Preface

A course on intimate relationships is one of the most exciting in the academic curriculum. Every topic is fascinating in its own right, but also because the content is applicable to our daily lives. We all care about how to build and maintain happy, healthy interactions and connections with the people we love. We had so much fun writing this book, and we hope you love reading it.

Our Approach

What makes our book different from the other relationships textbooks? There are a few really excellent textbooks available from other authors, and each has strengths. In writing this book, we've pulled together all the aspects of learning that our own students appreciate and love. We believe we offer a comprehensive, modern, and engaging approach to the science of relationships.

A Thoughtful Progression of Chapters. We open by explaining how relationship science is an interdisciplinary field and why it matters. Then, research methods, ethics, and the open science movement are discussed. The rest of the chapters follow a typical romantic relationship's trajectory: singlehood and friendship, attraction, social cognition, dating, sexuality, and conflict and communication are all examined. A unique aspect of this book, compared to others, is that this content also includes three chapters devoted to three theoretical approaches to research: the evolutionary perspective, attachment theory, and interdependence. No other book gives all three theories equal weight or presents them as thoroughly. Finally, we end with three chapters framing how to think about relationships in the long term. One focuses on sexual assault and relationship violence, perhaps more explicitly than other books. We then offer a chapter on dissolution and divorce, and a chapter on enduring love.

A Modern Approach to Sex, Gender, and Sexuality. The world has progressed beyond heteronormality. One of the book's authors is in the LGBTQIA+ community, and this entire book is written with respect and inclusivity in mind. This is both explicit—such as covering research results for the community when available and a discussion of diversity in that chapter—and implicit, such as using gender-inclusive pronouns.

Scaffolded Learning. "Big questions" and learning objectives guide each chapter and help students see each section's major goals. There's also a glossary of terms, which is missing from some other popular books on this topic. In addition, each section of every chapter is followed by "check your understanding" multiple-choice questions and critical thinking questions. These questions can be used for class conversations, or instructors can assign them as essay prompts. Either way, these features are unique to this book and are evidence that we want students see their own progression toward mastery of the material.

Unique and Exciting Features. While most textbooks include boxed features of additional material, the features chosen for our book are intended to really engage students in exciting ways. Each of the following appear in every chapter:

- *What's My Score?* presents self-report measures students can take to learn about a key concept and to apply that concept to their own relationships.
- *Research Deep Dive* reminds students of the scientific methodology behind our understanding of relationships, emphasizing what they learn in Chapter 2 throughout the entire book.
- *Relationships and Popular Culture* discusses how movies, shows, books, and songs portray relationships so that students can use critical thinking to analyze the world around them.
- *Making Use of Relationship Science* is a **brand-new feature** for the second edition! We distill research into essential, applicable tips for how to immediately use the knowledge learned in that chapter to make relationships stronger.

A Conversational Tone. The best textbook is one students actually *want* to read. While some books have a formal, scholarly tone, this one is different. We've written it with a tone that parallels how we explain things to our own students in class. Our hope is that the book is fun, accessible, and approachable while still being thorough and accurate. Students will be excited by a book they truly understand and can relate to their own lives and interests. It's our personal goal that students who read this book will honestly enjoy it.

What's New to this Edition

Exciting additions and changes include the following:

- An entirely new chapter! This edition includes **Modern Dating in a Digital Age.** We also updated other aspects of the table of contents, including shifting the content from the previous "Relationships Across the Lifespan" into other chapters and separating the final chapter from the first edition (what was "Ending or Enduring Love") into two chapters, so we could be more thorough with that content and cover a topic (breakup) that students enjoy and other books don't cover in as much depth.
- Every chapter now has the new **Making Use of Relationship Science** feature, emphasizing how theory and research can be applied to help relationships be happier and healthier.
- Updated popular culture features discuss *Bridgerton*, Disney princess movies, queer cinema, parasocial relationships, *Love Is Blind*, and more.

- There is new content on the risks of oversharing, adult friendships, relationships for people on the autism spectrum, jealousy, disorganized attachment style, nonmonogamous relationships, incels, virginity, sexual fluidity, dialectical theory, deception, relationships for people of color, gaslighting, relationship violence in LGBTQ+ couples, ambivalence, unrealistic beliefs, relationship breakup, invisible support, emotional capital, and more.
- Throughout, the references and discussion of research have been updated to reflect contemporary and cutting-edge studies. The book has been updated to reflect 7th edition APA style and has a total of 504 new references.

Chapter 1

An Introduction to Relationship Science

Big Questions

1. Why study relationship science?
2. What are different kinds of intimate relationships?
3. How is this book organized?

Learning Objectives

1.1 Explain how relationships are associated with survival, physical health, and mental health.

1.2 Discuss theories regarding different types of liking and loving.

1.3 Describe the order of chapters and within-chapter features you'll see throughout the book.

Intimate relationships might be the most important and influential aspect of daily life.

Our social connections are a fundamental part of us, a core aspect of being human. They affect our daily lives in a wide variety of vitally important ways. But how can we understand them from a scientific perspective? This book will take you through the exciting and complicated world of the scientific study of intimate relationships.

No single text can contain all the theories, research studies, and applications in relationship science—and we don't want you to just memorize a bunch of terms and facts. Instead, we hope that you analyze each section, apply it to your own life when relevant, and think critically about what should happen next in the scientific exploration of this field. To continue understanding intimate relationships, we need the next generation of scholars to get involved. Maybe that's you.

Why Study Relationship Science?

As we each navigate our own intimate relationships, they can often feel like a frustrating mystery.

Why don't the people you like find you attractive? Why can't your friends understand your perspective? How can you know whether to commit to your partner for the rest of your life? Relationships can be confusing and emotional. So how can we study and understand them using theories, scientific experiments, statistical analyses?

The scientific study of intimate relationships is a relatively new endeavor. One of the best aspects of this field of study is that it is truly an **interdisciplinary** field that combines theories, methods, and results from a variety of academic approaches (Figure 1.1). These approaches include communication, sociology, biology, psychology, human development and family studies, anthropology, and more. In addition to friendships and family relationships (like siblings and parents), most scientists in the field study sexual and romantic relationships. Recently, attention has shifted from "traditional," heterosexual, monogamous relationships to other forms, such as same-sex couples, polyamorous relationships, hookups, and so on. This book will cover a bit of everything, highlighting the wide diversity in forms of love.

Let's get started by considering why relationship science has become increasingly popular in the last few decades.

A Rise in Scientific Interest

Attraction, love, and commitment are ethereal topics. Some people balk at the very idea that science could ever understand "love"—it kind of saps the romance. Despite this skepticism, thousands of researchers all over the world give it their best effort, and the findings from their studies offer theoretical and pragmatic insights in contexts such as couples therapy.

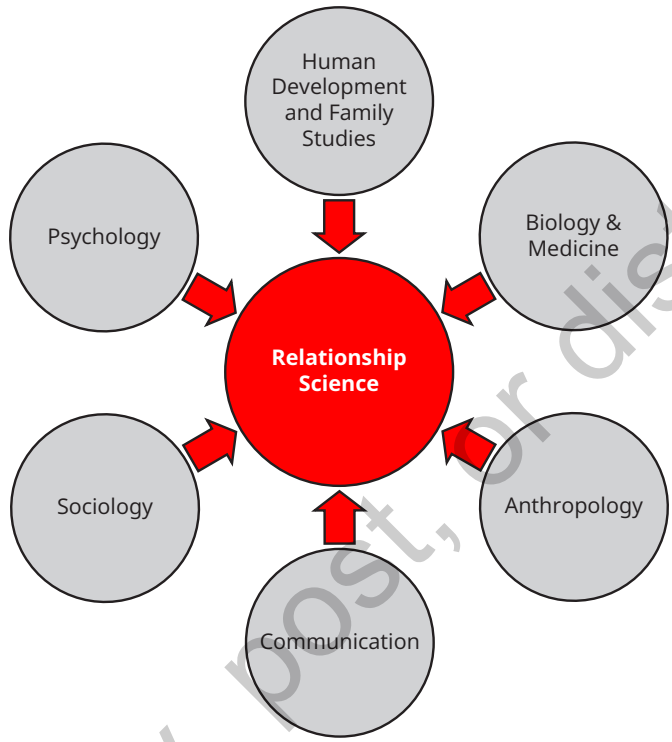
In general, there are two kinds of research on any topic—including relationships. **Basic research** is when scientists explore concepts simply to understand them more clearly, to advance theory, or to expand our base of knowledge on a given topic. For example, a study might investigate common personality traits in perpetrators of relationship abuse.

Basic research is the foundation for any academic field and is a necessary first step for the second type, **applied research**. Scientists doing applied research extend theories and patterns from basic research to solve real-world problems, help people who are struggling, or proactively make our world a better place. For example, once personality traits associated with abuse are identified (in basic research), applied research might then test and compare treatment programs designed to reduce abusive behaviors. Different programs could be linked to various personality traits so that treatments can be personalized for individual perpetrators. In this way, the applied research tries to make a real change, based on the understanding we gained from the basic research.

Scholarly attention toward the topic of relationship science—in both basic and applied forms—has blossomed in just the past few decades. One way to examine interest in the field is by simply counting the number of publications on relevant topics over the last 100 years. This can be done by searching for academic journal articles and book chapters in online databases that list publications. For example, in psychology (just one of the academic fields that makes up

Figure 1.1 ▪ Relationship Science Is Interdisciplinary

Relationship science is interdisciplinary, combining theories, methods, and results from several academic fields (the ones shown here are just examples).



relationship science) PsycINFO is a relatively comprehensive database of publications available through most college and university libraries.

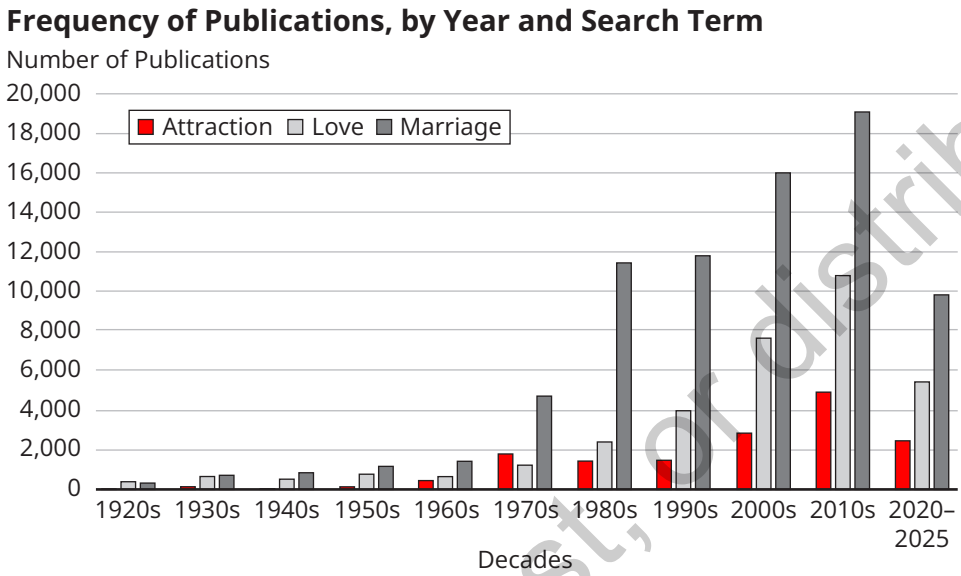
Figure 1.2 displays trends in publications listed in PsycINFO over the past 100 years. To create this chart, the search terms "love," "attraction," and "marriage" were entered by decade (just as examples). The results give us a good idea of the general increase in publications from a **longitudinal** view, or one with repeated measurement over time and multiple sessions of data collection. It's clear that research using any of these terms has exploded in frequency, especially since the 1980s. The last set of numbers, showing publications from the years 2020–2025 (we wrote this book halfway through 2025), indicate that the pace has continued to stay strong.

The Importance of Relationships in Our Lives

An increase in scientific scholarship regarding relationship science is great, but it doesn't answer the question of *why* interest has increased. In addition, a question that might be more interesting to you, personally, is why *you* should be studying the science of intimate relationships. Why

Figure 1.2 ▪ Frequency of Publications in PsycINFO, by Year and Search Term

Research on attraction, love, and marriage has greatly increased over time. Publications from 2020–2025 (when this book was written) show that pace has continued.



are you reading this book? Healthy, happy relationships are the cornerstone of life for many individuals. Their premier importance can be seen in a variety of contexts.

Intimate relationships can affect our physical health and vice versa.

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Relationships and Human Survival

At least some interpersonal contact is needed for the survival of the human species. Biologically speaking, reproduction usually means sexual bonding between a man and a woman (although with advances in technology, this isn't always true). Many studies are inspired by understanding how biological or evolutionary instincts apply to relationship and sexual behaviors. Thinking about relationships on the macrocosm level of the entire species is fascinating, and an entire chapter of this book is devoted to an evolutionary perspective of human relationships.

For now, consider briefly that Charles Darwin (1859) suggested that humans (and other species) evolved over time largely through **natural selection**. In this process, certain traits help an

individual survive and attract sexual partners—for example, intelligence or physical strength—and these traits are thus more likely to be passed on to the next generation. These traits, which provided **enhanced fitness** from a biological perspective, may also help any children survive, and again those traits stay in the gene pool. What particular characteristics do you think are most useful to human survival and our potential to reproduce successfully?

Instinctively, we also care about relationships because forming groups or communities increases our survival. One of the major benefits to friendships and to living in social groups is access to shared resources. We naturally form alliances and teams with people we think we can trust, even in abstract contexts like modern multiplayer videogames (Belz et al., 2013). In short, relationships are fundamental to our survival, both individually and as a species.

However, the evolutionary approach to understanding relationships can be criticized (as can all theories). It tends to overlook the LGBTQIA+ community, it reinforces differences between genders instead of similarities, and it has trouble explaining some behaviors such as when couples choose to adopt or to not have children at all (e.g., da Silva et al., 2025; Zagaria, 2024). Chapter 5 will explore the evolutionary perspective in much more detail, and this is just one of the major theoretical approaches to understanding relationships.

Relationships and Physical Health

Relationships can also affect our physical health.

A popular area of research is the link between the presence of healthy relationships in someone's life and their ability to cope with challenges, failures, and stress. The general idea of these studies is that physical health will be associated with people's level of **social support**, or the number and quality of relationships they have that they can rely on in times of need (House et al., 1988).

There are four specific types of social support, which we summarize for you in Table 1.1 (Uchino, 2004; Uchino et al., 2025).

