How to Develop and Utilize Surveys in Research

CDR Anthony R. Artino, Jr., PhD
Medical Service Corps, U.S. Navy
Associate Professor, PMB

LTC Kent J. DeZee, MD, MPH
Medical Corps, U.S. Army
Associate Professor, MED

February 16, 2012

Learning Objectives

- Recognize how to use a systematic, 7-step process as a framework for survey design
- Demonstrate how to develop an appropriate set of items to characterize the construct being measured
- Identify common item-writing pitfalls in survey design

Consider this…

- The puppy problem

  - The poodle has 9 puppies.
  - The collie has 5 puppies.
  - How many more puppies does the poodle have?

  - Students’ common response…
  “None”

  - Why?
  “It said she had 9 puppies, but it didn’t say she had any more, so it’s none.”

Revised item…

  - The poodle has 9 puppies.
  - The collie has 5 puppies.
  - How many more puppies does the poodle have than the collie?

And this…

Your opinion is that the high cost of health care is the second most important issue in America today.

The high cost of health care is the most important issue in America today.

<table>
<thead>
<tr>
<th></th>
<th>strongly disagree</th>
<th>disagree</th>
<th>neither agree nor disagree</th>
<th>agree</th>
<th>strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>High cost of health care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How important is the issue of high healthcare costs in America today?

<table>
<thead>
<tr>
<th></th>
<th>not at all important</th>
<th>slightly important</th>
<th>moderately important</th>
<th>very important</th>
<th>extremely important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of health care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Principle #1: You can’t fix by analysis what you’ve bungled by design.

- When creating a survey, it’s important to get it right the first time
- We often use surveys to measure “fuzzy” constructs (e.g., beliefs, attitudes, opinions), which is already hard enough
  - Bad data only makes it that much harder

Outline

- Survey Background
  - Uses of surveys
  - Survey language
- Survey Design
  - 7-Step Process
  - Small-group activity
- Common Pitfalls
- Debrief
Good for...

- Abstract ideas/concepts
  - Opinions
  - Beliefs
  - Attitudes
- Behaviors
  - Assuming that observing behaviors is impractical
  - And that people might reasonably report on their own behaviors

Not so good for...

- Clinical outcomes
  - Better to measure perceptions (ex: health questionnaires)
- Populations with cognitive impairment, severe disease
  - ICU patients may have difficulty with surveys
- Tasks of high cognitive load/burden
  - “How many hours did you use the Internet last year?”
  - “What did you eat for dinner on Wed, 11 Jan 2012?”

Survey Language

- Construct:
  - A model, idea, or theory
    - e.g., resilience, confidence, patient satisfaction, motivation, perceived barriers, interest, procrastination, health-related stigma
- Items (or “indicators”):
  - Individual questions/statements on the survey
- Scale:
  - 3 or more items intended to measure a construct

Respondents' answers guide the questions.

Principle #2: The questions guide the answers.

9) What topic(s) of study are you most interested in pursuing while at USU? (Total N = 11)

Ver 1: Lots of Space (5 lines) (N = 5)
- Financing of health care
- Global health, joint operations
- Policy development with regard to military and operational health
- Health policy, health economics
- Health care admin and policy

Mean Word Count = 5.0
Cohen's $d = 3.62$ $t(9) = 4.63, p < .001$

Ver 2: Small Amount of Space (1 line) (N = 6)
- Public health
- International health
- (blank)
- (blank)
- Health insurance
- Policy

Total Word Count = 7
Mean Word Count = 1.2
**Survey Design: 7-Step Process**

- Step 1: Literature Review
- Step 2: Interviews & Focus Groups
- Step 3: Synthesize
- Step 4: Develop Items
- Step 5: Expert Validation
- Step 6: Cognitive Interviewing
- Step 7: Pilot Test

**Step 1: Literature Review**

Goal: Ensure the construct is relevant in the field

- Critically evaluate the literature
  - How is the construct defined in prior studies?
  - Has the construct been evaluated sufficiently?
- Identify existing scales
  - What items/scales currently exist?
  - Appraise quality

**Step 2: Interviews & Focus Groups**

Goal: Ensure construct is what “real” people experience

- Interview experts
- Create focus groups from target population
- Apply open-ended questions
  - Avoid yes/no, multiple-choice questions

**Step 2: Interviews & Focus Groups**

Example: *Educational quality* of a “redesigned” medical school curriculum

- Interview experts
  - How do “experts” define educational quality?
  - Experienced medical educators
  - Educators/administrators who have gone through redesign
- Focus groups from the target population
  - How does the target population define educational quality?
  - Current students and recent graduates
Step 2: Practical exercise

Group discussion:

- If I wanted to create a survey to measure the educational quality of a redesigned medical school curriculum, what aspects of the curriculum would I need to include/address/ask about?

Step 3: Synthesize Literature & Interviews

Goal: Arrive at consensus/agreement

- Literature
- Target Population
- Experts

Step 4: Develop Items

Goal: Develop items using vocabulary your target population can understand

Considerations:
- Vocabulary and wording
- Response anchor selection
  - Ratings vs. rankings: Likert-scale items; yes/no items?
- Item formatting (visual design, order, other)

Step 4: Develop Items (examples)

Course Importance (a belief; the full scale = 6 items)

1. How important was it for you personally to perform well in this course?
2. How important were the practical applications of the information provided in this course?
3. How important was the content of this course?
4. How important was it for you to learn the material in this course?

