Designing and Conducting Research in Health and Human Performance

TRACEY D. MATTHEWS • KIMBERLY T. KOSTELIS

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TRACEY D. MATTHEWS
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Preface

The inspiration for this textbook began when I first started teaching at a small liberal arts college in Vermont, Castleton State College. The Physical Education Department included a Senior Thesis class designed to introduce undergraduates to research methods in physical education and exercise science. As I searched for textbooks to use, I realized that most of the research methods texts in exercise science and physical education were written with the graduate student in mind. At that time, I realized there was a need for such a textbook for undergraduate students. Later, after moving on to Springfield College, I had the privilege of having Dr. Kimberly Kostelis as my graduate assistant. I knew that if we partnered, we could write an effective and informative research methods textbook for undergraduates in health and human performance.

We have many years of experience presenting research methods to both graduate and undergraduate students, and we hope you agree that we have been able to gear this textbook for the particular needs of the undergraduate student. We emphasize real-world applications of research methods throughout the text. We draw on many different examples from the areas of health and human performance, with the hope that these examples will provide you with a context in which to understand research.

We also designed the textbook in a very specific sequence. In the first section, “Understanding Important Research Concepts,” we provide the reader with a holistic picture of research in process. Recognizing that at this beginning point students may know very little about the research process, and it may seem overwhelming, we took great care to continually reemphasize these concepts throughout the text.

After providing the foundational concepts to ensure that you have a basic understanding of the important concepts of research in Part One, we begin to present how to go about writing a review of literature in Part Two, “Reviewing the Literature.” Within the chapters of Part Two, we provide you with the necessary tools to identify your topic, search for related articles on your topic, and write a review of literature. Throughout you will notice practical, real-world examples, “Research to Practice,” so you can see how research is applied to our fields in health and human performance.

In Part Three, we take the research process to the next level and discuss issues related to “Understanding and Developing Research Designs.” Not only do we present information on how you can develop your own research design, but we present important concepts and also research examples in the health and human performance area. We cover qualitative, quantitative, and mixed-methods research designs in these chapters.

Part Four presents measurement and analysis issues related to research. These often can be the most difficult concepts to grasp; however, our intent is to make the information applicable to your content areas. Once more, examples and applications are provided throughout each chapter. We discuss measurement issues for both qualitative and quantitative research designs. We hope you will gain awareness and understanding of not only quantitative research analyses, but also qualitative data reporting. As is emphasized throughout the text, we offer analyses that will best answer your research question. We believe that, to do this, you need to have an understanding of and exposure to both types of research designs.

The final section, Part Five, is titled “Putting It All Together.” In this section, we teach you how to write your results and discussion. If you do decide to collect data, you

will have the resources and ability to do so. Additionally, we have found that there are many other ways of presenting your research, including posters and oral presentations. The last chapter provides detailed descriptions of how best to effectively present your information in both forms.

Throughout, you will notice not only the “Research to Practice” examples, but also “Tips,” which provide suggestions and additional resources to assist you in understanding the research process. Within the text, we also offer key terms that are defined and highlighted throughout each chapter. At the end of each chapter, chapter review questions will help you to understand and follow “best practices” in research methods. In addition to the text itself, we offer online resources and guides to help you understand important research concepts. We hope that these application pieces will provide a context in which to better understand research methods.

After you have used this book, we hope you have a better appreciation of and excitement for research methods. We believe this text can provide a context for you to comprehend the research process and how it can be implemented in our fields of health and human performance. We want you to be able to understand and perform research but also to become excellent consumers of research. We want you to become the source that your fellow students will go to for answers to research questions related to health and human performance. We hope our text will provide you with the necessary tools to achieve these goals!

Acknowledgments

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We also acknowledge our mentor, who has guided us along the way. Dr. Barbara Jensen served as a role model for both of us during our graduate programs. We are indebted to her for her time and leadership.

Finally, we must acknowledge our families. They have been a constant source of support and understanding throughout our writing. To our parents, Tom and Barbara Dexter and Donald and Norma Tower: You have always been supportive of our endeavors. Thank you for leading and guiding us. You have helped to shape the women we are today. To our husbands, Lee Matthews and George Kostelis: Lee, thank you for your editorial feedback and your constant encouragement. You believed in my abilities from the beginning. George, your confidence and belief in my professional and personal life have always been a source of strength for me. To Emma and Demitri, thank you for understanding when your mothers needed to spend more time writing than playing.

