example, a basic research study may aim to test a hypothesis about a specific genetic polymorphism associated with a neurological disease. Alternatively, a basic research study may aim to test the mechanism of action that allows a medication commonly used for depression to also be helpful in alleviating chronic pain. Basic research is undertaken for the sake of generating new knowledge without direct concern for its applicability or practical significance. The full range of research methods and designs previously described may be used in basic research. However, basic research traditionally emphasized the importance of value-free science that was disinterested in questions of application in order to avoid undue bias. It was thought that basic science would inform practice by identifying the underlying laws that governed phenomena thus providing the logic for professions that applied that knowledge (Schon, 1983). This approach has been criticized by some scholars who argue that basic science knowledge does not translate readily into practice (Peloquin, 2002).

Occupational Science. Prior to the late 1980s, occupational therapy relied on basic research conducted by other disciplines to inform much of its practice. For instance, research studies that identified the anatomy of the musculoskeletal system and the physiology of nerve conduction are two examples of information generated from basic research in the fields of anatomy and physiology that form part of the foundation of occupational therapy knowledge.

Many occupational therapists now support the development of the field's own basic science that is concerned with the study of occupation, referred to as **occupational science.** Its proposed purpose is to generate explanations of humans in everyday life circumstances behaving within occupational contexts (Yerxa et al., 1989). Like other basic research, the role of occupational science is envisioned as describing, explaining, and predicting events as part of the search for knowledge and truth (Primeau, Clark, & Pierce, 1989).

Today, occupational science has grown into an academic discipline in itself, with a growing number of master's and doctoral degree programs around the world that reflect this unique perspective. Additionally, an academic journal, the *Journal of Occupational Science,* has been developed to publish research that focuses on the form, function, performance, and meaning of human occupations,

or everyday activities in which people engage. The overarching goal of occupational science is to explicate the complexity of everyday occupations (Clark et al., 1991; Wilcock, 1991). Additionally, occupational science emphasizes the understanding of people as occupational beings who have the capability and need to participate in activities that shape their humanity (Yerxa et al., 1989). Moreover, the linkage of occupation and health serves as a central emphasis in occupational science because occupational scientists believe that occupations serve to enable or disable health and health serves to enable or disable people's participation in occupation (Wilcock, 1993; Yerxa, 1998). Another foundational concept behind occupational science is the understanding that occupations occur within cultural, spiritual, social, environmental (physical and natural), and economic contexts (Yerxa et al., 1989).

Hocking and Wright-St. Clair (2011) conceptualize occupational science in terms of its two major components: occupation and science. According to the occupational science perspective (Hocking & Wright-St. Clair, 2011) occupations are defined as the everyday activities in which people engage. Numerous scholars have reflected on how these occupations are enacted. From this perspective, occupation may be compartmentalized in terms of patterns, routines, and roles (Christiansen, 1991; Yerxa, 1998) and as having personal significance or symbolism (McGlaughlin Grey, 1997). Additionally, occupation has been viewed as promoting development and self-efficacy (Yerxa et al., 1989; Yerxa, 1998). Occupational scientists refer to science as the intention to develop new knowledge through quantitative and qualitative studies demonstrating adequate methodological rigor (Hocking & Wright-St. Clair, 2011).

Mosey (1992b, 1993) questioned the legitimacy of basic science in occupational therapy on the grounds that the allocation of human and other resources to basic inquiry would detract from badly needed applied inquiry. Its proponents, nevertheless, argue that occupational science will likely influence how occupational therapists perceive and approach their work (Zemke & Clark, 1996).

Basic research may vary in how closely it relates to practical problems and practice issues on which applied research focuses. Hocking and Wright-St. Clair (2011) summarized the relevance of occupational science to occupational therapy with a cluster of studies, including an international study of the meaning of preparing food for a special holiday among older women. The researchers asked fundamental questions about the occupations in which the women engaged in order to prepare the holiday meal. For example, the researchers asked the women when they began to prepare the meal, how they organized meal preparation, who else was involved, what each person did, how everyone knew what to do, and where the preparation took place. Hocking and Wright-St. Clair found that the older women drew upon local traditions, historical knowledge, and values passed down from honored people to inform their meal preparation, while at the same time accommodating the preferences of those being served.

The linkage to occupational therapy practice was made by Thibeault (2002), who then used the concept to unite and organize women ravaged by war and internal conflict in Sierra Leone to restore civility, trust, and organization within their community. The activity of meal preparation, with all of its associated traditions and personal, historical meanings, served as a cornerstone for future projects aimed to bring perpetrators and victims within the same community or families together, to rebuild their sense of community.

Applied Research

Investigations that seek to solve a practical problem or generate information specifically to inform practice are referred to as **applied research.** Many important research problems or questions generated in the health and human service environments are applied in nature. Applied research generally seeks to investigate the merits of practice strategies, such as assessments and interventions. In occupational therapy, applied research addresses issues such as:

- Whether an assessment used in practice provides dependable and useful information to guide practice
- How therapists reason in the context of practice
- What outcomes are achieved by providing particular services as part of therapy

Applied research is often viewed as particularly important for achieving external credibility (i.e., influencing the individuals who make policy and economic decisions that affect the delivery of occupational therapy services). Indeed, Mosey (1992a) argued that this type of research is critical to occupational therapy because it provides information about the value of what the profession does. However, practitioners have critiqued applied research for testing practice strategies under ideal conditions that cannot be reproduced in practice (Dubouloz, Egan, Vallerand, & Von Zweck, 1999;

Dysart & Tomlin, 2002). Applied research in occupational therapy ranges from psychometric studies to qualitative investigations of the therapy process to controlled experiments that compare different therapeutic approaches.

Transformative Research

Transformative research is a broad classification for inquiry that is designed to bring about change in a practical situation or a specific context. Its emphasis is on transforming social realities so that people's lives are improved. Transformative research aims to foster self-reflection, mutual learning, participation, and empowerment (Letts, 2003; Reason, 1994; Wadsworth & Epstein, 1998). Hence, this type of research has been used to enable groups of people who are in some way marginalized, deprived, or oppressed to bring about change in their lives and communities (Rice & Ezzy, 1999).

Examples of transformative research are growing in occupational therapy (Hocking & Wright-St. Clair, 2011). The efforts initiated by Thibeault (2002) to use a group meal preparation to initiate a series of projects that would eventually transform mistrust and animosity between perpetrators and victims of violence in Sierra Leone serves as one example. The most common form of research with a transformative purpose in health care and in occupational therapy is participatory research. Participatory research is an approach that involves the participants as co-creators and co-investigators who shape the research questions, methods, and outcomes while at the same time transforming themselves and others within their immediate contexts in significant and enduring ways. Some common features of participatory types of research are that it:

- Is always grounded in a practical context
- Involves people not simply as data sources but as partners in the research process
- Emphasizes power sharing between the researchers and local stakeholders (e.g., therapists and clients)
- Is action-oriented, focusing on making changes in the practice setting and on examining the impact of that change from the perspectives of those who are most influenced by it

Participatory approaches and other forms of transformative research are newer than either basic or applied research. Transformative research calls for embedding the research process in the practice setting and giving stakeholders a voice in shaping the research process. It aims to alter and empirically examine services while empowering the stakeholders and embedding change processes within the context to which they are relevant. In this way, it attempts to combine research, education, and action; in other words, it links theory (knowing) with practice (doing) (Rice & Ezzy, 1999).

On the face of it, transformative research has special relevance to practitioners and clients in fields such as occupational therapy because it is much more directly driven by their agendas and is aimed at having a positive impact on their circumstances (Crist & Kielhofner, 2005). Proponents argue that research grounded in and directly helping to evaluate practice in natural contexts should be given high priority in the field.

Summary

Research is a complex and multifaceted endeavor. Because there are so many approaches, it would be unrealistic to easily or quickly develop expertise across all areas. However, knowing the basic classifications and purposes of research offers a good beginning. This chapter provides an overview of how research is defined and classified. It delineates the major differences between quantitative and qualitative traditions and describes some of the most commonly used research designs in occupational therapy that lie within these traditions. These include experimental and quasi-experimental studies, single-subject studies, field studies and naturalistic observation, survey studies, and psychometric studies. The chapter also summarizes the purposes and relevance of basic, applied, and transformative research to occupational therapy. This includes coverage of the historical and contemporary foundations of occupational science as the field's most celebrated approach to basic science. Future chapters will provide greater detail on the various quantitative and qualitative approaches to research discussed in this chapter.

