Variables in Quantitative Research- by: Pamela Crary, PhD, RN

A variable is a measurable characteristic that varies among the subjects being studied. As the definition implies, the characteristic or phenomenon under study varies in some way.

**Independent Variable:** a stimulus or activity that is manipulated or varied by the researcher to create an effect on the dependent variable. It is helpful to remember the independent variable as the treatment or intervention.

**Dependent Variable:** the outcome or response that the researcher wants to predict or explain. Changes in the dependent variable are presumed to be caused by the independent variable. It is helpful to remember the dependent variable as the outcome being measured.

Example: "Cancer patients who receive music therapy have less perceived pain than cancer patients not receiving music therapy."

Music Therapy is the *independent* variable. Pain is the *dependent* variable.

Descriptive and correlational quantitative studies involve the investigation of research variables.

**Research Variable:** quality, property or characteristic identified in the research purpose and objectives or questions that are observed or measured in a study. Research variables are used when the intent of the study is to observe or measure variables as they exist in a natural setting without implementation of a treatment. Thus, no independent variables are manipulated, and no cause-and-effect is examined.

**Extraneous Variable:** a variable that exists in all studies and can affect the measurement of study variables and the relationships among these variables. Researchers try to control for extraneous variables so they do not interfere with measurement and outcomes. One way is using inclusion and exclusion criteria when sampling.

**Confounding Variable:** a type of extraneous variable that is not recognized until the study is in process, or is recognized before the study is initiated but cannot be controlled. Confounding variables weaken a study design and hinder interpretation of outcomes unless they are able to be controlled statistically during analysis.

**Environmental Variable:** a type of extraneous variable composing the setting in which the study is conducted. Examples of these include climate, family, healthcare system.

**Demographic Variable:** attributes of subjects that are collected to describe the sample such as age, gender, education, ethnicity, income, diagnosis, etc.

**Defining Variables**

**Conceptual Definition:** provides the theoretical meaning of a variable.

Example: Stress is defined by Lazarus and Folkman (1985) as a perceived state when demands exceed resources to manage those demands.

**Operational Definition:** provides the measurement process for the variable.

Example: Stress will be operationally defined using the Perceived Stress Scale.
Resources