

Survey Research Methods

Introduction to Clinical and Translational Research at UMB

Jessica Brown, PhD

Assistant Professor

Dept. of Epidemiology and Public Health

MPH Capstone Director

jpbrown@som.umaryland.edu

What is a survey?

- A method of gathering information from a sample of individuals.
- The sample is usually just a fraction of the population being studied.
 - Census = whole population studies

Some Terminology

- Questionnaire = the instrument
- Survey = the study, whole process

General Process

- Your topic/research question is clearly defined
- Information is gathered by asking questions of individuals (questionnaire)
- The data collection process is systematic and well-defined
- Your study generates results on the sample
- These results are generalizable to the population of interest

Purpose of Surveys

- To understand individuals
- To understand household
- To understand larger social units
- Most are directed to a specific administrative, commercial, or scientific purpose

Components to think about...

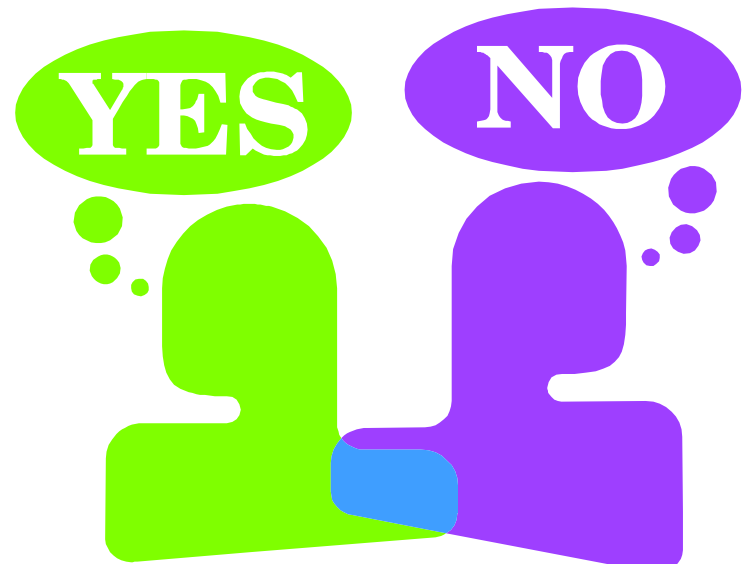
- WHAT
- WHO
- HOW
- WHEN
- WHERE

WHAT

- What is your topic of interest?
- What is your research question?
- What are your primary study variables?

Most Common Themes of Surveys

- Opinions
- Attitudes
- Behaviors
- Factual Characteristics



General Topics of Health Surveys

- Environmental characteristics
 - Political, cultural, and social factors
- Health system characteristics
 - Operational and cost issues
- Population of interest
 - Health status and relationship to utilization and expenditures

