Ch 1. Research in the real world

Key questions

- What is research?
- What is research methods?
- Why do research methods matter?

[Discussion]

1. What is research to you?
2. Why do we do research? What is the goal of research to you?

1. What is scientific research?

: A social and intellectual activity that involves [ ] inquiry aimed at accurately [ ] the world. (RR p. 9)

1) Purpose of scientific research

We can largely categorize into two:

1. Develop a theory. Strength or revise the existing theory
2. Explore and evaluate a theory

2) The characteristics of scientific research:

1. It should follow a systematic procedure.
2. The research question and hypothesis should be logical.
3. It should be empirical.

4. It should be reductive.
5. It should be replicable/reproducible.
6. It should be transmittable.

It's never perfect.

It always has some methodological or other shortcomings (weakness).

It aims to generalize.

Generalizability: the ability to take the results of research and apply them in situations other than the exact one in which the research was carried out.

Bits and pieces of a puzzle

A single study is almost never definitive; rather, empirical evidence on a topic is cumulative. Research produces a body of evidence, and researchers talk about arriving at a scientific consensus within the bounds of what is likely to be true (or not).

Research requires a formal "research method."

It can be quantitative, qualitative, or a Mix of both.

A number of research might deliver the controversial conclusions.

3) Typology of scientific research

1. Basic vs. Applied

: Based on the [ ] of research.

2. Quantitative vs. Qualitative

: Based on the [ ] for research

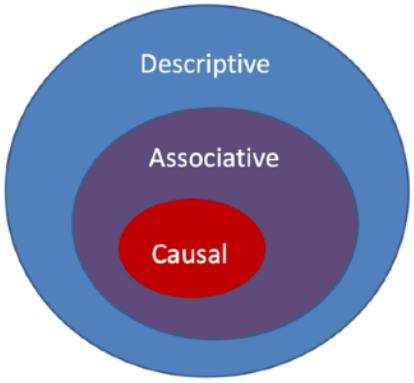
In quantitative research, investigators sometimes observe the world using instruments (including structured questionnaires) that produce numerical or categorical data representing various characteristics, behaviors, or attitudes. Or they will retrieve existing data that are already in numerical form, such as counts of reported crimes, graduation rates, or prices. These numerical or categorical data are then analyzed using the tools and techniques of statistics, from simple graphs and tables to sophisticated multivariate techniques.

Qualitative research involves various kinds of qualitative data, such as interviews (oral communication), printed or online texts or documents, videos or visual images, observations of behavior, cultural artifacts, case studies, social media content, and other forms of expression. Qualitative research can be defined as research involving spoken language, observations, texts, images, artifacts, and other forms of nonnumerical data that express meanings, which researchers then interpret—generally without relying on quantification or statistical analysis.

3. Descriptive vs. Associative vs. Causal

:Based on what research wants to [ ]: what is the *purpose* of research.

[Typology of research questions]



Descriptive

- What is/was happening in the world?
- What are the characteristics/qualities/opinions/patterns of behavior of a group of people or things?

Associative

- Do two (or more) characteristics tend to occur together?

- Can we **predict** the characteristics/qualities/opinions/behaviors of a group of people or things?

Causal

- How would the world be different if something changed?
- To answer "what if" questions.
- What is the effect of a course of action/treatment/intervention?
- ***What would happen if…?***
- If we change something, will other things (outcomes we care about, such as autism) change in response?

- One of the most important skills you will gain from this book (class) is how to distinguish a correlation, the description of a relationship, from evidence of a causal effect. And you will learn how to better judge good causal evidence of what works, and how well it works.

2. What is research methodology? Do Methods matter?

We need such evidence not only to enhance our own understanding and decision making but also to convince others.

Good evidence comes from well-conducted research

Research methods: The techniques and procedures that produce research evidence, such as sampling strategies, measurement instruments, planned comparisons, and statistical techniques. So we need to understand research methods to judge the quality of a study and the evidence it provides. (p. 3)

Do methods matter?

Research has become an essential element of modern public policy and management in the form of analytics, performance measurement, program evaluation, and the push for evidence-based policy and practices.

Evidence can mislead

1) **Misleading measurements** (Example in RR p. 7)

No Child Left Behind (NCLB) was signed into law in 2002, setting in motion a wave of reform in schools all across the United States that became suddenly preoccupied with high-stakes testing, worried about closing the race gap, and apprehensive about the need to demonstrate rapid gains in test scores. NCLB won support in part because of the "Houston miracle," the fact that this large, diverse city had itself demonstrated remarkable gains in reading and math scores, especially for Black and Hispanic students —at least according to scores on the Texas Assessment of Academic Skills (TAAS). If Houston could do it, so could the rest of the nation.

But scores on another test—the Stanford Achievement Test—taken by the same Houston students during the same school years showed a much different picture, according to an analysis by the New York Times (Schemo & Fessenden, 2003). Scores on the Stanford test, which is used nationwide, showed little or no gain overall in Houston and little or no narrowing of the race gap. Several well-known experts in education statistics, asked by the New York Times to review the discrepancy, concluded that the TAAS had considerably overstated the progress made by Houston students. Standardized tests do not necessarily provide a consistent measure.

2) **Misleading samples** (Example in RR p. 7)

Representativeness! Representative sample to a [ ].

As Pennsylvania considered legalizing marijuana, a PoliticsPA.com (2019) poll asked its readers "Should PA legalize recreational marijuana?" Marijuana legalization has become a major public policy issue facing many states with important health and financial implications. Nearly 1,500 people responded to the poll, and the results showed that fully 90 percent favored legalization. But the PoliticsPA reader's poll relied on a voluntary sample—visitors to the online news site who found the poll and decided to participate.