Table 1.1 ▪ Four Types of Social Support, According to Uchino (2004)

Type of Social Support	Definition and Example
Emotional support . . .	provides warmth and nurturing through empathy and expressions of concern.
Tangible (or instrumental) support . . .	provides material needs such as loaning someone money or a car.
Informational support . . .	provides problem-solving information or advice such as the best way to travel to a foreign country.
Companionship (or belonging) support . . .	provides a sense of belonging by engaging in shared activities.

- **Emotional support** occurs when your friends and/or relationship partners express concern for you in times of need. Not shown in the table, but equally important, is that they should also share your joy and help you celebrate your successes.
- **Tangible support** (sometimes called instrumental support) comes when others offer physical aid, financial resources, or other pragmatic help you need at the time.
- **Informational support** is when others provide facts or details that can help you understand or manage a stressful situation. They help you make decisions.
- Finally, **companionship support** (also called belonging support) helps you feel like you're not going through life alone. This could mean simply being by your side as you go through something or helping take your mind off it with a fun activity.

For example, imagine a man whose wife of many years decides to divorce him. During this difficult and stressful time, his friends can offer all four types of social support. Emotional support can involve listening to him while he talks through his anger or sadness. His friends might provide tangible support if they loan him money, let him sleep in their guest room, or physically move his furniture into a new apartment. Informational support might include helping him understand the state laws on divorce or providing recommendations for a good divorce lawyer. Finally, companionship support could be helping him avoid loneliness by inviting him to various events and parties.

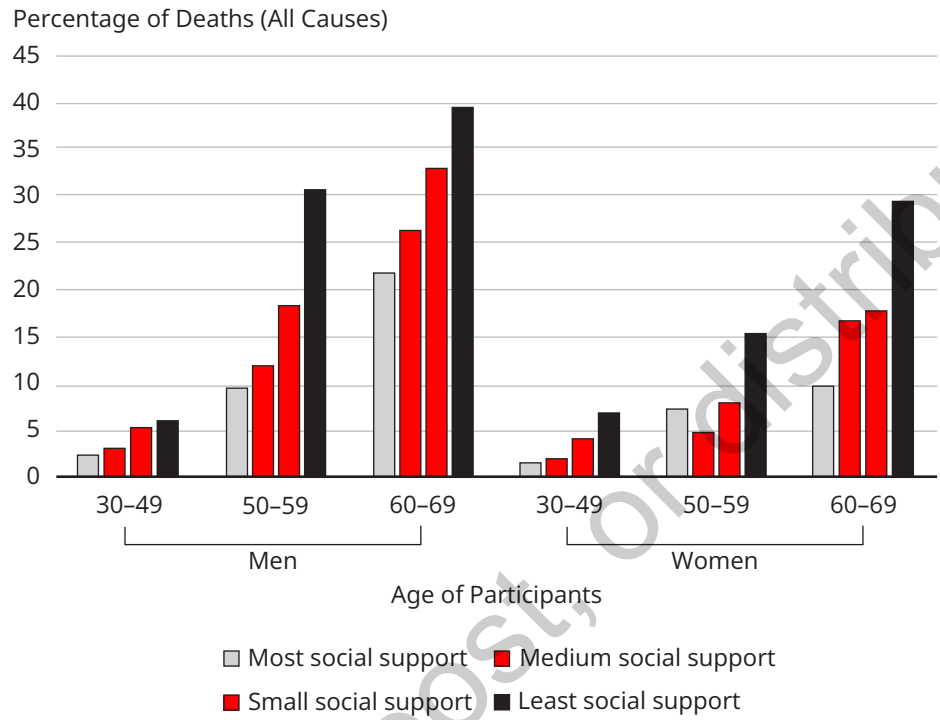
Identifying types of social support is a great example of basic research. How does social support translate into improved physical health—an example of applied research? The first large-scale study to investigate this link was the Alameda County Study (Berkman & Syme, 1979). In 1965, researchers sent lengthy questionnaires to every single resident living in Alameda County, California, who was at least 20 years old. Almost 7000 people completed and returned the surveys. One of the scales in the questionnaire asked about social support. Support was measured by whether the respondents were married, how many friends and family members they had frequent contact with, and how many social groups they belonged to (such as religious communities).

To see whether amount of social support was associated with physical health, the researchers then checked in with every participant over 9 years. Health was measured in a variety of ways, including additional questionnaires about smoking and alcohol, exercise habits, doctor visits, and so on—but the major concept the researchers tracked was how many of the participants actually died over those 9 years. The results are in Figure 1.3.

Happily, mortality rates for people between 20 and 29 years old were very low, regardless of social support levels (so low they aren't even in Figure 1.3). As the trend in Figure 1.3 shows, for older participants, higher levels of social support were associated with lower death rates. Overall, people with better social support were two to four times less likely to die. This trend was especially pronounced for men and was stronger as people got older.

You can imagine how the four kinds of social support described earlier might contribute to healthier habits, more exercise, more visits to the doctor, and so on. People might have a friend

Figure 1.3 ▪ Connections between Social Support and Mortality



Source: Berkman and Syme (1979).

with whom they go to the gym a few times a week, or someone's partner might remind them to take their pills or make doctor's appointments. In these ways, having better social support might lead to better physical health outcomes.

On the other hand, the reverse might also be true: People with worse health might be less likely to go out with friends, less likely to initiate romantic relationships, or even less likely to join social groups, so maybe worse health leads to lower social support. It's also possible that a third variable is involved. Maybe, for example, socioeconomic status matters. Having more economic resources might help people maintain better physical health (due to being able to afford doctor visits, eat healthier, etc.) and potentially engage more socially (because they have more free time, can afford to go out with friends, etc.).

This is a good example of a phrase scientists like to use: *Correlation does not equal causation*. We know that physical health and social support are tied together, but we can't say for sure whether one *causes* change in the other without a different kind of research. We'll talk more about correlations and what they mean in Chapter 2.

The Alameda County Study is a famous example of research on the link between relationships and physical health. Over the past several decades, additional research has established more

evidence that happy, healthy relationships are correlated with our physical health (for an entire book on this topic, see Agnew & South, 2014). For example, good relationships are associated with better resilience to heart disease (Coyne et al., 2001; M. L. Newman & Roberts, 2013), healthier neural and immune system responses (Loving & Keneski, 2014), better stress reactions at the hormonal level (Coan et al., 2006; Slatcher, 2014), and better management of chronic pain, especially for people in rural and relatively isolated locations (Tollefson et al., 2011). The flip side of the coin is also true: Unhealthy and abusive relationships are tied to worse physical health and may even be the cause of chronic illness in some cases (Jetter, 2013).

Relationships are also tied to the chemicals our bodies produce. Sexual contact with others—even cuddling!—can trigger the release of dopamine and oxytocin in the brain, two natural chemicals in the body associated with feelings of pleasure, relaxation, recall of positive memories, and attachment to others (Blaicher et al., 1999; Carmichael et al., 1987; Depue & Collins, 1999; Folorunsho et al., 2024; Gonzaga et al., 2006).

We'll return to the specific idea of different types of social support at the end of the chapter. For now, consider how relationships are also tied to mental health.

Relationships and Mental Health

Being surrounded by friends, family, and a loving partner would make anyone's life better. It should be no surprise that thousands of research studies find that social support is also associated with better mental health. A term often used in this research is **well-being**, an overall or general summary of someone's happiness, mental health, and cognitive ability to cope with stress. In general, good intimate relationships are associated with better well-being.

In one simple exploration of the link between well-being and social support, college students were given a survey that measured their anxiety, depression, hostility, and loneliness (Sarason et al., 1987). Researchers measured social support by asking each student these three questions:

- Who accepts you totally, including both your worst and your best points?
- Whom can you really count on to tell you, in a thoughtful manner, when you need to improve in some way?
- Whom do you feel truly loves you deeply?

Students who said that they had more loving, supportive people in their lives (quantity of support) and that these relationships were satisfying (quality of support) said that they had lower anxiety, depression, hostility, and loneliness (the study's measure of well-being, or mental health).

Across many studies, positive and secure intimate relationships are associated with better well-being (e.g., Birnbaum et al., 1997; M. L. Cooper et al., 1998; Karreman & Vingerhoets, 2012; Merz & Consedine, 2009). For example, college students in Israel with secure and supportive intimate relationships reported better coping to missile attacks during war (Mikulincer et al., 1993). Mothers with newborn infants suffering from congenital heart disease were better able to emotionally deal with the infants' special needs if they (the mothers) felt secure in their adult intimate relationships (Mikulincer & Florian, 1998). A wide variety of diagnosable

mental illnesses are correlated with lower levels of social support, including personality disorders (Critchfield et al., 2008), dissociative disorders (Ogawa et al., 1997), eating disorders (Cole-Detke & Kobak, 1996), and schizophrenia (Fonagy et al., 1996). The list goes on and on, but it seems clear that intimate relationships can affect our mental health and happiness, and our mental health and happiness can affect our intimate relationships.

Check Your Understanding

1.1 When understanding of any topic comes from combining theories, methods, and results from a variety of academic fields (such as psychology, communication, and human development and family studies), this approach is called:
- **a.** Interdisciplinary
- **b.** Cross-cultural
- **c.** Longitudinal
- **d.** Basic research

1.2 You are visiting a new city for the first time and find the subway system confusing. So, you call your friend who lives there and they explain what trains and stops you need. In this case, which type of social support is your friend providing?
- **a.** Emotional support
- **b.** Tangible support
- **c.** Informational support
- **d.** Companionship support

1.3 Which statement below is an accurate summary of the findings from the Alameda County Study (Berkman & Syme, 1979)?
- **a.** Social support was not correlated with mortality rates in this study.
- **b.** Surprisingly, more social support was associated with higher mortality rates.
- **c.** More social support was associated with lower mortality rates, especially among older men.
- **d.** Social support and mortality weren't correlated for people between the ages of 30 and 59, but they were correlated for people over 59 years of age.

Application Activity

Figure 1.2 displayed how the frequency of publications on intimate relationships has greatly increased over the last 100 years. However, this is based on only the three search terms used within PsycINFO ("attraction," "love," and "marriage"). Would different patterns emerge with other terms or if alternate databases were used? Choose three search terms related to relationship science and interesting to you, personally. First, explain why you've chosen these terms. Then, choose an online database available to you and explain why

you've chosen it. Create a graph similar to Figure 1.2 using your search terms, and analyze the patterns that appear to emerge.

Critical Thinking

- This section introduced the idea of basic versus applied research. Which do you think is more valuable? Which do you, personally, find more interesting? Is it really possible to have one without the other? Provide specific examples that support your opinion.
- Which of the four types of social support (emotional, tangible, informational, companionship) do you value the most in your own life? What kinds of situations would change your answer, at least temporarily? Do different kinds of people value some types of support more, regardless of the situation? Explain your answers.
- Can you identify a time in your own life when having a supportive friend, family member, or romantic partner improved your physical health and/or mental health, or a time when you helped someone else? Describe the circumstances of this situation.

Answers to Check Your Understanding Questions

1.1 a, **1.2** c, and **1.3** c.

What Are Different Kinds of Intimate Relationships?

On some levels, the question "What are different kinds of intimate relationships?" is easy to answer. You might have relationships with your friends, your family members, your professors, your dating partner(s), and so on. Each relationship type could be considered a different relationship category. But what is "intimacy" in the first place? Are intimacy and love the same thing? Are you "intimate" with your friends? How "intimate" does a conversation have to be before it becomes personal, rude, or suggestive?

It's important to know how researchers approach the definition and measurement of relationships and of all the relevant concepts we'll discuss in this book. A **categorical approach** to relationships is one that separates types or forms of relationships into groups, like friends versus romantic partners. However, the question gets more nuanced if you think about intimate relationships from a **continuous approach**, one that considers relationships on a sliding scale or

range of intimacy. A continuous approach might, theoretically, look like what you see in Figure 1.4. Here, strong intimacy is one end of a possible range, with the other end being no connection or feelings at all.

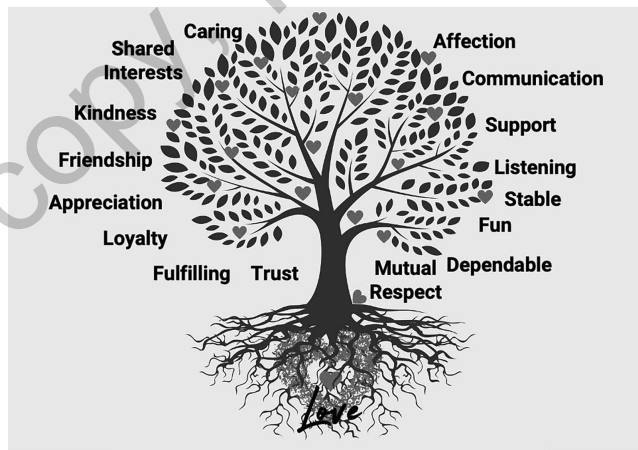
Figure 1.4 ▪ A Continuous Approach to Types of Intimate Relationships

No feelings at all — Strong intimacy

Relationships could be conceptualized along a continuum, with strong intimacy on one end and no feelings at all on the other.

Beyond whether relationships should be studied from a categorical or continuous approach, a difficulty in the scientific study of intimate relationships is how to define abstract ideas like "love." Academic fields treat "love" as a **construct**, a theoretical, abstract, and invisible concept or idea. To study it in research, we have to **operationalize** it, which means defining it in very specific ways related to how we plan to measure it in a given study.

As you can probably imagine, different researchers have operationalized or defined love in a wide variety of ways over the years. While some studies operationalize love using objective numbers such as a relationship's length in months or years, most researchers use subjective self-report scales to assess psychological feelings or thoughts regarding participants' experiences of love (Berscheid et al., 1989; Knobloch et al., 2001). You'll see a lot of operationalizations of love in this book; for now, let's discuss one classic idea.



What exactly is love? What is love made of—and how can relationship scientists define and measure it?

Created by authors.

Defining and Measuring Love: Rubin's Scales

Over the years, researchers have defined love in many different ways. Everyday people also seem to have notions of different kinds of love, as heartbroken suitors immediately understand the meaning of the sentence "I love you, but I'm not *in love* with you." Ouch.