Most Important Step

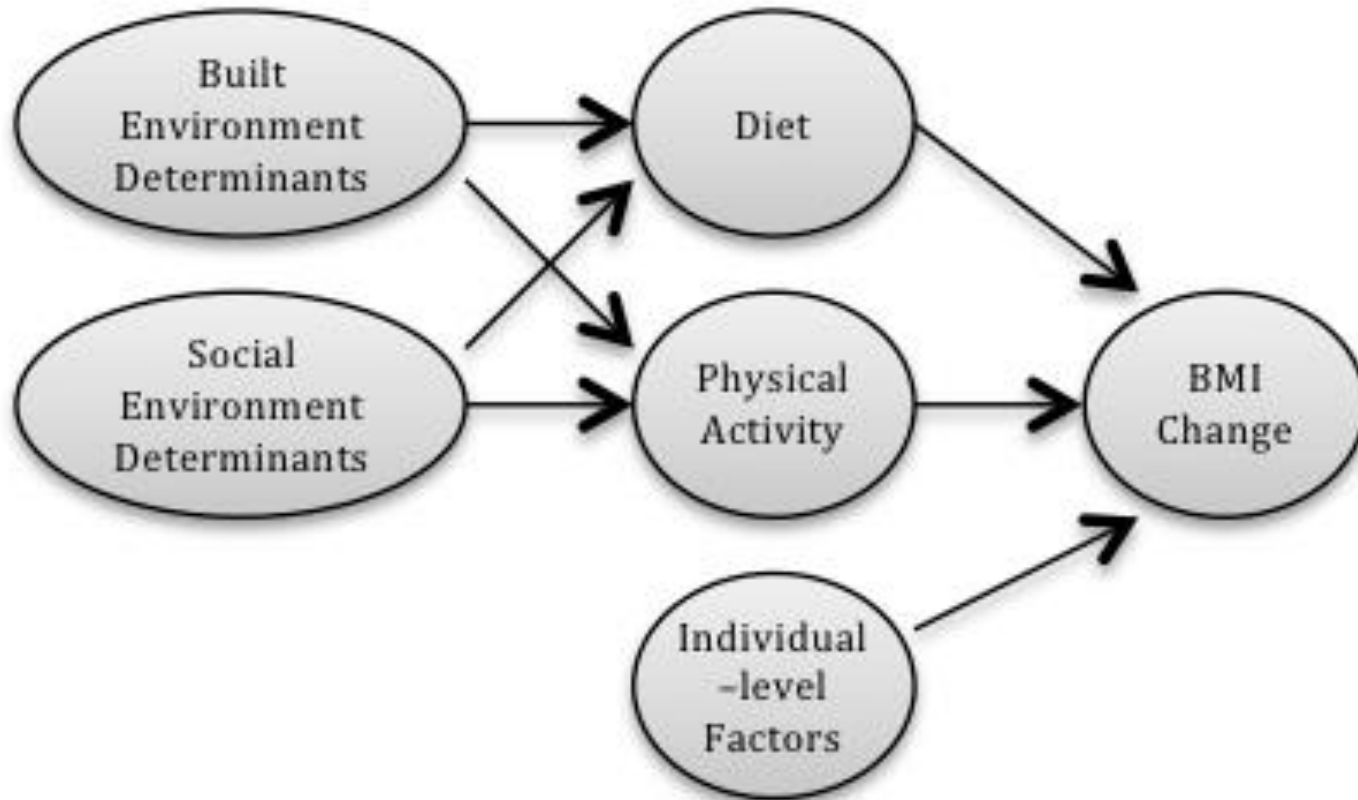
- What is your research question?
 - What domains/constructs will you capture?
- Study design flows from research question
 - Cascade of questions



Use a Conceptual Model

- Organize ideas and identify constructs and variables relevant to your specific study question
- To identify relationships among variables
 - Predictors and Outcomes
 - Confounders
 - Effect Modifiers
 - Acknowledge omitted variables

Environment-BMI Conceptual Map



Study Design

- Research question drives study design
- Observational
 - Cross-sectional (one point in time)
 - Case control
 - Cohort
- Experimental
 - Quasi-experimental
 - Randomized Controlled Trials

WHO

- Who is your target population and how will you identify and select them?
 - Proxies?
- Who will be compared?

HOW

- How will you measure your topic of interest?
- How will you collect your data?

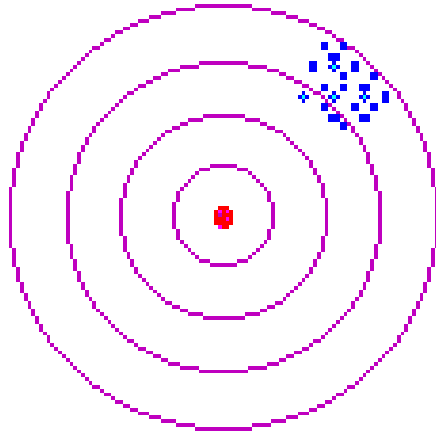
Questionnaire Variables

- Single or multiple variables?
- How do you measure?
 - Vocabulary
 - Intelligence
 - Well-being

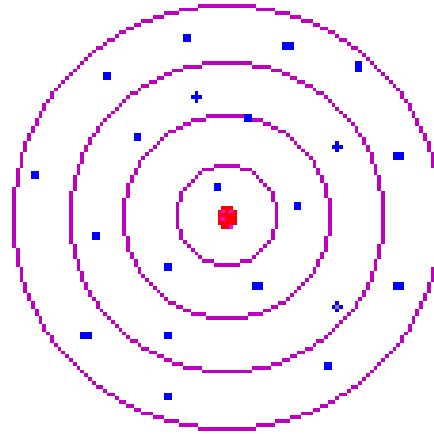
Optimal Way of Finding Content

- Review literature for surveys on the construct and in the population you are interested in
 - <https://commonfund.nih.gov/promis/tools>
 - <https://www.cdc.gov/nchs/dhcs/index.htm>
- Existing measures:
 - Known psychometric properties
 - Known sensitivity to change

