Week 5
Hypothesis, Conceptualization and operationalization of Variables

PowerPoint presentation is modified based on Allen Rubin

Overview

- Conceptualization
  - in Quantitative Inquiry
  - in Qualitative Inquiry
- Developing a Proper Hypothesis
- Variable Terminology
- Operational Definitions
- Levels of Measurement

Conceptualization in Quantitative Inquiry: Key Terms

- **Concept**
  - A mental image that symbolizes an idea, an object, an event, a behavior, a person, etc.

- **Attributes**
  - Concepts that make up a broader concept are called attributes, e.g. old/young (attributes) vs. Age (variable); male/female (attributes) vs. gender (variable)

- **Variables**
  - Broader concepts that vary (include more than one attribute or level of a concept) and that researchers investigate, e.g. age, gender, level of self-esteem, number of abusive incidents, etc.

Conceptualization in Quantitative Inquiry: Key Terms

- **Relationship**
  - Variables that change together in a consistent, predictable fashion, e.g., height and weight

- **Hypothesis**
  - Tentative and testable statement about a presumed relationship between variables

- **Independent Variable**
  - The variable in a hypothesis that is postulated to explain or cause another variable

- **Dependent Variable**
  - The variable in a hypothesis that is thought to be explained or caused by the independent variable

Self-Esteem

- Concept

- Attributes- 1) Low self-esteem 2) High self-esteem

- Variable- The score from Rosenberg Self-Esteem Scale(10 items; 4-point Likert scale; ranging from 0 to 30)

- Relationship- High self-esteem mitigates the chance of having depression; Trauma in childhood may decrease self-esteem.

- Hypothesis- If individuals have high self-esteem, the chance of having depression decreases.

Illustration of a Hypothesis and its Components

ILLUSTRATION OF A HYPOTHESIS AND ITS COMPONENTS

Concepts	Hypothesis	Variables	Attributes
Student	Praise by teacher	Independent: Whether teacher praises student	Praised / Not praised
Teacher			
School	will ‖ increase		
Praise	Student confidence at school	Dependent: Student's level of confidence at school	High level of confidence / Low level of confidence
Confidence			

# Developing a Proper Hypothesis

- Hypotheses should:

  - be clear and specific

  - have more than one possible outcome

  - be value free-Not based on your value, but developed from evidence

  - testable

Hypothesis Example

- **If** skin cancer is **related** to ultraviolet light, **then** people with high exposure to UV light will have a higher frequency of skin cancer.

- **If** leaf color change is **related** to temperature, then exposing plants to low temperatures will result in changes in leaf color.

- **If** the rate of photosynthesis is **related** to wavelengths of light, **then** exposing a plant to different colors of light will produce different amounts of oxygen.

- Children who eat a breakfast high in protein perform academically better in school than children who eat cereal for breakfast.

- Providing high-quality, intensive training for in-home daycare providers will help to create more affordable daycare options.

Extraneous (control) Variables

- Extraneous variables- variables are not independent variables but could affect the results (outcome variable) of the experiment or outcome of the statistical model.

