

Questionnaire Development and Testing

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Outline of Lecture

Self-report measures

Data collection methods

Main questionnaire development steps

1. Determine analytic objectives
2. Put together draft questionnaire
3. Cognitive testing
4. Field pretesting
5. Translation

Qualitative Research

Mixed Methods Research

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Data Sources for Health Research (other than self-report)

Birth and death records

Medical records at physician offices, hospitals, nursing homes, etc.

Medical databases housed within various agencies, universities, and insurance companies

Physical exams and laboratory testing

Registers of diseases

Self-Report Measures

Used in questionnaires

Some information can be gathered only by asking people questions (i.e. not easily observable)

Self-report measures are estimates of true scores

True score + Measurement error =

Survey response

What are the Pitfalls
of Self-Report?

Susceptible to the respondent's:

Mood

Motivation

Memory

Understanding

What are the Pitfalls
of Self-Report?

Also susceptible to:

Context of interview

Social desirability

Thus, importance of rigorous methods

Common Types of Questions

Open-ended

What health conditions do you have?

Closed

Which of the following conditions do you currently have? Say yes or no to each.

Diabetes?

Asthma?

Hypertension?

Common Types of Questions

Response options

Nominal – unordered (e.g. male, female)

Ordinal – ranked (e.g. excellent, good, fair, poor)

Type of information

Factual – Objectively verifiable

Subjective – Knowledge, perceptions, feelings, judgment

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Data Collection Methods in Surveys

Computerized vs. paper surveys

Computerized: desktop, laptop, web, smartphone, tablet

Interviewer vs. self-administered

Interviewer: Face-to-face or from centralized location

Occasionally interactive voice response

Skip Patterns

Computerized Surveys

Pros

Faster data availability

Can handle complex skip patterns

Can help to eliminate skip errors (but not always)

Can be tailored to severity of symptoms or situation

Computerized Surveys

Cons

Data can get lost if system crashes

Requires power source

In-Person Interviewer Administered

Pros

Interviewer can answer questions

Can administer to illiterate/low reading level

Can reach people who can't come to you

Can build rapport

Higher response rates

Can use visual aids

In-Person Interviewer Administered

Cons

Expensive

Geographic limitations

Longer data collection period

Interviewer presence can bias results

Interviewers may use inconsistent techniques

Telephone Interviewer Administered

Pros

Lower Costs

Can ensure uniform data collection

Shorter data collection period

Good geographic coverage

Telephone Interviewer Administered

Cons

Omit people without phones (2% of US)

4 in 10 U.S. adults are cell phone only (complicates sampling)

Cannot use visual aids

Lower response rates compared with in-person

Web/Smartphone/Tablet
Self-Administration

Pros

Lower costs

Timely data

Anonymity (good for sensitive items)

Flexible in design options (can use visual aids, long lists, complex skips)

Convenient for respondents (any time/location)

Can cover large geographic area

Web/Smartphone/Tablet
Self-Administration

Cons

Varying degrees of computer skills, access, connection speeds

Samples reflect select online groups

Difficult to verify informed consent

Difficult to track non-responders

Paper and Pen Self-Administration

Pros

Anonymity for sensitive questions

Can use long, complex response categories

Can use visual aids

Appearance consistent

Can cover large geographic area

Length easy to see (plus or minus?)

Paper and Pen Self-Administration

Cons

Requires good reading/writing skills

Cannot have complex skip patterns

No quality control

Does not always save money

Effects of Data Collection

Method on Response

Multiple methods increase response rates (but at what cost?)

Spoken vs. Visual

Spoken questions produce more positive responses

“How would you describe your health, would you say excellent, good, fair or poor?”

Effects of Data Collection
Method on Response

Questions tailored to method:

Yes/No for telephone

Long list of check boxes for web

Long scales for self-administered/ shorter scales for telephone

Vast array of visuals/graphics available for computerized surveys

Be careful combining/comparing

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Main Development Steps:

1. Determine Analytic Objectives

What are the general concepts to be covered/research questions?

Literature review

Expert panels, think tanks

Patient input

1. Determine Analytic Objectives
What Type of Data Will Answer the
Research Question?

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Main Development Steps:

2. Put Together Draft Questionnaire

Use existing instruments

National Field Surveys:

National Health Interview Survey (US)

National Health And Nutrition Examination Survey (US)

National Health Service Survey (UK)

Research Electronic Data Capture (REDCap):

Shared library of data collection instruments

Put Together Draft Questionnaire

HealthMeasures.net (sponsored by NIH/ developed with best practices)

Patient Reported Outcomes Measurement Information System (PROMIS)

Quality of Life in Neurological Disorders (Neuro-QoL)

Adult Sickle Cell Quality of Life Measurement Information System (ASCQ-Me)

NIH Toolbox

Put Together Draft Questionnaire

Pay attention to aesthetics

Draft new questions using known criteria

Put Together Draft Questionnaire

Literacy < 9th grade U.S.