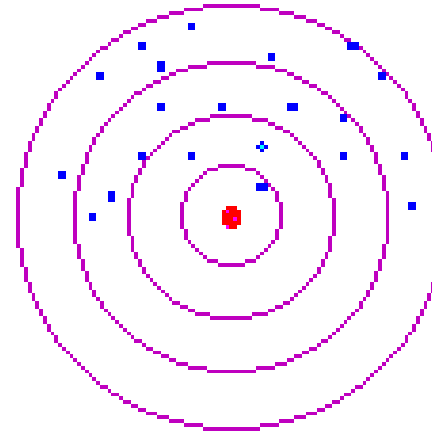
Psychometric Properties



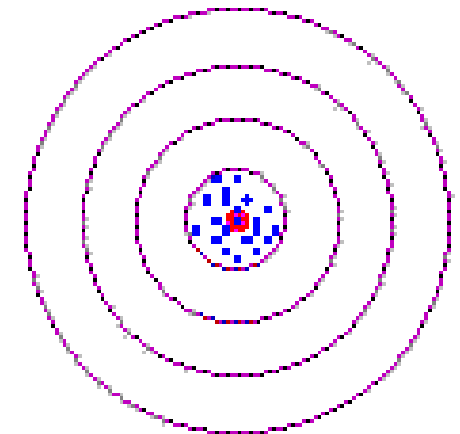
**Reliable
Not Valid**



**Valid
Not Reliable**



**Neither Reliable
Nor Valid**



**Both Reliable
And Valid**

Psychometric Properties

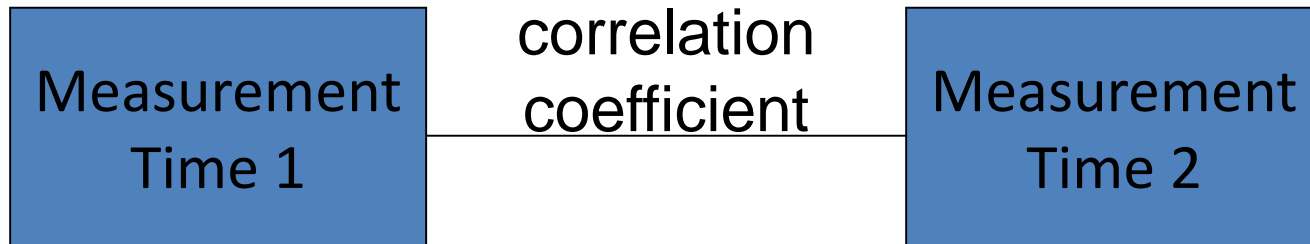
- Reliability
 - Internal consistency
 - Test-retest
 - Inter-/Intra-rater reliability
- Validity (More Important)
 - Content
 - Criterion
 - Construct

Internal Consistency

- Cronbach's Alpha (or Correlation Coefficients)
- Are the items in your scale measuring the same concept?
 - Aim is for coefficient value close to 1.00

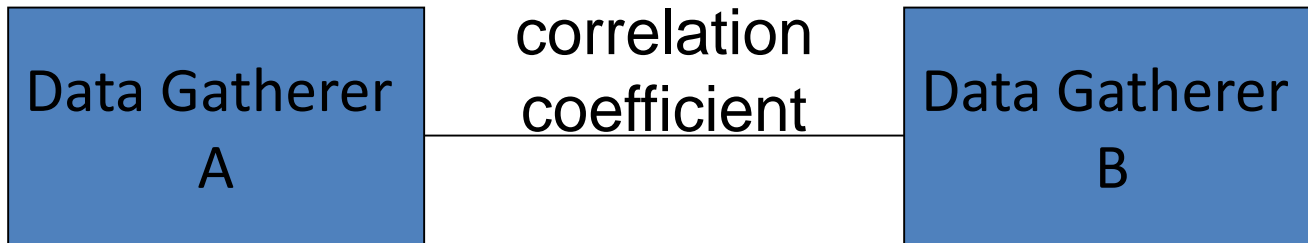
Test-Retest (Stability)

- Correlation between time points
- What is the duration between assessments?