Review Questions

1. Define the three central purposes of research in occupational therapy according to research classifications.
2. Provide an example of a study that uses an experimental design, and justify why the study would be realistic/feasible to conduct.
3. Describe a circumstance under which using a single-subject design would be appropriate to answer an occupational therapy research question.
4. Provide an example of a naturalistic study and describe one benefit of the approach.

5. What is a central characteristic of transformative research? How is transformation achieved?
6. Explain the unique contributions of occupational science to the broader field of occupational therapy.

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CHAPTER 3

Philosophical Foundations of Research

Renée R. Taylor • Gary Kielhofner

Learning Outcomes

- Identify the four time periods that formed the philosophical foundations for the understanding of science, including the unique contributions of each.
- Describe linkages between contemporary research traditions and their philosophical foundations.
- Analyze one's own preferences toward knowledge generation and how they influence the choice of a research approach.

Introduction

Although the philosophical foundations of studies are rarely described in research publications, they inevitably have had an influence on their design and execution. Such differences in the conduct of research are not simply incidental to the methods used; they reflect fundamentally different ideological stances on reality, objectivity, and human knowing. Individuals who participate in research and/or consume research should appreciate the philosophic underpinnings that shape the fundamental attitudes and beliefs of the researchers. In the end, these may be as important and consequential as the researchers' adherence to accepted methods and protocols (Kaplan, 1964). This chapter introduces the major historical traditions of thought that form the philosophical foundations of research, describes how these philosophical approaches link to contemporary research traditions, and helps guide individuals to identify their own preferences toward knowledge generation and the impact of those preferences on a research approach.

Philosophical Foundations for Understanding Science

An examination of the philosophical foundations of research begins by examining four periods marking the philosophy of science:

- Classicism
- Modernism
- Critical modernism
- Postmodernism

Each of these periods offers a different understanding of the aims and consequences of conducting inquiry. Note that this is not a comprehensive discussion of the philosophy of science. Rather, the following sections describe key concepts and highlight the different perspectives for understanding knowledge and the process of knowing that are likely to be implied in the range of research found in occupational therapy. Table 3.1 outlines these

CASE EXAMPLE

As a postdoctoral fellow working for a well-known occupational therapy researcher, Radhika is fortunate to receive a scholarship to study abroad. The first part of the scholarship involves interning for a 1-month period with each of the research faculty at the host university. During her internship, Radhika has the opportunity to study with researchers who are conducting inquiry according to a wide range of approaches. Each of these approaches reflects a distinct philosophical orientation toward the application of science. For her final assignment, Radhika is required to link each researcher's study designs and methods to an underlying philosophical orientation. Then, she is required to disclose her own preference toward a philosophical orientation and corresponding research tradition and to state the strengths and limitations of her choice.

Table 3.1 A Continuum of Ideas in the Philosophy of Science

	Classicism	Modernism	Critical Modernism	Postmodernism
The Nature of Theory	Theory is built on first principles that are self-evident (i.e., revealed by the world).	Theory is a logical system that explains and can predict events in the world.	Theory is a product of creative imagination that enables scientists to appreciate the world in a particular way.	Theory is a meta-narrative that falsely claims privileged status over other possible narratives.
The Role of Empiricism	Theory can be proved by deducing empirically demonstrable statements.	Theory can be disproved through empirical tests of logically derived hypotheses.	Theory can only be improved by empirical testing.	Empirical testing proves nothing; it only reinforces claims to power/legitimacy.
View of Scientific Knowledge	Scientific knowledge represents truth.	Scientific knowledge is tentative but can be made increasingly true over time.	Scientific knowledge is one possible version of the world, which must be critically judged for its consequences.	All knowledge, including scientific knowledge, is socially constructed and relative.

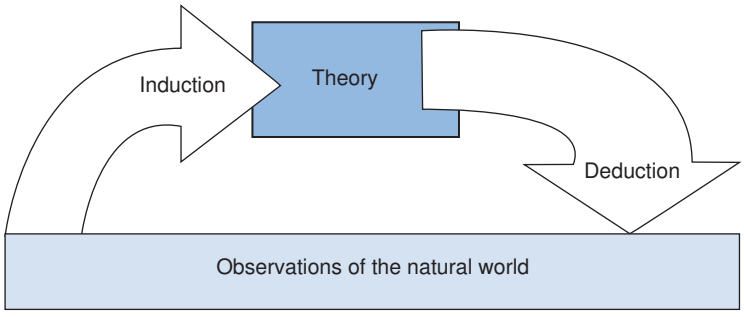

Figure 3.1 Aristotle's inductive–deductive method. *(From* Research in Occupational Therapy: Methods of Inquiry for Enhancing Practice, *by Gary Kielhofner, 2006, Philadelphia, PA: F.A. Davis Company, p. 11.)*

four periods in the philosophy of science and their major arguments concerning theory, empiricism, and scientific knowledge. It represents not only the evolution of ideas about research, but also a continuum of perspectives—some of which are embraced, either implicitly or explicitly, by researchers today.

Classicism: The Origins of the Scientific Method

Aristotle and other early philosophers of science were fundamentally concerned with separating scientific knowing from the fallibility of ordinary knowing. The truthfulness of any knowledge, they believed, depended on logic. The supporters of **classicism** reasoned that if pure logic was used to connect the natural world to scientific knowledge, the latter could be demonstrated to be true. Thus, they critically examined how logic was used in both the **inductive** (i.e., generating explanations and theory from specific observations of the natural world) and **deductive** (i.e., deriving predictions from existing theory to see if those predictions hold in the natural world) phases of research (Fig. 3.1).

For Aristotle and many philosophers who followed, the deductive stage readily conformed to rigorous logic; that is, the specific statements that were tested through research could be deduced from the larger theory following strict logical principles. However, the inductive phase was problematic because it involved an intuitive leap. In arriving at explanations, a scholar had to invent "first principles," which were the foundation of the

explanation that any theory provided. These first principles could only be assumed to be true because they couldn't be proved. Aristotle argued that they were self-evident.

In the late 15th and early 16th centuries, Galileo criticized Aristotle's self-evident first principles as being too metaphysical and therefore unscientific. Galileo sought, instead, to ground scientific explanations in the "obvious truth" of mathematical descriptions that perfectly fit the natural world (Klee, 1997; Losee, 2001). Nonetheless, like Aristotle, Galileo was ultimately confronted with the fact that the process of induction involved intuition. He made extensive use of imagining phenomena that he could not observe (e.g., free fall in a vacuum) to arrive at explanations. In the end, this imaginative process also required him to use certain unavoidable nonmathematical assumptions to construct his explanations. Thus, a complete logical connection between the natural world and theory was still not achieved for the inductive process.

Descartes, a contemporary of Galileo, was not convinced that mathematical correspondence was sufficient to constitute the truth of theoretical first principles. He sought to resolve the problem by doubting all potential first principles in search of those that were beyond doubt (Watson, 2002). His search for principles beyond all doubt resulted in the famous dictum "*Cogito, ergo sum*" ("I think, therefore I am"). Like Aristotle and Galileo, Descartes also was unable to avoid the fact that he made intuitive leaps in his inductive reasoning. He referred to these intuitive leaps as using analogies (e.g., inferring that planetary movement had to be circular based on observations of other naturally occurring phenomena such as whirlpools). Although he sought to defend the logic of analogical thinking, like those before him, Descartes was unable to reduce induction to pure logic. It remained a creative act that went beyond logical thought.

In the end, philosophers of science were unable to avoid the conclusion that induction involved more than pure logic. Even today it is understood that induction is an intuitive and creative process. Moreover, they were also unable to resolve the problem that the first principles that were generated through induction could not be proven. Early philosophers attempted to justify the first principles that resulted from induction on the grounds of self-evidence, mathematical correspondence, and truth beyond doubt. No matter how well argued these justifications, the bottom line was that they each demanded some type of belief that went beyond logic. The fact that intuition and faith remained unavoidable parts of induction eventually led philosophers to search for truth in the deductive phase.

