

Survey Research Methods

Introduction to Clinical and Translational Research at UMB

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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 methodology, the 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 households
- To understand social units
- Most are directed to a specific administrative, commercial, or scientific purpose

Components to think about...

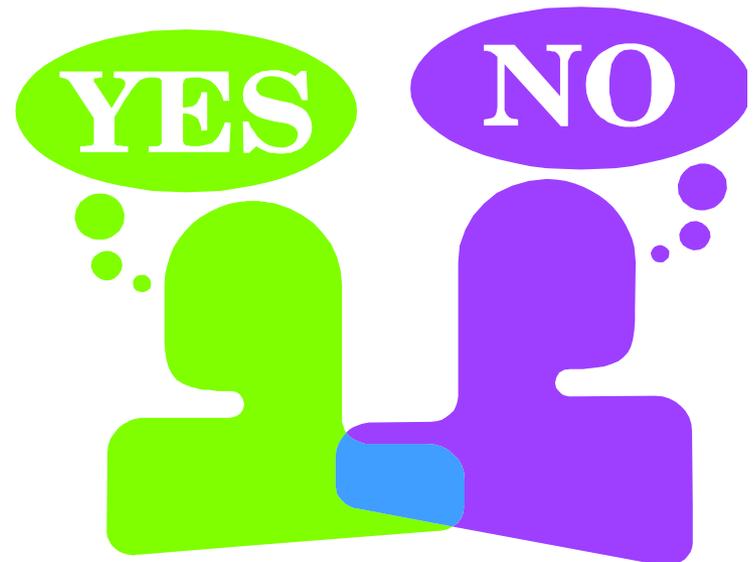
- WHAT
- WHO
- HOW
- WHEN
- WHERE

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

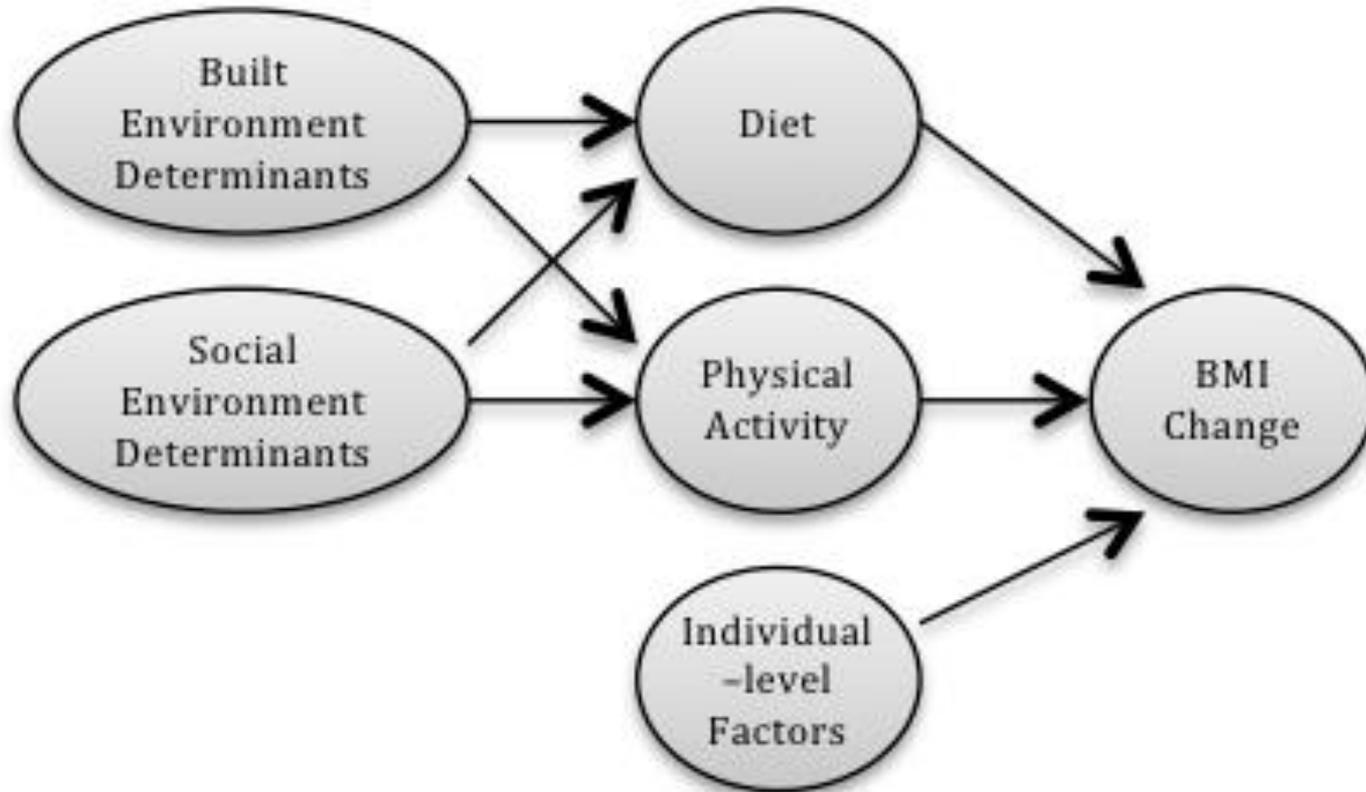
- What is your research question?
 - What domains/constructs will you capture?
- Study design flows from research question
 - Cascade of questions