The Authors

Tracey Dexter Matthews is professor and department chair in the Exercise Science and Sports Studies Department at Springfield College, Springfield, Massachusetts. Dr. Matthews has served as research chair for the Eastern District Association of AAHPERD. Additionally, she served as the measurement and evaluation chair of the Measurement and Evaluation Council of AAPAR. Dr. Matthews has presented internationally and regionally on topics including assessment, grading, and mixed-methods research. Before teaching at Springfield College, Dr. Matthews was department chair in the Physical Education Department at Castleton State College, Castleton, VT, where she taught an undergraduate research methods course. While at Springfield College, Dr. Matthews has taught courses including Graduate-Level Research Methods, Educational Statistics, Advanced-Level Statistics, Measurement and Evaluation in Exercise Science, and Research Methods in Athletic Training. Over the course of her tenure at Springfield College, she has served as the research or statistics advisor on more than 110 theses or dissertations.

Kimberly Tower Kostelis is an associate professor in the Department of Physical Education and Human Performance at Central Connecticut State University, New Britain, Connecticut. Dr. Kostelis has also served as research chair for the Eastern District Association of AAHPERD and as the CT representative for EDA. Dr. Kostelis serves as section editor in pedagogy for the *Measurement in Physical Education and Exercise Science* journal. Dr. Kostelis has presented nationally and regionally on topics including assessment, grading, and accreditation for teacher education. At Central Connecticut State University, Dr. Kostelis serves as the assessment chair for the School of

Education and Professional Studies and also teaches graduate and undergraduate courses including Research Methods I and II and Measurement and Evaluation in Exercise Science. In 2008, Dr. Kostelis received the University Teacher of the Year Award from CTAHPERD.

To our mentor in research methods and statistics, Dr. Barbara Jensen

Part 1

Understanding Important Research Concepts

What is the purpose of understanding research? Why do I need to understand the research process? When will I use research concepts in my profession? Perhaps these are questions that you are asking yourself as you begin your quest into understanding research concepts. We hope that by the end of this section and more so, after reading this book, you will have a greater appreciation for research in general. Research is a challenging topic; we ask you to keep an open mind throughout and experience the research process at least once. Our goal is not to make you a scientific researcher but rather a good consumer of research. We also encourage you to make applications to your area of study, and we hope that through this textbook you gain a better appreciation of why research is important. Consider some of the following scenarios:

You are a health educator, and a parent asks you about a recent health topic, such as the salmonella outbreak with tomatoes in 2008. As a health educator, you need to convey the most accurate and correct information to the parents. You may not know all the answers, so what will you do? Yes, research the topic!

You are a health promotion/wellness coordinator in a corporate setting. Your supervisor has asked you to create a survey regarding client satisfaction with the fitness facility you are managing. How will you create a survey? This book can help you to understand the steps that go into questionnaire development, but you also need to know the

content of appropriate items, which involves a review of literature.

You are a personal fitness trainer at a local fitness facility. Many clients have asked you about the latest diets and their credibility. How will you respond to help them make an informed decision? Yes, research the topic!

Finally, you are an athletic trainer, and an athlete has asked you about a new supplement on the market and its effects when training. To provide an informed decision, you need to research the new supplement and provide the athlete with the most accurate and up-to-date information.

We hope that these scenarios have provided you with a basis of why research is important. In Chapter One, you will learn some of the basic concepts of research. We also emphasize the importance of being a good consumer of research, which is relevant to each of these scenarios. Chapter Two continues to cover research concepts by providing an overview of research designs, as well as to introduce the nature of research variables and measurement issues. Both of these chapters provide a strong base for understanding research concepts. Good luck!

Chapter 1

Introduction to Research in Health and Human Performance

What You'll Learn

- How to define research and begin to explore the nature of research
- How the scientific method helps guide the research process
- How the research continuum ranges from applied research in field settings to basic research in laboratory settings

As stated in the Introduction, research is part of our everyday lives. We use research in our personal lives to enhance our decision making and problem solving. For instance, when we are considering purchasing a new car, most of us will take the time to research and define specific criteria we are looking for in our car purchase. Through the information that is gathered, we are able to make an informed decision. Using data from current research to support the situation at hand will enhance our decision-making process. Next time you are having a debate with a friend, add a research claim or identify data to augment your position. Do not worry if you cannot cite the source; most likely your friend will not ask, because it is hard to argue with research claims and data!

Using research within your career is critical to your professional development. The research examples used in the Introduction for the health and human performance

fields are good examples of how you may use research methods in your career. Whether you will conduct research or read about research to advance professionally, it is imperative to understand the concepts of research as well as research designs. We hope that you will be able to experience the process so that you will be able to better apply your experience with the sometimes difficult and complex nature of research. Through this textbook, we will guide you through the research process. To begin, we must define research and examine the research continuum.

Defining the Research Process

How do we go about defining research? Think about research as a process that starts with a question and ends with a conclusion. To arrive at the end and have the ability to make a knowledgeable conclusion requires a systematic approach to answering your research question.

