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# Introduction

If you are reading this book, you may have an idea for a research study. You may have a research question in mind or even an idea of the method you would like to use. A *research question* is a broad question about the topic a researcher is studying. A *research method* is the methodical and scientific process a researcher uses to answer a research question. At whatever stage you find yourself in designing a study, the time has come to think more carefully about how you will measure the psychological or social science concepts you wish to study. This concise guide will provide all the information you need to choose the right instrument for your specific study. In psychology, *research instruments* are tools used to observe and describe psychological phenomena in a way that provides data that can be analyzed.

Have you ever watched a concert and seen the guitarist pick up a different guitar between songs or maybe even within the same song? This is

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*Selecting and Describing Your Research Instruments*, by K. S. McClure

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because, in a concert, each instrument (in this example, a specific type of guitar) may produce a unique sound that best fits the song, the acoustics of the venue, the musicians in the band, or some combination of factors that impact how the audience experiences the music. Both guitars do the same basic job of making sounds by plucking and strumming strings. However, the fit of each guitar with a particular song is related to the goals of the musicians making the music. The same is true of research instruments in psychology and the social sciences. Instead of making music, in research you are asking questions about psychology or other social science concepts. It is critical that you select the best instrument to measure each concept you study.

You will have many choices to make about the research instruments you use for your study. For example, did you know that there are over 100 instruments available just to measure depression? Just like all guitars make music with strings, all these instruments measure depression. However, each instrument is designed for a specific type of goal, setting, format, or research participant. How does a researcher choose which instrument to use? New researchers are often surprised to learn that instrument selection is a complex and important step in the process of research design. This concise guide will show you how to identify the instruments that are available for your study, select the best instruments for the job, and describe the instruments so that others will know how and why you made your decisions. You may also find that the skills you develop and practice (e.g., goal setting, creating a detailed plan, creating and sticking to a timeline, digging deeper to find information, organizing large quantities of information, and collaborating) will transfer effectively to most jobs in a wide range of settings.

### WHY AN ENTIRE GUIDE ON INSTRUMENT SELECTION?

If you were going to buy a guitar, you would probably gather some information about the different models and pricing before making your decision. The same is true for research instruments. All research instruments

have limitations, and selecting the best instrument for a specific study requires weighing the instrument's strengths against its weaknesses for the specific task at hand. There is a lot to consider, including whether the instrument accurately measures the experiences and problems of the population with individual differences and diverse identities, languages, abilities, and other characteristics. Instrument selection is where researchers get to make some important choices that will impact the entire study, so it requires a careful and informed decision-making process. Unfortunately, if you do not give instrument selection some time and care, it may be difficult to interpret the results of your study later. I hope this guide will help you select the right instruments for the job before you collect and analyze your data so that you will be confident in your conclusions.

## HOW TO USE THIS GUIDE

This guide is intentionally brief so that you can read it quickly and easily. Each chapter focuses on a specific aspect of instrument selection. It is designed to be read from beginning to end. There are a lot of examples to show you the concepts. There are also worksheets for you to fill out along the way. The worksheets are in the text, and I will explain when to use them. I recommend copying the worksheets so that you can use them again for your next study. (This may be the first study that you design, and hopefully, it is not your last!) You will get the most out of this guide if you complete the worksheets along the way. They will help you understand the concepts, keep track of your work, and document the steps you have taken while selecting your instruments. The worksheets are also designed to be communication tools, so take the completed worksheets to your advising meetings to help you explain the work you have done.

Research is best when it is conducted in a team. Building a team and consulting with an advisor is often a new skill for new researchers. As a research advisor, I have seen students get to the end of their projects before I realized that they did not fully consult with me. This step can slip through the cracks when students do not know what questions to ask, when to ask them, or when it is appropriate to reach out for consultation.

This brings us to your first exercise. Figure 1 provides a list of issues you should discuss with your advisor as you go through the process of selecting and describing your research instruments. It is meant to be filled out over time. Take a minute to read it now so that you are familiar with the issues you will discuss with your advisor. Then place a check next to Item 1 on the checklist to indicate that you reviewed the worksheet.