Around 50 years ago, one of the first scholars to operationalize "romantic love" was the social psychologist Zick Rubin (1970). His definition was this: "love between unmarried opposite-sex peers, of the sort which could possibly lead to marriage" (p. 266). Right away, you can probably see several problems with this definition:

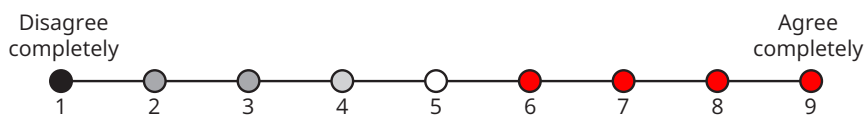
- It assumes that most people in love are on a path toward marriage (while in fact many couples may not be interested in marriage at all; we'll discuss declining marriage rates around the world later).
- It assumes that romantic love exists only between "opposite-sex" peers, which means that only heterosexual, cisgender people feel love; clearly this is limited and heteronormative).
- It assumes that married people do not feel romantic love!

Despite this severely limited definition of romantic love, Rubin was still an important figure in the progression of research on intimate relationships because he was one of the first scholars to create a self-report measure of love that participants could complete in survey research. When he created his scale, he specifically made sure to include items that would distinguish "liking" from "loving" (a categorical approach), but scores on the scale also have a possible range to indicate strength of feeling (a continuous approach). The result is the scale shown in the What's My Score? feature. Try answering the questions yourself to see what your score is on each set of items.

What's My Score?

The Rubin Scales of Liking and Loving

Instructions: For the items below, you'll see an X in place of a person's name. When you think about the love scale, replace X with your current partner's name (if you don't have a current partner, try thinking about someone you *wish* you were dating or in a relationship with). When you think about the like scale, replace X with your best friend's name. For each item, write your level of agreement using this scale:



Love Scale

____ **1.** If X were feeling badly, my first duty would be to cheer them up.
____ **2.** I feel that I can confide in X about virtually everything.
____ **3.** I find it easy to ignore X's faults.
____ **4.** I would do almost anything for X.
____ **5.** I feel very possessive toward X.
____ **6.** If I could never be with X, I would feel miserable.
____ **7.** If I were lonely, my first thought would be to seek X out.
____ **8.** One of my primary concerns is X's welfare.
____ **9.** I would forgive X for practically anything.
____ **10.** I feel responsible for X's well-being.
____ **11.** When I am with X, I spend a good deal of time just looking at them.
____ **12.** I would greatly enjoy being confided in by X.
____ **13.** It would be hard for me to get along without X.

Like Scale

____ **14.** When I am with X, we are almost always in the same mood.
____ **15.** I think that X is unusually well adjusted.
____ **16.** I would highly recommend X for a responsible job.
____ **17.** In my opinion, X is an exceptionally mature person.
____ **18.** I have great confidence in X's good judgment.
____ **19.** Most people would react very favorably to X after a brief acquaintance.
____ **20.** I think that X and I are quite similar to each other.
____ **21.** I would vote for X in a class or group election.
____ **22.** I think that X is one of those people who quickly wins respect.
____ **23.** I feel that X is an extremely intelligent person.
____ **24.** X is one of the most likable people I know.
____ **25.** X is the sort of person whom I myself would like to be.
____ **26.** It seems to me that it is very easy for X to gain admiration.

Scoring: For each scale (love and like), add the items together to find your total score. The result should be a number between 13 and 117, with higher numbers indicating more loving or more liking.

When Rubin asked college students to take the scales back in 1970, the average scores were as follows:

- Men who took the love scale: 89.37
- Women who took the love scale: 89.46
- Men who took the like scale: 55.07
- Women who took the like scale: 65.27

Source: Z. Rubin (1970). Note that some items have been slightly changed so that pronouns are gender inclusive.

Critical Thinking: Do you think that some of the items in this scale are out of date or that people of different genders or sexual orientations would interpret them differently? If so, what questions could be updated or added?

When Rubin asked college students to complete his loving scale regarding their current partner back in 1970, he found that higher scores on the scale really were associated with their estimates of how likely they were to get married (as his original definition suggested). However, scores were not correlated with length of the relationship; it seems that some people fall in love quickly, while others take time (Z. Rubin, 1970). Since 1970, many studies have found other interesting trends by including **Rubin's liking and loving scales**.

For example, one study (Kenrick et al., 1989) showed participants nude centerfolds from either the erotic magazine *Playboy/Penthouse* (male participants) or *Playgirl* (female participants). Results showed that men who looked at the images reported lower love scores for their partners afterward but that the images didn't affect women's love scores. Note, however, that more recently when researchers tried to replicate these findings, or confirm them by doing the study again, neither men nor women had lower love scores after looking at erotica across three different groups of participants (Balzarini, Dobson, et al., 2017).

Another study found that higher scores on Rubin's love scale were associated with participants' certainty and confidence in their relationships, in their own feelings about their partner, and in their partner's feelings (Knobloch et al., 2001). People report being more in love when their current partners match their ideal expectations in terms of trustworthiness, attractiveness, and status (L. Campbell et al., 2001). Higher scores were also correlated with better overall marital quality, more sexual satisfaction, and better communication (Perrone & Worthington, 2001). So, while Rubin's original definition of love may have been flawed, his ideas made him an early pioneer in inspiring research that continues today.

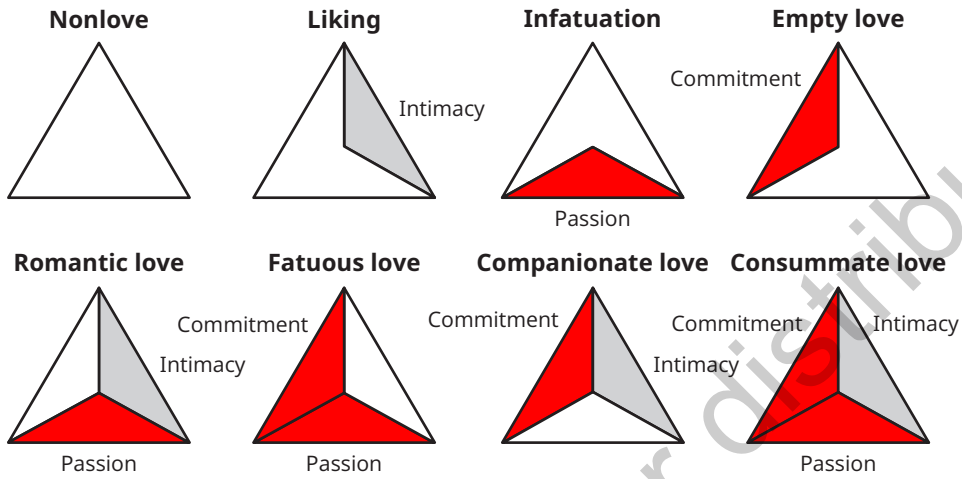
Sternberg's Triangular Theory of Love

Rubin's early work laid the groundwork for potential ways of scientifically defining and measuring love. But as we've already noted, there are dozens of ways this might be done—love might be gazing at someone with longing, sexual passion, and/or feelings of euphoria (Fehr, 1988). Other researchers have published typologies that make distinctions between styles of loving (Hendrick & Hendrick, 1986; J. A. Lee, 1977), love versus commitment (Kelley, 1983), and models of trust and attachment to others (Ainsworth et al., 1978; Bartholomew & Horowitz, 1991; Bowlby, 1958). The list could be longer—and we will discuss many of these theories in later chapters—but you get the idea.

One of the most well-known theories attempting to define intimate relationship types is the **Sternberg triangular theory of love** (Sternberg, 1986). It's called the "triangular" theory (sometimes the "triarchic" theory) because Sternberg suggested that love is made up of three components, like ingredients in a recipe, and that the degree to which each of these components is present in any given relationship will determine its nature. In this way, Sternberg's theory is both categorical (he suggests eight different types of relationship, as shown in Figure 1.5) and continuous, as levels of each component can range in degree or amount.

Let's start with examining the three components (Sternberg, 1986):

Figure 1.5 ▪ Eight Types of Love in Sternberg's Triangular Theory



Source: Sternberg, R. J. (1986). A triangular theory of love. *Psychological Review, 93*(2), 119–135, reprinted with permission.

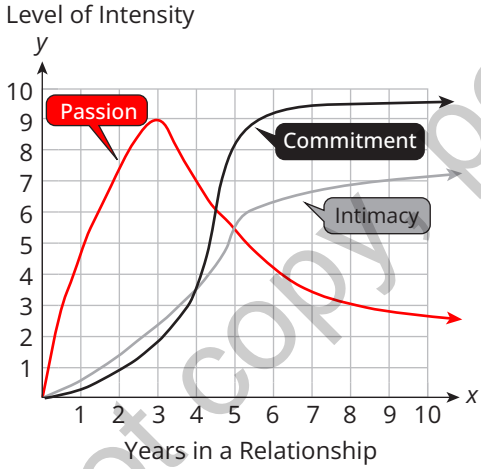
- **Intimacy:** The emotional component, intimacy is feelings of closeness, connection, bonding, and warmth toward a partner. High intimacy is associated with the desire to protect someone, high regard for them, and more revealing of secrets and other deeply personal information.
- **Passion:** The physical, motivational, or behavioral component, passion is sexual drive or attraction toward a partner, including physical arousal and other bodily changes (increased heart rate, release of brain chemicals, etc.). While passion for someone else is not necessarily in our control, we're usually aware of our physical attraction toward certain others.
- **Commitment:** The cognitive component, commitment is a thoughtful, reasoned decision to stay with a given partner and to maintain the relationship, often exclusively. "Loving relationships almost inevitably have their ups and downs, and there may be times in such relationships when the decision/commitment component is all or almost all that keeps the relationship going" (Sternberg, 1986, p. 123).

If you think about these components as being simply present or absent, there are eight categories of relationship that are theoretically possible (Figure 1.5). If a relationship has none of the components, it's called "nonlove"; these would be relationships with casual acquaintances, such as people in your class whom you don't know personally. Sternberg (1986) notes that "the large majority of our personal relationships" are nonlove (p. 123).

The opposite would be "consummate love," or complete and perfect love. In Sternberg's theory, ideal romantic relationships have commitment, intimacy, and passion. If you have only one or two of these three essential components, you get one of the other six types of relationship. For example, "companionate love" is more like a deep friendship; it's missing sexual/physical attraction, but it has all the other aspects of being with a partner. The other forms are romantic, liking, fatuous, infatuation, and empty love, which you can see result from different combinations.

From a categorical perspective, you can probably think of people you know who represent these different types of relationship. Younger couples might be more driven by passion, for example, and thus be more likely to experience infatuation, while older couples more interested in an emotional connection might be considered closer to liking relationships. However, remember that while Sternberg categorized these eight different types of love based on whether each component was present or absent, he also approached relationships from a continuous approach. If passion, intimacy, and commitment can all range on a continuum, then a *single* relationship might change categories over time.

Figure 1.6 ▪ Changing Components of Love in a *Theoretical* Relationship Over Time



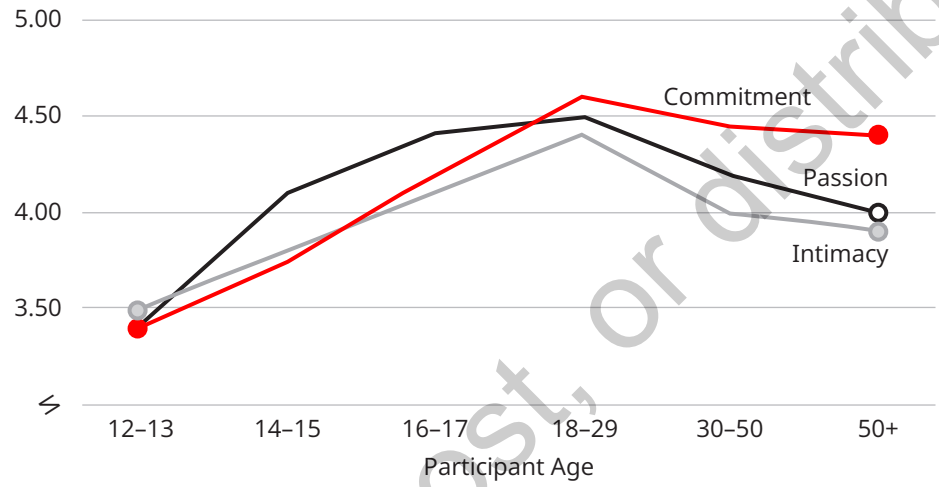
Source: Sternberg, R. J. (1986). A triangular theory of love. *Psychological Review, 93*(2) 119–135, reprinted with permission.

Consider Figure 1.6. Here we have a theoretical relationship between two people that ebbs and flows in its nature over 10 years. At the beginning, the two people involved barely know each other (nonlove); all three components are low. In the first 3 years, they quickly develop physical attraction toward each other; as their passion peaks and is the driving force behind spending time together, they are infatuated. This trend matches a finding that on first dates physical attraction is the most important factor in how much people feel satisfied by the end (Walster et al., 1966). Later, if they become emotionally invested and decide to commit to each other, for a moment in time (around year 5) they achieve consummate love.

Consummate love is hard to maintain, though. Sternberg wrote, "Attaining consummate love can be analogous in at least one respect to meeting one's target in a weight-reduction program: Reaching the goal is often easier than maintaining it. The attainment of consummate love is no guarantee that it will last" (1986, p. 124). In the theoretical relationship shown in Figure 1.6, the two couple members slowly lose physical passion for each other, but their high levels of intimacy and commitment keep them together.

A study that measured the three love components in relationships for participants from a wide range of ages (from 12 to 88 years old) mostly supported this general pattern (in Figure 1.7; Sumter et al., 2013). In youth relationships (ages 12–17), all three love components were relatively low, and all three peaked in young adult relationships (ages 18–29). In older couples (over 50), commitment stayed strong while intimacy and passion both declined.

Figure 1.7 ▪ Changing Components of Love in *Real* Relationships Over Time



Source: Sumter et al. (2013).

Many studies have used Sternberg's (1986) theory and the scales he created to explore various interesting aspects of relationships (and there are updated versions; see Sorokowski et al., 2021). There are also translations for languages besides English and modifications of the scale specifically for college students (Lemieux & Hale, 1999) and for married couples (Lemieux & Hale, 2000). Here are just a few examples of interesting research studies and applications of Sternberg's triangular theory of love:

- All three components of love are associated with relationship satisfaction in emerging adults, ages 18–25 years old (Nabila & Gunawan, 2023).
- Women in relationships at least a year long who are targets of psychological abuse report low levels of intimacy and commitment to their partners—but interestingly, they also report either no passion or high passion, showing two very different motivations (Ablana et al., 2024). We discuss theories and research on relationship violence in depth in Chapter 12.