Modernism: From Absolute Truth to Positivistic Science

A critical turning point in the philosophy of science was ushered in by Newton and his contemporaries in the 17th century (Cohen, 1978; Klee, 1997; Losee, 2001). The early researchers who supported the ideas of **modernism** replaced the concern for absolute truth with concern for how to correct errors in knowledge. They envisioned science as a process of testing and verification of the theory created through inductive reasoning. Newton accepted the idea of intuition and creativity in generating theory as a necessary process because he made extensive use of such thinking in his own theorizing. Thus, to establish confidence in his theories, Newton focused on the deductive phase.

To specify how error could be identified in theory through testing, he outlined an axiomatic method (Cohen & Smith, 2002) involving three steps:

1. Identifying within the theory those first principles that could not be deduced from any others that were, therefore, ultimately not provable. These first principles were labeled *axioms,* and the other theoretical principles that could be deduced from the first principles were labeled *theorems*.
2. Specifying how the theorems were correlated with the empirical world so that they could be systematically tested.
3. Testing the theorems through observation of the natural world.

Although this approach admitted that the first principles could not be proved, the principles had to yield theorems that did not contradict the natural world. Hence, first principles that yielded incorrect theorems would ultimately be understood to be false and therefore could be eliminated (Cohen, 1978).

Logical Positivism

This approach to research meant that theories had to be contingent and subject to revision because the evidence generated in research required it. Thus, the approach of Newton and his contemporaries did not seek to claim that their theories were true. Rather, they asserted that any theory was a possible, but not necessarily infallible, explanation. A theory's plausibility depended on whether

statements that could be logically deduced from it held up in the natural world. If observations of the natural world did not bear out what was logically deduced from a theory (i.e., were disproved), then the theory would ultimately be rejected. Within this framework, although truth was not immediately at hand, scientists could make progress toward it. Research could systematically identify what was false through empirical testing. What survived the test of time and evidence would be increasingly closer to the truth.

This view that research allowed theory to progress toward truth came to be known as **logical positivism.** Subsequent philosophers of science in the logical positivist tradition focused on improving the logical rigor of methods through which researchers induced theory from observation and then went about testing the fit of theoretical explanations with the empirical world.

Logical positivism contained an important idea of progress that is also a cornerstone of modernism. Born out of 18th-century Enlightenment, modernism included not only faith in science as a method, but also a belief that true human progress would result from science. That is, science was expected to continually improve the human condition as knowledge accumulated and was used for the betterment of society and its institutions. Thus, modernism optimistically sought "universal human emancipation through mobilization of the powers of technology, science, and reason" (Harvey, 1990, p. 41).

The Critique of Positivism

Logical positivism underscored the importance of deriving hypotheses logically from theory so that they could be tested by research and, when incorrect, shown to be false. However, a major problem with this approach was whether a hypothesis, much less a theory, could actually be demonstrated to be false. The whole foundation of logical positivism was based on the falsifiability of hypotheses, which allowed research to correct theories.

The popular notion was that a crucial experiment could be designed for each hypothesis that would, once and for all, determine whether it was false. However, the idea of the crucial experiment came to be strongly criticized. For instance, Grunbaum (1971) argued that no hypothesis derived from a theory could be sufficiently isolated from the theory so as to provide an absolute test of the theory. This was, in part, because the meaning of any hypothesis was not contained solely in the statement of that hypothesis but also in the entire matrix of concepts from which the hypothesis was deduced. This means that the understanding of the hypothesis, including what evidence could constitute its falsity, also depends on the theory from which it is derived.

Therefore, evidence that contradicts a particular hypothesis can easily be explained away. A convenient shift in the sense of the hypothesis will suffice to protect the theory from which the hypothesis was derived. Grunbaum's argument led to the conclusion that there could be no logic of proof or disproof external to any theory. Rather, any proposed test of a theory depends on the theory for its sensibility. For instance, Hesse (1970) pointed out that all observational terms contained in hypotheses are theory-dependent. That is, their meaning cannot stand apart from the theory. Therefore, any attempt to capture the empirical world in the language of a hypothesis irrevocably commits the researcher to the theory that makes sense of the hypothesis in the first place.

These were not small problems for logical positivism. If the very observational terms necessary to generate evidence about a theory are themselves reliant on the theory for their meaning, then:

- A theory can never truly be shown to be false.
- Evidence cannot be used to show that one theory is better than another (Hesse, 1970; Scriven, 1970).

These two conclusions basically undermine the whole idea of a progressive, self-correcting science that incrementally eliminates error and thereby moves toward truth. Instead, these arguments point out that a theory, at best, represents one possible explanation of the events it addresses (Hesse, 1970; Scriven, 1970).

Critical Modernism: Rethinking the Role of Empiricism

Criticisms of logical positivism ushered in an important new direction in the understanding of science. This perspective has been labeled **critical modernism** (Midgley, 2003). As noted, an earlier shift had redirected the ideal of science as achieving necessary truth toward a conception of science as progressing toward truth through self-correcting empiricism. Despite their differences, both of these views ultimately sought to identify logical principles and procedures that would emancipate science from the fallibility of ordinary human thinking and knowing.

However, the more philosophers attempted to isolate the logic of science from other psychological processes (e.g., intuition and creativity), the more apparent it became that this was not possible.

The logical principles that were once considered to specify the very nature of science came to be understood as only one property of science. Although logic is necessary, it is not sufficient for doing research. Within this new framework, the role of intuition in induction, the nonprobability of first principles, and the embeddedness of observations within their theoretical contexts were considered anew.

Philosophers of science came to see the incorrigibility of the first principles upon which all theories must be based not as a fundamental problem, but as an important clue about the nature of science. That is, if the most abstract components of a theory cannot be shown to be grounded in the empirical world, it is because theory imparts meaning to, rather than extracts meaning from, the natural world. Theory is a creation of the human mind that makes sense of the world. The creative process by which researchers originate ideas to make sense of their observations of the natural world is as much a part of the research process as the logic by which researchers link the theoretical with the observed (Bronowski, 1978).

These critics of logical positivism identified flaws in its assertion that research would advance theory toward truth. Moreover, they were able to give creative and meaning-making processes a place in the research process. Along with other critics of positivism, Kuhn (1977) argued that when investigators collect data, they do not directly test their theories. Kuhn argued that this was the case because "the scientist must premise current theory as the rules of his game" (p. 270). He further noted that all theories "can be modified by a variety of ad hoc adjustments without ceasing to be, in their main lines, the same theories" (Kuhn, 1977, p. 281). So, instead of testing theory, evidence generated in research allows the theory to be adjusted to better fit whatever phenomena it is designed to explain.

Kuhn's insights point out that research does not prove or disprove the theory. However, it does improve the theory. Research serves as the basis for generating theories and, thereafter, can be used to enhance the fit of that theory to the natural world. As noted earlier, theory serves as a way to impart meaning to observations made in research. Once in place, theory becomes a schema for guiding the systematic observation of the world. Finally, because theory explains the world in a particular way, it leads to investigations that refine that explanation. All of these processes result in the accumulation of knowledge. Studies thus add to the stockpile of information related to any theoretical system.

Over time, the knowledge accumulated through research does appear somewhat like the progression of knowledge envisioned by the logical positivists—with one important difference. Instead of progressing toward truth, critical modernism argues that theories progress by becoming better at the particular way they make sense of the world.

Postmodernism

Postmodernism represents the most recent set of ideas in the philosophy of science. It is not a coherent single argument, but rather a set of loosely related themes. Postmodernists are particularly critical of the logical positivist perspective in more extreme ways than the critical modernists (Harvey, 1990). The critique of modernism discussed earlier pointed out that it is impossible to disentangle the language of a hypothesis from the theoretical system in which it is embedded. The philosopher Wittgenstein (1953) went even further, asserting that language constructs reality. His argument leads to the conclusion that because language determines what humans perceive, science cannot escape its own linguistic blinders. In other words, the very language of science determines what the scientist can come to know.

