

# Nursing Research Series

## *Essentials of Science: Methods, Appraisal and Utilization*



**Nursing Research Series**

*Essentials of Science:  
Methods, Appraisal and Utilization*



Southern  
California  
Nursing  
Research

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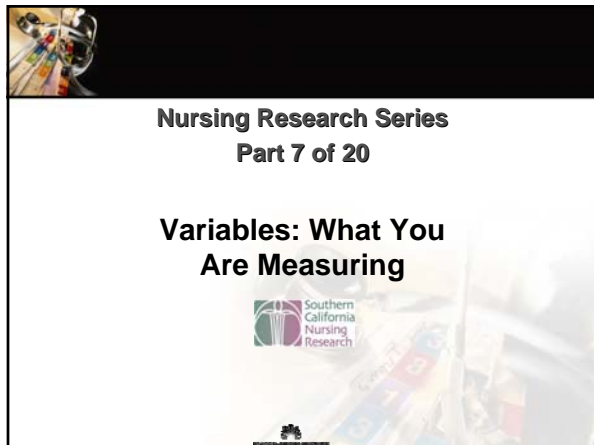
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**Nursing Research Series**  
Part 7 of 20

**Variables: What You  
Are Measuring**



Southern  
California  
Nursing  
Research

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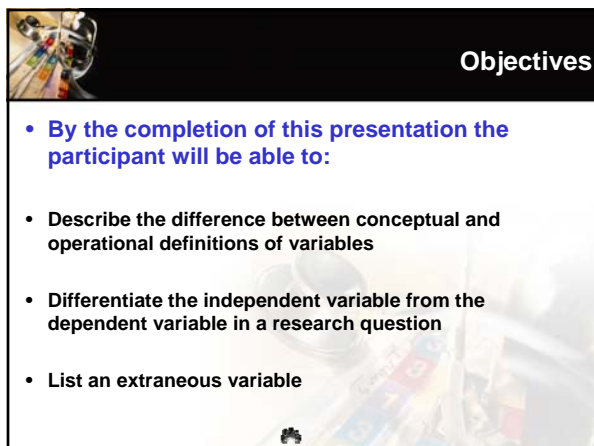
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**Objectives**

- **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

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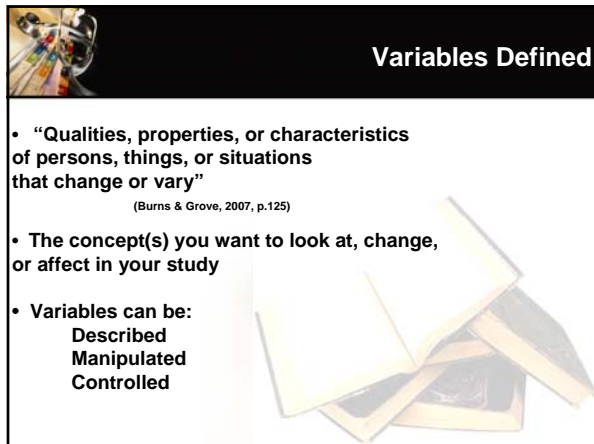
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## Essentials of Science: Methods, Appraisal and Utilization



### Variables Defined

- “Qualities, properties, or characteristics of persons, things, or situations that change or vary”  
(Burns & Grove, 2007, p.125)
- The concept(s) you want to look at, change, or affect in your study
- Variables can be:
  - Described
  - Manipulated
  - Controlled

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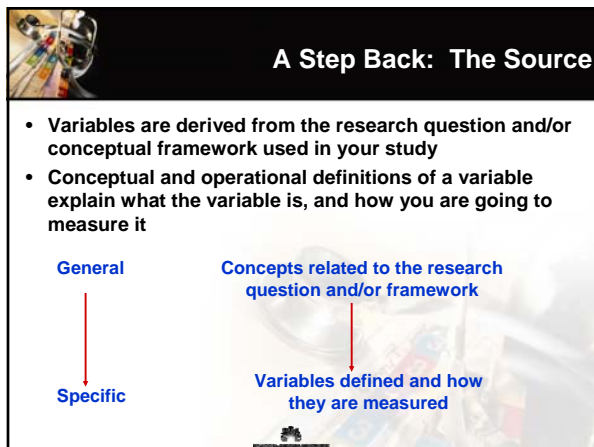
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### A Step Back: The Source