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 any 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? How will you identify and select the participants in the sample?
 - Proxies?
- Who will be compared?

HOW

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

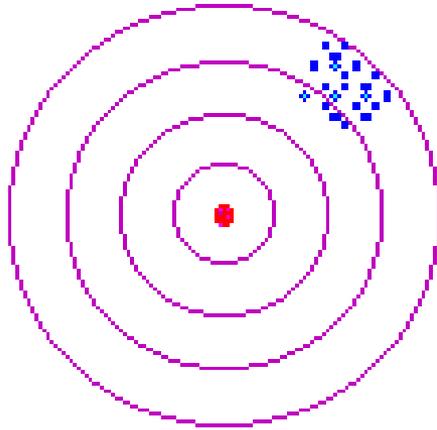
Questionnaire Variables

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

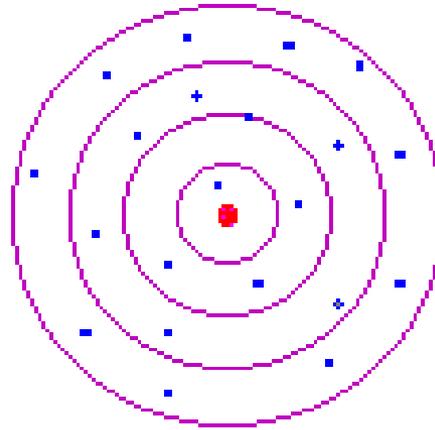
Optimal Way of Finding Content

- 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

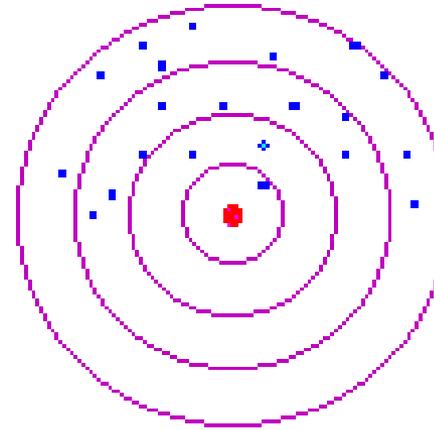
Psychometric Properties



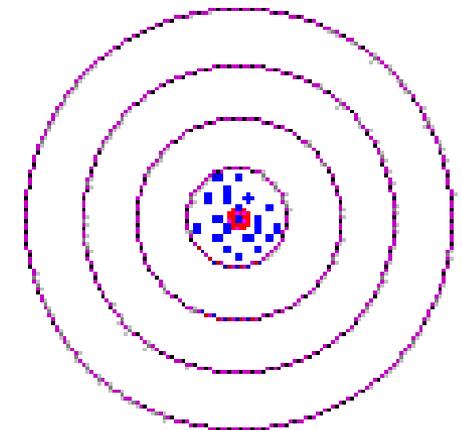
**Reliable
Not Valid**



**Valid
Not Reliable**



**Neither Reliable
Nor Valid**



**Both Reliable
And Valid**

Psychometric Properties

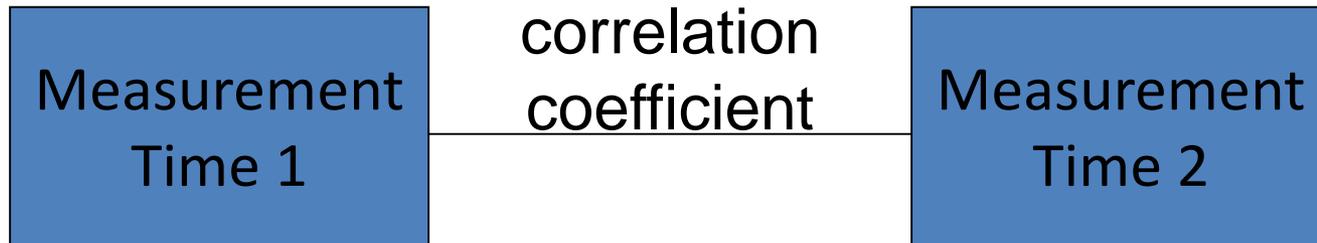
- Reliability
 - Internal consistency
 - Test-retest
 - Inter-/Intra-rater reliability
- Validity (More Important)
 - Content
 - Criterion
 - Construct

