Operationalization

ESP178 Research Methods
Dr. Susan Handy
1/14/16
Founded in 1863 by President Lincoln to meet government’s need for an independent adviser on scientific matters.

“The National Academies of Sciences, Engineering, and Medicine are private, nonprofit institutions that provide expert advice on some of the most pressing challenges facing the nation and the world. Our work helps shape sound policies, inform public opinion, and advance the pursuit of science, engineering, and medicine.”

http://www.nationalacademies.org/
“The mission of the Transportation Research Board is to provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal.

“A resource to the nation and to the transportation community worldwide, TRB provides an extensive portfolio of services:

• Opportunities for information exchange on current transportation research and practice,
• Management of cooperative research and other research programs,
• Analyses of national transportation policy issues and guidance on federal and other research programs, and
• Publications and access to research information from around the world.”
• 13,000+ attendees
• 3100+ research papers
• 200+ committee meetings
ITS-Davis Reception at TRB's 95th Annual Meeting

Tuesday, Jan. 12, 2016
8:00 p.m.
Light Refreshments

Ballroom A, Walter E. Washington Convention Center
801 Mt. Vernon Place NW, Washington, D.C. 20001

Please join UC Davis Institute of Transportation Studies faculty, students, alumni and friends at the annual meeting of the Transportation Research Board, as we look back on last year's progress and prepare for more great work ahead! We hope to see you there!

Save the date for ITS-Davis' 25th Anniversary Celebration - October 7-8, 2016!

www.its.ucdavis.edu
Now, where were we?
Conceptual Models

- Cul-de-sac → Perceived safety → Outdoor play
- Weather
- Income
From Conceptual to Operational

Diagram showing the relationship between theoretical and empirical planes, with constructs, propositions, independent variables, and dependent variables connected by arrows labeled proposition and hypothesis. Indicators/measurements are indicated at the bottom of the diagram.
From Conceptual to Operational

**Concept**
- Cul-de-sacs

**Proposition**
- lead to more

**Concept**
- outdoor play for children

**Variable**
- Living on a cul-de-sac

**Hypothesis**
- is positively associated with

**Variable**
- number of days children play outside

**Indicator/Measure**
- “What type of street do you live on?”

**Indicator/Measure**
- “How many days last week did your oldest child play outside?”
# Levels of measurement

<table>
<thead>
<tr>
<th>Level</th>
<th>Definition</th>
<th>Example</th>
</tr>
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<tbody>
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<td>Nominal</td>
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<td>Ratio</td>
<td>Continuous variable</td>
<td>Frequency of play: # times children played outside</td>
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<td>Amount of play: # minutes children played outside</td>
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Deriving one kind of variable from another...

Number of days in last 7 days that child played outside

Child played: infrequently, moderately frequently, frequently

Child played: yes, no

What kind of variable is it?
How could you convert the variable?
Why might you want to do this?
Why might you not want to do this?
How do we know our measures are good?

Reliable = Consistent
Valid = Accurate
Reliability testing...

Do you get the same answer the second time?

Why might you get different answers?

What’s close enough?
Validity testing...

Translational – How well is theoretical concept translated into measure?

**Face Validity**
makes sense “on its face”

**Content Validity**
fully covers the concept
Validity testing...

**Criterion** – Does measure behave the way it should?

**Convergent Validity:** Compare measure to a different measure of the same concept

“Does your child play outside frequently or infrequently?” vs. “How many times did your child play outside last week?” vs. 24-7 observations of outdoor play

Second question in the survey
## Recap

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<th>Criteria/Tests</th>
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<td><strong>Reliability</strong></td>
<td>Repeated measures of a variable yield consistent results</td>
<td><strong>Test-Retest</strong></td>
<td>Ask children how often they play in the street in a typical week, then ask them again two weeks later; compare responses for each individual</td>
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<td><strong>Measurement Validity</strong></td>
<td>The measure of a variable is accurate (passes at least one test)</td>
<td><strong>Translational</strong></td>
<td>How well is theoretical construct translated into measure?</td>
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<td>Face Validity – makes sense “on its face”</td>
<td>The number of times a child played in the street in the last week is clearly related to the concept of street play</td>
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<td>Content validity – fully covers the concept</td>
<td>Asking about playing basketball and playing hopscotch doesn’t add up to total street play</td>
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<tr>
<td><strong>Criterion</strong></td>
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<td><strong>Convergent validity</strong> - compare measure to a different measure of the same concept</td>
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<td>“Gold standard” – compare to the most accurate possible measure</td>
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To do:

• Keep doing your reading!
• Section on Friday
• Work on your first assignment – due Tuesday!
  • Meetings on Friday and Monday
  • Focus on:
    • Individual behavior (as consumer, decision maker, voter…)
    • Institutional behavior (e.g. agencies, non-profits, etc…)
  • Don’t worry about moderators! Mediators also optional. Keep it simple!!!