- People who have personality traits such as impulsivity, excitement seeking, and low empathy—a combination sometimes called psychopathy—tend to have lower intimacy and commitment to their romantic partners (Čopková & Lörincová, 2021).
- When people feel versions of commitment and intimacy toward their professions (such as nursing), they are more dedicated to their job and emotionally resilient to burnout (Joy & Nashwan, 2024).

Check Your Understanding

1.4 This section discussed the difference between continuous constructs and categorical constructs. Which of the constructs below is categorical?
- **a.** Height
- **b.** Country where you were born
- **c.** Number of sexual partners someone has had
- **d.** Scores on the Rubin "love" scale

1.5 What type of love would Sternberg say includes high levels of passion, intimacy, and commitment?
- **a.** Companionate
- **b.** Fatuous
- **c.** Consummate
- **d.** Romantic

1.6 According to research on Sternberg's triangular theory of love, which component below increases the most slowly, but also tends to stay high after years of a couple being together?
- **a.** Intimacy
- **b.** Commitment
- **c.** Passion
- **d.** Liking

Application Activity

Analyze two or three famous celebrity relationships you've seen in the news over the past several years. Do they seem to be driven by one, two, or all three components in Sternberg's triangular theory of love? Do the component levels change over time for those couples? Do you think the nature of celebrity lifestyles makes relationships fundamentally different than relationships for noncelebrities in terms of these three components? Explain your opinion.

Critical Thinking

- Do you prefer to think about intimate relationships in a continuous way or a categorical way? Why does this system appeal to you?
- Most of the studies based on Sternberg's theory have been conducted with participants in countries like the United States or similar cultures. Do you think the same three components exist in every culture? Do different cultures emphasize different components at different times or with different types of people? What about other kinds of relationships in the United States? (For example, do asexual people feel differently about passion? Do people in polyamorous relationships feel differently about commitment?) Discuss your views.
- Imagine that you knew you would be in only one monogamous romantic relationship for the rest of your life—and that relationship could only have *one* of Sternberg's three components. Which one would you choose, and why?

Answers to Check Your Understanding Questions

1.4 b., **1.5** c, and **1.6** b

How Is this Book Organized?

Hopefully you enjoy reading this book! But any textbook can seem overwhelming at first. Breaking down what to expect helps.

Chapter Order

We designed the table of contents with a specific order of ideas in mind.

Of course, Chapter 1 is a basic introduction to relationship science. Chapter 2 follows with a much more in-depth explanation of the research methods and statistical analysis options we have for studying our questions and hypotheses. After that, we start to critically examine relationships from start to finish. The chapter order follows a logical step-by-step progression.

Chapter 3 focuses on singlehood and friendship, where many relationships begin. Chapter 4 is about attraction, which might be where a relationship goes next. The next section (Chapters 5 through 7) is basically the "theoretical foundations" part. These chapters cover three of the most popular and broad-reaching theories used to understand relationship patterns. The theories attempt to explain why people act and think as they do in relationships, how that translates into different people's experiences, and how each theory applies to a wide variety of settings. This

strong emphasis on a theoretical foundation can help you use the theories through the rest of the book and, potentially, into your own life or even research projects.

The second half of the book (Chapters 8 through 14) covers theory and research regarding various forms of relationships and how they evolve. We left off with attraction in Chapter 4, so we pick things back up with social cognition in Chapter 8, which is how we perceive people, form judgments, make decisions, and retain memories. Chapter 9 is a focused examination of modern dating in a digital age. Chapter 10 is a contemporary examination of the complicated and nuanced world of sex, gender, and sexuality.

The last set of chapters discusses some of the best and worst experiences we can have in relationships. In Chapter 11, we'll talk about some of the conflicts people experience—Why do they happen? What can we do to improve communication? Chapter 12 tackles the important but difficult subjects of sexual assault and partner violence. If our relationships don't go well, they might end, which we discuss in Chapter 13. Finally, we end on a positive note: Chapter 14 covers theory and research on lasting, happy, successful relationships.

Special Features

To start each chapter, you'll see "big questions" and learning objectives that guide three major sections in an outline. Each section concludes with some questions where you can do a quick check of your understanding for a few concepts, an application activity, and some critical thinking essay or discussion prompts. At the end of the chapter you'll see an overall summary and a list of key terms.

Every chapter also includes four special features to help you really engage with the material.

- **What's My Score?** allows you to take a self-report scale relevant to a concept in that chapter. You've already seen one of these, for Rubin's liking and loving scales. This feature is helpful in two ways. First, it allows you to better understand exactly how a particular variable is operationalized in research. Second, by calculating your score, you can apply the concept to your own life and experiences.
- In Chapter 2, we'll talk about research methods and statistical analysis. These concepts are fundamental to relationship science. To remind you and help you practice the concepts you're learning, each chapter has a **Research Deep Dive** feature. These go into detail about a particular research study, using terms from Chapter 2 and reinforcing the science behind our field. Because you haven't gotten to that one yet, the Research Deep Dive you'll see here just talks about details from a study in general terms.
- The **Relationships and Popular Culture** features discuss how friendships or romantic relationships are portrayed in songs, television, books, and movies. Fictional relationships reflect what our culture thinks is exciting and what matters as well as how values change over time. Analyzing the patterns and characters we see in popular culture reveals insights about real life. The first example here in Chapter 1 summarizes

an analysis of themes in some of the most popular Hollywood movies about love since the 1960s.

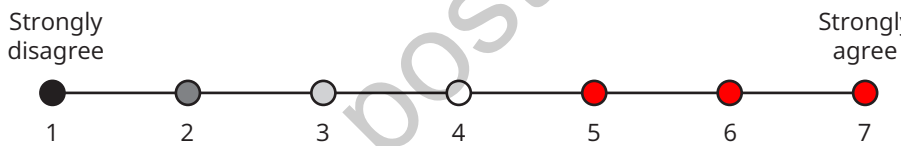
- Finally, we want to help you use the ideas in this book to make your own relationships happier and healthier. So each chapter includes a **Making Use of Relationship Science** feature. These are essentially life hacks that translate potentially abstract or complicated ideas into "take-home" messages about how to actually apply what you learn.

To finish this chapter, we offer one of each of the four features now, so you can see how they will look. Engage with them, ask questions, and apply them to your own relationships. We hope you find this topic as exciting to read as we found it to write and that you look forward to learning more.

What's My Score?

Measuring Intimacy, Passion, and Commitment in College

Instructions: Think about your current partner. Next to each item below, write how much you agree using this scale:



Intimacy

____ **1.** My partner and I share personal information with one another.
____ **2.** There is nothing I couldn't tell my partner.
____ **3.** My partner and I self-disclose private thoughts and information to each other.
____ **4.** There are things I could tell my partner that I can't tell anyone else.
____ **5.** My partner understands my feelings.
____ **6.** My partner and I are psychologically close to one another.

Passion

____ **7.** I feel a powerful attraction for my partner.
____ **8.** I am often aroused by my partner's presence.
____ **9.** My partner and I are very passionate toward one another.
____ **10.** My partner and I are very affectionate toward one another.
____ **11.** My partner is sexually exciting.
____ **12.** My partner and I have a very passionate relationship.
____ **13.** Sex is an important part of our relationship.

Commitment

____ **14.** I am committed to continuing our relationship.
____ **15.** I think of our relationship as a permanent one.
____ **16.** I am unlikely to pursue another relationship in the future.
____ **17.** Commitment is an important part of our relationship.
____ **18.** I think this relationship will last forever.
____ **19.** I would rather be with my partner than anyone else.

Scoring: For each subscale, add the items together and then divide by the number of items to find the average. Higher numbers indicate stronger or more extreme experiences of that component. When Lemieux and Hale (1999) asked college students to complete the scales, the average scores were as follows:

- Men: 5.4 for intimacy, 5.6 for passion, and 4.5 for commitment
- Women: 5.9 for intimacy, 5.8 for passion, and 5.3 for commitment

Source: Lemieux & Hale (1999, 2000).

Critical Thinking: Notice that when the authors of these scales gave them to college students, women scored slightly higher on all three components, compared to men. Why do you think that happened?

Research Deep Dive

Social Support and the Optimal Matching Hypothesis

When your relationships don't go well, you probably turn to friends and family for support. They can help you laugh or cry, maybe distract you if you start to obsess, and ideally assist you in moving on.

Earlier, we identified types of social support. When you need a shoulder to cry on, it makes a world of difference. But if your friends don't get it—if they offer the *wrong* kind of support, it can actually make things awkward and worse. The **optimal matching hypothesis** states that when type of support and type of need align it enhances well-being. If there's a misalignment, well-being goes down. If you just want a friend to listen while you're upset but instead they try to fix the problem, it can be frustrating. On the other hand, if you want your friend to offer you tangible support and they just say, "That sucks," it's often equally frustrating.

Researchers wanted to know if the optimal matching hypothesis applied to people who had to tell their friends and family about broken engagements (Riemann, 2024). They recruited 43 participants for the study who were at least 21 years old (the average age was 38.8), had been engaged (60% of them even had picked a wedding date!), and were willing to complete interviews over Zoom. They talked about their relationship, why it ended, what kind of support they were offered, and what support was helpful versus unhelpful.

The researcher coded participant comments, then categorized and named the themes she identified.

Based on the interviews, when people talked about engagements ending with their support networks, they reported receiving a wide range of responses. The researcher identified five types of helpful support, six types of unhelpful response, and four types that were mixed. Table 1.2 summarizes each category. When participants received support attempts like those listed in the bottom "Not Helpful" group, it only made things worse, providing research evidence for the optimal matching hypothesis.

Table 1.2 ▪ Support Types Offered for Broken Engagements, by Effect

Support Type	Characteristics
Helpful	
Listener	Willing to listen to participant as they vent and process; might offer encouraging words if desired
Sage	Good listener; can provide direction and wisdom
Friend on deck	Recognizes need for space; available if desired, but no pressure
Doer	Takes specific, tangible actions to help without being formally asked
Stalwart friend	Offers distraction opportunities through shared activities, especially on specific dates (e.g., originally planned wedding date)
Club member	Has been in similar situations in the past and offers reassurance
Mixed Response	
Monday morning quarterback	Uses hindsight to criticize and judge after the fact (e.g., "You weren't good for each other anyway")
Prayer	Offers thoughts and prayers for healing
Apologizer	Offers variations of "I'm sorry"
Jokester	Tries to find humor in the situation; tells quips
Not Helpful	
Pollyanna	Toxic positivity; false reassurances; unrealistic optimism
Pusher	Trying to control the situation; rushing the participant into something they might not want

(*Continued*)

Table 1.2 ▪ Support Types Offered for Broken Engagements, by Effect (*Continued*)

Support Type	Characteristics
Helpful	
Rug sweeper	Trying not to talk about it; avoiding it when the participant did want to discuss it
Judger	Disapproving of the decision; criticizing or verbally attacking the participant
Pity partier	Overly emotional, stirring up drama about the situation
Bungler	Makes thoughtless remarks (e.g., I need a refund for my plane ticket)

Created by authors. Based on Riemann (2024).

Relationships and Popular Culture

Young Love in Movies for the Past 60 Years

Young love is an enduring theme for popular culture around the world—and it sells movie tickets. Researchers from the University of Florida analyzed 41 of the top-grossing money-making American movies from 1961 to 2019 to identify the types of themes, characters, plot points, and endings they featured (Pezoldt et al., 2024). They focused on movies where the love story occurred in characters 13–22 years old. Here are some of the major findings:

- Every character with a love interest was heterosexual. (Of course, LGBTQIA+ movies were created, but they didn't make it to the list of top money makers.) The characters were also usually in high school (60%) or college (21) and were usually White (86%).
- The movies usually reinforced cultural ideals that may not be realistic, such as "love at first sight" (3%), "love conquers all" (29%), and the existence of "soul mates" (68%). Men were more likely to express these ideals than women, and the ideals became more prominent and more frequent over the years (in other words, love was portrayed in these idealistic ways in more recent films to a greater extent, compared to older films).
- Usually, the movies had a happy ending for at least one of the main characters with a love interest (63%), but several had at least one character with an unhappy ending (44%), and a few had mixed endings (32%).

Do you have a favorite romantic movie? Does it reflect these findings?

Making Use of Relationship Science

Does Love Conquer All?

Our relationship partners aren't perfect. In fact, research shows that the thought of our partner often conjures both positive and negative feelings (Zayas & Shona, 2015). In other words, we often have a bit of a love-hate relationship with them.

When our love life isn't perfectly lovable, we sometimes rely on the romantic notion that we're in love and that's all we need. But that isn't entirely true. Feeling in love with our partner is only one piece of what makes a relationship successful. Yes, you want to love your partner, but you also want a relationship and/or partner to have each of the characteristics in this list:

- Kind
- Caring
- Affectionate
- Friendship
- Shared interests
- Stable
- Loyal
- Open communication
- Trust
- Supportive
- Fulfillment
- Dependable
- Fun
- Generous
- Appreciation
- Listening
- Respect
- Predictable
- Transparent
- Feel seen, heard, and understood

A partner who truly loves you will have all of these qualities. In other words, a partner who authentically cares for you won't try to change you for their own selfish purposes or be demanding, threatening, controlling, isolating, disrespectful, mean, manipulative, or abusive. A truly loving partner won't need to attempt to excuse bad behavior by saying, "But, I love you."

Check Your Understanding

1.7 Dulcé believes that she needs tangible support right now. According to the optimal matching hypothesis, which kind of support should her friend Sam actually offer her to maximize Dulcé's well-being?
- **a.** Emotional support
- **b.** Tangible support
- **c.** Informational support
- **d.** Companionship support

1.8 According to the research study by Riemann (2024), which category of support offered to people who had broken engagements turned out to NOT be helpful?
- **a.** Pollyanna
- **b.** Club member
- **c.** Friend on deck
- **d.** Listener

1.9 In the analysis of top money-making Hollywood movies about young love from 1961–2019, how many had a happy ending for at least one of the main characters with a love interest?
- **a.** 32%
- **b.** 44%
- **c.** 63%
- **d.** 86%

Application Activity

Choose your own favorite "romantic" movie and analyze it using the method discussed in the Relationships and Popular Culture feature. Specifically, write up the results regarding the age, race, and sexuality of the characters; whether the movie reinforces the three idealistic beliefs mentioned in the feature; and if the relevant characters had happy, unhappy, or mixed endings.