Wittgenstein is generally attributed with beginning what has come to be known as **social constructivism,** a viewpoint that pervades postmodern thought. It asserts, in essence, that all knowledge, including scientific knowledge, is socially constructed and, therefore, relative. According to postmodernism, scientific knowledge is no more privileged than any other source of knowledge. It is the particular perspective of a particular group of people who have a particular purpose in mind.

Lyotard's (1979) critique of the state of scientific knowledge directly assaults the positivist approach of modernism. He argues that science is a form of meta-narrative. According to Lyotard, the scientific meta-narrative claims that science is a project of human enlightenment based on logic and empiricism, which promises to create a unified understanding of the word, work for the good of all, and improve the human condition. Lyotard and other postmodernists point out the many failures of science in this regard (e.g., contributions of science to the atrocities of modern warfare and ecological problems; the failure of modern science to address the needs of oppressed groups, women, ethnic minorities, and members of third-world countries).

Lyotard further argues that scientific disciplines are like games, with their own rules, boundaries,

and permissible moves. Importantly, what is permissible in the game is determined by the power structure of any particular branch of science. Foucault (1970), in particular, emphasizes this relation between power and knowledge, arguing that the production of knowledge is closely tied to social control and domination. His work provides a basis for many postmodern critiques of how science serves to perpetuate oppression.

As a result of Lyotard's and Foucault's work, postmodernists are particularly critical of any broad theories, which they see as forms of meta-narrative. They argue that these meta-narratives privilege certain groups and certain perspectives, while they have no more validity than any other "story" that might be narrated. Postmodernists emphasize the right of groups to have their own voice and speak for their own reality (Harvey, 1990). For this reason, postmodern thinking has been used by scholars whose work has championed disenfranchised groups (e.g., women's studies and disability studies).

In the end, most postmodernists paint a negative view of science. They not only discount the methodological claims made by the logical positivists, but also call into question the value of much of the information science has created. The ultimate conclusion of postmodernism is that "there can be no universals, that absolute truth is an illusion" (Midgley, 2003, p. 48). Moreover, postmodernists have critiqued science as being ideologically biased, tied to power structures, and ultimately contributing to oppression by replacing local knowledge with falsely claimed universal knowledge. Consequently, postmodernists seek to "promote variety, undermine certainty, and promote local, critical thought" (Midgley, 2003, p. 55).

As with all of the philosophical foundations covered in this chapter, a number of severe critiques of postmodernism exist (Harvey, 1990; Midgley, 2003). Some of these are directed at apparent self-contradictory arguments within postmodernism. For example, the most frequently cited contradiction within postmodernism is that, while it disparages grand theories (meta-narratives), it proposes a grand theory that is supposed to supersede all previous theories. Or conversely, if one accepts the proposition that no universal claims about knowledge are true, then one has to reject the postmodernist claim that all knowledge is socially constructed. Postmodernists typically admit that there are ironic and self-contradictory elements of the postmodern argument, but they dismiss criticisms of this aspect of postmodernism as a misplaced concern for logic and coherence. The most salient criticism of postmodernism, however, is that although it has successfully pointed out some of the limitations and failures of modernism, it has not offered any alternative (Midgley, 2003). In fact, extreme postmodernists argue that any attempt at creating universal knowledge is essentially pointless.

Application of Philosophical Foundations to Contemporary Research

This section reviews the major historical traditions of thought that comprise the philosophical foundations of contemporary science today. When applying the philosophical foundations of science to the practical situation of occupational therapy research, it is important to approach these foundational ideas with a sense of perspective. Few individuals today would embrace the classic idea that science produces truth. However, with the exception of extreme postmodernists, most would agree that science produces potentially useful knowledge.

Contemporary science has evolved in such a way that the research conducted by most scientists derives from one of the three later traditions of logical positivism, critical modernism, or postmodernism. Or, in the case of mixed-methods approaches, research is derived from a blend of these traditions. For example, most quantitative research employs logical methods developed in the logical positivist tradition. Many qualitative researchers embrace ideas represented in critical modernism and postmodernism. In some way, every study draws upon the kinds of ideas that originated in the philosophical foundations of science.

What lessons can researchers and practitioners who use research take from the continuum of philosophical perspectives described in this chapter? First, it is important to recognize that one's preferences in adhering to one research approach over another automatically reflect a particular **philosophical orientation,** or inclination toward approaching knowledge and knowledge development. Knowing one's philosophical orientation is important in terms of shaping one's path of study and eventual independence as a researcher. The following section describes the three most relevant orientations (logical positivism, critical modernism, and postmodernism) as they apply to selecting and applying various research approaches in everyday practice.

Logical Positivism and Quantitative Research

Quantitative approaches are consistent with the tradition of logical positivism. In practical terms, logical positivism supports a process of scientific inquiry that involves testing hypotheses that are rooted in theory. This process is undertaken by following a logical and rigorous methodology. There is an objective reality (represented by a study outcome) that can be replicated using a specific methodological approach. Thus, if one researcher adheres closely enough to the methodology outlined by a second researcher, she or he should be able to replicate the original findings—assuming the second researcher follows the same procedures as the original researcher and uses the same assessments and data collection approaches to collect data from a sample with similar characteristics from the same overall population of clients. Experimental and quasi-experimental approaches fall into this general category, as do other quantitative approaches discussed in this text.

Critical Modernism and Qualitative Research

Representing the view of critical modernists, Kuhn (1977) ultimately concluded that scientific efforts should be judged on their utility—that is, "the concrete technical results of [what is] achievable by those who practice within each theory" (p. 339). Kuhn's comments suggest that scientific efforts in occupational therapy should be judged on their ability to help therapists effectively solve the kinds of problems their clients face. Within the general domain of critical modernism, it is understood that theories can be created and developed as much as they can be confirmed.

This perspective is endorsed by qualitative research. Theories evolve by providing increasingly accurate estimates of the subjective world, and these perspectives are based upon observations of people interacting in natural contexts, as well as the perceptions and experiences of those who participate and live in the world (i.e., clients). In this way, critical modernism supports the most commonly utilized approaches to qualitative research and naturalistic inquiry in occupational therapy today.

For example, ideas from critical modernism are consistent with phenomenology, which emphasizes how people experience and make sense of their immediate worlds. These ideas are also consistent with ethnography, which emphasizes the societal and cultural context that shapes meaning and behavior. Moreover, there is consistency with narrative inquiry, which seeks to understand how people construct storied accounts of their and others' lives and of shared events (Rice & Ezzy, 1999).

Postmodernism and Research Perspectives

Postmodernism is generally not useful as a philosophical premise for doing research, although it can be useful as a critical stance from which to judge scientific efforts. In particular, it is useful in calling attention to how science can be shaped by ideology, power, and interest.

One of the most relevant examples for occupational therapy is disabilities studies, which use the postmodern social constructivist argument as a basis for critiquing much existing research on disability. As Rioux (1997) points out, the various research efforts to classify, count, and study relationships among variables associated with disability appear to be objective and scientific. However, this science is informed by an ideology about the nature of disability that focuses on disability as an individual deviation from norms. Importantly, the understanding of disability that has resulted from this approach is at variance with how people with disabilities experience their situation. Thus, the dominant modern understanding of disability is a social construction, not a fact. Scholars in disability studies have called for the voices of disabled persons to be added to the scientific discourse about disability in order to correct this prevailing misunderstanding of disability (Scotch, 2001).

A second important point to be taken from postmodernism is the need to contextualize knowledge in the circumstances of its production—that is, to place any claims to knowledge in the context within which the knowledge was generated. A number of investigators, especially those involved in qualitative research, carefully document their research efforts in the context of their personal and other relevant histories, because most qualitative research approaches rely upon the investigator's interpretation as a major analytic tool. By doing so, the investigator gives the reader an additional perspective from which to understand and judge the research findings.

Basic Foundations for Moving Forward

Although the ideas about the nature of research in the philosophy of science have changed

dramatically over the centuries, each era has offered certain principles, ideas, and understandings that are useful to keep in mind regarding research. Irrespective of one's preferred approach to research, the following general insights and guidelines can aid researchers and consumers of research in understanding the foundations upon which contemporary science is built.