Inter-Rater Reliability

- Also have intra-rater (same rater at different time points)
- Kappa coefficient
- Goal is to standardize the training and administration of questionnaires to limit variation between gatherers



Content Validity

- How representative the items are of the underlying concept being measured
 - Based on appropriate selection of the items
 - Item selection based on:
 - Review of the literature
 - Items from similar instruments
 - Expert panel
 - Feedback from the target population

Construct Validity

- Theory driven and examines the extent to which the questionnaire/instrument demonstrates the hypothesized relationships with the same concepts/constructs (convergent validity) and with different constructs (divergent validity)
 - Essential for more abstract concepts such as attitudes and psychological distress
 - Factor Analysis

Criterion Validity

- Extent to which the survey/instrument predicts/agrees with a criterion measure (similar concept) or “gold standard”

Sensitivity to Change

- Important when the test/instrument is intended for use in a clinical trial to assess therapeutic change
 - Pre-post analysis where compare within groups t-test

Designing Your Own Questionnaire

- Generate a pool of questions
 - Drawn from existing questionnaires
 - Expert opinion
- Focus group of 6-10 people from the population of interest
 - Help identify concepts of interest
 - Early review of questions/language
 - **Pilot test** completed questionnaire

Designing Your own Questionnaire

- How will you phrase the question?
 - Consider reading level
 - Positive vs. negative phrasing
 - Open vs. closed ended
- What level of measurement?
 - Nominal, ordinal, interval, ratio
- Ordering of questions

Generating Questionnaire Items

- Open-Ended questions
 - More time
 - Less constrictive and will allow responses beyond a small collection - minority views
 - Can lead to future, improved closed ended questions
 - Difficult to code and analyze
 - Less influenced by researcher because not providing discrete answers

Generating Questionnaire Items

- Closed-ended questions
 - Conversely, more constrictive but easier to code and analyze
 - Allow for ranking, rating
 - Agree vs. disagree - strength

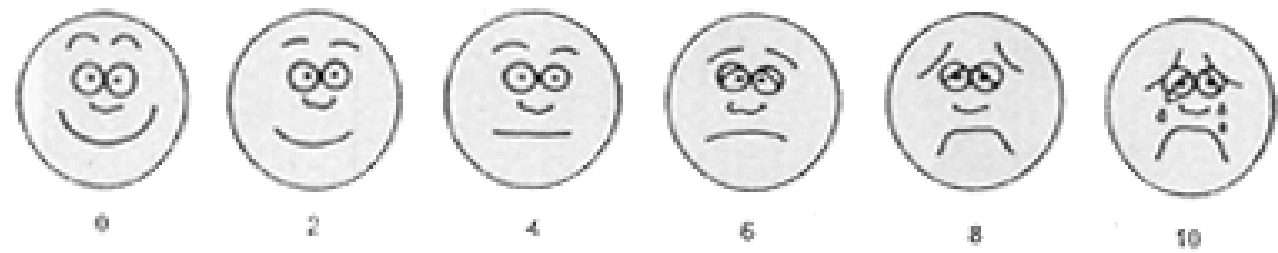
Likert Scales (Ordinal)

1. Strongly disagree
 2. Disagree
 3. Neither agree nor disagree (neutral)
 4. Agree
 5. Strongly agree
- Ideal to have at least 5 ordinal responses
 - Best practice to be balanced

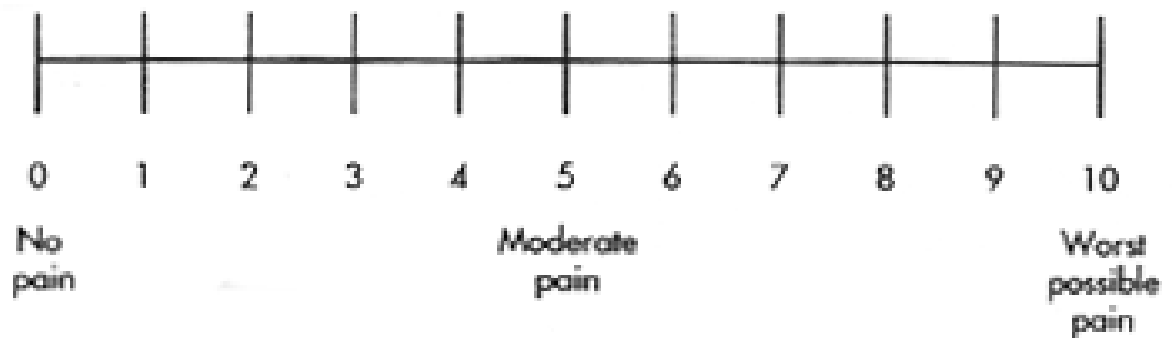
Visual Analog Scale (VAS)†



WONG/BAXER FACES RATING SCALE



0-10 Numeric Pain Intensity Scale



Variability in Response

- A well written item produces variability in response
- What do you think about this course? (check one)
 - It is the worst course I have ever taken
 - It is somewhere between the worst and best
 - It is the best course I have ever taken
- Respondents are likely to choose the second category – no variability

Designing Your Own Questionnaire

- Content must be evaluated with hundreds of participants to establish reliability and validity **BEFORE** you get to the point that you can focus on a study that addresses your specific research question!!!

