Concepts, Variables, Validity and Operationalization—and threats to measurement quality
Concept

A mental image that refers to a unified set of ideas.
Concept versus Construct

Concept

1. Phrase that represents an idea that you wish to study;

2. Represents collections of seemingly related observations and/or experiences

Concepts as Constructs

We refer to concepts as constructs to recognize their social construction.
Research design – operationalization of variables

- The construction of actual, concrete measurement techniques; the creation of “operations” that will result in the desired measurements.

- The development or choice of specific research procedures (operations) that will result in representing the concepts of interest.
Operationalization

- An operational definition is a procedure for classifying, ordering, or quantifying something
  - Classifying - crowded or not crowded
  - Ordering - uncrowded, mildly crowded, severely crowded
  - Quantifying - measure crowdedness in terms of the number of residents per square kilometre
1. The process of conceptualization includes coming to some agreement about the meaning of the concept.

2. In practice you often move back and forth between loose ideas of what you are trying to study and searching for a word that best describes it.

3. Sometimes you have to “make up” a name to encompass your concept. If you are interested in studying the extent to which people exhibit behaviors that bring together groups, you might come up with the nominal definition “bridge maker.”

4. As you form the aspects of a concept, you begin to see the dimensions; terms that define subgroups of a concept.

5. With each dimension, you must decide on indicators; signs of the presence or absence of that dimension. (Dimensions are usually concepts themselves).
Choices to be made about operationalization

- The range of variation – how large should your categories be?
  - Depends on the purpose of your study – pragmatic considerations (e.g., income)

- Variation between the extremes – how fine are the distinctions you want to make in your study?
  - e.g., age
  - Again, depends on the purpose of your study

- Single or multiple indicators of variables
  - Some straightforward, such as gender
  - But others benefit from multiple indicators (e.g., Q3A-L)
Operationalizing Choices

- The process of creating a definition(s) for a concept that can be observed and measured

- The development of specific research procedures that will result in empirical observations

Examples
- SES is defined as a combination of income and education and I will measure each by...
- The development of questions (or characteristics of data in qualitative work) that will indicate a concept
Variable Attribute Choices

- Variable attributes need to be exhaustive and exclusive

- Represent full range of possible variation

- Degree of Precision
  - selection depends on your research interest, but if you’re not sure, it’s better to include more detail than too little

- Level of Measurement
Independent and Dependent Variables

- Independent variable is what is manipulated (or it is the subject or grouping variable)
  - a treatment or program or cause
  - ‘Factor’
  - ‘Explanatory Variable’

- Dependent variable is what is affected by the independent variable
  - effects or outcomes
  - ‘Measure’
  - ‘Response Variable’
Validity

The extent to which our measure reflects what we think or want them to be measuring

- **Internal Validity**— design and measurement concerns that reduces chances for internal errors.

- **External Validity**— describes our ability and intent to generalize to subjects beyond our study sample. Largely an issue of design and sampling.
Internal Validity

- Internal validity addresses the "true" causes of the outcomes that you observed in your study.

  - Strong internal validity means that you not only have reliable measures of your independent and dependent variables BUT a strong justification that causally links your independent variables to your dependent variables.
External validity addresses the ability to generalize your study to other people and other situations.

- To have strong external validity (ideally), you need a probability sample of subjects or respondents drawn using "chance methods" from a clearly defined population.

- Ideally, you will have a good sample of groups and a sample of measurements and situations.

- When you have strong external validity, you can generalize to other people and situations with confidence.
Internal Validity

- Specifically, *measurement* validity
- Measures are valid for a single purpose
- Four types of validity:
  1. Face—as judged by others or by logic
  2. Content—captures the entire meaning of the experience
  3. Criterion—agrees with a validates, reliable external source:
     - Concurrent, agrees with a preexisting measure
     - Predictive, agrees with a future behavior or outcome
  4. Construct—a measure is related to other measures as suggested by a theory
The variations in the dependent variable are not due to variation in the subjects, but due to variations in the measuring instrument. The instrument is **unreliable**.

Some statistical assumptions have been violated (e.g., non-normal data treated with parametric statistics; means of ordinal data, etc.).
Repeated use of the measure with identical subjects yields identical and consistent results. It is improved by:

- Clear conceptualization
- Precise measurement
- Multiple indicators
- Pilot-testing
Reliability

- A measurement that produces consistent scores when the object or phenomena does not change or has experienced known change.
Reliability

- Three types:
  - Test-retest reliability—
  - Inter-item reliability—based on the correlation of several related items that measure a single concept.
  - Inter-rater reliability—similar phenomena are rated similarly by multiple observers.
Validity and Reliability

NOT Valid but Reliable

Valid but UNReliable

NOT Valid and UNReliable

Valid and Reliable