- 1) Socio-demographic factors

- 2) Mediating variables

- 3) Moderating variables
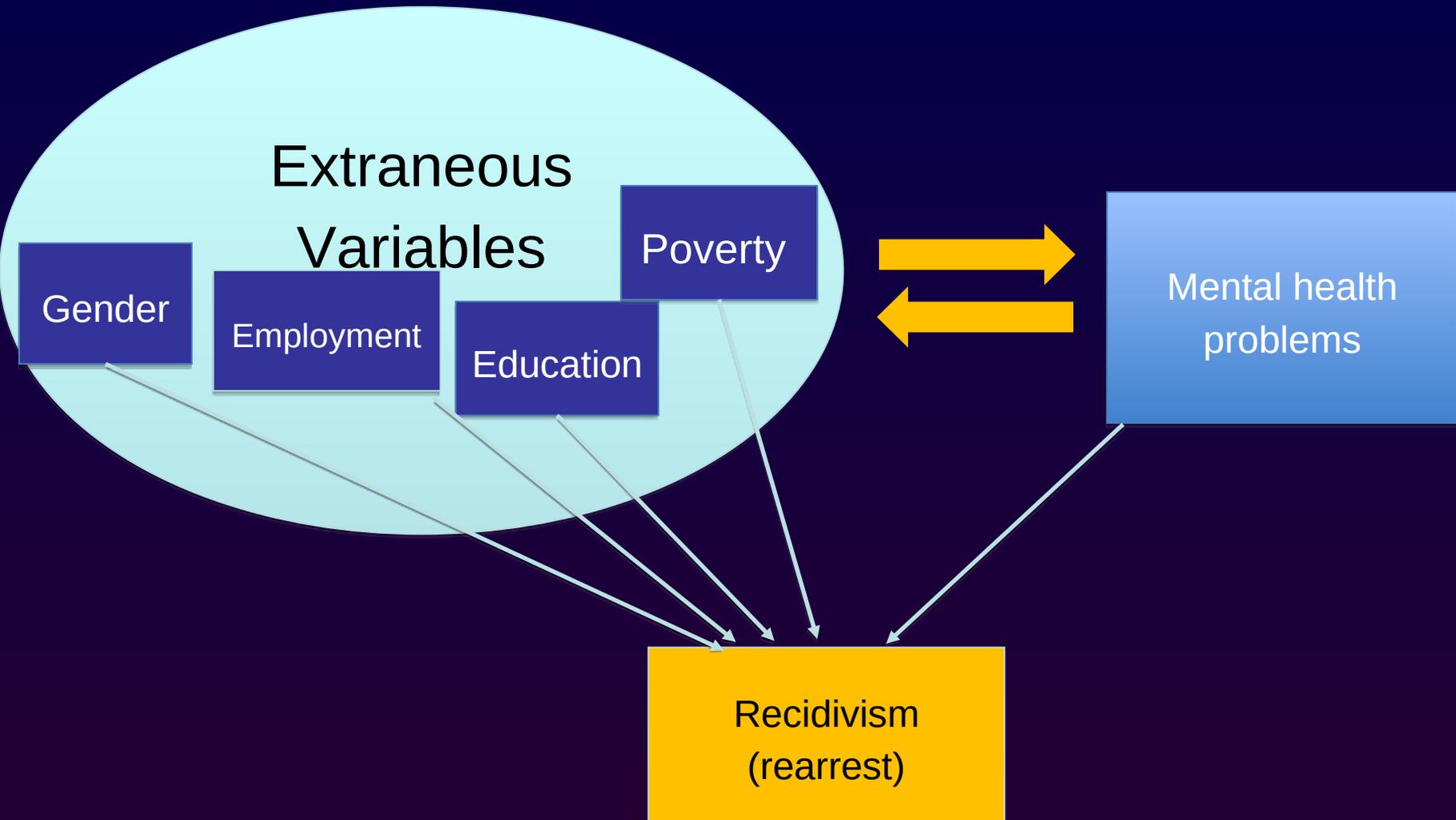
Mediating Variables

- Mechanisms by which independent variables can affect dependent variables

- Example:

Moderating Variables

- A third variable that can influence the strength and **direction** of relationships between independent and dependent variable