Insights Regarding Theory

Contemporary approaches to science understand theory in terms of shared knowledge rather than fact. Correspondingly, the following points apply:

- Theories are human creations that seek to impart meaning to the world.
- First principles, or underlying assumptions, are unavoidable and untestable parts of any theory.
- Theories always represent one way of explaining or making sense of things.
- Although theories cannot be disproved, their ability to explain the natural world can be improved through research.
- The ultimate worth of any theory is its ability to generate solutions to practical problems.
- It is not possible to undertake research, no matter how open-ended and free of presuppositions, without some underlying theory and first principles, even if they are not made explicit. Thus, whether a researcher is using only a handful of loosely connected assumptions and concepts or a complex theory, some conceptual context is necessary to any research.

Insights Regarding the Research Process

Irrespective of the tradition of inquiry, modern research requires clear articulation of the role of theory in the scientific approach and specification of the methods by which one plans to conduct inquiry. In turn, one should attend to the following points:

- Research is part of an inductive–deductive process in which theory is derived from and tied back to the world through empiricism.
- Logic is necessary to connect the concepts and propositions that make up a theory with each other and to connect them with the things in the world to which they refer.
- All research is embedded in theory (whether or not it is made explicit). The theory is what makes sense of the phenomena examined, the scientific problems addressed, and the way those problems are solved.
- Research does not advance theory toward truth; instead, it improves the way that any theory makes sense of the world.

Insights Regarding Researchers

Researchers must know their own philosophical orientations and biases in order to conduct sound research. This is recognized by the following observations:

- Researchers always impart meaning to what they have observed by creating theories.
- Investigators bring to bear all their characteristics (including personal history, training, theoretical understandings, and assumptions) on the research process.
- Researchers are part of a social community that shares a perspective that makes sense of what is studied as well as related norms and rules that set out what should be studied and how.

Insights Regarding the Impact of Research

It is important to accurately represent the meaning, impact, and limits of research findings, as outlined by the following:

- Research is not inherently value-free or benign.
- Research can be tied to particular ideologies and used to reinforce power structures and to disenfranchise or oppress groups.
- Research can be used for positive ends. By advancing understanding or a prediction of certain phenomena, it can inform practical action.

Summary

This chapter provides an introduction to the major historical traditions of thought that form the philosophical foundations of research: classicism, modernism, critical modernism, and postmodernism. Most scientific approaches in occupational therapy derive from the historical periods of modernism, critical modernism, and postmodernism. During these periods, the ideas behind logical positivism and the criticisms of such ideas through the traditions of critical modernism and postmodernism contributed to the perspectives and methods used in quantitative and qualitative research.

Logical positivism is associated with major quantitative traditions, such as quasi-experimental and experimental research, whereas critical modernism and conservative interpretations of

postmodernist thought are associated with many qualitative and naturalistic approaches to inquiry, including, but not limited to, ethnography, phenomenology, and narrative inquiry. Conservative interpretations of postmodernist thought can be observed through the perspectives of disability studies and other relativistic approaches to knowledge generation.

Following an explanation of how these approaches articulate with the philosophical foundations, the chapter concludes with insights for researchers and consumers of research in applying the chapter content to understand more broadly the role of theory in research, the necessity of clarity in the research process, the inherent biases in the approach of any researcher, and the responsibility of all researchers to qualify and accurately represent the impact of findings.

Review Questions

1. Describe the early contributions of classism and why they were rejected in favor of modernism.
2. List two or more approaches to research that are consistent with the ideas of critical modernism. Draw specific linkages between these approaches and the ideas of critical modernism.
3. Explain the utility of postmodernist ideas to scientific inquiry today, delineating the potential contributions, as well as limitations, to a postmodernist orientation toward science.
4. Based on the various philosophical orientations toward science, describe your own preferences toward knowledge generation. How might those preferences influence your choice of a research approach?

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CHAPTER 4

Reading and Understanding Published and Presented Research

Renée R. Taylor • Nancy A. Baker • Pimjai Sudsawad

Learning Outcomes

- Identify the major types of research articles.
- Describe the contents of the major sections of a peer-reviewed research article.
- Differentiate the major types of presented research.
- Compare and contrast the objectives and contents of presented and published research.

Introduction

Researchers are not the only professionals who need to develop expertise in reading and understanding published and presented research. Occupational therapy (OT) practitioners, OT managers, insurance agents, granting agency officials, policymakers, legislators, advocates, and clients should also possess these skills (to varying degrees). Assurances related to client safety, quality and efficiency of care, and evidence-based practice continually influence ongoing changes in the health-care system. A fundamental skill for all occupational therapists is the ability to understand and critically appraise the field's evidence. Whether you are a manager who needs to update a treatment approach within a practice setting or a practitioner attending a conference or paging through a professional journal to remain up to date on therapeutic approaches, knowing how to read, interpret, and evaluate published and presented research is a crucial part of evidence-based practice.

Evidence-based practice (covered in Chapter 1) involves using existing published or presented research to inform decision-making, rather than conducting it anew. In occupational therapy, evidence from research can be used in a wide range of ways (Tickle-Degnen & Bedell, 2003). Uses include, but are not limited to:

- Development or revision of practice guidelines
- Development of economic analyses of different treatment approaches
- Evaluation of local clinical performance against published outcomes
- Dissemination of information to clients and other consumers about the effectiveness of a given intervention
- Shaping of clinicians' choices regarding the most appropriate intervention

Evidence-based practice (EBP) is defined as the reciprocal use of research evidence and clinical expertise in informing decision-making about the care of individual clients (Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000). Honing your research-related reading skills will allow you to apply an EBP perspective and decide which approaches and technologies are most likely to be helpful to you and your clients in therapy and beyond.

For individuals who are engaged in advanced graduate work, reading and understanding research will assist you in writing a final project, thesis, literature review, and/or dissertation, including the ability to recognize the strengths and limitations of your own work. This chapter guides you through the process of reading and understanding published and presented research and serves as an enduring reference for the process of reading and writing research papers. Moreover, this chapter covers the different components of research articles. You will understand why each component of a research article is important to the overall findings and recommendations from the study. Additionally, you will learn how to read and listen for results when presented at conferences or in journals by understanding basic approaches to interpreting research findings.

Applying the Evidence

Evidence-based practice is not a unilaterally formulaic guide to intervention (Sackett, Rosenberg,

CASE EXAMPLE

Kim is an occupational therapist and research coordinator with the Spinal Cord Injury Program at an urban medical center. Because new technologies and other innovations in the field of spinal-cord-injury research evolve at such a rapid pace, Kim must ensure that she, her fieldwork students, and the other therapists on her unit are always up to date on the results of published research in this area. Justin, an advanced fieldwork student on her unit, was assigned to work with a 23-year-old woman with a spinal cord injury resulting from traumatic abuse. The client was badly beaten by her partner and thrown down a flight of stairs. In addition to her spinal cord injury, the client was also diagnosed with reactive major depression and posttraumatic stress disorder.

Kim decided that one of the best ways of mentoring this student was to show her a basic application of evidence-based practice as a means of preparing for her consultation in advance. Fortunately, Kim works for a medical center that is affiliated with a medical school. The school has a medical library that is accessible online. Kim and Justin sat down together at the computer with a plan to visit the online library (Fig. 4.1). Among numerous articles, Justin located two recently published articles that were of particular relevance to his assigned client. The first was a descriptive study of women with violently acquired spinal cord injury (Forchheimer & Meade, 2011). The second was an article that discussed psychological contributions to functional independence in spinal cord injury and included recommendations for rehabilitation professionals (Kennedy, Lude, Elfstrom, & Smithson, 2011).

After a brief assessment of levels of evidence, Kim and Justin agreed that the articles were not intended or designed to offer exceptionally high levels of rigor and evidence. One was a descriptive study of data extracted from an existing database (i.e., Forchheimer & Meade, 2011), and the other was a longitudinal cohort study examining questionnaire data (i.e., Kennedy et al., 2011). However, the research practitioners agreed that both studies provided useful information, responsibly cited limitations, and presented data that would contribute to their preliminary therapeutic reasoning about this client. The two articles served as a starting point for an in-depth discussion between supervisor and student about the upcoming client on the student's caseload.