> **Research:** a purposeful and systematic approach to problem solving

Consider the health educator scenario again from the Introduction. The salmonella outbreak with tomatoes in 2008 was covered extensively in the media. As a health educator, it is your professional responsibility to recognize that the reported information may be compelling but not always totally accurate or complete. Relying solely on mass media information is not recommended, especially those convincing and persuasive headlines. Furthermore, it is your responsibility to determine what information is truthful and how you will present and inform parents in your school system about this outbreak. As a health educator, you should use more accurate resources, such as the Centers for Disease Control and Prevention (CDC). When turning to more scientific resources in an attempt to provide accurate

information, you need to remember that you are presenting this information to individuals without your content knowledge base. Therefore, you must be able to communicate clearly in such a manner that your audience will understand the information. With your education and training thus far, combined with the help of this textbook, you will know where to look for reliable resources, how to interpret information, and how best to communicate that information to others. With practice, sorting and filtering mass media information and reviewing scientific research will become easier, and you will be able to carefully and systematically report the needed information accurately to your audience.

Research to Practice: Flawed Method May Underestimate Childhood Obesity

The American College of Sports Medicine (ACSM) publishes a weekly bulletin titled *Sports Medicine Bulletin*. In the September 14, 2010 issue, Daniel O'Connor reported that the parent-reported values for children's height and weight that are used to identify obesity rates in the United States may be inaccurate. O'Connor examined data from clinics and found that parents tended to underreport weight and overreport height. With this information, it was noted that the data that we obtain from parents may not be reliable and that these errors affect the calculation of body mass index (BMI) that is used to identify obesity rates. O'Connor concluded that BMI may not be a good indicator of obesity, and new measures should be considered to provide a more accurate depiction of obesity rates.

O'Connor, D. P. (2010, September 14). Active voice: Flawed method may underestimate childhood obesity. *Sports Medicine Bulletin*. Retrieved from www.multibriefs.com/briefs/acsm/active9–14.htm

Because the health and human performance fields are service-based professions, we need to stay current with new developments in our disciplines. It is our professional responsibility to stay current and be able to communicate

ongoing changes within our fields to our clients. For example, in 2007, the American College of Sports Medicine (ACSM) and American Heart Association (AHA) announced recommendations on physical activity and public health (Haskell et al. 2007). Updates are continually being made with regard to dosage, intensity, frequency, and duration of physical activity. In fact, in 2008, the United States Department of Health and Human Services (HHS) issued the 2008 Physical Activity Guidelines for Americans (www.health.gov/paguidelines). In 2010, First Lady Michelle Obama introduced the Let's Move initiative and renamed the President's Council on Fitness and Sports to the President's Council on Fitness, Sports, and Nutrition to provide a broader perspective of health initiatives for Americans. Staying informed and being a good consumer of research will assist you in informing clients and keeping you up to date on current trends. Continuing to read, interpret, and communicate scientific information will become easier with practice, as will further understanding of the research process.

Scientific Method

Remember, research is a purposeful and systematic process to problem solving. Understanding how to communicate research findings to individuals is only one aspect of research. Being able to develop a sound research design and execute the research methods is equally important. Personally experiencing the research process will allow you to apply your experience to the concepts of research and its designs. The scientific method is used to answer your research question.

> **Scientific method:** steps within the research process used to answer research questions

The scientific method is a way to ask and answer specific questions by making observations and performing experiments. See Table 1.1 for an overview of the steps in the scientific method.

Table 1.1 Steps in the Scientific Method

1. Identify the problem	What is your area of interest? What questions are you curious about in your profession? What do you want to know more about in your professional field?
2. Research the area (Review of Literature)	How will you get a better picture of your research topic area?
3. Identify a hypothesis and/or research question	What are your initial predictions or questions based on the research that has been conducted in the field to date?
4. Design an appropriate research design (Research Methods)	How will you solve your research problem or question?
5. Collect data	How you execute your research methods, and what will you do with all your data?
6. Analyze data (Results)	How you will analyze your data, and what will you find?
7. Formulate findings and conclusions	How will you make sense of your results, and what does it all mean?

Step One: Identify the Problem.

The first step in the scientific method is to select/define a general problem or question of interest to you. You should ask yourself what you are interested in and want to know more about in your profession. Identify the problem you would like to solve. We cannot stress enough that this topic area must be of interest to you. You will be spending much of your time working with this topic area, and your choice of topic will affect the approach and execution of the remaining steps of the scientific process. This is like the foundation of a house; you need to have a solid underpinning to build your framework to have a well-built

house that will withstand the test of time. At this point, you should be able to brainstorm some areas of interest to you; however, further refining your topic area is discussed in Chapter Three.