- Sometimes called *Extraneous (Control or Cofound) variables*

- A third variable (factor) that should be controlled to find a true relationship between IV and DV- Sometimes could be socio-demographic variable
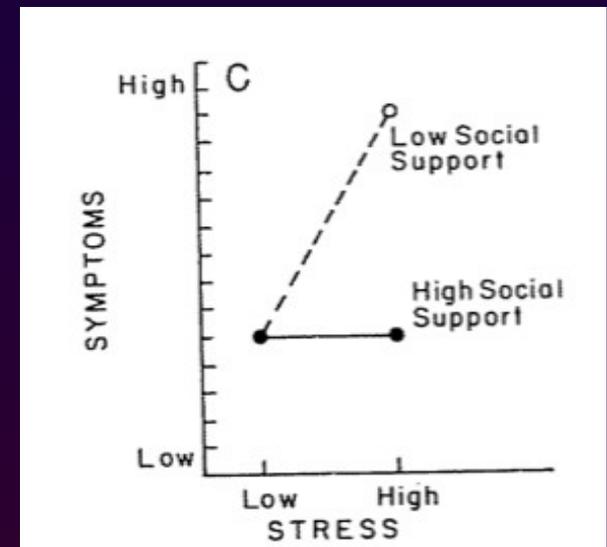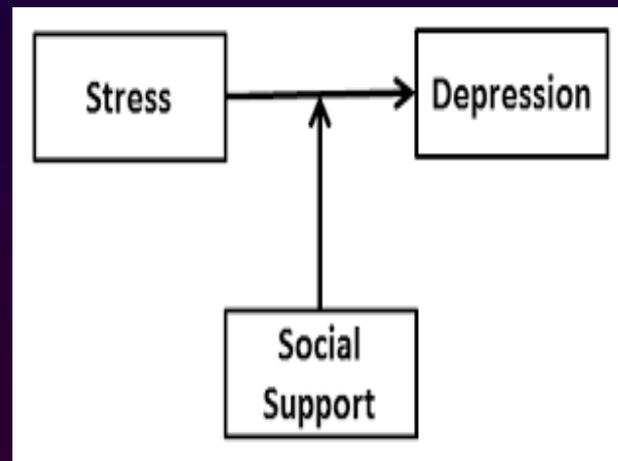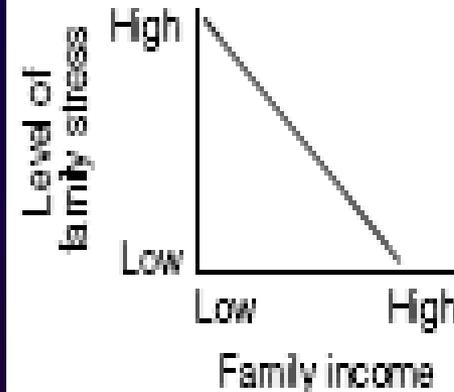
Types of Relationships between Variables

- Relationships between variables can be positive, negative, or curvilinear
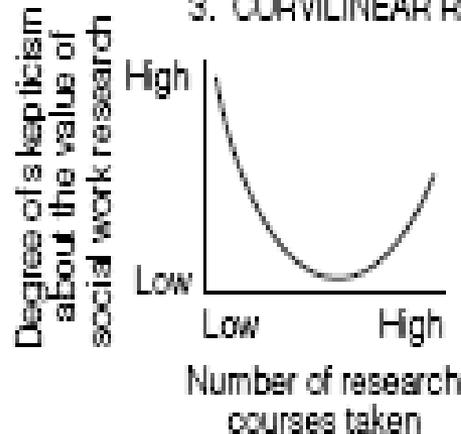

1. POSITIVE RELATIONSHIP
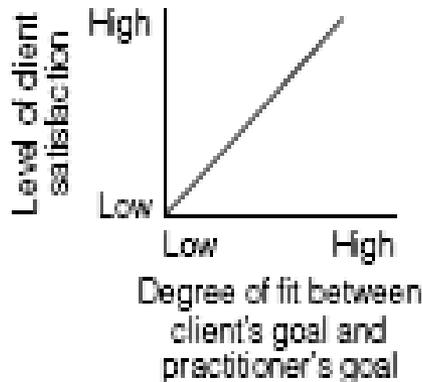
The better the fit between the client's reason for seeking help and the service goal formulated by practitioner, the more the client satisfaction.

2. NEGATIVE RELATIONSHIP

The lower the family income, the higher the level of family stress.