Critical Thinking

- Look over the table of contents for this entire book. Discuss which chapter you anticipate being the most interesting to you, personally, and why. Then, explain if

you believe you will find any of the chapters personally challenging, and why. What strategies or support systems can you put in place if a chapter does challenge you?
- You've now seen two examples of self-report scales in the What's My Score? features. When researchers come up with the specific items in questionnaires like this, how can they write items without personal biases interfering? What concepts or variables do you think would be fun or interesting to study if you made your own new self-report scale to be used in relationship science research?
- The features on popular culture and on making use of relationship science discussed the idea of "love conquering all." In what ways does this value or idea help people, and in what ways could it potentially hurt? Identify at least two advantages and disadvantages to this belief or value, and explain each.

Answers to Check Your Understanding Questions

1.7 b, **1.8** a, and **1.9** c

Chapter Summary

Big Questions

1. Why study relationship science?
2. What are different kinds of intimate relationships?
3. How is this book organized?

Why study relationship science?

The scientific study of intimate relationships is interdisciplinary in that it combines research from several fields of study (biology, psychology, communication, and so on). The field has grown significantly over the past 100 years. Relationships are necessary for human survival, affecting our physical and mental health. One example of an important research study showing these links is the famous Alameda County Study. Results indicated that more social support is associated with lower mortality rates, especially for men and older participants.

What are different kinds of intimate relationships?

One of the first people to scientifically define romantic love was Rubin, who distinguished between "liking" and "loving." The scales he created can be used in either a categorical approach

(sorting relationships into types) or a continuous approach (thinking about love on a range). Another popular model is Sternberg's triangular theory, which suggests that love relationships are made up of three components: passion, intimacy, and commitment. For Sternberg, a "consummate" (perfect) relationship would have high levels of all three. Sternberg's components can also be considered as present or absent (a categorical approach) or as existing at different levels (a continuous approach).

How is this book organized?

The chapters in this book go from this introduction to research methods, singlehood and friendship, and then to attraction. Next it covers three major theoretical perspectives. Then, chapters analyze ideas on social cognition, dating, sex/gender and sexuality, communication and conflict, assault and abuse, and relationship dissolution and divorce. The final chapter covers ideas on how relationships can stay happy and healthy over time. Every chapter includes special features, including guiding questions, learning objectives, critical thinking and discussion prompts, self-report scales, research deep dives, discussions of relationships in popular culture, and a note on how to apply ideas to make your relationships better.

List of Terms

Learning Objectives	Key Terms
1.1 Explain how relationships are associated with survival, physical health, and mental health.	**Interdisciplinary** **Basic research** **Applied research** **Longitudinal** **Natural selection** **Enhanced fitness** **Social support** **Emotional support** **Tangible support** **Informational support** **Companionship support** **Well-being**
1.2 Discuss theories regarding different types of liking and loving.	**Categorical approach** **Continuous approach** **Construct** **Operationalize** **Rubin's liking and loving scales** **Sternberg triangular theory of love** **Intimacy** **Passion** **Commitment**

Learning Objectives	Key Terms
1.3 Describe the order of chapters and within-chapter features you'll see throughout the book.	**Optimal matching hypothesis**

Chapter 2

Research Methods and Analysis

Big Questions

1. What research methods help us understand relationships?
2. How do we analyze results?
3. What is "open science"?

Learning Objectives

2.1 Describe the scientific method, different types of research study, and ethical considerations.

2.2 Compare and contrast the most common ways to analyze and interpret research results.

2.3 Describe the "open science" movement and what it means for future research endeavors.

The scientific study of attraction, love, friendship, and everything else covered in this book is a hugely impressive feat.

We're talking about squishy, abstract concepts that even the people experiencing them can't explain. So anyone who decides to jump into the deep end of the science pool by trying to define, measure, and experiment on the world of intimate relationships is up for a challenge! And as you read about the theories and findings covered in this book, it's always important to ask *how* relationship scientists arrived at these claims. Think of methods and statistics as the building blocks to finding answers, or a treasure map leading toward the riches of insight. A fundamental knowledge about different research approaches and how to analyze results is essential to a true understanding of the science of relationships.

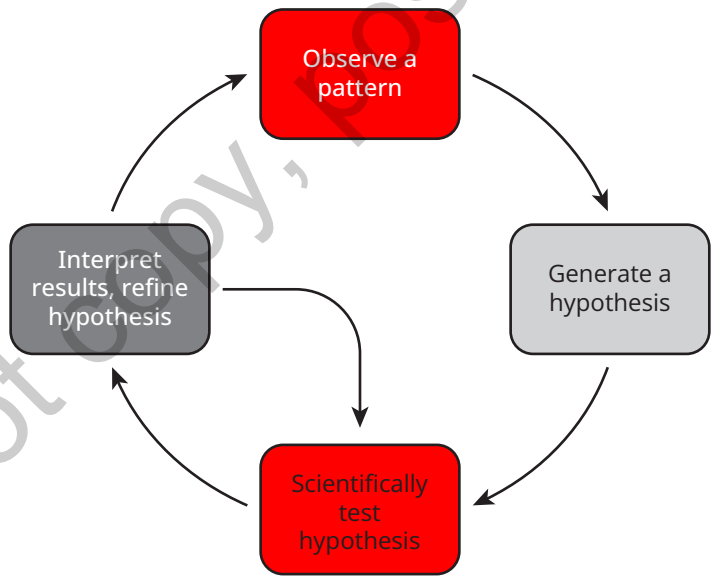
What Research Methods Help Us Understand Relationships?

As we've already started to discuss, the scientific study of love, attraction, friendship, sexuality, romance, and all the behaviors, thoughts, and emotions involved is a difficult task. Even the question of how to define or operationalize variables such as "love" is answered in many ways across different studies, as you read in Chapter 1. Let's start by considering how relationships researchers ask and answer questions from a scientific approach. Then, we'll review five different approaches to setting up a study. For an interesting look at how pioneering sex researchers have been portrayed in TV and movies, see the Relationships and Popular Culture feature as well.

The Scientific Method

Most academic disciplines studying intimate relationships approach the topic from the **scientific method**, a systematic and evidence-based approach to asking and answering questions. The scientific method's general approach appears in Figure 2.1. Researchers start by observing a pattern in the "real world" and then generate a formal **hypothesis**, or a specific statement of what they believe will happen in a study they design to test the phenomenon of interest.

Figure 2.1 ▪ The Scientific Method



The scientific method starts by noticing interesting patterns and generating hypotheses regarding those patterns. Then, evidence is gathered that either supports or refutes the hypothesis. Those results help us refine hypotheses and keep testing them as we learn more.

Relationships and Popular Culture

Scientifically Studying Sex: Pioneers on the Screen

In the first half of the 1900s, studying human sexual behavior was quite controversial—even scandalous. One of the most controversial figures in the history of research on sex and intimate relationships was, unquestionably, Alfred Kinsey. One part of his legacy might even be the terms "sexology" and "sexologist," as he developed university courses on human sexuality and created one of the largest research efforts to understand the true nature of human sexual behaviors. Part of Kinsey's controversy were his views that women were capable of several different kinds of orgasm (e.g., from both vaginal and clitoral stimulation) and that everyone is at least a little bit bisexual. However, as shocking as those ideas might have been in the 1930s–1950s when he was a prominent professor, his research methodology itself was also controversial. Kinsey interviewed prostitutes, prisoners, abuse victims, and gay men—populations that had previously been ignored. He also crossed the boundaries between objective observer and participant as he engaged in sexual behaviors with his participants, graduate students, and colleagues on his research team. In 2004, Kinsey's fascinating life was made into a movie simply called *Kinsey*, starring Liam Neeson and Laura Linney (Coppola et al., 2004).

Following in Kinsey's footsteps were the famous pair Masters and Johnson (specifically, William Masters and Virginia Johnson), who published research on human sexual behaviors over the entire second half of the 20th century. They also studied phases of sexuality and tried to understand the female orgasm (which is apparently quite the mystery!), including how and why women are able to have multiple orgasms in a short period of time. Their lives and research have been fictionalized in the television series *Masters of Sex*, which ran from 2013 to 2016 and starred Michael Sheen and Lizzy Caplan (Ashford, 2013–2016). As you can probably expect, both *Kinsey* and *Masters of Sex* are filled with content that might not be suitable for children to watch.

After operationalizing all the variables involved, designing an ethical study (more on this a bit later), and gathering data, researchers then interpret the results (often using statistical analysis). Once researchers know the pattern of results, the process can repeat again and again, each time providing a deeper or more detailed understanding of the topic. It's also important to think about standards of quality when designing a study.

There are several ways to analyze whether a study is done well. First, a study should have solid **internal validity**, which relates to how well the researcher constructed the study and whether the researcher can interpret any results in the ways they intended. For example, were all the variables operationalized and measured appropriately? If you designed a study that wanted to make some people feel more in love, did you accomplish that (high internal validity), or did they actually just increase liking (low internal validity)? Another example of internal validity is if a study compares two groups, are they identical in every way except for the main variable of interest, or are there other explanations at play? While internal validity refers to the structure within the study and whether it was set up correctly, **external validity** relates to whether the study applies to other people or situations. Can the results generalize to people beyond those

who actually participated? Does the study have any "real-world" implications? For example, if you are able to successfully increase feelings of love in "Western" college students, will that same technique work with middle-aged adults from "Eastern" cultures?

A growing concern in the scientific community is the ability to reproduce a research study's results. **Replication** helps with this by doing the same study again, with different people, and confirming the results by finding the same patterns over and over. If a study's results can never be found again, it calls into question whether the original study was really done properly. Replication—or lack of replication—can lead to controversy. A famous example occurred in the 1950s. A man named James Vicary claimed that when he hid subliminal messages of popcorn and Coke in film reels at movie theaters, there was a 58% increase in sales of popcorn and an 18% increase in sales of Coca-Cola (Pratkanis, 1992). After several years of scientists attempting to replicate similar behavioral effects of subliminal messages—and failing to do so—Vicary finally had to admit that he had made the entire study up!

This is an extreme example. Failure to replicate usually doesn't mean that the original study was bogus or that the findings aren't interesting and important. It does mean that we should ask questions, such as why other people can't seem to find the same results—and sometimes there are theoretically interesting answers that lead to additional hypotheses. Perhaps there was something special about the original participants, or there was something happening in the world that affected the results, or the sample of people in the study was too small, or the statistics were done incorrectly.... But if the researchers were, indeed, honest about their results (as the vast majority of scientists are), a lack of replication might actually lead to interesting developments in theory or practice.

Making Use of Relationship Science

Seven Questions to Evaluate Relationship Information

We all know that relationships are important. For that reason there is no shortage of relationship advice, tips, tricks, hacks, and outrageous claims online and in your social media.

In fact, one of the most common things students ask us is something along the lines of, "I saw a video on TikTok about relationships...is this true?"

There's plenty of material. TikTok trends have included such things as "invisible string theory" (i.e., we're cosmically connected to others), the "bird test" or "orange peel test" (i.e., ways to see if your partner is really into you), and many, many more. Each has intuitive appeal and is shared via short, fun videos. But are they helpful or harmful to your relationship?

Not surprisingly, helping students improve their evaluation of social media claims is a common component of building scientific literacy (Brown, 2023). Much like in your relationships, you want to look for red flags to determine what is trustworthy. Here are key questions you should ask:

1. **Who is making the claim, and do they have an ulterior motive?**
   If the person sharing the information can benefit from what they're claiming, it's less trustworthy. Follow the money.
2. **What's the basis of their claim? Is it personal experience or scientific research?**
   Personal experiences don't automatically apply to everyone and can be quite idiosyncratic. Research-based conclusions are more likely to replicate.
3. **Is their evidence high quality?**
   Use what you've learned in your research courses. Ask things like: How many participants were there? Where did they come from? Where was the study published? Were these claims peer reviewed?
4. **Are they portraying the information as "one size fits all"?**
   It's nearly impossible for any information or solution to apply equally to everyone. For example, many mental health and relationship resources don't apply to marginalized groups or people with different types of relationships (Ramos et al., 2022).
5. **Is the information presented in a clickbait or sensationalized way? Are they overstating their case?**
   To get attention, people often exaggerate the evidence or claim that a solution, test, or conclusion tells us much more than it realistically can. More trustworthy sources may make more mundane or boring claims, but they're also much more accurate.
6. **Is their claim shocking, surprising, counterintuitive, or contrary to existing evidence?**
   If so, there's a much greater chance that it's a fluke. To be trustworthy, we would want to see the same finding repeatedly so that we can establish a pattern.
7. **What is your feeling about the topic or claim?**
   It's important to understand your own biases when evaluating information. If it's a conclusion you want to believe, you're much more likely to be lenient with the previous questions. However, for information you're skeptical about, you'll much more strict.
   "*The first principle is that you must not fool yourself and you are the easiest person to fool.*"
   —Richard Feynman

Methodological Approaches

Imagine that you want to design a research study. For the purposes of the next few pages, let's use an example: You're interested in investigating whether introverts or extroverts are happier with the intimacy levels in their social relationships. (By the way, both "extrovert" and "extravert" are acceptable spellings of the word.) Maybe extroverts (people who are more gregarious and social on most occasions) perceive that they have more close friends in terms of *quantity*, but introverts feel that their relationships are more intimate (e.g., better *quality*). You might make that your hypothesis. As we've already covered, you have to formally state your hypothesis and operationalize your variables (define them and decide how to measure them).

You also have a few other decisions to make, right off the bat. One is whether you will do a qualitative or a quantitative study. A **qualitative study** is one that gathers open-ended data, usually through surveys or interviews. Though some information is in non-numerical form, qualitative approaches often code data by rating, counting, or quantifying in some other way. You might set up interviews with 10 people who self-identify as introverts and 10 who self-identify

as extroverts and ask them questions such as "Tell me how you feel about the intimacy levels in your relationships." You could then rate those responses based on their emotional content. This approach has the advantage of allowing the participants to be the experts in their own lives and provides an interesting level of detail and a personal touch in the results you gather

A real example of a qualitative study is interviews of 22 women who were survivors of abusive relationships (Rosen, 1996). The author asked the participants why they had initially been attracted to the person who later became their abuser and how they felt once the abuse started. Her interviews led to fascinating insights regarding the mindset of abuse victims (which are described for you in detail in a later chapter). These women's stories, emotions, and insights might have been lost if they had only been asked questions in the form of numbers, like scales from 1 to 10.

However, you might prefer a **quantitative study**, in which the data you gather are in numerical form and thus better suited for most statistical analyses. Paralleling the theoretical example from before, you might ask the same 10 introverts and 10 extroverts to take surveys in which they answer a series of questions on a scale from 1 (strongly disagree) to 7 (strongly agree), then you average their answers. Quantitative data are useful for gaining an understanding of patterns of results across more people and have the advantage of additional statistical analyses, but they lose the personal feel of qualitative data.