- 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

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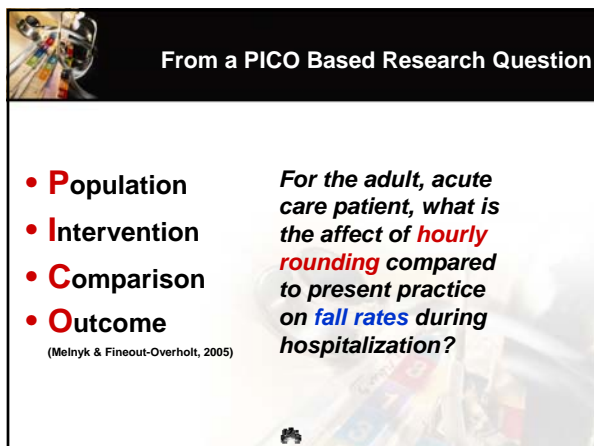
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### From a PICO Based Research Question

- **P**opulation
- **I**ntervention
- **C**omparison
- **O**utcome

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

(Melnik & Fineout-Overholt, 2005)

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### 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**

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### 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**



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### Linking Concepts To Variables

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

Concept → Variable → Tool or way to measure

- 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



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### 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.

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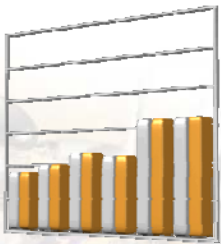
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### Types of Variables

There are five types of variables described in this module:

- Demographic
- Descriptive
- Independent
- Dependent
- Extraneous



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### 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



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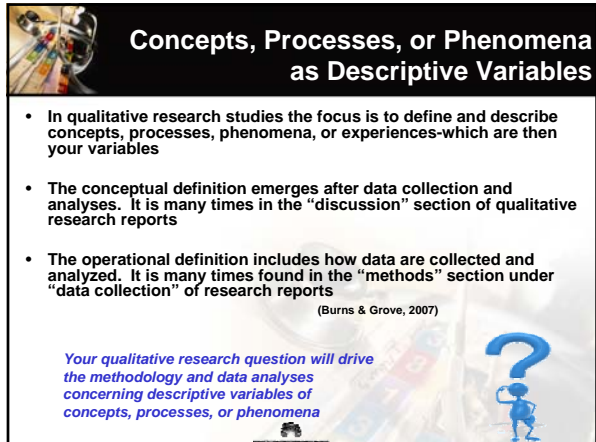
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## Essentials of Science: Methods, Appraisal and Utilization



### Concepts, Processes, or Phenomena as Descriptive Variables

- 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*

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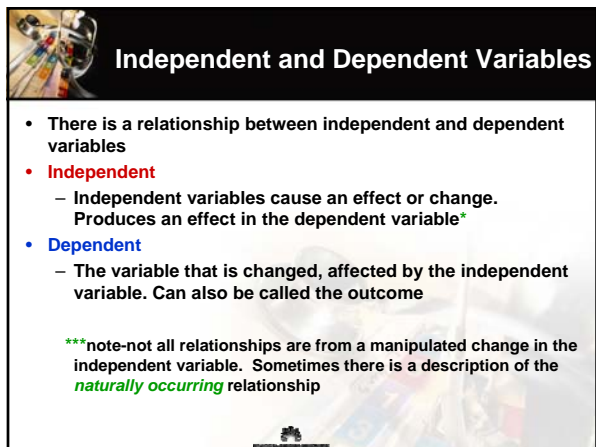
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### Independent and Dependent Variables