Additionally, Justin later discussed some findings from the articles during a conversation with the client. During one session following a visit from her abusive boyfriend, the client looked particularly demoralized and distracted. Justin asked whether she had been having any distressing thoughts about her relationship with her boyfriend. This occurred after several sessions had passed and the two had established a trusting relationship. The client began to discuss the nightmares she was having, and this led to an important discussion about the psychosocial aspects of the client's care and rehabilitation process, which later resulted in a referral for additional support and services.

Figure 4.1 Advanced fieldwork student working with his research coordinator.

Gray, Haynes, & Richardson, 1996). The currently available best evidence must be used judiciously by skilled practitioners in combination with their knowledge of treatment principles and overall therapeutic skills. As covered in Chapter 1, part of this skill is matching potential evidence-based interventions with the needs and values of clients (Sackett et al., 2000). In addition, practitioners should remember that there are "consumers" other than clients who are interested in the evidence for

an intervention. For example, insurance companies, hospital administrators, policymakers, granting agencies, and OT managers are concerned about intervention options and choices. Practitioners can use evidence to justify their choices to clients, family members, policymakers, insurance companies, and other groups as necessary. Clinicians should be able to present the results to all of these groups, using different language and focus for each. Tickle-Degnen and Bedell (2003) suggest that when communicating the results of evidence, practitioners should:

- Use simple, concrete, nontechnical, culturally neutral language
- Keep the information brief
- Check frequently for confusion or lack of comprehension
- Suggest concrete actions related to the information (p. 229)

Research Articles and Conference Presentations

Many local, national, and international OT organizations publish magazines and/or professional journals that contain a range of articles relevant to our field. For example, within the United States, the American Occupational Therapy Association publishes a trade magazine, *Occupational Therapy Practice,* and a professional journal, *American Journal of Occupational Therapy* (Fig. 4.2).

Additionally, many organizations hold annual or periodic conferences where research is disseminated and discussed verbally. For example, the American Occupational Therapy Association holds an annual conference and exposition every spring (Fig. 4.3). Because the focus of this text is on research, this section emphasizes research-based conferences and journals (as opposed to general articles about a topic or clinical continuing education presentations, for example).

When you open a professional journal, you will typically find two major types of research articles: **literature reviews** (i.e., articles that provide a summary of the scientific literature about a topic) and **experimental reports** (i.e., articles that provide a structured report of findings from a research investigation). Other types of research articles published in professional journals include, but are not limited to, **case reports** (i.e., articles that provide a structured description of a novel approach to assessment and/or intervention with a single client or a small number of clients) and **opinion papers** (i.e., articles that discuss novel or controversial information about a topic of broad impact within a profession).

Similarly, professional conferences offer five general formats for the verbal and visual dissemination of research. These include, but are not limited to:

- Individual paper presentations
- Symposia
- Workshops
- Poster presentations
- Roundtable discussions

The following sections describe and define the major types of research articles and presentations that are most commonly used by OT researchers and practitioners.

Peer-Reviewed Journal Articles

A **peer-reviewed journal article** is a research article that has undergone intensive review by at

Figure 4.2 Cover of the *American Journal of Occupational Therapy.*

Figure 4.3 Call for papers for occupational therapy organizations from around the world.

least two other professionals who are considered peers of the authors in a given field of study. With some exceptions, there is a general format to a published, peer-reviewed research article, which makes reading and interpreting findings easier. This format, which is specified in publication manuals distributed by organizations such as the American Psychological Association (2010) and the American Medical Association (Iverson et al., 2009), is used by a wide range of research professionals who publish their findings in journals, including occupational therapists. Because many journals in which occupational therapists publish require papers to conform to the format specified by the *Publication Manual of the American Psychological Association* (American Psychological Association [APA], 2010), we will use these publication guidelines **(APA format)** to guide our discussion.

APA format is often discussed with respect to the specific order and format in which references are reported at the end of a research article. However, APA format refers to a very specific order in which an entire research article is presented, as well as how the contents of a study are reported and described. The order for literature reviews and experimental reports, which are the most common types of journal articles, is shown in Figure 4.4.

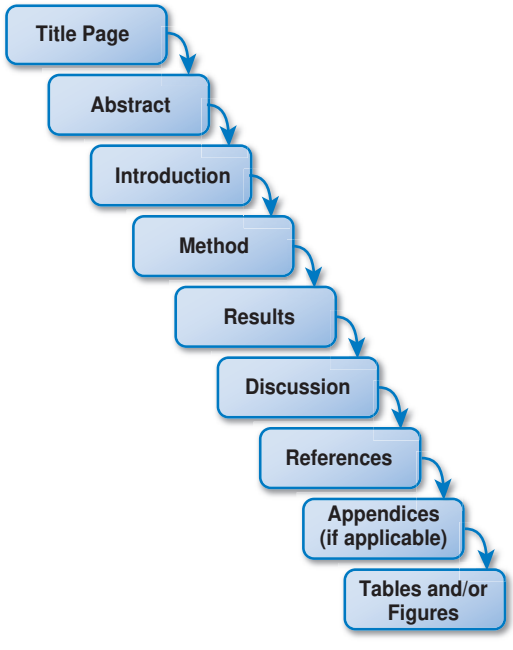

Figure 4.4 The sequence of sections in a peer-reviewed journal article.

The following section describes what goes into each of these parts in detail to guide you in your reading (and eventually in your writing) of a research article.

Title Page

At minimum, the **title page** typically contains the article title, running head, authors' names, and institutions with which the authors are affiliated. An example of a title page is provided in Figure 4.5.

When scanning through numerous articles during an online search for information, titles can be very informative at the preliminary stages. The title of a study should contain several key words that succinctly convey the topic, approach, and findings of the study. In the previous Case Example, the titles of the articles that Justin selected were very informative. For example, the first article was titled "Women With Violently Acquired Spinal Cord Injury: Characteristics of a Vulnerable Population." From this title, we understand that the topic is women who sustained spinal cord injuries as victims of violence. Moreover, we can hypothesize that it is a descriptive study because the title refers to the characteristics of these women. Finally, reference to the fact that these women are considered a vulnerable population suggests that the results, or findings from the data analysis, highlight the nature of vulnerabilities within this population of women.

The **running head** is an abbreviated title that appears on each page to remind readers of the title as they page through the particular study, which is one among many within a printed journal volume. (The running head becomes less significant with electronic dissemination because computer programs often do the job of only presenting a single article of interest at a time on the computer screen.)

Most title pages of journal articles also include the author names and **institutional affiliations.** An institutional affiliation gives the reader a general idea about the location and nature of the institution or institutions in which the research was developed, supported, and/or executed. Moreover, it allows readers to locate and contact authors if they have additional questions about the study or for other reasons, such as inviting them to serve as a collaborator on a grant or asking them how to obtain an assessment used in the study, for example.

Some title pages also include information such as word counts, acknowledgments, and contact information for the author who has agreed to receive and respond to any correspondence regarding the article **(corresponding author).** This