Common Methods

- Can be classified by method of data collection
 - Mail, telephone interview, in-person interview are most common historically
 - Online data collection becoming much more popular



Methods of Data Collection

- Personal interviews
 - Higher response rates, ideal for open-ended questions, but more threatening, time consuming
- Telephone interviews
 - More flexible design, perhaps less threatening, but lower response rate

Methods of Data Collection

- Self-administered questionnaires
 - Lower response rate, questions must be less complex (less explanation), ideal for closed-ended questions, can be less threatening (more privacy)
- Computer Adaptive Testing (CAT)
 - PROMIS[®]

WHEN

- When will you collect your data?
 - Are there seasonal variations to be concerned about?
 - Are there temporal variations to be concerned about?
 - Cyclical events?

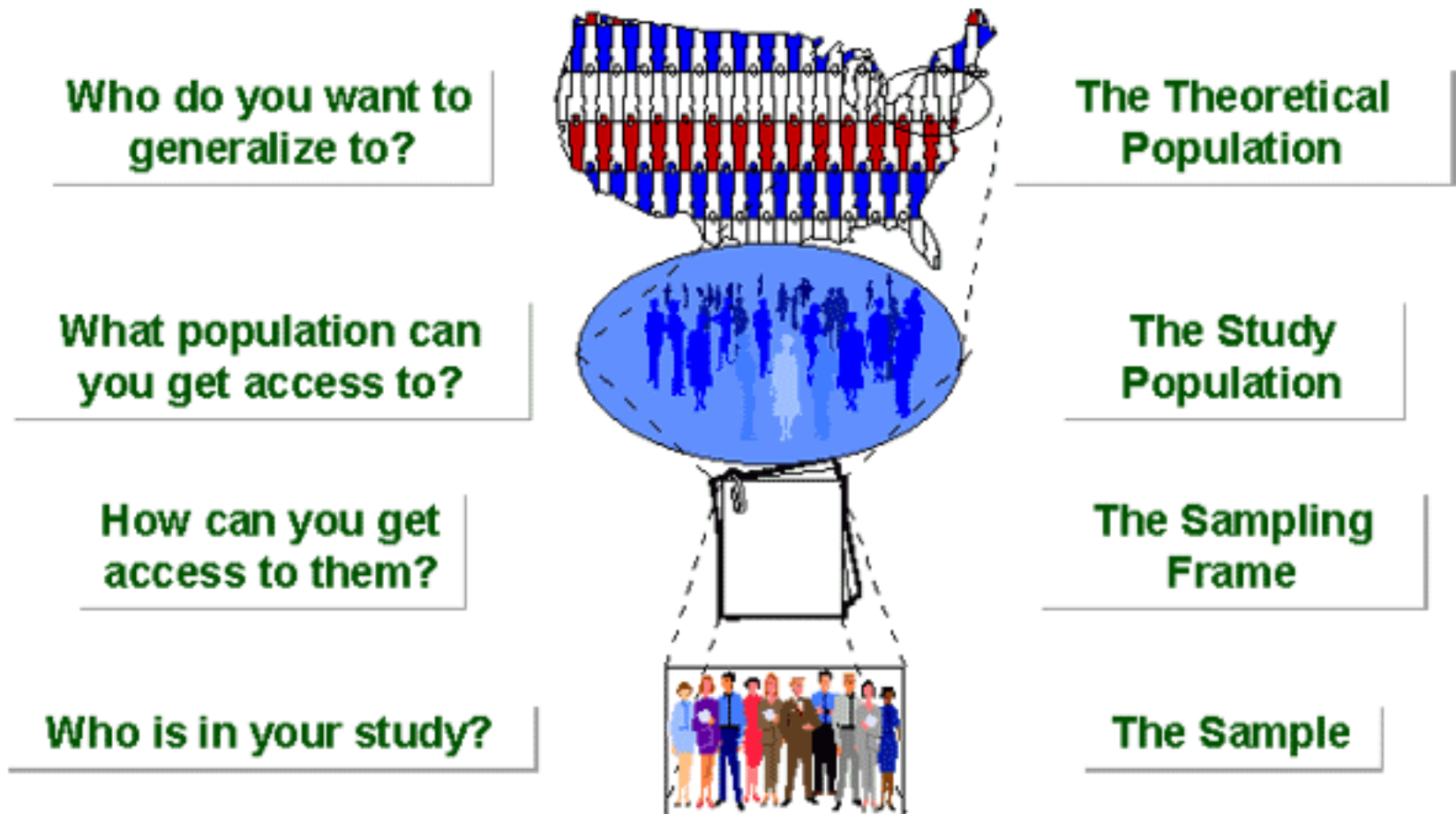
WHERE

- Where will you recruit your participants?
- Where will you actually interview participants?

Other Concepts Important for Survey Research

- Sampling
- Sample Size
- Response Rates
- IRB
- Budget

Sampling



Sampling

- Random
 - Simple or complex in its execution
- Non-random
 - Convenience

Random Sampling

- Simple Random Sample
 - Every unit of the population is given equal chance of being included
 - Random number generator
- Systematic Random Sample
 - Select a starting point on a list and then take every n^{th} person afterwards
 - Every 3rd person that comes to the clinic

Random Sampling

- Stratified Sample
 - The entire population of interest is divided up into homogenous subgroups and those strata are sampled randomly
 - Participants' ages in decades: 50-59, 60-69, 70-79, etc.
 - Sample randomly from within the strata
 - Proportionate or disproportionate

Random Sampling

- Cluster Sample
 - The entire population is divided into heterogeneous clusters and a sample is drawn from each cluster
 - ICUs are the cluster
 - Sample 5 patients randomly from each ICU

Sample Size

- Related to
 - Who you are sampling
 - Your research question
 - Your questionnaire
- “Easy” way – use numbers similar to prior studies
- Better way – do your own power calculation

Response Rate

