

Chapter 1 – Variables, Research Problems and Questions

Chapter Outline

- I. Research Problems: Statement about the relationships between two or more variables.
- II. Variables
 - A. Definition: Characteristic of the participants or situation for a study
 - 1. Must be able to vary or have different values.
 - 2. Concepts that do not vary are called constants.
 - 3. Operational definition: defines a variable in terms of the operations or techniques used to measure it or make it happen.
 - B. Independent Variables
 - 1. Active (manipulated) independent variable: can be given to participants within a specified period of time during the study.
 - a. Are not necessarily manipulated by the experimenter.
 - b. Treatment is always given after the study is planned.
 - c. Randomized experimental & quasi-experimental studies must have active independent variables.
 - 2. Attribute (measured) independent variable: preexisting attributes of the persons or their ongoing environment.
 - a. Cannot be manipulated by the experimenter.
 - b. Non-experimental studies have attribute independent variables.
 - 3. Other terms for independent variables:
 - a. factor
 - b. grouping variable
 - 4. Inferences about cause and effect:
 - a. Designs with active independent variables (experimental, quasi-experimental) can provide data to infer that the independent variable caused the change or difference in the dependent variable.
 - b. Designs with attribute independent variables (non-experimental) should not be used to conclude a cause and effect relationship between the independent variable and the dependent variable.
 - 5. Values of the independent variable:
 - a. Several options or values of a variable.
 - b. Also called: categories, levels, groups, samples
 - C. Dependent Variables
 - 1. Presumed outcome or criterion that is supposed to measure or assess the effect of the independent variable.
 - 2. Must have at least two values, but usually have many values that vary from high to low.

- D. Extraneous Variables
 - 1. Not of interest in a particular study but could influence the dependent variable.
 - 2. May also be called nuisance variables or covariates.
- III. Research Hypothesis and Questions
 - A. Research hypothesis: predictive statements about the relationship between variables.
 - B. Research questions: similar to hypotheses, but do not make specific predictions.
 - 1. Difference research questions: compare two or more different groups on the dependent variable
 - a. Utilize difference inferential statistics (e.g. ANOVA or *t*-test)
 - 2. Associational research questions: find the strength of association between variables or to make predictions about a variable from one or more variables.
 - a. Utilize associational inferential statistics (e.g. correlation, multiple regression)
 - 3. Descriptive research questions: summarize or describe data without trying to generalize to a larger population of individuals.
 - 4. Complex research questions: involve more than two variables at a time.
 - a. Utilize complex inferential statistics.
 - b. May be called multivariate in some books.
- IV. Sample Research Problem: The Modified High School and Beyond (HSB) Study
 - A. Research Problem: What factors influence mathematics achievement?
 - 1. Identify primary dependent variable
 - 2. Identify independent and extraneous variables
 - 3. Identify types of independent variables (active vs. attribute)
 - 4. Identify the research approach (experimental, quasi-experimental, non-experimental)
 - B. SPSS Variable View
 - 1. Columns give information on database variables
 - a. Name shows the variable name
 - b. Label gives a longer description of the variable
 - c. Values shows assigned value labels
 - d. Missing identifies if certain values are designated by user for missing values
 - C. SPSS Data Editor
 - 1. Shows raw data
 - a. Variables are across the top (identified by short variable names)
 - b. Participants are listed down the left side.

D. Research Questions for the Modified HSB Study

1. Descriptive questions (Chapter 4)
2. To examine continuous variables for normality (Chapter 4).
3. Determine relationships between two categorical variables with crosstabulations (Chapter 8).
4. Associational questions (Chapter 9)
5. Complex associational questions (Chapter 9)
6. Basic difference questions (Chapter 10)
7. Complex difference questions (Chapter 11)