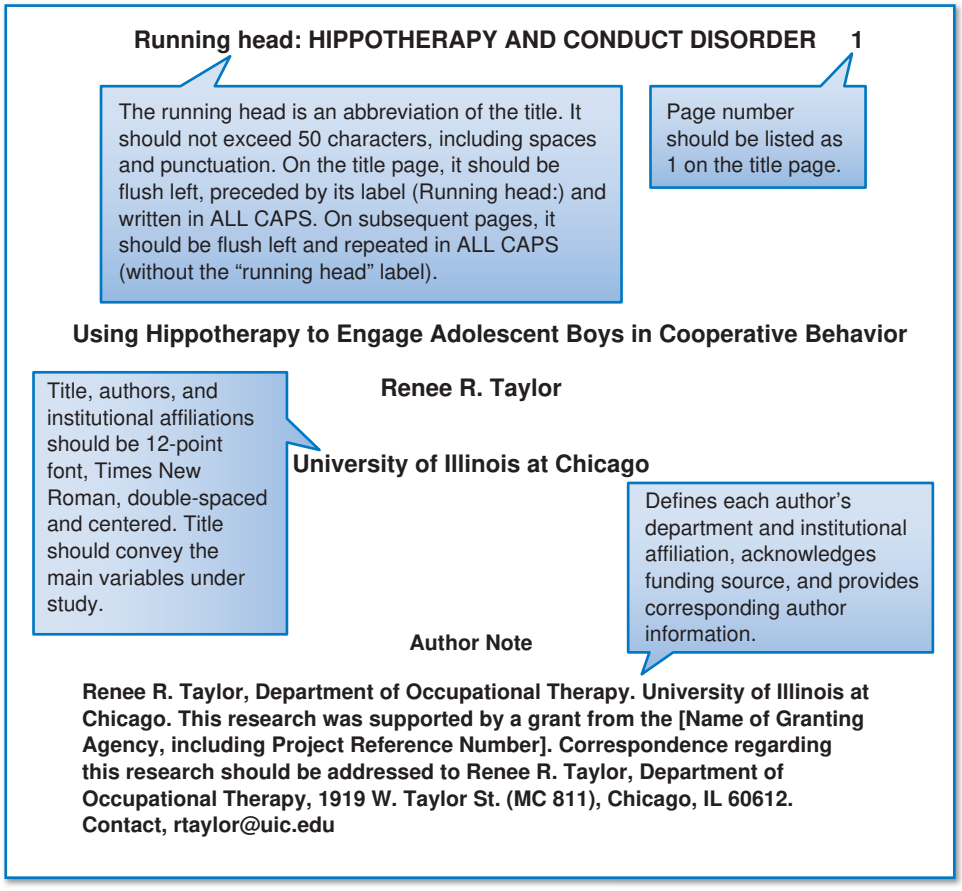

Figure 4.5 Sample title page.

individual may or may not be the first author of the article.

Abstract

An **abstract** is a concise summary (typically between 150 and 250 words) of key aspects of the study. This is an important component of the study because it is the first thing (and sometimes the only thing) that a busy practitioner may have time to read when determining whether to retrieve and read the entire article for more detailed information. A good abstract is clear, providing just enough information for a reader to navigate through the actual article. This is important to the experienced reader, who typically has been intellectually immersed in a topic area for a number of years and may only wish to read a certain part of the study. For example, a reader might be interested in a given article specifically because of a unique methodological approach that was used, in which case she or he would focus mainly on reading the method section, beginning with the abstract and followed by the main body of text within the article. Other readers may only be interested in the introduction, particularly if it offers a well-written and detailed overview of the topic area. Essentially, a well-written abstract serves as a kind of topical legend or reference point for an experienced reader.

The abstract is typically presented as a single paragraph. Most abstracts contain the following elements:

- A sentence or two of background information about the topic of the study
- The objectives of the study
- The research questions or hypotheses to be examined
- A description of the participants and the methodological approach (including data analysis)
- A description of the results and conclusions

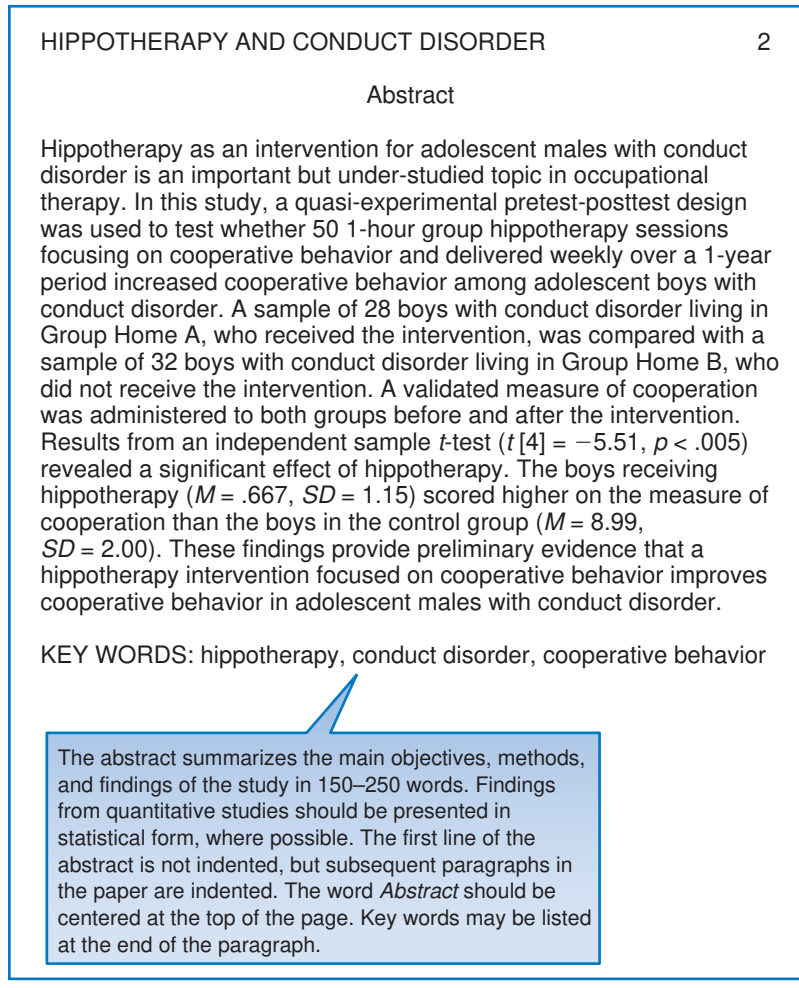

Figure 4.6 Sample abstract page.

Some journals request that abstracts include distinct headers for each section (e.g., objectives, methods, results, conclusions) followed by brief phrases describing each section, rather than full sentences. Many journals require a listing of three to five **key words** from the article that capture the main topics covered by the article but are distinct from the words used in the title. These are usually listed immediately after the abstract. An example of an abstract is presented in Figure 4.6.

Introduction

The **introduction** is an often underestimated, yet important aspect of a research article. It provides background evidence justifying the relevance and need for a given study. Many introductions are three to five pages in length. However, they may be as brief as one-half to two pages in some medical journals or brief reports. A well-written introduction often begins with a strong **statement of impact.** A statement of impact references data that point to the importance of the topic under study. For example, consider a study with the objective of testing the outcomes of a work-rehabilitation program for women with HIV/AIDS. A statement of impact for this study would include a reference to a study about the high prevalence of HIV/AIDS among women, followed by a reference to additional studies citing the severity of symptoms, occupational consequences, and high rates of unemployment within this population.

The statement of impact would then be followed by a comprehensive and integrative review of current (i.e., from the past 5 to 10 years) literature specific to the topic under study. The most cohesive reviews include literature that relates as closely as possible to the central objectives of the

topic under study. Thus, the study of women with HIV/AIDS would need to include a description of other studies that explain the barriers to and facilitators of employment for women with HIV/AIDS. The literature review would also include a description of any prior attempts at work rehabilitation with this population. Because the literature on this topic is relatively scant, one would want to include any relevant articles within and outside of the field of occupational therapy.

Additionally, strong introductions include an overview of the theory base upon which the research and methodological approach are rooted (Kielhofner, 2009). Returning to the example of a study on work rehabilitation for women with HIV/AIDS, the authors wish to ensure that their intervention is client centered and occupation focused and that it has been found to be successful with other populations. Moreover, they want to select outcome measures that reflect their theoretical orientation. After reviewing their options, they select the Model of Human Occupation (MOHO; Kielhofner, 2008). They select MOHO because it contains a range of work-rehabilitation assessments and evidence that prior work-rehabilitation programs based on this model were markedly successful with other populations.

Well-written introductions typically point out controversies or unanswered questions within the literature. Then they explain how the current study aims to respond to or provide new insight into those controversies or questions. For example, the study of women with HIV/AIDS might highlight the fact that prior intervention studies relying on biomechanical and cognitive disabilities approaches to rehabilitation have only shown modest outcomes because they were not tailored to the unique needs and capacities of the clients.

Finally, a strong introduction should end with a well-argued rationale for pursuing the particular question or hypothesis under study within that broader topic area. For example, the rationale might be that it is worth testing the outcomes of a client-centered, occupation-focused work-rehabilitation program because it is novel (i.e., has never been done before) and because its flexibility will better accommodate the unique and variable needs of the specific population. The rationale is often followed by a statement of the objectives, questions, and/or study hypothesis. This typically marks the end of the introduction, and it sets the stage for understanding the methods and results sections. More information about how to determine study objectives and write research questions and hypotheses is provided in later chapters of this text.