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

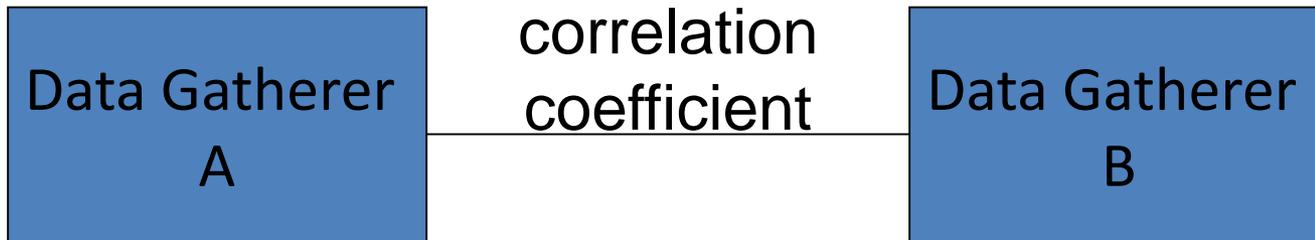
Test-Retest (Stability)

- 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 we 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
 - Difficult to code and analyze
 - Less influenced by researcher because not providing discrete answers
 - Can lead to future, improved closed ended questions

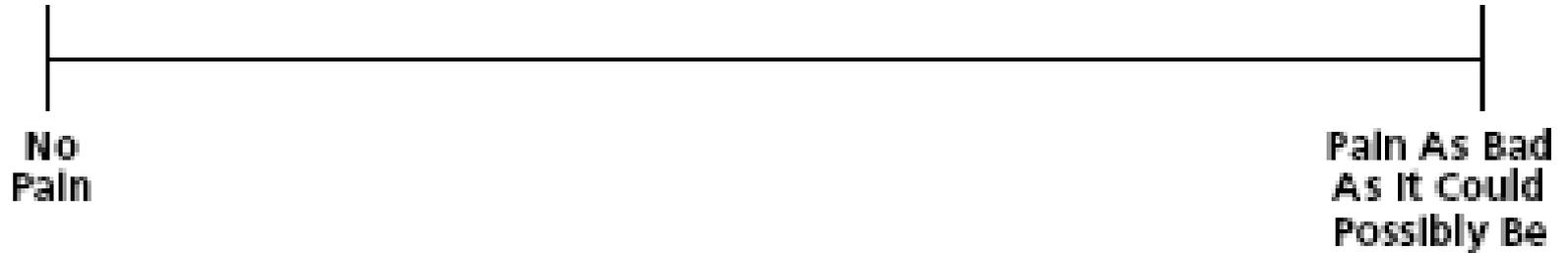
Generating Questionnaire Items

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

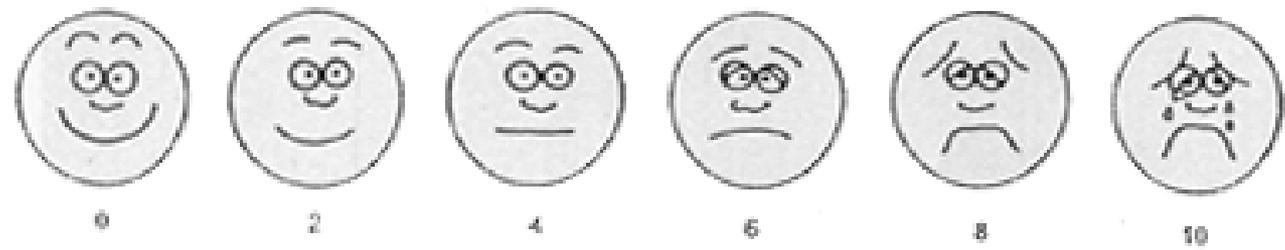
Likert Scales (Ordinal)

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

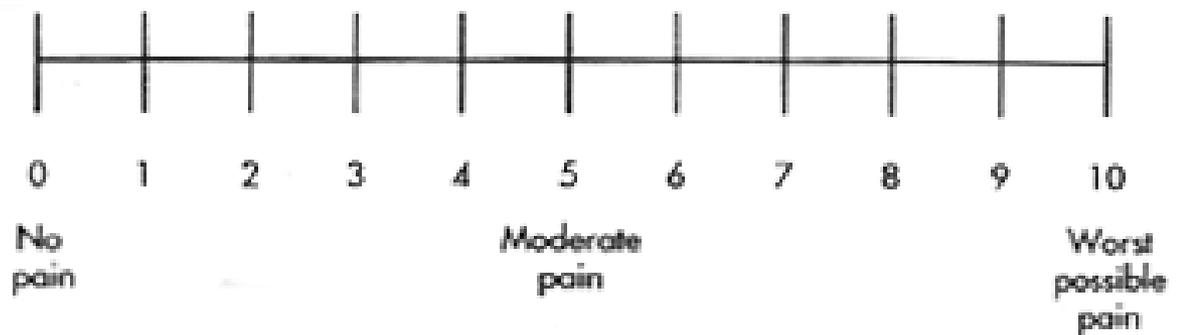
Visual Analog Scale (VAS)†



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 and/or mobile data collection becoming much more popular



Methods of Data Collection

- Personal interviews
 - Higher response rates, ideal for open-ended questions, but more socially 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?