Advisor Consultation Checklist	
Use the checklist below to ensure that you consulted with your advisor during the key steps in the process of selecting and describing your research instruments.	
1. ____	Read this checklist
2. ____	Made an appointment for our first meeting to discuss the instrument selection
3. ____	Showed my advisor this checklist
4. ____	Reviewed Figure 1.2, The Present Study Research Question, Aim, and Hypotheses Worksheet
5. ____	Reviewed Figure 1.1, Examples of Study Constructs
6. ____	Reviewed Figure 3.1, Search Term Note-Taking Worksheet
7. ____	Discussed what languages the population of interest may speak
8. ____	Discussed accessibility considerations for the population of interest
9. ____	Reviewed Figure 4.2, Possible Instruments Note-Taking Worksheet
10. ____	Discussed permissions that will be required
11. ____	Reviewed Figure 6.1, Decision-Making Worksheet
12. ____	Discussed which demographic variables and whether confounding variables will be measured
13. ____	Discussed whether institutional review board (IRB) approval is required and, if applicable, how to apply
14. ____	Discussed potential grants to cover the cost of the study
15. ____	Discussed whether to develop an instrument if one does not exist
16. ____	Reviewed efforts to obtain permission when permissions could not be secured
17. ____	Reviewed the descriptions of the instruments for my study proposal
18. ____	Reviewed the descriptions of the instruments for my IRB application
19. ____	Reviewed the descriptions of the instruments for my final manuscript

**Figure 1**

Advisor consultation checklist.

As you work your way through this guide, check off each item that you complete in your Advisor Consultation Checklist.

This is also a good time to begin Item 2 on the Advisor Consultation Checklist. Contact your advisor to request a 15- to 30-minute appointment for a date 1 to 2 weeks from now. By then, you will have a few items to go over. I did not include reminders in the checklist to set every appointment with your advisor. Instead, I suggest setting up a regular meeting time to go over your instrument selection. Fifteen to 30 minutes every 2 weeks should be sufficient, and this can be done one-on-one or as part of a research group discussion.

The first two chapters in this guide discuss how to identify the constructs and variables and the types of instruments available for you to consider using in your studies. Some information in Chapters 1 and 2 will be familiar to you. I find it helpful to review these concepts frequently. Also, students usually find the information more meaningful when they are applying it to their own studies.

In Chapters 3 and 4, I show you how to identify what instruments are available, collect the specific information you need to select your instruments, how to organize the information and keep helpful notes that you can use later, and how to engage in a decision-making process to make your selection.

Then, in Chapters 5, 6, and 7, we walk through how to obtain permission to use the instruments, how to pilot them to test their feasibility, and ethical considerations. In Chapter 8, I show you how to write descriptions of these instruments for various audiences. Then, in Chapter 9, we go over troubleshooting many common challenges that arise during instrument selection. Finally, the book ends with a conclusion followed by definitions of important vocabulary terms found in the book with cross-references to the chapters where the terms are first used and defined in the text.

1

# Identifying and Defining the Constructs and Variables to Measure

So you want to design a research study. There are so many interesting things to study in psychology and the social sciences. This book is about finding instruments to measure the topics you wish to study. Before we begin discussing instruments, though, let us make sure your research topic is clear and specific. It is important that you have a good idea of what you aim to study before you begin planning how you will measure those topics. If you are finding it difficult to choose your study topic, you are not alone. Beginning researchers often find it challenging to narrow down their study topics because there are so many good choices. If you have not narrowed down your topic yet, I recommend reading *Writing Your Psychology Research Paper* (Baldwin, 2018). Chapter 1 will guide you through the process of developing an idea, and the rest of the book is full of strategies for organizing your ideas until you arrive at a thesis.

It is important to remember that your study will take place within the larger context of social science research. Sticking with the music analogy

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from the Introduction, you can think of the body of social science research as a concert where each study is like one piece in the performance. One song on its own has meaning, but it has even more meaning when it is part of a set or a concert. Similarly, the findings from one study have meaning, but the meaning is even greater when the findings are part of a series of related or complementary studies. You can begin to understand how your study is part of a series of studies by conducting a thorough and critical review of the literature. Chapter 2 of *Writing Your Psychology Research Paper* (Baldwin, 2018) can help you with this process. Also, see *Conducting Your Literature Review* (Hempel, 2020), another guide in this series and one that focuses exclusively on the literature review. You should conduct the literature review before you select the research instruments for your study.