A few weeks later, the Franklin and Marshall College Poll (2019) conducted a telephone survey that involved calling a random sample of 540 registered voters in the state. This poll found that only 59 percent favored marijuana legalization—a clear majority but still a finding that suggests a more divided view of the issue. Which survey do we believe? The Franklin and Marshall College Poll uses much better methods—including careful random sampling—to produce its results. And representativeness depends on the method of selecting the sample, not on how large the sample is. The true level of support for marijuana legalization in Pennsylvania is thus much closer to 59 percent than it is to the strikingly high figure of 90 percent, despite the larger sample in the PoliticsPA poll.

3) Misleading correlations

- [ ]: when two variables are correlated because both are a reflection of a third, underlying variable or common cause.
- [ ]: A spurious factor, a variable that actually affects the outcome but ignored in a model.

Examining a city's ice cream sales: The sales might be highest when the rate of drownings in city swimming pools is highest. To allege that ice cream sales cause drowning, or vice versa, would be to imply a spurious relationship between the two. In reality, a heat wave may have caused both. The heat wave is an example of a hidden or unseen variable, also known as a confounding variable. [Wikipedia]

3. Ethics of research

Research in social science, ethical issues are important because it deals with human beings. These ethical concerns shape and constrain the design and conduct of research in ways that have implications for most of the research methods.

- Code of ethics: APA, AERA
- NIH (National Institutes of Health) training: Protecting Human Research Participants course

Historical research using human subjects

The history of research involving human beings includes many instances of unethical practices, sometimes extremely troubling practices. Early medical experiments were performed on prisoners, racial minorities, or poorhouse residents, often without their consent or even knowledge. During the Nuremberg trials, it was revealed that the Nazis had a program of profoundly inhumane medical experiments on Jews imprisoned in concentration camps during World War II (RR p. 20).

1) Milgram's experiment: obedience to authority

- Milgram, Stanley. (1974). Obedience to authority: An experimental view. HarperCollins.

- Short video1, Video2
- Full documentary is here.
- Practical psychology

- To alleviate the stress caused by his manipulation, Milgram disclosed to participants the true intent of his experiment and that no shocks were ever administered, after the experiment was completed.

2) Stanford prison experiment

- Zimbardo, P. G. (1975). On transforming experimental research into advocacy for social change. In M. Deutsch & H. Hornstein (Eds.), Applying social psychology: Implications for research, practice, and training (pp. 33–66). Hillsdale, NJ: Lawrence Erlbaum.
- Haney, C., & Zimbardo, P. G. (1977). The socialization into criminality: On becoming a prisoner and a guard. In J. L. Tapp & T. L. Levine (Eds.), Law, justice, and the individual in society: Psychological and legal issues (pp. 198–223). New York, NY: Holt, Rinehart & Winston.

Videos:

- Practical Psychology
- BBC documentary
- Movie in 2015

Stretch your brain further:

Deception vs. Transparency

Asch's conformity study (1951): if and how individuals yielded to or defied a majority group and the effect of such influences on beliefs and opinions

- Video

Deception is a strategy used by researchers in which participants are deliberately misled concerning the true purpose and nature of the research being conducted. Deception can be active (deliberately untruthful) or passive (omission of key information). The use of deception is sometimes unavoidable. [PR p. 81]

- **Debrifing** is required when deception is used in a research study. At the conclusion of a study, all participants and/or parents receive a debriefing in which the researcher discloses the true purpose of the study.
  - Evans, A. D., & Lee, K. (2011). Verbal deception from late childhood to middle adolescence and its relation to executive functioning skills. *Developmental psychology*, *47*(4), 1108–1116. https://doi.org/10.1037/a0023425 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3474321/)
    - *"Upon completion of the 30-min testing session, participants were debriefed with their parents and discussed issues regarding truth and lie telling. All participants received the $10 for participating in the study regardless of their performance on the test." (p. 8)*

Confidentiality vs. Open Science

- Data should be kept confidential, but what confidentiality means, and how one ensures it, would be much different for a statistical study using administrative health data than an in-depth interview study

about sexual abuse in childhood. Issues like informed consent, confidentiality, or the acceptable use of deception arise to different extents and in different ways depending on the form and context of the research.

- [ ] is a protection of individual identity in which the identity of a participant remains unknown throughout a study, even to those involved in a study.
- [ ] is a protection of individual identity in which the identity of a participant is not made available to anyone who is not directly involved in a study. Those involved in a study, however, are able to identify participant information.

- A recent trend in academic research: [ ] - share data and code for analysis and result.
  - Researchers are expected to share their data upon request from others (or, publicly) for the purposes of verification or other analyses, which is one reason that researchers are expected to maintain their research data for years (or, forever, in an online repository).

Scientific integrity

Ethics is not only in conducting research but also in [ ] the results.

1) Reporting research results
   - Researchers are expected to truthfully report data and never fabricate research results by making up data that were never observed or measured.
   - [ ] [PR Ch 2.8]: The tendency for editors of peer-reviewed journals to preferentially accept articles that show positive results and reject those that show only negative results. The publication bias is also called the **file drawer problem** because researchers have a tendency to file away studies that show negative results, knowing that most journals will likely reject them.
     - Big problem in meta-analysis: reporting effect size estimates

2) Plagiarism

Plagiarism is an individual's use of someone else's ideas or work that is represented as the individual's own ideas or work.

- AI and plagiarism: A careless usage of AI/ChatGPT can be considered as plagiarism.