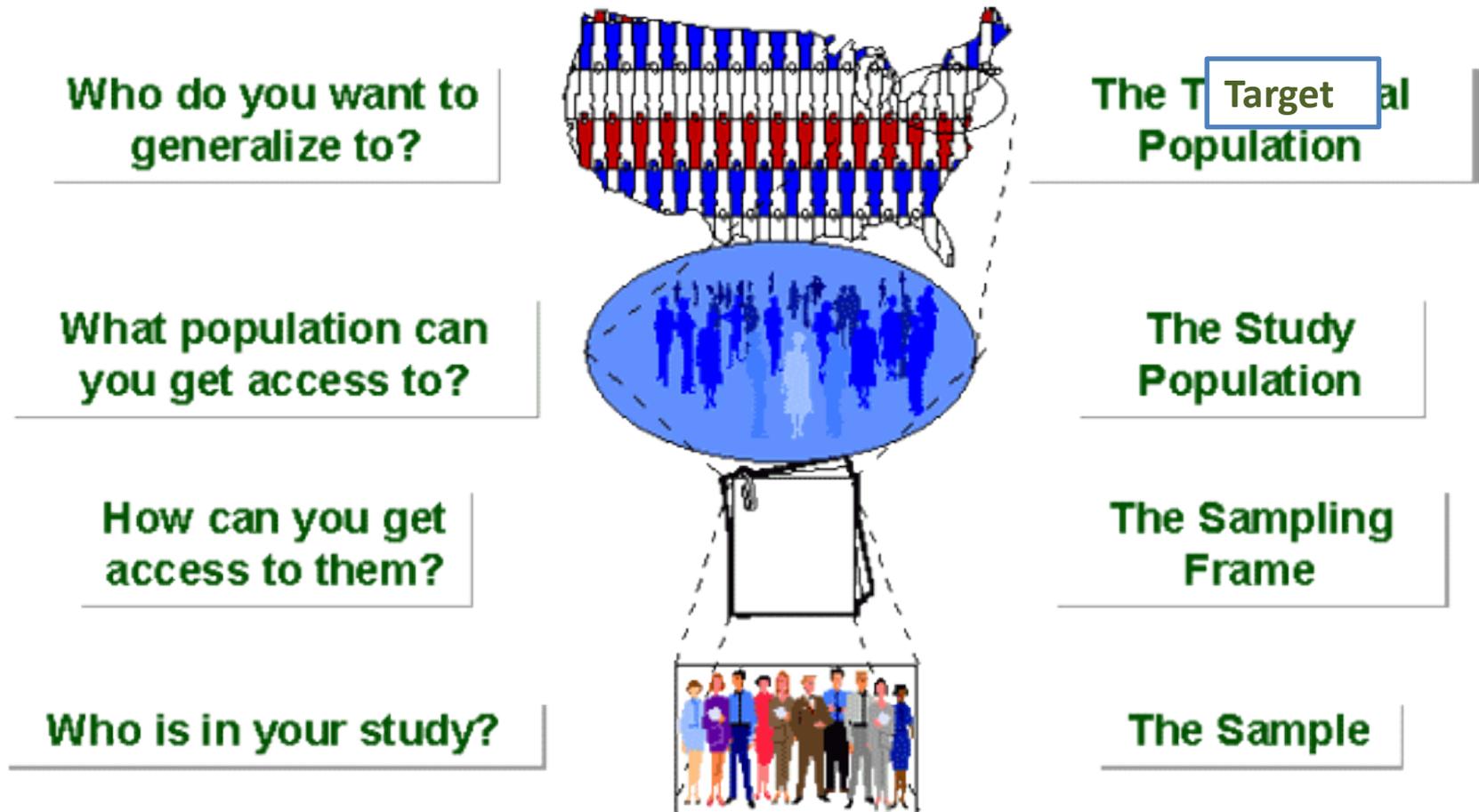
WHERE

- 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

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
 - Analytics

If you would like to learn more...

- Health Survey Research Methods
 - PREV 758
 - Offered every Fall
 - Full for 2018
- Consult or collaborate

Reference Material

General texts on survey design/development/methods

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Questions