An example of a real quantitative study is a survey that asked participants to fill out several numerical scales regarding whether victims of relationship abuse were "responsible" for what happened to them (a form of victim blaming; Arnocky & Vaillancourt, 2014). Participants read different scenarios, and the results showed that participants blamed victims more (scores on the quantitative scale were higher) when the scenarios described a male victim, compared to a female victim. In other words, the numerical results showed that victim blaming appeared to be worse for male victims in this study. This particular finding might have been harder to understand if participants only described their feelings because it may have been difficult to verbalize feelings that placed responsibility on victims.

Another decision to make is whether the study should be cross-sectional or longitudinal. A **cross-sectional study** occurs at a single time, whereas a longitudinal study takes place over two or more time periods or data collection sessions. "Cross-sectional" studies are called that because the general idea is that you can compare results across multiple groups at a single time. In contrast, remember the Alameda County Study (Berkman & Syme, 1979) from Chapter 1, which was longitudinal because it followed the participants over many years. Longitudinal studies have the advantage of seeing how patterns change over time. This is especially interesting in a relationships context, to see how friends or couple members change and adapt as their relationship grows in intimacy (or ends). The disadvantages of longitudinal studies are the time, expense, and effort that they take, plus the fact that many of the participants might drop out of the study before it's done. Because of these disadvantages, cross-sectional studies are more common.

When recruiting participants for a study, it's important to get as many people as possible. In addition, ideally the participants have enough diversity that they represent a wide variety of cultures, sexualities, ages, religions, experiences, and so on. This ideal type of sample is called a **representative sample**, meaning the participants in your study serve as examples of a typical

person in the larger population and that the participants are diverse enough to cover many different perspectives. The best strategy to get a representative sample is to use **random sampling** of the larger population, meaning that everyone in the larger group has an equal chance of participating. That way, your study isn't biased toward only one type of person.

The ideal situation is to test theories and hypotheses many times, with many different participants, in many settings. We can be more and more confident of claims when we replicate studies that have strong internal and external validity. Multiple methods, such as both quantitative and qualitative data, also help. So there are many different ways to test a hypothesis. Most studies used for this book fall into one of five basic structures or types of research methodology; each one is covered next.

However, in addition to the methodologies listed here, there's one more option we'll mention several times in this book. A **meta-analysis** is a study that doesn't collect any original data, but instead statistically combines the results from several studies published by other researchers, from a wide variety of samples. Doing a meta-analysis is a great way to see if patterns replicate and if results are robust across time and place—but they can only be done after lots of individual studies have already been conducted using one (or more) of the methods covered next.

Option 1: Archival Research

Archival data are stored pieces of information that were originally created for some other purpose. Newspapers, census data, transcripts of text messages, social media posts (e.g., TikTok videos), and even popular culture are all examples of archival data. To explore our study regarding introvert and extrovert differences in relationship intimacy, you could examine Snapchat accounts to see how many "friends" people have, how long their "streaks" are, how many times other people post and vice versa, how many "likes" their posts get, how many times the owner of the profile self-discloses intimate information on their page, and so on.

Archival research has led to important insights in the world of intimate relationships. One interesting example is an understanding of abusive marriages. For years, some researchers believed that abusive relationships almost always had male perpetrators and female victims and that violent incidents were fairly severe. This perspective came from looking at archival data collected through police reports and profiles of victims in emergency shelters. However, researchers who were doing studies on abusive marriages through anonymous surveys found very different patterns, including female-to-male violence and many couples in which physically aggressive behavior was mutual (see M. P. Johnson, 1995, 2007). This debate is discussed further in a later chapter, but for now the point is that the source of archival data is important in how it shapes our understanding.

Option 2: Naturalistic Observation

Another approach is **naturalistic observation**, or scientific surveillance of people in their natural environments—in other words, where the behaviors would be occurring anyway, even if you weren't there watching it happen. You might decide to go to a local bar to watch people interact with their friends or flirt with strangers and make notes of the patterns you see play out.

You might be thinking, "If some scientist came to the bar and started writing down everything I did, then I probably wouldn't react very naturally." You're right, and this is a potential challenge to good observational research. When people change their behavior due to awareness that they're being observed, it's called **reactivity**. One creative solution is a technique called **participant observation**, in which scientists disguise themselves as people who belong in that environment. It's kind of like going undercover. You pretend you're not doing research at all and hope to fade into the background—and still find some discreet way to record your observations. In our example, perhaps you pretend to simply be an innocent bar patron, or you act as the bartender so you have an excuse to talk with people about their thoughts.

Participant observation may create some ethical problems, so be careful. After all, you are deceiving people about why you are there. And it may be an ethical violation to observe people when they don't know they are being observed. The advantage of this technique—or any form of naturalistic observation—is that hopefully we get to see authentic social behaviors.

Option 3: Self-Report Surveys

Perhaps the most popular research method in studying intimate relationships is **self-report surveys**, in which questions ask people to respond regarding their own thoughts, feelings, and behaviors. The types of measures used in self-report surveys are scales like the Rubin liking and loving scales or the scale measuring Sternberg's love components that you saw in Chapter 1.

In the movie *21 Jump Street* (Moritz et al., 2012), two young police officers go undercover pretending to be high school students so that they can bust a new drug that's hitting the community. In *Imperium* (Taufique et al., 2016), Daniel Radcliffe's character works for the FBI and infiltrates a White supremacist group, pretending to be racist. If any of them had been social psychologists doing research with this "undercover" technique, it would have been called participant observation.

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The main advantages to using self-report scales are that it's relatively inexpensive and fast to get a lot of data, lots of participants can take the survey (making the sample more diverse), and statistical techniques can analyze patterns of responses (if the surveys were quantitative). Self-report surveys are also often the only way to get access to people's intimate personal lives, such as their sexual fantasies, whether they want to cheat on their partner, or what they find sexually attractive.

Remember that one common problem with naturalistic observation is reactivity, or people changing their behaviors because they know they are being observed. Self-report surveys have their own concerns, and one of the big ones is dishonesty. People might not want to admit to cheating, abuse, and other behaviors that are generally not socially acceptable. The dishonesty problem is called **social desirability**, the idea that people shape their responses—exaggerate, manipulate, or just straight out lie—so that others will have positive impressions of them. (This problem is also sometimes known as impression management.)

One creative way around this potential problem is to include a social desirability measure in the survey to see whether people admit to behaviors that almost everyone does. If someone denies something like gossiping or littering, for example, they're probably not being particularly honest since pretty much everyone does these things at least occasionally. An example social desirability scale appears in the What's My Score? feature.

What's My Score?

Measuring Social Desirability

Instructions: Listed below are several statements concerning personal attitudes and traits. Please read each item and decide whether the statement is true or false as it pertains to you, personally. Circle T for true statements and F for false statements.

T F 1. Before voting I thoroughly investigate the qualifications of all the candidates.
T F 2. I never hesitate to go out of my way to help someone in trouble.
T F 3. I sometimes feel resentful when I don't get my way.
T F 4. I am always careful about my manner of dress.
T F 5. My table manners at home are as good as when I eat out in a restaurant.
T F 6. I like to gossip at times.
T F 7. I can remember "playing sick" to get out of something.
T F 8. There have been occasions when I took advantage of someone.
T F 9. I'm always willing to admit it when I make a mistake.
T F 10. There have been occasions when I felt like smashing things.
T F 11. I am always courteous, even to people who are disagreeable.
T F 12. At times I have really insisted on having things my own way.

Scoring: Give yourself 1 point each if you said TRUE for question 1, 2, 4, 5, 9, or 11. Then, give yourself 1 point each if you said FALSE for question 3, 6, 7, 8, 10, or 12. Then, add your points. Higher scores indicate great attempts to manage your impression on others, or a higher tendency toward socially desirable responding on self- report scales.

Source: Crowne & Marlowe (1960).

Critical Thinking: If a participant shows a high level of deception based on this scale, is the only option to ignore the rest of their data in any given research study? All you know is that they might not have been honest—you can't tell in what direction or to what degree they've been dishonest in the rest of their responses. So, what can you do with the rest of their data?

Option 4: Quasi-Experiments

Many studies on intimate relationships are interested in comparing two or more groups of people to each other. For example, in our theoretical study, we want to compare introverts to extroverts. But we don't get to manipulate people's personality; we have no control over whether they are introverted or extroverted. When researchers gather data in which two or more naturally occurring groups are compared to each other, it's called a **quasi-experiment**. It's "quasi," meaning "half-formed" or "almost" because it's not a "true" experiment (those are explained in the next section).

Another example of a quasi-experiment would be to compare people who are in long-distance relationships to those who are not, to see if the quality of the two different types of relationship changes. When one of my students and I did this (Butler & Goodfriend, 2015), we found that relationship satisfaction levels were similar in each relationship type, but that people *believed* that satisfaction was lower in an "average" long-distance relationship. This belief might eventually lead to a self-fulfilling prophecy of lower satisfaction in long-distance couples—although we didn't test that possibility with longitudinal data. Quasi-experiments are very commonly done because researchers want to compare naturally occurring groups such as Republicans versus Democrats, married versus divorced people, heterosexual versus gay/lesbian relationships, people who grew up in abusive homes versus healthy homes, and so on. These are interesting and important questions, and quasi-experiments are the only way to find answers.

Option 5: Experiments

An **experiment** compares two or more groups of participants who have been formed through **random assignment**. Random assignment means that each participant is put in one of the groups by chance. More and more relationship scientists use experiments to explore causal processes and mechanisms in their research (for a recent review, see Doan et al., 2024). However, experiments tend to be more successful for some research goals than for others.

Imagine you wanted to know whether listening to love songs made people feel more positively toward their partner. So, you randomly assigned 50 people to listen to love songs (this is the **experimental group**) and randomly assigned 50 different people to hear no songs at all (if a "neutral" or comparison group exists in an experiment, it is the **control group**). If it's true that the two groups really are equal in every way *except* for hearing love songs or not and then the two groups have different outcomes in terms of their feelings toward their partner, then it's fairly safe to conclude that the only possible explanation for their different feelings was the songs. You can say that the love songs caused an increase in feelings of love.

In an experiment, what makes the groups different, based on that random assignment, is called the **independent variable**. The independent variable is what the researchers set up to make Group 1 versus Group 2 (or Group 3, and so on). In the case of the theoretical experiment in the previous paragraph, the independent variable is the presence or absence of love songs. There doesn't have to be a control or neutral group, but there always has to be some kind of comparison group. For example, this study could have compared people who listened to love songs with

people who listened to jazz, country, or classical music. In a perfect study, the independent variable is the *only* difference between or among groups.

The outcome variable in an experiment is called the **dependent variable**. It's called "dependent" because if the hypothesis is correct, then scores or levels of this variable are "dependent" upon which group the participant was in. Here, the dependent variable is feelings toward a partner, and they're expected to be more positive after love songs are played. So love feelings are "dependent" on whether they heard the songs or not. In short, independent variables are the "cause" in an experiment, and dependent variables are the "effect" or outcome. For several more examples of independent and dependent variables in theoretical studies on intimate relationships, see Table 2.1.

Table 2.1 ▪ Examples of Studies, Independent Variables, and Dependent Variables

Experiment Basics	Independent Variable	Dependent Variable
People listen to love songs or no songs and then rate how much they love their partner.	Presence or absence of love songs	Love ratings for partner
People list either positive or negative memories about their partner, then estimate their chances of being married in 10 years.	Memory type (positive or negative)	Estimates of marriage probability
Children play with either white-skinned or brown-skinned dolls, then answer questions about which magazine models they think are the prettiest.	Doll type (white-skinned or brown-skinned)	Perceptions of the models' attractiveness
Two strangers sit in a room together for 1 hour and are asked to get to know each other. The room is either well lit (lights on) or dark (lights off). Researchers code how intimate their conversation becomes.	Lights on or off in the room	Level of intimacy in conversation

Experiments have independent variables, which separate participants into different groups. They also have dependent variables, or the outcome being measured.

Ethical Considerations Within Research Studies

Any research study done with living creatures needs to be done ethically. This means it must follow standards that protect the study participants' rights, safety, and well-being while ensuring the research's integrity. Investigations into people's personal, intimate lives is a context in which we much take ethical considerations very seriously. Consider experiments in which researchers are actually trying to *manipulate* people's feelings, thoughts, or behaviors within their intimate relationships! Or surveys asking people about sexual abuse or domestic violence or secret affairs—just answering questions about these topics could lead to traumatic memories and emotions. Research on intimate relationships is challenging both for methodological reasons and for

ethical and moral reasons. However, researchers receive extensive training in conducting research ethically, which allows us to study relationships responsibly and learn all of the great information you will read in this book.

There's a certain level of trust that happens when anyone shows up to participate in a research study. As researchers, we want to remember that we have a solemn responsibility to treat people with respect. Even when we use unobtrusive methodologies like naturalistic observation or archival studies, all people involved in the study of human social behavior should be valued. Researchers across all the sciences provide ethical and legal guidance about what it means to treat study participants with respect to an **institutional review board (IRB)**, which is a committee of people who consider the ethical implications of any study. Your local IRB is typically composed of representatives from different departments in a college, university, research institute, or corporation. IRBs also often have a lawyer as a member, and sometimes they have a member with no background in research at all in order to represent the "average person's" perspective.

Here are some of the participant rights required by most IRBs:

- *Informed Consent:* Participants should be told what they will be asked to do and whether there are any potential dangers or risks involved in the study before it begins; this is called **informed consent**.
- *Deception:* Participants should be told the truth about the purpose and nature of the study as much as possible. **Deception**, or hiding the true nature of the study, is allowed only when it is necessary because knowing the truth would change how the participants respond.
- *Anonymity:* No participant's individual responses will be published in a way that identifies them publicly. Any identifying information (such as names or specific demographics) needs to be removed if individual responses are to be reported, such as answers during a qualitative interview.
- *Right to Withdraw:* Participants have the right to stop being in the study at any time, for any reason, or to skip questions on a survey if they are not comfortable answering them.
- *Debriefing:* After completing the study, all participants should be given additional details about the hypotheses of the study, allowed the opportunity to ask questions, and even see the results if they wish. This **debriefing** after the study is complete should definitely include an explanation of any deception that was involved (if deception occurred) so that participants have the opportunity to withdraw their data if they are upset about the deception.