Specific better than broad

Culturally sensitive

Scales consistent

Terms well-defined

Instructions clear

Reference periods clear

Response options match question

Multiple concepts separated

Put Together Draft Questionnaire

Interpreted accurately by people with range of demographic characteristics

Capturing what researcher intended

Avoid

Social desirability effects

Negative wording

Double barreled

Jargon

Ambiguous

Leading

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Main Development Steps:

3. Cognitive Testing

Cognitive Testing

Technique to study the way in which respondents understand, process, and respond to survey questions

Probing techniques to determine how respondents interpret questions

Cognitive Testing

All components tested (stem, response categories, instructions, question ordering)

Qualitative analysis performed to find common themes

Performed in laboratory by trained research team

Can be beneficial to travel to respondents (hard to reach populations)

Cognitive Testing

Participants:

Based on target population

Start to lose focus after 1 hour

Usually paid

Cognitive Testing

Iterative Process

Test questionnaire

Modify based on

cognitive

testing

Goal: Find and fix sources of Response Error

Sources of Response Error

Respondent does not know the information

They cannot recall it, although they do know it

They do not understand the question

They do not want to report the answer in the survey context

(Fowler F. (1991). Survey Research Methods, Sage)

Actions Taken Based on Cognitive Interviews

Accept original question

Accept original question with minor edits

Accept original question with major edits

Drop question/draft new question

Examples of common questionnaire problems: Too Broad

Original

Would you be more inclined to use complementary therapies if your medical doctor or other conventional health care provider recommends it?

Examples of common questionnaire problems: Too Broad

Final

During the past 12 months, did you use [therapy] because it was recommended by a medical doctor?

Examples of common questionnaire problems: Too Complex

Original

During the past 30 days did you use any of the following vitamins and minerals for your own health or treatment? Be sure to include ALL vitamins that you use. If you take a SINGLE vitamin or mineral supplement, such as niacin, that is not part of a combination multi-vitamin/mineral supplement, include it separately.

Examples of common questionnaire problems: Too Complex

Final

The next questions are about any vitamins and minerals you may take. Have you ever taken any vitamins or minerals listed on this card?

Examples of common questionnaire problems: Double-barreled

Original

What was the reason you chose to use acupuncture...was it to treat a specific health problem or just to stay healthy or well?

Examples of common questionnaire problems: Double-barreled

Final

Did you use acupuncture for any of these reasons? Please say yes or no to each.

For general wellness or general disease prevention?

For one or more specific health problems, symptoms, or conditions?

Examples of common questionnaire problems: Information Unknown

Questions dropped

Do you currently see a practitioner for homeopathy more, less, or about the same as you did one year ago?

At what age did you first start using
[complementary therapy]?

During the past 12 months, did your child pray for his/her own health?

Examples of common questionnaire problems: Terms Undefined

Original

During the past 12 months did you use movement therapies for your own health or treatment?

Examples of common questionnaire problems: Terms Undefined

Final

Have you ever practiced any of the following movement or exercise techniques?

Alexander Technique?

Feldenkrais?

Pilates?

Trager Psychophysical Integration?

Examples of common questionnaire problems: Cultural salience

Have you ever switched from a stronger to a lighter cigarette?

(Original) During the past 12 months, did you see a practitioner for/use [therapy] because it is how you were raised?

(Final) During the past 12 months, did you see a practitioner for/use [therapy] because it was part of your upbringing?

Examples of common questionnaire problems: Inconsistent response categories

NHIS: 10-fold increase in children reported to have cerebral palsy 2004-2006

311-353 cases in 2004-2006 vs. 34 cases in 2003

Caused by interviewer error when survey moved to new screen design

Examples of common questionnaire problems:

Ordering effects

Original

Have you ever had a sigmoidoscopy?

When was your most recent?

Have you ever had a colonoscopy?

When was your most recent?

Final

Order reversed

Pay Attention to Length

Ideally

< 30 minutes for face-to-face

<15 minutes for phone or web

Too long will increase costs/decrease response rates

Interviewers rush

Respondents get tired

Interviewers may cheat (keystroke data)

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Main Development Steps:

4. Field Pretesting

Survey administered in realistic setting to similar study population

For Interviewer-administered surveys

Experienced interviewers

Nearly final instrument

Designers/sponsors observe

Rating forms to record issues

Debriefing

Field Pretesting

For Self-administered surveys

Respondents interviewed after they complete survey

Observe respondents as they fill out survey

Field Pretesting

Tabulated data used to:

Design closed response categories from open-ended questions

Collapse/eliminate response categories

Alter skip patterns

Drop items

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PROMIS Approach

Harmonization: different words/ languages must mean the same

Universal approach: One language version for multiple countries

People from various countries/dialects involved

Translation (PROMIS approach)

2 English to target lang. translations

Native speaker of target lang. reconciles

Back translated by native English speaker

Review by project manager

3 native target lang. experts review (linguists and healthcare professionals)

Review by project manager

Translation (PROMIS approach)

7. Native target lang. speaker reviews history of items/determines final version

8. Review by project manager

9. Formatting/typesetting/proofreading

10. Cognitive testing with native target lang. speakers

11. Compilation of comments and finalization

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Qualitative Research

The systematic collection, organization, and interpretation of textual material derived from talk or observation.

