

Chapter 6

Formulating Hypotheses And Research Questions

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Hypotheses

- Statements that explain or predict relationship or difference between variables in terms of expected study outcomes
- Serve several purposes
 - Guide scientific inquiry for advancement of knowledge
 - Provide direction for research design and collection, analysis, and interpretation of data
 - Provide basis for selecting sample
 - Provide framework for reporting conclusions of study

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Hypotheses (cont'd)

- Researcher tries to collect data to support or refute hypothesis
- Hypotheses do not have to be proven to be successful
- Not needed for research classified as descriptive

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Characteristics of Hypotheses

- State expected relationship between variables clearly and concisely
- Include:
 - Variables being studied
 - Population being studied
 - Predicted outcomes
- Example
 - Subjects who receive *X* are more likely to have *Y* than subjects who do not receive *X*.

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Characteristics of Hypotheses (cont'd)

- All nouns in hypotheses should be defined conceptually then operationally
- Concepts and variables need to be defined according to their relationship to the problem
- Limit hypotheses to a single relationship between two variables to add clarity
- Well-state hypotheses must be testable

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Types of Hypotheses

- Simple versus complex
 - Simple hypotheses
 - State relationship between two variables
 - Easier to understand, test, measure, and analyze than complex hypotheses
 - Complex hypotheses
 - State relationship between two or more independent and dependent variables
 - What type of hypothesis is best for your study?
 - Is the study you are planning feasible?

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Simple Versus Complex Hypotheses

Simple hypothesis

Expresses a predicted relationship between one IV & one DV

Complex hypothesis

States a predicted relationship between two or more IVs &/or two or more DVs

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Simple Hypothesis

- States relationship between 2 variables
- Easy to understand
- Easier to test, measure & analyze
- When X changes, Y is affected
- Example: Patients experience less discomfort during contractions while laboring in a whirlpool as compared to laboring in a bed.

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Complex Hypothesis

- States relationship between 2 or more independent &/or 2 or more dependent variables
- More complex to test, measure & analyze
- X & Y are related to W & Z
- X is related to Y & Z
- X & T are related to Y, Z & W
- Example: Satisfaction with a health care encounter is related to the cost of the encounter, length of wait, & compliance with the recommended treatment plan.

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Types of Hypotheses (cont'd)

- Nondirectional versus directional
 - Nondirectional hypotheses
 - State relationship between variables, but has no specific direction
 - Used when past research provides conflicting results or relationship unknown
 - Directional hypotheses
 - States direction of relationship between variables
 - Usually derived from conceptual models or findings of previous research
 - Clearer and more logical than nondirectional hypotheses

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Types of Hypotheses (cont'd)

- Statistical versus research
 - Statistical hypothesis
 - Also known as null hypothesis
 - States no relationship (or difference) exists between two variables
 - Usually used because they suit statistical techniques
 - Are usually stated with another hypothesis
 - Declarative research hypothesis
 - Research hypothesis, analysis of data, making of inferences
 - Research hypothesis
 - Referred to as an alternative declarative or scientific hypothesis
 - States that a relationship or difference exists between variables

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Types of Hypotheses (cont'd)

- Statistical versus research
 - Research hypothesis
 - Indicate what researcher expects to find when conducting study
 - Can be simple or complex, directional or nondirectional
- Hypotheses can also be categorized according to how they are derived
 - Inductively
 - Deductively

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Testing Hypotheses

- Testable hypothesis is one that contains variables that are measurable
- To test, researcher determines sample, measuring instruments, design, and procedure for collecting data
- Evaluated by statistical analyses
- Results obtained described using research terminology

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Research Questions

- A concise, interrogative statement that includes one or more variables or concepts
- Focus of research questions
 - Describing variables
 - Examining relationships among variables
 - Determining differences between two or more groups in relation to variables
- Specify type and purpose of research
- More precise and specific than problem statements

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Classification of Variables

- Variable is a measurable characteristic that varies among subjects
- Independent variable
 - Observed, introduced, or manipulated to determine effect it has on another variable
 - May be classified as experimental, treatment, intervention, or predictor variable
- Dependent variable
 - Observed for change or reaction after the treatment is applied
 - Variable which is under investigation

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Independent Variable (IV)

- A variable that is manipulated and controlled by the researcher
- Usually symbolized by the letter X.
- Ex: - Children ages 5 to 10 years old who are provided with **prior information** about their tonsillectomy will experience less **postoperative** anxiety than children of the same age who do not receive prior information.

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Dependent Variable (DV)

- Variable measured to assess the possible effect of a treatment or manipulation
- May be the outcome of an experimental procedure
- Usually symbolized by the letter Y.
- Ex: - Men ages 25 to 50 years old who experience migraine headaches and perform biofeedback therapy report fewer **headaches** than do men in the same age range who do not perform biofeedback therapy.

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Independent (IV) vs. Dependent (DV)

- Independent variable is actively controlled/changed
- Dependent variable is changed as a result of the independent variable
- Independent variable is the "presumed catalyst/cause", while dependent variable is the "presumed effect" of the independent variable.

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Extraneous Variable (EV)

- Extraneous variables
 - Characteristics not under investigation but may be relevant to study
 - Exist in all studies
 - May be classified as controlled or uncontrolled and recognized or unrecognized
- Variable that is not controlled for in a study, which threatens the accuracy of the results (internal validity) of the study.
- If not controlled can invalidate the results
- Ex: A study on hope and healing time in surgery patients needs to control for terminal illnesses.
