Nursing Research Series

Variables: What You Are Measuring

Objectives

• By the completion of this presentation the participant will be able to:
  • Describe the difference between conceptual and operational definitions of variables
  • Differentiate the independent variable from the dependent variable in a research question
  • List an extraneous variable
Variables Defined

• “Qualities, properties, or characteristics of persons, things, or situations that change or vary” 
  (Burns & Grove, 2007, p.122)

• The concept(s) you want to look at, change, or affect in your study

• Variables can be: Described, Manipulated, Controlled

A Step Back: The Source

• Variables are derived from the research question and/or conceptual framework used in your study

• Conceptual and operational definitions of a variable explain what the variable is, and how you are going to measure it

General

Specific

Concepts related to the research question and/or framework

Variables defined and how they are measured

From a PICO Based Research Question

• Population
• Intervention
• Comparison
• Outcome

For the adult, acute care patient, what is the affect of hourly rounding compared to present practice on fall rates during hospitalization?

(Melnyk & Fineout-Overholt, 2005)
From a PICO Based Research Question

- Conceptual definition: Abstract meaning to a variable, the concept
  - *Hourly rounding*, what is it, how defined
  - A *fall*—what is a fall, even what it will mean to the patient

- Operational definition: Measurement, the concrete meaning to a variable
  - How you will measure *hourly rounding*
  - How you will capture the number or rate of *falls*

From a Conceptual Model or Framework

- An example is the Health Promotion Model (Pender, Murdaugh, & Parsons, 2006)
- Example: A proposed study to identify the barriers to the health promotive behavior of exercise
- Conceptual definitions of:
  - What is health promotion and the behavior of exercise
  - What are barriers and the specific barriers you hypothesize exist
- Operational definitions of:
  - Assessing and measuring identified barriers
  - How you are going to measure exercise

Linking Concepts To Variables

- A well planned research study proposal will have both conceptual and operational definitions for variables

- Definitions provide clarity for you, co-investigators, and consumers of your findings on what is studied and how it was measured, changed, controlled, or described
Example: Linking Concepts, Variables, and Tools

- For a descriptive study on patients’ sleep: What is it about sleep that you are interested in?
- Hours of sleep?
  - A standard sleep diary to count number of hours
- Likelihood to fall asleep or sleepiness?
  - Sleepiness scale tool
- Sleep quality?
  - Use a sleep quality index tool (Hedges, 2008).

(What’s in your toolbox? Considerations when selecting and evaluating instruments in clinical research)

Types of Variables

There are five types of variables described in this module:

- Demographic
- Descriptive
- Independent
- Dependent
- Extraneous

Demographic Variables

- Attributes or characteristics of the subjects in a study
- Examples:
  - Age
  - Gender
  - Diagnosis
  - Socioeconomic information

- This information aids in generalizability of study results. Demographic data informs the investigative team and other consumers of your research as to whether your sample reflects the population of interest.
In qualitative research studies the focus is to define and describe concepts, processes, phenomena, or experiences—which are then your variables.

The conceptual definition emerges after data collection and analyses. It is many times in the “discussion” section of qualitative research reports.

The operational definition includes how data are collected and analyzed. It is many times found in the “methods” section under “data collection” of research reports (Burns & Grove, 2007).

Your qualitative research question will drive the methodology and data analyses concerning descriptive variables of concepts, processes, or phenomena.

There is a relationship between independent and dependent variables.

- **Independent**
  - Independent variables cause an effect or change.
  - Produces an effect in the dependent variable*

- **Dependent**
  - The variable that is changed, affected by the independent variable. Can also be called the outcome

***note-not all relationships are from a manipulated change in the independent variable. Sometimes there is a description of the naturally occurring relationship.

**Examples: Independent and Dependent Variable Question Statements**

- What is the effect of daily exercise on glucose levels in adolescents with type I diabetes?

- What is the effect of heart failure self-management education on a patient’s knowledge level and readmission rate to the hospital?

- For term, stable infants, is there a relationship* between immediate skin-to-skin contact after birth and exclusive breastfeeding at 2 months of age?

  *a naturally occurring, described relationship
Extraneous Variables

- Extraneous variables are in all studies. They can interfere with the relationship between the independent and dependent variable. Extraneous variables are the other influences in your patient's lives that can affect results.
- Examples are:
  - Cost of healthcare or treatment
  - Transportation
  - Literacy
  - Healthcare system
  - Family dynamics
- Goal is to identify and control if possible.

Variable Characteristics in Measurement

- Sometimes a variable—whether it is described, independent or dependent, has an innate characteristic that reflects the amount of its variability.
- Here are two main characteristics:
  - Categorical
    - Either yes or no, male or female
    - Limit on variation
  - Continuous
    - Age, weight
    - More variation

Type of analysis depends on the research question and variable characteristic.

Variable Characteristics in Measurement

- Sometimes you limit the variability in your variable by changing the way you decide to measure it.
- An example is Age:
  - Capturing the exact age of a patient—which is on a scale from 0 to 100
    - More variation
  - Placing the subject's age into a category, either below 50 or above 50. This is a either/or choice.
    - Less variation
Next Steps

- After addressing variables, a well planned research proposal will:
  - State the data collection process, your protocol, which is how you obtain the information on your variables to answer your research question
  - Describe your analysis plan. The type of analyses or choice of statistics will depend on the characteristics of your variables

In Summary

- Variables in a well planned study have both conceptual and operational definitions
- There is a relationship between the independent and dependent variable
- Demographic variables describe the sample characteristics
- All studies have extraneous variables
- Variable characteristics influence analyses

Reach for the Stars

Be part of the discovery of new knowledge through research!
References to Consider


References to Consider


For more information please contact:
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http://nursingpathways.kp.org/scal/research/index.html