Step Two: Research the Area.

Next, you need to begin to research your topic area of interest. What do you need to know to understand your topic? Where do you need to go to understand more? Secondary sources and browsing through government and professional organization Web sites may be useful to gain a broad sense of your topic area; see Tip for more information.

> **Secondary sources:** include sources such as textbooks, reviews of literature, and position papers that present research, but not the author(s)' own research

Primary or critical research journal articles will provide information on the research that has been conducted in the field to date.

> **Primary sources:** are sources in which the author(s) actually performed the research presented and include methods, results, and discussion sections

The review of the literature is like the framework that is built on the foundation of your house. You want to ensure that a solid framework is present, because the rest of the house is contingent on how the framework is designed and constructed. Conducting a thorough review of the literature is discussed in Chapter Three, and Chapter Four guides you through writing a Review of the Literature.

Tip: Professional Organization Web Sites

National Institutes of Health	www.nih.gov
Centers for Disease Control and Prevention	www.cdc.gov
Coalition of National Health Education Organizations	www.cnheo.org
American School Health Association	www.ashaweb.org
National Center for Health Education	www.nche.org
National Athletic Trainers Association	www.nata.org
American College of Sports Medicine	www.acsm.org
National Strength and Conditioning Association	www.nsca-lift.org
American Public Health Association	www.apha.org
American Alliance for Health, Physical Education, Recreation and Dance	www.aahperd.org
International Association for Worksite Health Promotion	www.acsm-iawhp.org
Society for Public Health Education	www.sophe.org

Step Three: Identify a Hypothesis and/or Research Question.

A thorough review of literature will help you understand the problem and allow you to successfully lead to the next step in the scientific method of identifying a hypothesis or research question. A hypothesis is an *educated* guess: What do you think will happen? This is not just a guess; it comes from the research you have performed in step 2. Based on past research, you will be able to develop a best guess (research hypothesis) as to what will happen. Another approach is to develop a research question. Sometimes it may be difficult to come up with an educated guess, especially when you are using the qualitative research approach. We will discuss much more on specific research designs; however, overall, research is divided into two approaches: quantitative and qualitative.

> **Quantitative research approach:** research that relies on numerical data to reach results and conclusions

Further discussion on quantitative research designs is discussed in Chapter Five.

> **Qualitative research approach:** research that asks *how* or *why* to explore research topic areas from the participants' descriptive perspective and thereby reach results and conclusions

Qualitative research designs are discussed in Chapter Six. The decision to formulate a research hypothesis or use a research question is sometimes up to the researcher or the type of research design. Not to complicate things more for you, but these two approaches could also be combined, which is known as mixed-methods research (discussed in Chapter Seven).

Step Four: Design an Appropriate Research Design.

Once the research hypothesis or question is developed, the researcher will determine the most appropriate research design. The design and methodology are always driven by the research hypothesis or question. Going back to building a house, the framework that is set will dictate the design of the house. This is true here in our example; the research that was conducted that led us to developing our research hypothesis or question (framework) will dictate the research design. Your review of the literature will help to guide you in appropriately developing your own research design. As you begin reading past research, you will find that often researchers identify future research considerations or suggestions for future research designs. These can be very helpful as you begin to develop your own design. At the same time, you must keep in mind ethics in research (Chapter Eight) and ensure that the benefits of the research outweigh the risks involved with conducting the research. Chapter Nine further discusses developing research designs

and methodology considerations. At this point of refining the design and developing the methodology, you will define the research variables you can measure and the ways in which you can measure those variables. Further discussion and considerations of ways of measuring your research variables include considering validity, reliability, and objectivity, which are presented in Chapter Ten. In short, you want to make sure you will be measuring what you want to be measured (validity), and you want to be consistently (reliability and objectivity) measuring your research variable.

Steps Five and Six: Collect and Analyze Data.

The next two steps in the scientific method include collecting and analyzing your data, which again are dependent on the research design that was selected based on the research hypothesis or question. This is the final finishing stage of building a house. All the finish work is dependent on the framework and type of design. The finish work of a house is contingent on its style and design. Likewise, in research, if you are using a quantitative research approach, you will be using inferential statistics to either accept or reject the statistical (null) hypothesis. Chapters Eleven and Twelve will provide you with more in-depth coverage of hypothesis testing and specific statistical procedures to test research hypotheses. Conversely, if the researcher will be using qualitative methods, Chapter Thirteen details how to interpret the data and answer research questions. If you are using a mixed-methods approach or combining qualitative and quantitative data analysis, you will be using statistical procedures and qualitative data analysis procedures to answer your research question.