**response anchors**
- not at all important
- slightly important
- moderately important
- quite important
- extremely important

Principle #3: A survey is a conversation between you and your respondents.

4) To what extent do you favor or oppose USU's Maximally Accessible Materials (MAM) policy to make all printed materials at the school available upon request in enlarged font form for the visually impaired?

**response anchors**
- strongly disagree
- disagree
- neutral
- agree
- strongly agree

(from Hoge et al., 2004)

Total N = 17
Mean = 5.1

8 said “neither favor nor oppose”
6 said “slightly favor” or “moderately favor”
3 said “strongly favor”!!

NO MISSING DATA!!!!
Principle #3: A survey is a conversation between you and your respondents.

A note about providing a reason

"because..." or "so that..."

8. As some of you may know, USU is debating whether to move some parts of the university to a new section of campus in Rockville. Do you think USU should move to Rockville? Total N = 17

Yes = 12.5%
No = 87.5%

Pearson χ²(1) = 3.44, p = .06

8. As some of you may know, USU is debating whether to move some parts of the university to a new section of campus in Rockville. Do you think USU should move to Rockville so that the school can have more space?

Yes = 55.6%
No = 44.4%

Today’s Small-Group Activity

Construct = Basic Clinical Skills Self-Efficacy

Definition:
- A student’s confidence in his/her ability to perform the basic clinical skills expected of a graduating medical student

Tell us your items:
1. ___________________________
2. ___________________________
3. ___________________________

Tell us your response anchors:

Common Pitfalls

Creating double-barreled items

Example Item: “How effective is the inpatient and ambulatory teaching?”
- What if one is good and the other is bad?

Solution: split into two items
- “How effective is the inpatient teaching?”
- “How effective is the ambulatory teaching?”

Creating negatively worded items

Example Item: “In an average week, how often are you unable to start rounds on time?” (rarely-often)
- “I can’t stop thinking about the war in Iraq” (rarely-often)

Solution: make sure “yes” means “yes” and “no” means “no”
- “In an average week, how often do you start rounds on time?”
- “Iraq”:
  - Slight Improvement: “I keep thinking about the war in Iraq”
  - Better: “How often do you think about the war in Iraq?”
Common Pitfalls

- **Using statements instead of questions**
  - Example Item: “I am confident I can do well on this rotation.”
  - Statements are not very “conversational”
  - People are more practiced at answering questions
  - Solution: use questions
    - “How confident are you that you can do well in this rotation?”
    - Use construct-specific confidence response anchors

- **Using agreement response anchors**
  - Example Item: “The high cost of health care is the most important issue in America today.”
  - Agreement response anchors don’t just measure the construct of interest
  - Confounded by how “agreeable” respondents are
  - Respondents often “agree” just because
  - Solution: avoid agreement response anchors; maintain focus on construct by using construct-specific anchors
    - “How important is the issue of high healthcare costs in America today?”

- **What does it mean to “strongly agree” anyway?**
  - Section II: In this section, each question will ask you to indicate how you understand a commonly used phrase by marking an “X” at the appropriate place on the line.
  - Example Item: “How useful was the rotation in emergency medicine?”

- **Using too few or too many response anchors**
  - Influences reliability within a set of survey items
    - Too few (<4) → less reliable
    - Too many (>7-9) → diminishing return; false impression of precision
  - Example Item: “How useful was the rotation in emergency medicine?”
Common Pitfalls

- **Using jargon and/or unclear language**
  - Instead, use language that is simple, direct, comprehensible, and unambiguous
  - Instead of exhausted... consider tired
  - Instead of leisure time... consider free time
  - Instead of due to the fact that... consider because
  - Instead of at this point in time... consider now

Step 5: Expert Validation (aka, content validation)

**Goal:** Make sure the items ring true to experts
- Depending on your needs, experts can consider the following for each of your survey items...
  - Clarity
  - Construct relevance
  - Language level
  - Missing facets/aspects

Step 6: Cognitive Interviewing

**Goal:** Make sure respondents understand the items as intended by you (the developer)
- Recruit members of the targeted population
  - e.g., students, teachers, patients, etc.
- Conduct one-on-one interviews, in “laboratory” or other location
- THEN: Make informed decisions, with cognitive interview as one source of input

Step 7: Pilot Testing

**Goal:** Collect evidence of survey's reliability (score reproducibility) and validity (are you measuring what you intend to measure?)
- Collect data from a small sample
- “Get to know” your descriptive statistics
  - Are the item scores normally distributed?

Today’s Small-Group Activity

Debrief

Would anyone like to share some particularly good (or bad) items?
Final Example

19) Parking is the most important issue at USU today.

19) How important is the issue of parking at USU today?

Cohen's $d = 1.16$

$t(15) = 2.31, p < .05$

Questions?

If you remember nothing else, remember…

Principle #1: You can’t fix by analysis what you’ve bungled by design.

Principle #2: The questions guide the answers.

Principle #3: A survey is a conversation between you and your respondents.

CDR Anthony R. Artino, Jr, PhD
anthony.artino@usuhs.mil

LTC Kent J. DeZee, MD, MPH
kent.dezee@usuhs.mil