Check Your Understanding

2.1 Dr. X asks participants to complete a single survey in which they write essay responses to several questions. Everyone answers the same questions. This study is therefore an example of which type of research?
- **a.** Longitudinal
- **b.** Experimental
- **c.** Archival
- **d.** Qualitative

2.2 True experiments use random assignment to place each participant into one of the groups being studied. Random assignment helps ensure the groups are identical in every other way, which means that use of random assignment helps improve the study's:
- **a.** Ethics
- **b.** Replication
- **c.** External validity
- **d.** Internal validity

2.3 Dr. Z asks half of their participants to fill out Rubin's liking and loving scales in a very cold room and the other half to fill out the same scales in a very hot room. What is the dependent variable in this study?
- **a.** The number of participants Dr. Z has in the study
- **b.** Temperature of the room (hot or cold)
- **c.** Participants' answers to the Rubin scales
- **d.** Whether the participants are told Dr. Z's hypothesis

Application Activity

Choose a topic you think is very personal or controversial within the field of intimate relationships and search for a study done on that topic. Then, analyze the methodology that was used and discuss whether you think the participants were treated ethically. Were all of the typical IRB standards used, as far as you can tell? If not, do you think the study violated ethical guidelines for research studies? Could the study have been done differently to improve ethical treatment?

Critical Thinking

- If you wanted to study patterns of attraction or relationship behaviors among the students of your college or university, what kinds of archival data could you use? Consider public resources such as social media, library archives, the school newspaper, and so on.
- This section introduced you to a measure of social desirability that could be used to identify whether participants are being honest in their responses. Imagine you did a survey study and 20 of 60 participants had high scores on this scale, indicating dishonesty. What do you do now with the rest of their survey answers? Do you throw them out completely? Why or why not? Do you need to collect more data from other people so that you have more "honest" answers?
- Most people who are monitored during studies using naturalistic observation are never told that they are being watched or that their behavior might end up in a study (even if it is anonymous). Does this practice seem ethical to you? Why or why not?

Answers to Check Your Understanding Questions

2.1 d, **2.2** d, and **2.3** c.

How Do We Analyze Results?

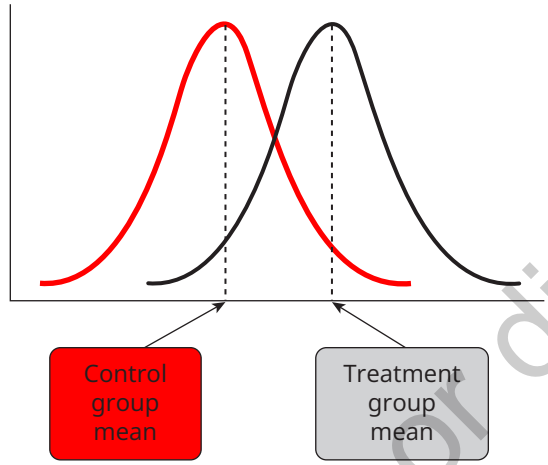
If you've chosen a quantitative design, you'll need to understand the results of your study using some basic statistical tests. Even if you, personally, never conduct a study, this book contains summaries of many other people's studies, so to understand them you need a foundational understanding of how scientists decide what their data really mean. Let's cover just the basics of two different statistical approaches that you'll see throughout this book: comparing groups to each other and doing correlations.

Comparing Groups: *t*-Tests and ANOVAs

In a survey, quasi-experiment, or true experiment, researchers often want to compare answers or behaviors across groups of participants. There are two basic statistical tests we use to do that. The first is called a ***t*-test**, which compares responses between two different groups. It might be men versus women, introverts versus extroverts, happy versus unhappy couples, people who listen to love songs versus no songs, or any other two relevant groups of people.

Figure 2.2 ▪ Comparing Two Groups of Participants: A *t*-Test

One way researchers look for patterns is by comparing average scores between different groups of participants. When we compare two groups, as here, we use a t-test. When we compare three or more groups, we do an analysis of variance, or ANOVA.



You can remember that a *t*-test compares two groups by thinking that the *t* stands for "two." Just as you can see in Figure 2.2, a *t*-test compares two things in each group: the average of each group and the variance or standard deviation (how widely distributed or spread out the scores are in each group) to see how much the two groups overlap. If they don't overlap very much, then the groups can be considered different from each other.

You might find it fun to know that we have beer (well, Irish dry stout to be exact) to thank for the invention of the *t*-test. William Sealy Gosset, a brewer at Dublin's Guinness Brewing Company, had to test the amount of stout in each batch of beer for quality control (Mankiewicz, 2004). It would have been impossible for him to sample from all of the thousands of casks produced every single day, so instead he took a random sample from the morning batches and a random sample from the afternoon batches and compared them to each other to make sure they were the same. Gosset's invention of the math behind his comparison was published anonymously (under the fake name "Student") and is now used for much more than making sure our beer tastes great.

We have Guinness to thank for the statistic known as the *t*-test.

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What if researchers want to compare three or more groups? For example, a study might be interested in analyzing relationships in each of the seven continents to test for cultural differences. The principle for comparing multiple groups is the same as for comparing two groups. For each group, we calculate the average score and the standard deviation, just like before, but when several groups are

involved it's called an **analysis of variance**, or **ANOVA** for short. ANOVA tests will tell you whether at least one of the groups is different from the others, and additional follow-up analyses can tell you the details of which groups are different and how much they vary.

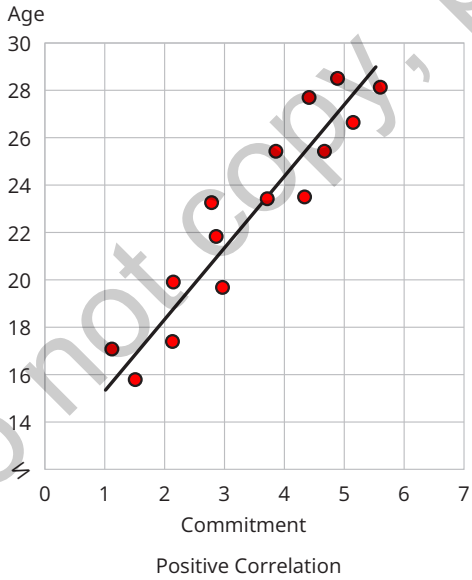
Patterns in a Single Group: Correlations

In Chapter 1, we talked about the difference between categorical and continuous variables. Variables that make different groups (Christians vs. Muslims vs. atheists, Canadians vs. Brazilians vs. Rwandans, people who listen to love songs vs. a control group) are categorical and thus use *t*-tests and ANOVAs. These tests compare the average scores and standard deviations of each group to each other. However, many studies include a single group of participants and look for patterns of results among two or more continuous variables.

We covered an example in Chapter 1: the Alameda County Study (Berkman & Syme, 1979). There, social support was linked to mortality rates: People are less likely to die if they have a lot of social support. While *t*-tests and ANOVAs compare patterns of results in different groups, **correlations** look for patterns of results in a single group. Correlations test whether two different variables are systematically associated with each other, like social support and mortality were in Alameda County.

Figure 2.3 ▪ An Example Scatterplot Graph

In this fictional study, age and commitment go together: As people get older, their commitment increases. That means there is a positive correlation between age and commitment.



Correlations analyze the association between two continuous variables, meaning variables that have a range of scores that fall along a continuum. To test for a pattern, scores on each variable are gathered from as many people as possible and are then charted on a graph called a **scatterplot**. One variable is on the (horizontal) *x*-axis, and the other is on the (vertical) *y*-axis, and each dot on the scatterplot represents one person. Take a look at Figure 2.3 for an example (with theoretical data created for the purposes of this chapter—not from a real study).

The pattern shown in Figure 2.3 indicates that as people age through early adulthood, they are more likely to be in relationships with higher levels of commitment. The line summarizes the trend in the data. When a correlation is calculated, the number you get is called a **correlation coefficient**. It will always be a number between −1.00 and +1.00. How can you tell what the coefficient means? It's basically like a two-part code you can crack to understand what the pattern

looks like on a scatterplot. There are two parts to the code: (1) the sign or direction (positive or negative) and (2) the number.

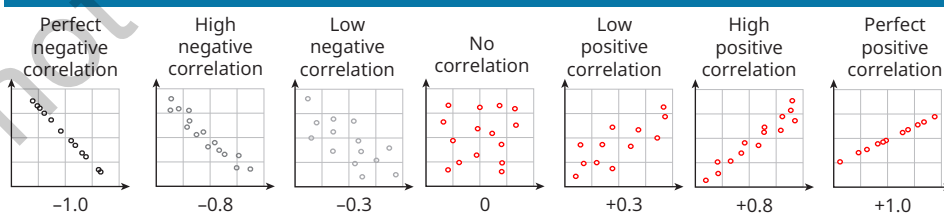
First, the sign will always be either a positive or a negative (unless the correlation is exactly zero). A **positive correlation** (between 0.00 and +1.00) indicates that both variables move in the same direction. In other words, if scores or values on one of the variables go up, values on the other variable will also go up. If one goes down, the other will go down. The example in Figure 2.3 shows a positive correlation: As age goes up, so does relationship commitment. Positive correlations appear in scatterplots when the pattern or summary line moves from the bottom left-hand corner to the upper right-hand corner.

In contrast, a **negative correlation** (between 0.00 and −1.00) indicates that the variables move in opposite directions. As one variable goes up, the other goes down. For example, in Alameda County, more social support was associated with lower mortality (death rates). As social support went up, likelihood of death went down. Negative correlations appear in scatterplots with a pattern that goes from the upper left-hand corner to the bottom right-hand corner.

The second part of a correlation coefficient is the number, which will always be between zero and one (either positive or negative). The number tells you how clear the pattern is on the scatterplot, or how well the different dots (which represent people) fall along the summary line. Basically, this number tells you how much variability there is in the data, or whether some people don't fit the pattern. In Figure 2.3 you can see that not all of the people fall exactly on the line. If the dots all fall *exactly* on the line, meaning the pattern is perfect, the number you get will be 1.00. As the number gets closer to zero, it means the pattern becomes slightly less clear.

Note that coefficients of +1.00 and −1.00 are *equally strong*—both indicate perfect patterns, with all of the dots exactly on the line. It's just that in one case the variables move in the same direction (+1.00) and in one case they move in opposite directions (−1.00). Figure 2.4 is a summary of how to understand correlations, showing a range of patterns that move from perfect and positive, through no correlation at all, to perfect and negative. A zero correlation coefficient means that the two variables have no relation to each other at all, such as relationship commitment and someone's height or love of chocolate. These variables are not associated with each other at all, so the scatterplot would look like a bunch of random dots.

Figure 2.4 ▪ Summary of Types of Correlation



Source: Heinzen & Goodfriend (2019).

A final note, but a very important one, is that *correlation does not equal causation*. Being older doesn't *cause* someone to be more committed to relationships. It's possible that being older leads people to feel more prepared to make life plans, or being older leads to social expectations to marry and start a family. But without doing an experiment with random assignment to different conditions, causal inferences shouldn't be made.

An interesting example of this principle is, again, the Alameda County Study (Berkman & Syme, 1979). There, having more social support was negatively correlated with death rates. But does having more friends and family around lead to heathier behaviors? Or is it the other way around? Maybe being healthier leads to better quality relationships because people have more energy, participate in more activities, have more money to spend on luxurious gifts for their friends, and so on. A good understanding of the limitations within each research methodology and statistical analysis helps in knowing what conclusions should really be made within each study that's done.

Interpreting Dyadic Data

There's one more important point to consider regarding analyses of study results about relationships.

Most statistical tests work with the assumption that each participant's scores are independent from everyone else's in the study. In other words, the participants haven't influenced each other. However, if a study includes two or more people who are in a relationship with each other, that assumption goes right out the window. Clearly, the happiness, satisfaction, and so on of one person in a friendship or romantic couple likely influences the other person, and vice versa. So if a study wants to include *both* people, the methods and statistics get much more complicated.

Methodologically, researchers have to consider the pragmatics of holding study sessions when both people can be there. That automatically makes things complicated, with new considerations such as whether they'll need to find a babysitter, whether they both have the same work schedule, and more. If participants are being compensated with something like extra credit, what if one person is in the class offering compensation and the other isn't? How will the other person be compensated? And if the study is longitudinal, what happens to compensation if the couple breaks up halfway through the study or one person wants to stop participating and the other wants to continue? Researchers need to consider these additional aspects when couples or friends are supposed to participate together.

Statistically, the analyses also become more complicated. Data now have to be analyzed knowing that the results of one person are linked to another, using a technique called **dyadic analysis** (Kenny et al., 2006). Essentially each *couple* will be analyzed and then compared to the other couples, instead of comparing individual to individual—so slightly different formulas need to be used for these studies. Dyadic analysis is needed for parent to child, friend to friend, partner to partner, or any other method that includes people who influence each other. All of these considerations add another layer of challenge to people who want to make sure the science of intimate relationships is done well.

Check Your Understanding

2.4 Dr. Y conducts a study in which they ask people over 50 years old how many sexual partners they have had in their lifetime. Dr. Y then compares the answers based on participants' socioeconomic status: lower class, middle class, or upper class. Which statistical analysis should Dr. Y do to understand their results?

a. Analysis of variance
b. *t*-test
c. Scatterplot
d. Correlation

2.5 Dr. Z asks half of their participants to run on a treadmill for 5 minutes, and the other half of the participants listen to calm, soothing music. All participants then rate how attracted they are to photographs. To analyze whether physiological arousal influenced perceived attraction in this study, what statistical analysis should Dr. Z do to understand their results?

a. Analysis of variance
b. *t*-test
c. Scatterplot
d. Correlation

2.6 Dr. X finds that the more introverted someone is, the more likely that person is to say they have high self-esteem. What can be safely concluded from the results of this study?

a. Introversion and self-esteem are positively correlated.
b. Introversion and self-esteem are negatively correlated.
c. Being introverted causes self-esteem to go up.
d. Both a and c are correct.

Application Activity

Try to draw scatterplots that show the following results:

- A study of 10 people that resulted in a correlation of −1.00
- A study of 15 people that resulted in a correlation of exactly zero
- A study of 20 people that resulted in a correlation of +0.75

Critical Thinking

- Consider correlation coefficients. A common mistake people make when they are first learning about correlations is that positive correlations are somehow "stronger" than negative correlations, even if the number is the same (e.g., +0.8 and −0.8). Why do people tend to make this mistake?
- "Correlation does not imply causation" is easy to say, maybe, but often hard for people to really follow as a rule. Try to identify three examples of real-life correlations in the world around you (e.g., "Calorie intake and body weight are positively correlated"). For each, identify whether you think there is a causal connection between the two variables where one causes the other, or whether both variables influence each other mutually, or whether there is a third variable that might be involved.