Method

The **method** section is often a good place to critically evaluate the level of evidence that a particular study contributes to knowledge about a given topic area. This section is where the approach that the researchers used to answer a particular practice question or solve a practice problem is described in detail. The method section is typically divided into a number of subsections that describe the ethical approvals, design, participants, procedures, measures, and data analysis approach. These headings are very helpful to readers who wish to learn more about a specific aspect of a study, such as the type of instrument used to measure a client's movement or the approach that an interviewer used when determining a client's treatment goals.

The **ethical approvals** section typically identifies the professional bodies that approved conduct of the research and describes how participants provided consent for the study. The **design** section describes the type of study that was developed and the way in which a research question or problem was examined. For example, if in the study of women with HIV/AIDS the researchers first conducted a work evaluation pretest and then compared outcomes from one group of women receiving the current standard of care for work rehabilitation with those from another group of women receiving an intervention based on the MOHO (Kielhofner, 2008), the study design would be described as a quasi-experimental pretest–posttest design; the study compared two groups of women (one receiving MOHO and one receiving standard care) and only measured work performance before and after intervention. The **participants** section describes the social and demographic characteristics of the sample, as well as the criteria by which the individuals in the study were selected for participation. It also describes the criteria by which certain individuals were excluded from participating in the study. For example, a researcher might choose to study occupational adaptation in a group of adolescent girls aged 13 to 18 with brachial plexus injury and those without such injury. The researcher would thereby exclude adolescents younger and older than this age range and would exclude males. Additionally, the participants section typically includes a description of the **recruitment and retention methods,** or means by which the authors were able to locate, access, enroll, and retain their sample over time and through the course of the study. Later chapters emphasize how important it is to develop a realistic and reliable recruitment strategy. If participants in the study were divided into subgroups and/or assigned to different conditions

or treatments so that they could be compared with one another, the group assignment approach would also be described in the participants section of the article, as well as the means by which the groups were characterized.

The **procedures** section describes the sequence of actions taken to conduct the study, from beginning to end. Procedures include such actions as obtaining human subjects approval, obtaining consent from the subjects for study enrollment, and administering assessments.

The procedures section describes other approaches to collecting data, such as physical approaches to assessment (e.g., drawing blood, estimating grip strength, or obtaining a brain scan). Depending on the study, the description of the approach to data collection may be quite detailed. For example, a study that employs functional magnetic resonance imaging (FMRI) to look for changes in neuronal activity in the brain based on movement of the right upper extremity following a cerebrovascular accident may include the brand and model of the machine that was used to take the fMRI.

In a qualitative study, the procedures section may describe how field notes were recorded from observations and interactions with subjects. For example, a researcher interested in learning more about how small farming families living in remote rural areas create their own assistive devices and adaptations to accommodate a farming family member with a disability would describe exactly how, where, and for what duration the observations of this particular phenomenon took place.

When a study involves administering a treatment or other intervention to subjects or testing any other kind of experimental manipulation, the procedures section describes the treatment protocol or sequence of steps taken to carry out the intervention in detail. The procedures section is often a good place to include a sufficiently detailed description of the intervention so that it can be easily replicated by another research team. Often, **standardized interventions** (i.e., interventions that follow a structured format and do not deviate from implementation guidelines) are available in a manual that was created by a researcher or research team. That manual may be referenced in this section or appended to the paper, along with a description of how fidelity (faithfulness) to the procedures described in the standardized intervention was maintained by the person administering the intervention. The measurement of fidelity is often referred to as a **fidelity measure,** and it is similarly referenced or included in an article appendix.

The procedures section is also a good place to describe any **follow-up procedures,** or assessments undertaken after subjects have completed the intervention to follow their reaction to the intervention over time.

The **measures** section (sometimes referred to as the instruments section) is also included within the method section of the paper. This section describes the assessments and other data collection devices used to collect data. Descriptions of measures used should include any statistical or other evidence of the **dependability** of the measure, which often includes numeric data indicating the degree to which the measure was estimated as being reliable and valid. The **analytical approach** (or statistical analysis) section describes how the information or data collected in the study were coded, scored, summarized, analyzed, and interpreted. For quantitative data, this section often describes the sequence of statistical tests conducted to analyze the findings, including any details about particular variations of those tests that were used to best fit the data provided. For qualitative data, this section describes how data were coded, summarized, and interpreted in a way that tells a cohesive story about the findings to the reader.

Results

The **results** section of an article contains the statistical findings or qualitative summarization resulting from the data analyses that were conducted. The results section may be organized such that findings reflecting the sociodemographic characteristics of the sample or study groups are described, followed by the main findings from the study. Findings are typically presented in the order in which the study hypotheses, questions, or objectives were outlined in the introduction. The presentation of findings is typically limited to the direct results of the analyses undertaken and does not include an interpretation of or reflection on any of those findings.

Discussion

The **discussion** section provides an overview of study aims and findings. It typically begins with a summary of the central aim of the study and a general conclusive sentence about the corresponding central finding. An interpretation and reflective discussion about this central finding and a discussion of the other, related findings introduced in the results section typically follows. Often, the discussion of results includes a reflection on questions,

controversies, and/or issues raised within the literature review, which is presented in the paper's introduction. The researchers may compare and contrast findings from the present study with findings from previous work that their team and other research groups studying the topic have completed. In the discussion section, the researchers may also reflect on how findings from this study can contribute to practice and how they can form a foundation for yet-to-be answered questions and future research.

Importantly, any discussion section should also include a **limitations section.** In this section, researchers acknowledge any flaws in study design, procedures, measures, and/or analyses, as well as any variables that were not examined but could have limited the interpretation and generalizability of the findings. If this section is well written, it is where one can find an abbreviated, critical appraisal of the study's methodological approach. If a study is not of the highest methodological rigor (the criteria for which are covered in Chapter 5), then the researchers must characterize the findings as preliminary and the conclusions as tentative and limited in scope.

References, Appendices, Tables, and Figures

Published articles always include a list of references that correspond to the literature cited within the paper. These references must be formatted in the style consistent with the requirements of the particular journal in which a study is being published. Typically, these styles include either APA style (the style recommended by the American Psychological Association) or AMA style (the style recommended by the American Medical Association). An example of an in-text citation and corresponding reference entry in APA style is presented in Figure 4.7.

Additionally, many studies include findings or other important data in tables, and concepts are often presented as diagrams, photographs, or other images in figures.

Reading the Various Sections: What to Look For

After one has read a number of peer-reviewed journal articles, one soon finds that they follow a specific format and pattern in terms of presenting the information to the reader. It is important to note that not all journals use the same headings as those presented here. Additionally, some are more inclusive and detailed in terms of subheadings. The following sections include the headings most often used and offer suggestions in terms of what to look for when reading each component of a peer-reviewed journal article.

The Abstract

In addition to the title, the abstract offers the most concise means of obtaining an overview of the approach and findings of a given research study. There may be circumstances in which reading only the abstract suffices in terms of serving a specific need, such as the need to be particularly time efficient while scrolling through numerous articles during an initial literature search. For example, when searching online databases to gather a specific subset of articles on a given topic, the reader does not typically search for and read each article one at a time. Instead, one enters the appropriate search criteria and then finds that the search screen is populated by numerous titles of articles. Once all of the articles appear (typically in a long list), reading the titles of all the articles serves as a good beginning in terms of weeding out irrelevant titles. However, this process, alone, does not typically provide enough information about the type or content of each article and its relevance to a reader's needs. In most, if not all, cases, one must also read the abstract of the article to understand the methodological approach and the results, which contribute to knowing whether the article is worth culling for further reading and analysis. A well-written abstract provides just enough information for this type of first-level screening and culling process to occur.

The Introduction

Sequentially, the next section of the paper is the introduction. In reading the introduction, the first part typically begins with a history and background of the scientific questions and findings in the area. It is important that the reader looks to the history and background to understand previous research questions and findings that provide a foundation for the questions to be answered in the current study. Also within the introduction, the reader will want to locate the rationale for the current study that outlines the unanswered questions in the scientific community that the current study addresses. Finally, toward the end of the introduction, the reader should find a statement of the study questions, objectives, and/or hypotheses. These anchor the reader when it comes time to read the study