I also recommend that you develop one or two specific aims and one or two specific hypotheses and that you have these aims and hypotheses approved by your research advisor before you select your instruments. A *research aim* is the purpose or objective of a study. It sits within a trajectory of studies that collectively explain a psychological phenomenon or experience and is supported by a review of previous literature on the topic. A *hypothesis* is a proposition based on a theory or some limited evidence about the frequency of a phenomenon or how two or more variables are related. Table 1.1, Sample Research Questions, Aims, and Hypotheses, provides such examples for two hypothetical studies on posttraumatic growth in people with cancer. *Posttraumatic growth* is the personal growth that people sometimes experience after having gone through a trauma.

## CONSTRUCTS

Constructs are so difficult to describe and define that philosophers and social scientists have been discussing what constructs are for decades (Lovasz & Slaney, 2013). Some of the early pioneers of psychological assessment defined *constructs* as theoretical concepts that “refer to the processes or entities that are not directly observed” (MacCorquodale & Meehl, 1948, p. 104) and attributes of people, “assumed to be reflected

Table 1.1

Sample Research Question, Aim, and Hypothesis

	Question	Aim	Hypothesis
Example 1	How often do adults with cancer experience personal growth after the diagnosis?	To understand the frequency with which adults with cancer experience posttraumatic growth.	More than 75% of adults with cancer will experience posttraumatic growth within the first year after diagnosis.
Example 2	Is posttraumatic growth related to lower stress in adults with cancer?	To understand the strength and direction of the relationship between posttraumatic growth and stress in adults with cancer.	There will be a statistically significant negative relationship between posttraumatic growth and stress in adults with cancer. Patients who experience more posttraumatic growth will report lower stress.

*Note.* It can be difficult to distinguish between a research question, an aim, and a hypothesis. This table provides two examples of possible questions, aims, and hypotheses for two different studies.

in test performance” (Cronbach & Meehl, 1955, p. 283). The American Psychological Association’s *APA Dictionary of Psychology* (<https://dictionary.apa.org/construct>) defines a *construct* as “a complex idea or concept formed from a synthesis of simpler ideas.”

Most research in psychology and social science studies constructs. Psychology researchers hold the idea or belief that attributes of people—attributes such as intelligence, happiness, and hope—exist even though we cannot feel, see, hear, touch, or smell them. However, researchers can measure these constructs so that their observations and descriptions of the constructs have meaning that can be understood by and communicated to others.

One helpful approach to identifying the constructs you aim to study is to find a published article that reports a study that is almost like the study you would like to conduct. You can find this in your literature review. There are empirical articles, which describe the purpose, method, results,

and conclusions of one or a few studies. You can create a list of the constructs studied in all the empirical articles in your literature review. There is also a category of articles called systematic reviews and meta-analyses that review and synthesize all the articles on a specified topic. If a systematic review or meta-analysis has been conducted on the topic you wish to study, you are in luck because that article will list specific terms and constructs that the authors used to conduct their research on the topic. A *systematic review* is a type of literature review that includes a synthesis and summary of research on a particular topic to draw a new conclusion. A *meta-analysis* is a quantitative technique used to synthesize the results of studies that have already been conducted by conducting a mathematical analysis of the effect sizes of the studies.

Let us work through an example of how to identify constructs. I start by describing constructs that one of my students examined in her doctoral dissertation. I describe part of this study example here and then refer back to this study in Chapter 8 when discussing how to describe instruments for different audiences. This study was on the relationship between posttraumatic growth and social problem solving in adults with cancer and was eventually published in the *Journal of Clinical Psychology in Medical Settings* (Markman et al., 2019). The study examined two constructs: posttraumatic growth and social problem solving. As I mentioned earlier, posttraumatic growth is the personal growth that people sometimes experience after having gone through a trauma. *Social problem solving* is the methodical way people go about solving problems in their everyday lives. Although this study was conducted with adults with cancer, adults and cancer were not constructs examined. Adults with cancer is a description of the population of interest.