- The proportion of people selected as eligible to complete the questionnaire that actually complete the questionnaire
 - Potential for bias

IRB

- Survey research ≠ exempt IRB approval
 - Could contain PHI
 - Survey content could be embarrassing if it became public
 - Could result in harm if responses or even participation were known in the community
- Consent process
 - Proxies
 - Assent

Budget

- Survey costs...
 - Materials
 - Personnel
 - Mode of administration (interview, postage)

Closing Comments

- Development of a questionnaire and conducting survey research is...
 - A major undertaking
 - Time & Resources
 - Requires a systematic approach
 - Methodological
 - Analytical
 - Requires a skill-set not commonly taught in research training programs

Closing Comments

- Educate yourself
 - Existing questionnaire strengths & weakness
 - Psychometric methods and analyses
- Find collaborators with skill-set that will augment your own
 - Item development, focus groups
 - Administration Methods
 - Analytics

Reference Material

General texts on survey design/development/methods

1. Groves, RM, Fowler, FJ, Couper, MP, Lepkowski, JM, Singer, E, and Tourangeau. Survey Methodology (2st edition), John Wiley and Sons, Hoboken, NJ.
2. Aday LA, Cornelius LJ. Designing and Conducting Health Surveys: A Comprehensive Guide, 3rd ed. Jossey-Bass, San Francisco, CA. 2006.
3. Dillman, DA, Mail and Telephone Surveys, the Total Design Method, John Wiley and Sons, New York, 1978.
4. Dillman, DA, Mail and Internet Surveys, The Tailored Design Method, 2nd ed., New York: John Wiley & Sons, 2000.
5. Levy PS, Lemeshow S. Sampling of Populations: Methods and Applications, 3rd ed. John Wiley & Sons, New York, 1999.

Psychometric texts

1. Nunnally JC, Bernstein IH. Psychometric Theory, 3rd ed. McGraw-Hill, Inc., New York. 1994.
2. Bond TG, Fox CM. Applying the Rasch Model: Fundamental Measurement in the Human Sciences, 2nd. ed. Lawrence Erlbaum Associates, Mahwah, NJ. 2007.
3. Wright BD, Stone MH. Best Test Design: Rasch Measurement. Mesa Press, Chicago, IL. 1979.
4. Wright BD, Masters GN. Rating Scale Analysis. Chicago: MESA Press, 1982.

If you would like to learn more...

- Health Survey Research Methods
 - PREV 758
 - Offered every Fall
 - Full for 2017
- Consult or collaborate

Questions