3. CURVILINEAR RELATIONSHIP

Skepticism decreases as students take more research courses up to a point, but after that skepticism increases as more research courses are taken.

Nominal VS Operational Definitions

- In quantitative research we must first translate variables into operational definitions (observable terms) before a study is implemented

- Operational definitions differ from nominal definitions. For example, consider the concept *level of social adjustment*:

  - *Nominal definition*: "How well people perform their major roles in life"

  - *Operational definition*: "Score on a scale that measures social adjustment"

Example

- Variable- Negative Parenting
- **Nominal Definition- Parenting characterized by low levels of warmth** (e.g. rejection/criticism, hostility) and high levels of control (e.g. overinvolvement, lack of autonomy-granting) is associated with child social anxiety

Influence and Categories of Operational Definitions: Negative Parenting/Direct Observation

- Operational Definition: You might begin by making a list of positive parenting behaviors. Then you might **directly observe the parents or foster parents in a challenging parenting situation (such as getting children to put away their toys) and count the number of times the parents show positive and negative behaviors.** Perhaps you will give them +1 for every positive behavior and −1 for every negative behavior; tally up the points to get a parenting skill score.

- Testing the hypothesis: See if the average scores of parents in the counties receiving the innovative program are higher (better) than the average scores of parents in the counties receiving the traditional program.

- Advantages: Behaviors are observed first-hand.

- Disadvantages:
  - Time-consuming.
  - Parents will know they are being observed and may not behave the same as when they are not being observed.
  - Possibility of observer bias.

Influence and Categories of Operational Definitions: Negative Parenting/Self Report

- Operational Definition: Ask the parents to complete an existing **self-report scale that purports to measure attitudes about parenting**. Such a scale might ask parents questions about what they would do in various child-rearing situations or how they perceive various normal childhood behaviors that some parents misperceive as provocative.

- Testing the hypothesis: See if the average scale scores of parents in the counties receiving the innovative program are lower than the average scale scores of parents in the counties receiving the traditional program.

- Advantages:
  - Less costly and less time-consuming than direct observation.
  - If scales are completed anonymously, parents might be more likely to reveal undesirable attitudes.

- Disadvantages:
  - Parents might distort their true attitudes to convey a more socially desirable impression.
  - The scale might not be valid.
  - Knowledge and attitudes may not reflect actual behaviors.

Influence and Categories of Operational Definitions: Negative Parenting/Available Records

- Operational Definition: Examine county records of the number of documented incidents of child abuse and neglect.

- Testing the hypothesis: See if the number of documented incidents of child abuse and neglect in the counties receiving the innovative program is lower than the number in the counties receiving the traditional program.

- Advantages:
  - Less costly and time-consuming than either direct observation or self-report.
  - You don't have to assume that positive parenting knowledge and skills translate into less abuse; you measure abuse per se.

- **Disadvantages:**
  - Reliance on the adequacy of county records.
  - Won't show whether the parents who received your intervention improved their parenting.
  - Possibility of biased reporting.

Existing Scales

- Existing scales spare researchers the costs in time and money

- Practical concerns:
  - The length of the scale
  - Time required to complete the scale
  - Compensation
  - The level of difficulty
  - Sensitivity to changes
  - Reliability and validity

Class Activity

- 1. What is the hypothesis of your research?

- 2. What are the dependent variable and independent variable(s) in your research?

- 3. What could be the nominal definition and the operational definition of the independent variable?

- 4. What could be the nominal definition and the operational definition of the independent variable?

Conceptualization in Qualitative Inquiry

- Observations are not restricted to predetermined operational indicators

- Researchers let meanings of little-understood phenomena emerge from the observations

- Deeper meanings are the purview of qualitative studies

Qualitative Perspective on Operational Definitions

- We may not know in advance what all the most salient variables are

- Limited understanding of the variables may keep us from anticipating the best way to operationally define those variables

- Even the best operational definitions are necessarily superficial