Let us work through another example together. This time, I describe the study, and you identify the constructs. The answers are in Figure 1.1, Examples of Study Constructs. This study was about student athletes. The issue or problem the student researcher identified was that student athletes experience about the same amount of mental health issues as students who are not on sports teams. However, student athletes seek help for their mental health issues less often than do other students who are not on athletic teams. This student decided to focus on whether

Examples of Study Constructs

Issue or problem	Construct
Study 1. Some adults with cancer experience personal growth after the experience of cancer and its treatment.  Individuals solve problems in a methodical way.	Posttraumatic growth  Social problem solving
Study 2. Student athletes have an identity as an athlete.  This athletic identity may be related to student athlete attitudes about seeking help from the student counseling center or other mental health services when needed.	Athletic identity  Mental health help-seeking attitudes

Figure 1.1

Examples of study constructs.

student athlete identities as athletes were related to their attitudes about seeking professional psychological help from the student counseling center or other mental health services when needed. The aim of the study was to understand whether athletic identity was related to student athletes’ attitudes about seeking mental health treatment. The hypothesis was that student athletes who had strong identities as athletes would have more negative attitudes about seeking mental health treatment. What do you think are the two main constructs in this study?<sup>1</sup>

## VARIABLE

Now that you understand what a construct is, let us also define what a variable is and then discuss how constructs and variables are similar and different. The *APA Dictionary of Psychology* (<https://dictionary.apa.org/variable>) defines a *variable* as “a condition in an experiment or a characteristic of an entity, person, or object that can take on different categories, levels, or values and that can be quantified (measured).” In research, variables are measured to describe the constructs under investigation.

<sup>1</sup>I acknowledge Elisabeth Markman and Amanda Chapin, who came up with these study ideas.

The construct is still abstract, whereas the variable is a measurable representation of that construct. Constructs and variables are similar in that they are both terms for ideas that are being studied. However, they are different in that the variable is a measurable representation of the construct. For example, social problem solving is a construct. When a person indicates how well they solve problems by stating, “I solve problems very well” or “I do not solve problems well at all,” this is a variable. More specifically, this is a variable with two levels. Level 1 is “I solve problems very well,” and Level 2 is “I do not solve problems very well at all.” If we were to describe social problem solving as someone’s score on a five-item questionnaire in which they rate each item on a scale of 1 to 5, social problem solving would be a variable with 25 levels (five items times five possible responses to each item).

There are two general types of variables: categorical and continuous. *Categorical variables* are variables that are described or measured in discrete or distinct categories. These may be nominal variables made up of two or more categories that do not have a distinct order, or ordinal variables that have two or more categories corresponding to the levels to indicate more or less of the variable but without a specific value to the level. *Continuous variables* are quantitative variables that, in theory, have an infinite number of values indicating the quantity or how much of the construct is present or reported by the participants.

In addition to understanding whether the variables are categorical or continuous, it will also help you understand whether you are measuring independent and dependent variables. These terms refer to the theories and hypotheses about how the variables are related when conducting an experiment. The *independent variables* are the variables that are manipulated or measured first to test how they influence the dependent variables. The *dependent variables* are the variables that you believe are being affected by the independent variables. Whether the variables are independent or dependent will not have much influence on which instruments you select. However, if you are conducting an experiment, knowing what the independent and dependent variables are in your study will help ensure that you select an instrument for every variable that has to be measured.

## OPERATIONAL DEFINITIONS

Each variable in your study will need an operational definition. *Operational definitions* are the specific methods by which the variables are observed and measured in a particular study. The rest of this book will guide you through the process of deciding on an operational definition for each variable in your study. In our example of the posttraumatic growth and social problem-solving study, there are many ways the researcher could measure posttraumatic growth and social problem solving. For example, each variable could be measured by asking participants to answer a series of questions related to their growth after cancer and how they solve problems. The questions could be about posttraumatic growth and social problem solving in general, or they could be about growth specifically after cancer and approaches to solving problems about cancer and treatment. These variables and operational definitions, as well as issues to consider, are demonstrated in Table 1.2.