Answers to Check Your Understanding Questions

2.4 a, **2.5** b, and **2.6** a.

What Is "Open Science"?

Ethics are always important.

We've already discussed some ethical considerations, such as avoiding deception in studies whenever possible, making sure we get informed consent before participants start in a research project, and so on. The ethics of science are even broader, though, when we start to think about how studies happen from start to finish. What if a researcher misrepresented their results, or they decided to form a hypotheses only after they had already done analyses? What if they refused to share their data with other people, who could confirm the findings?

Open science is a movement to make scientific research transparent, accessible, cooperative, reproducible, and honest. The aim of open science is to remove barriers for the creation of studies, sharing of data and results, and analysis of implications or conclusions. It's a way of saying to others, let's all do this together in an open, honest environment. One specific goal is to increase the number of studies focused on replication of previous work so that we can be confident in the conclusions we make and in the theories we teach in classes and textbooks (like this one!). Replication of results is the topic of this chapter's Research Deep Dive feature.

Research Deep Dive

Getting It Right: The Role of Replication in Relationship Science

As scientists we are obsessed with getting it right. This impulse is not entirely about us being right in the sense of seeing our predictions gain support (though that is nice), but more about getting the facts straight. Make no mistake, the stakes are high. Published research becomes the foundation for policies, college courses, textbooks, general audience books, and life decisions. In all cases, people put their faith in science to help improve their relationships.

Science is the gold standard for establishing facts because it requires that several key criteria be present for a finding to be considered authentic. For example, scientific information must be falsifiable, which means there has to be some way to refute it or collect evidence that contradicts the alleged fact. Despite every scientist's best efforts, no study is 100% perfect. Thus there is always a chance a study's conclusions are wrong. Perhaps the most straightforward way to see if a statement of fact is false is to retest it. If someone else's research finds that a training program helps people find quality partners more easily, we need to be able to test that ourselves. That is, we need to check our work and test our theories.

A key way for relationship science (and all other scientific fields) to accomplish and demonstrate falsifiability is through replication, where scientists redo a study to determine if they get similar results each time. In fact, replication comes in a variety of forms, with each type along the continuum contributing to our knowledge base. The first type is a **direct replication** in which researchers attempt to rerun the original study, sticking as closely as possible to the measures, manipulations, and/or procedures that other researchers used in the previous study. Direct replications help establish that a given finding exists. In other words, if two different research teams can obtain the exact same finding, then it gives us more confidence that the finding is real. Technically speaking, direct replications help falsify the null hypothesis (that there is no association between the variables in the study).

At the other end of the replication continuum is a **conceptual replication**, in which researchers study the exact same variables and test a similar association, but intentionally use different measures, manipulations, or procedures. Conceptual replications help establish the extent to which previously established associations between variables apply to other contexts. For example, if we find that being in love leads to higher relationship quality, is that true of each type of love? How about for other measures of relationship quality?

To make replication even easier, scientists are increasingly using more open science practices. It is important to realize that simply because replication in science in general is not perfect, it does not mean that it is not trustworthy. Even diamonds have their flaws. It simply means that you have to read scientific findings (as well as every piece of information you encounter) with a critical eye.

For more, read Lebel, P. E., Berger, Z. D., Campbell, L., & Loving, J. T. (2017). Falsifiability is not optional. *Journal of Personality and Social Psychology, 2,* 254–261.

In addition to sharing data (M. N. Meyer, 2018) and sharing materials (Gilmore et al., 2018), there are several ways that open science encourages this kind of communication and exchange; a few are preregistration, results-blind peer review, and publication badges. We'll cover each idea below, but to learn more about this exciting trend in science, you can also go to the following websites:

- The Center for Open Science (https://cos.io/)
- The Open Science Framework (https://osf.io/)
- ORION Open Science (https://www.orion-openscience.eu/)
- The FOSTER Portal (https://openscience.eu)

Preregistration

Imagine that a scientist does a study in which they're not really sure what they're looking for or what the outcomes are expected to be. This is called exploratory research, and there's nothing wrong with it. But now imagine that after the results are analyzed, the scientist publishes the study and more or less pretends that they predicted the outcomes from the beginning. They look super smart! But it's not an honest approach.

Open science's solution is **preregistration**, a practice of specifying—in advance—your hypotheses, procedure, and statistical plan for analyses (see Nosek et al., 2017). This plan is made publicly available to anyone, so you are committing to everything in an open, transparent way. Several preregistration templates have been created to help people through this process, where researchers can post their plans on independent websites.

Preregistration is not without problems. For example, you might say that you're going to get 100 people for your study, but you can get only 75. Or you might assume that people will pay attention to instructions during your procedure, but some of them don't and they mess up what they are supposed to be doing. Or you might realize after you've collected data that you had a typo on your scale that changed what the question asked. Scientists are certainly not perfect, and mistakes can be made. But all of these changes can simply be documented and explained. That way, readers of the research can understand exactly the process that occurred and why changes had to be made.

Typical questions you'll answer on a preregistration form are things like this:

- What are your hypotheses? If you're doing a quasi-experiment or experiment, what are the independent and dependent variables? If you're doing a correlation study, do you expect a positive or negative correlation?
- What exactly will the procedure be—what will participants do? What will be the order of procedural steps? How long will it take each person to do the study? How will you do random assignment (if relevant)?
- How will you recruit participants, and how many do you expect to find? Will anyone be excluded from data analysis—and if so, why?

- How will each of your variables be operationalized and calculated (if you're doing a quantitative study)? What statistical tests will you use to analyze the results?

Results-Blind Peer Review

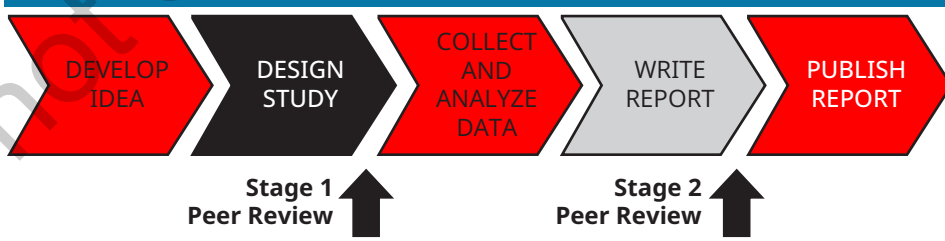
Every academic field has professional journals where researchers publish their results.

Most of these journals are what we call "peer-review" journals. That means that before any article is accepted for publication, it's sent out to other experts on that topic to see what they think. Those people, called reviewers, give the author(s) anonymous feedback about whether they think the article is worthy of being published. Sometimes reviewers suggest changes that they want to see; if those changes are made, the journal will usually publish the article. Sometimes, however, the reviewers can simply say that they don't like the study for scientific reasons and stop it from being published.

Until the open science movement, all of this reviewing happened after a study was completed and written up. That meant that the peer reviewers knew how the study turned out. The problem with this is that it can lead to biases in what is and isn't accepted for publication. Maybe the reviewers wouldn't like the results because they go against a theory they favor. A more common problem is that studies usually weren't published if their results didn't show statistically significant findings or results that matched their hypotheses.

These problems can largely be eliminated with a practice called **results-blind peer review**, which means that reviewers are asked about the importance of the study *before* they see the statistical outcomes, as shown in Figure 2.5. If they agree that the study has merit, they accept it for publication at this stage. Reviewers provide feedback after researchers calculate results—but now they comment on whether the study followed the preregistration plan and interpreted everything correctly. That way, even if the results surprise everyone, the study still gets published. Chris Chambers, the chair of a committee at the Center for Open Science, stated the benefits of this process: "The incentives for authors change from producing the most beautiful story to producing the most accurate one" (Center for Open Science, 2020b). Just like a relationship partner, science is even more beautiful when it's accurate and honest.

Figure 2.5 ▪ The Results-Blind Peer Review Process

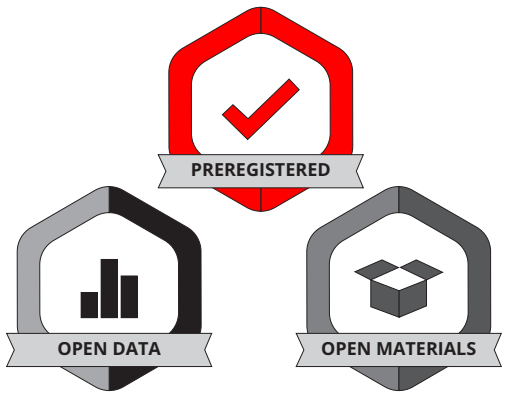


Source: Center for Open Science, used under Creative Commons Attribution 4.0 International license, https://creativecommons.org/licenses/by/4.0/.

Publication Badges

Beyond the rewards of knowing you're doing good science, what incentives are there for engaging in open science practices?

Figure 2.6 ▪ Examples of Open Science Badges



Source: Center for Open Science, used under Creative Commons Attribution 4.0 International license, https://creativecommons.org/licenses/by/4.0/.

One reward is the use of **badges**, or visual icons that mark a study with signals that it has followed these procedures. You can see what the badges look like, at least for some journals, in Figure 2.6. If a study followed the requirements for any of the badges, the badges it earned will appear on the first page of the published article. For example, if they posted their original, raw data spreadsheets online, they get the "Open Materials" badge. Over 50 journals now use the badge system, and early trends show that they really do increase the number of scientists who share their data publicly (Kidwell et al., 2016; Rowhani-Farid et al., 2017). The open science movement is likely going to increase in usage and popularity over the next several years, as many people see it as the only way to make the scientific process truly objective and transparent.

Check Your Understanding

2.7 The movement to make research more transparent, accessible, cooperative, and honest is called:
- **a.** Academic authenticity
- **b.** Public futurism
- **c.** Open science
- **d.** Methodological truth

2.8 Dr. X wants to replicate the idea behind someone else's study but to use new procedures and a different sample of people to see if the phenomenon holds up again under these new methods. What kind of replication would Dr. X's study be called?
- **a.** Abstract replication
- **b.** Conceptual replication
- **c.** Multiple replication
- **d.** Direct replication

2.9 Research on the use of badges by journals has shown that badges:
- **a.** Increase the number of scientists interested in publishing their work

b. Decrease external validity in most studies
c. Increase the number of scientists who publicly share their data
d. Decrease the amount of deception used on participants in studies

Application Activity

While many people praise open science practices, these practices are not without drawbacks. One article that discusses some disadvantages can be found online by searching for the title "Open Science Isn't Always Open to All Scientists" (Bahlai et al., 2019). Read this article and discuss or write your own opinion about the pros and cons of the open science movement.

Critical Thinking

- Some professional journals charge for copies of their articles, or they require people to pay for subscriptions. Others offer their articles to readers for free, but they require that the scientists themselves pay to publish their work in the journal. What do you think is the best system for research to be available to other scientists or the general public, in terms of how it is funded? Should there be a new system, like a "science tax" that everyone pays but is used to make scientific progress available to everyone? Discuss how you think science should be funded, and why.
- The peer review process, even when done using the results-blind procedure, can be frustrating to people who want to publish their work. Sometimes, it seems unfair that anonymous people get to judge your work and decide whether it's "worthy." On the other hand, peer-reviewed articles are considered more credible because they have passed through this hoop of acceptance. Do you think the peer-review system is good or bad, and why? If you don't like it, is there a better alternative?
- If you were a researcher, would badges make you more likely to engage in open science practices? Why or why not?

Answers to Check Your Understanding Questions

2.7 c, **2.8** b, and **2.9** c.

Chapter Summary

Big Questions

1. What research methods help us understand relationships?
2. How do we analyze results?
3. What is "open science"?

What research methods help us understand relationships?

The scientific method consists of steps: observe a pattern, generate a hypothesis, test the hypothesis, and interpret the results. It then continues in a circular, repeatable cycle. Good research has high internal validity, external validity, and replicability. Researchers choose between a qualitative study, which gathers open-ended data through interviews or surveys, and a quantitative study, which gathers data in numerical form (e.g., a scale that ranges from 1 to 7). In addition, several methods are used. These include archival research (or information originally gathered for another purpose), naturalistic observation (watching people in their natural environments), self-report surveys, quasi-experiments, and experiments. Each method has advantages and disadvantages. Finally, ethical treatment of participants includes practices such as obtaining informed consent, avoiding deception when possible, giving participants the right to withdraw, and performing a thorough debriefing.

How do we analyze results?

When two groups are compared to see if they are different from each other, the statistic used to analyze data is called a *t*-test. It compares the two groups' average scores and standard deviations to see how much they overlap. The same principle is used to compare three or more groups, but then the statistical test is called an analysis of variance, or ANOVA. When a single sample is used in a study, but researchers want to test for associations between variables, correlation tests are used. Correlations can be positive (both variables move in the same direction) or negative (the two variables move in opposite directions). The number for a correlation will always be between zero and one, with higher numbers meaning a stronger association between the two variables. Importantly, just because two variables are correlated with each other, it doesn't necessarily mean that movement of one causes movement in the other.

What is "open science"?

"Open science" is a movement to make research more transparent, cooperative, and honest. It involves practices like preregistration, where researchers specify their hypotheses, procedures, and statistical plan for analyses before any data are actually gathered. Another practice in open science is results-blind peer review, where other experts judge the value and quality of a study without knowing what the results were, so they can't be biased by the outcome of the study. Finally, many

journals are now awarding badges for people who use open science. Badges are icons that appear on the first page of a published study that indicate the usage of various open science practices in a given study.

List of Terms

Learning Objectives	Key Terms
2.1 Describe the scientific method, different types of research study, and ethical considerations.	**Scientific method** **Hypothesis** **Internal validity** **External validity** **Replication** **Qualitative study** **Quantitative study** **Cross-sectional study** **Representative sample** **Random sampling** **Meta-analysis** **Archival data** **Naturalistic observation** **Reactivity** **Participant observation** **Self-report survey** **Social desirability** **Quasi-experiment** **Experiment** **Random assignment** **Experimental group** **Control group** **Independent variable** **Dependent variable** **Institutional review board (IRB)** **Informed consent** **Deception** **Debriefing**
2.2 Compare and contrast the most common ways to analyze and interpret research results.	***t*-test** **Analysis of variance (ANOVA)** **Correlation** **Scatterplot** **Correlation coefficient** **Positive correlation** **Negative correlation** **Dyadic analysis**

(*Continued*)

Learning Objectives	Key Terms
2.3 Describe the "open science" movement and what it means for future research endeavors.	**Open science** **Direct replication** **Conceptual replication** **Preregistration** **Results-blind peer review** **Badges**