- 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

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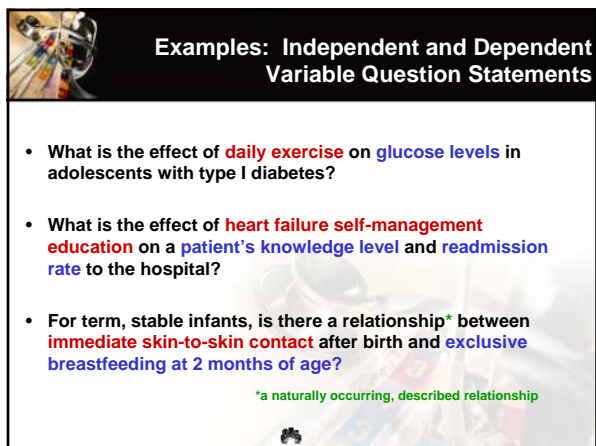
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### Examples: Independent and Dependent Variable Question Statements

- 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

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### 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



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### Variable Characteristics in Measurement

- Sometimes a variable –whether it is described, independent or dependent, has an innate characteristic that reflects the amount of it's 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

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### 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*

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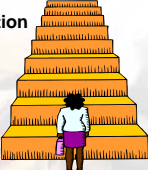
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### Next Steps

- 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



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### 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

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### Reach for the Stars

*Be part of the discovery of new knowledge through research!*



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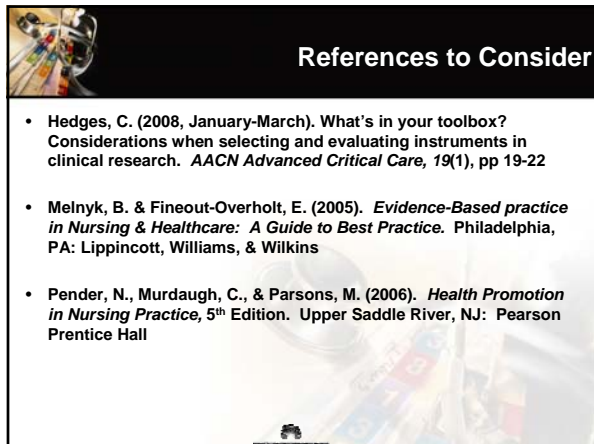
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**References to Consider**

- Hedges, C. (2008, January-March). What's in your toolbox? Considerations when selecting and evaluating instruments in clinical research. *AACN Advanced Critical Care*, 19(1), pp 19-22
- Melnyk, B. & Fineout-Overholt, E. (2005). *Evidence-Based practice in Nursing & Healthcare: A Guide to Best Practice*. Philadelphia, PA: Lippincott, Williams, & Wilkins
- Pender, N., Murdaugh, C., & Parsons, M. (2006). *Health Promotion in Nursing Practice*, 5<sup>th</sup> Edition. Upper Saddle River, NJ: Pearson Prentice Hall

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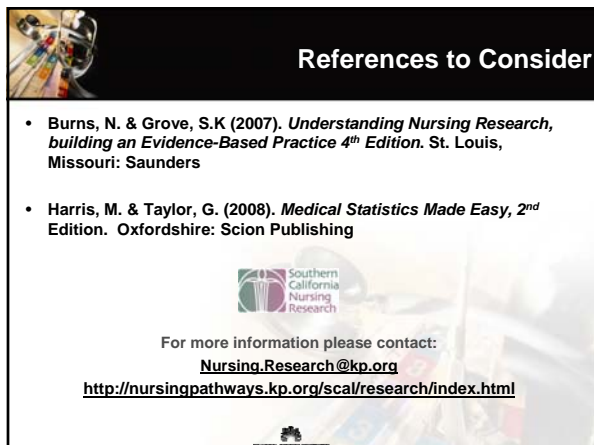
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**References to Consider**

- Burns, N. & Grove, S.K (2007). *Understanding Nursing Research, building an Evidence-Based Practice 4<sup>th</sup> Edition*. St. Louis, Missouri: Saunders
- Harris, M. & Taylor, G. (2008). *Medical Statistics Made Easy, 2<sup>nd</sup> Edition*. Oxfordshire: Scion Publishing

  
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<http://nursingpathways.kp.org/scal/research/index.html>

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