(Malterud, 2001)

Qualitative Research

Quantitative

Begin w/ hypotheses

Specific research questions

Analysis after data collection

Qualitative

Generate hypotheses

General research questions

Analysis ongoing during data collection

Qualitative Research

Data collection:

Data sources: interviews, observations, videos, diaries, memoirs, biographies

Requires sensitivity to pick up on non-verbal cues

Familiarity with literature can enhance sensitivity

Context is important

Qualitative Research

Data collection:

Interviews audiotaped/transcribed later

Interview protocol

Data about date, time, location

Questions to be asked during interview

Additional questions asked spontaneously

Qualitative Research

Data Analysis:

Begins with 1st piece of data

Coding: assigning themes to data

Each piece of data compared for similarities/differences

Conceptually similar segments grouped to form categories

Concepts form basis of analysis

Qualitative Research

Data Analysis:

Coding scheme evolves

Saturation: no new piece of data challenges categorical structure

Both an art and a science

More than one story can be derived from data

Qualitative data analysis software (e.g. MAXQDA, ATLAS, Nvivo)

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Integrating or combining qualitative and quantitative methods to draw on strengths of each

Reasons for using

View problems from multiple perspectives

Contextualize information

Develop more complete understanding

Challenges

Teamwork, resources, sample size, interpretation

Mixed Methods Designs

Qualitative → Quantitative: Qualitative research used to develop outcome measures or intervention

Most pertinent to questionnaire development

Qualitative data used to ensure instrument is grounded in views of participants

Mixed Methods Designs

Example:

Patient Reported Outcomes Measurement Information System (PROMIS):

Expert review → focus groups → cognitive testing → administer survey → psychometrics

Mixed Methods Designs

Quantitative → Qualitative: Qualitative used to help explain the quantitative data

Example: Do positive views on aging influence health?

First questionnaires used to determine if there are associations

Then qualitative interviews used to determine specific barriers and resources that impact health behaviors

Craciun et al. (2015)

Mixed Methods Designs

Qualitative and Quantitative used Concurrently: Both methods used at the same time to answer the same research question

Example: Sought to better understand cause of distracted driving by commercial truck drivers

Qualitative interviews identified how supervisors might distract drivers

Surveys focused on decision-making by drivers in near crashes

Synthesis of these guided interventions

Swedler et al. (2015)

Mixed Methods Research

NIH Clinical Center Example

Brain imaging study with Fibromyalgia patients and healthy volunteers

Subjects given experimental heat on leg using thermode, and asked to rate their level of pain

Qualitative component added to learn how patient's determine pain ratings (looking for differences between FM and HV)

Mixed Methods Research

NIH Clinical Center Example

Qualitative data used to explain peculiarities in quantitative data:

Identified subjects who were confused/did not follow directions

Identify subjects who had trouble focusing/fell asleep

Identify subjects who had pain other than FM

Summary

Questionnaire development requires careful planning

Use existing validated instruments when possible

Rigorous methods will reduce response error

Suggested Resources (Textbooks)

Cognitive Interviewing (Willis, 2005/Sage)

Survey Research Methods (Fowler, 2014/Sage)

Basics of Qualitative Research 3e (Corbin and Strauss, Sage/2008)

Designing and Conducting Mixed Methods Research (Creswell and Clark, 2007/Wiley)

Mail and Web Surveys (Dillman, 2007/Wiley)

Suggested Resources (Internet)

Question Appraisal System (Willis & Lessler, 1999)

(appliedresearch.cancer.gov/areas/cognitive/qas99.pdf)

NIH sponsored health measures

(healthmeasures.net)

Patient Reported Outcomes Measurement Information System (PROMIS)

(nihpromis.org)

Suggested Resources (Internet)

NIH Toolbox

(nihtoolbox.org)

Quality of Life in Neurological Disorders

(neuroqol.org)

Adult Sickle Cell Quality of Life Measurement Information System

(ascq-me.org)

Suggested Resources (Internet)

United Health Service Surveys (U.K.) (nhssurveys.org/)

Centers for Disease Control and Prevention (CDC) Surveys

(cdc.gov/nchs/surveys.htm)

REDCap Shared Library

(project-redcap.org)