Why we do research

- Improvement
- Description
- Explanation
- Prediction
Theory

- Explanation of an observed phenomena
- In the social sciences, it is derived from theoretical constructs
- Constructs are operationally defined
Deriving a theory

- Grounded theory (qualitative)
- Formulating (quantitative)
Limitations to Generalizability/Transfer

- Bias
- Phenomenological
- Inconsistent realities
  - Objective reality vs constructed reality
Postmodernism

- There is no superior form of inquiry
- There is no universal truth
- Rather, there is an agreement among many voices
Response to postmodernism

- Scientific researchers have developed concepts and procedures to conduct high quality investigations
- Findings can be replicated
- Findings can be refuted
- Bias and errors can be minimized
- A good researcher is guided by ethical principles
Improvement

We wish to know the effectiveness of an intervention
Description

We wish to know the form, structure, activity, change over time, and/or relationship to other phenomena.
Explanation

We wish to develop a theory behind a specific phenomena
Prediction

We wish to identify what and when specific events will occur
How do we use research to answer questions?

- Define what we want to measure:
  - Purpose of research
  - Type of Research
  - Variables

- Develop questions or hypotheses

- Identify how data will be collected
  - Population
  - Sampling
Define what we want to measure: Purpose

- Fundamental research
  - Deductive method
  - less concerned with application
  - more common in physical sciences
  - The benefits of the research may not be applied immediately
Define what we want to measure: Purpose

- Applied research
  - Purpose is to improve a product or process
  - Describes most social science research
  - Attempts to develop generalizations about a population
Define what we want to measure: Purpose

- Action research
  - The researcher is actively involved in the process
  - Focus is on immediate application, not generalization
  - Purpose is to improve practice
  - Results may not be generalizable because they often do not occur in an experimental setting
Define what we want to measure: Purpose

- Assessment
  - Fact-finding—examines what exists
  - No hypothesis testing
  - Not considered research
Define what we want to measure: Purpose

- Evaluation
  - Application of findings
  - Examination of utilization and effectiveness
  - Not considered research
  - May be *summative*—occurs at the conclusion of a specific period (i.e. assigning a grade)
  - May be *formative*—evaluation is ongoing and continuous
Define what we want to measure: Two broad areas

- **Qualitative research**
  - Inductive
  - Identifies the details of a phenomena
  - Develops theory

- **Quantitative Research**
  - Deductive
  - Generalizes to a population
  - Tests theory
Define what we want to measure:
Type

- Descriptive research
  - May be quantitative:
    - The gathering and analysis of empirical data in order to accurately describe a population
    - Focus is on descriptive statistics
    - Involves hypothesis testing, analysis, and generalization
  - May be qualitative:
    - Focuses on the nature of a phenomena
    - Develops a theory of a phenomena
Define what we want to measure:
Type

- Experimental research
  - Attempts to identify group differences or relationships between or among variables
  - Always involves manipulation of variables and random assignment

- Quasi-experimental research
  - Combines descriptive and experimental research
  - There is no random assignment

- Either may be qualitative or quantitative
Descriptive vs. Experimental Research

- Both involve hypothesis testing
- Both employ *random sampling* (more on that later)
- Experimental research uses *random assignment* (more on that later too)
Descriptive vs. Experimental Research

- Descriptive research does not employ random assignment—that is, some phenomena cannot be randomly assigned, such as sex.
- The researcher may be interested in the relationship between two variables that are already present—this type of descriptive research is known as a correlational research.
  - For example, a researcher wishes to study the relationship between depression and disordered eating.
Define what we want to measure: Type

- Historical research
  - Describes what was by investigating, recording, analyzing, and interpreting events
  - Purpose is to identify previous trends of the past to understand what needs to happen in the present and future
  - May be quantitative or qualitative
Define what we want to measure: Variables

- Variables are defined through observation:
  - i.e. demographic variables (e.g. SES, ethnicity, sex)

  OR

- Variables are defined operationally
  - Constructs (i.e. mood, creativity, wellness)
  - Based on theory
Develop questions or hypotheses:

Questions

- When developing a research project, it is sometimes helpful to think in terms of what question(s) may be answered through this research.
Develop questions or hypotheses: Questions

- Research questions may be *descriptive*
  - They describe what is occurring
  - What percent of low achieving students come from single parent families?
Develop questions or hypotheses: Questions

- Research questions may be *relational*
  - The relationship between two variables is examined
  - What is the relationship between exercise and decreases in depression?
Develop questions or hypotheses: Questions

Research questions may be *causal*

- Is one phenomena caused by another phenomena?
- Does drinking alcohol cause an individual to escalate in drug use?
- Causal studies are rarely conducted in social science research because determining causation is very difficult.
Develop questions or hypotheses: Questions

- Conditions for causation:
  - Relationship between the two phenomena
  - Time order—the proper sequence of events
  - Influence of confounding variables has been eliminated—no other influences can be attributed to the relationship
Develop questions or hypotheses: Hypotheses

An hypothesis is a specific statement of prediction. There are two types:

1. **Scientific**
   - Statement about what we think should happen in our study
   - Statement about the variables that deter the study

2. **Statistical**
   - Contains a null and an alternative hypothesis
   - You accept one
   - Lends credibility, provides evidence
   - DOES NOT PROVE
Statistical Hypotheses

- Actually, a statistical hypothesis includes \textit{two} hypotheses.

- Let's say that you predict that there will be differences between males and females in a study of emotional maturity in high school students.

- The way we would formally set up the hypothesis test is to formulate two hypothesis statements:
  - One that describes no differences between the groups
  - One that describes differences between the groups.
Statistical Hypotheses

- Usually, we call the hypothesis that describes no differences as the *null* hypothesis.
- We call the hypothesis that you supports differences the *alternative* hypothesis.
- We use a notation like $H_1$ to represent the alternative hypothesis and $H_0$ to represent the null case.
Statistical Hypotheses

- Null Hypothesis
- Alternative (research) hypothesis

\[ H_0: \mu_1 = \mu_2 \]
\[ H_1: \mu_1 \neq \mu_2 \]

“OK, I know it's a convoluted, awkward and formalistic way to ask research questions. But it encompasses a long tradition in statistics called the \textit{hypothetical-deductive model}, and sometimes we just have to do things because they're traditions. And anyway, if all of this hypothesis testing was easy enough so anybody could understand it, how do you think statisticians would stay employed?” (Trochim, 2006)
Questions or Hypotheses?

- In the end, you can decide whether you want to identify research questions or research hypotheses in your research project.