There is one more thing to consider: You may also have to measure confounding variables. These are not the main variables in your hypotheses. The *main variables* are the variables related to the study's aims and hypotheses. The main variables are often the variables you are most interested in for a specific study. *Confounding variables* are variables that may make it difficult to understand the results of a study because they also help to explain the relationship between the two variables of interest by offering an alternative explanation as to why the variables are related. A *demographic variable* is a variable that describes the personal characteristics of an individual (e.g., age, race, religion). Sometimes a demographic variable is also a confounding variable. Sometimes, a demographic variable is used simply to describe the participants in a study. This guide focuses on the main variables in your study. If you are measuring confounding or demographic variables, you will need good instruments for these variables too. You may have to consult with your advisor about which confounding or demographic variables to measure. You will use the same process that is described in this guide to select instruments to measure these variables. I recommend focusing on selecting the instruments to measure the main variables for your current study

Table 1.2

Variables and Operational Definitions Example

Variable	Possible operational definitions	Issues to consider
Posttraumatic growth	<ol style="list-style-type: none"><li>1. An individual's score on the Posttraumatic Growth Inventory (Tedeschi &amp; Calhoun, 1996), with higher scores indicating more posttraumatic growth and lower scores indicating less posttraumatic growth.</li><li>2. Responses to an interview asking participants to describe their growth over the past year when they have been undergoing cancer treatment.</li></ol>	Each of the possible operational definitions is an example of an acceptable operational definition of posttraumatic growth. The researcher has to decide whether it is most important to measure general posttraumatic growth with a measure that is already developed and offers the ability to compare scores with those from other studies (in which Operational Definition 1 would be a better choice) or to specifically measure posttraumatic growth after cancer (in which Operational Definition 2 would be better).
Social problem solving	<ol style="list-style-type: none"><li>1. An individual's score on the self-report questionnaire, the Social Problem-Solving Inventory-Revised (D'Zurilla, Nezu, &amp; Maydeu-Olivares, 2002), with higher scores indicating more effective social problem-solving skills.</li><li>2. Score on a performance test that requires participants to solve a problem while being observed.</li></ol>	Operational Definition 1 offers a quicker measure of social problem solving, however it relies on the person's assessment of how well they solve problems. Operational Definition 2 does not rely on the person's self-assessment but requires more human resources (time from the participants and the observer, plus observer training) and may be less applicable to social problems if the performance task is more general.

first and then moving on to selecting the instruments for the confounding or demographic variables. Figure 1 includes an item for consulting with your advisor about measuring confounding or demographic variables.

Now, try to think of the research question, aim, and hypotheses for your study. In a published paper about a study, the authors refer to that study as the *present study*. Therefore, in Table 1.2, I refer to the study that you are currently designing as the *present study*. Figure 1.2, the present study research question, aim, and hypotheses worksheet, provides a

The Present Study Research Question, Aim, and Hypotheses Worksheet

Research question	Aim	Hypotheses (limit the study to 1–3 hypotheses)
		Hypothesis 1:
		Hypothesis 2 (if applicable):
		Hypothesis 3 (if applicable):

Figure 1.2

The present study research question, aim, and hypotheses worksheet.



worksheet for you to write down the question, aims, and hypotheses of the study you are currently designing. Fill this out now as best you can. In your next appointment, go over this completed worksheet to make sure that your question, aim, and hypotheses are clear, so you and your advisor agree about what they should be. After the meeting, make any needed revisions to Figure 1.2. Then check off Item 4 on your Advisor Consultation Checklist. Now that your research question, aim, and hypothesis or hypotheses are clear, let us move on to constructs and variables, which is the topic you will discuss with your advisor in the meeting after you discuss the question, aims, and hypotheses.

### SUMMARY

This chapter focused on identifying and defining the constructs and variables to measure. Before selecting the instruments you will use for your study, it is important that you know the aims and hypotheses of your study, paying particular attention to the type of claim you intend to examine. Figure out how many constructs you wish to measure for your study and identify which are the independent and dependent variables in the study. You will need an instrument to measure each measured variable in your study.