

Statistical for Psychosocial Research: Measurement

- Session 10: Scale Development
 - Monday, September 25, 2006
 - Bill Eaton

How to construct a valid scale

- 1. *See if a suitable scale exists already*
- 2. *Define the construct carefully*
- 3. *Choose a modality*
- 4. *Generate items*
 - *Avoid goofy wording*
 - *Choose a response format*
 - *Avoid common biases*
- 5. *Conduct pilot tests*
- 6. *Evaluate results*

Steps in the Construction of a Scale with High Validity

1. See if a suitable scale exists already

- Review literature
- Check mental measurement yearbook, various collections–
- It is not unusual for scales measuring the same construct to be developed independently
- Examples
 - Stress (Life event scales, daily hassles)
 - Distress (General Health Questionnaire, perceived stress)
 - Demoralization (Langner, GWB, HOS)
 - Depression (Beck, Zung, CESD)

Steps in the Construction of a Scale with High Validity

2. *Define the construct carefully*

- Consider alternate definitions
- Inclusion and exclusion criteria
- State as scale or index
- Stratify the domain of content
- Fit the construct into various theories

Steps in the Construction of a Scale with High Validity

- 3. *Choose a Modality*
 - Clinical Rating
 - Examination
 - Self-report-- Structured Interview
 - Telephone Interview
 - Computer-assisted Interview
 - Paper and pencil
 - Informant Interview

Steps in the Construction of a Scale with High Validity

- 4. *Generate items*
 - Sample the domain of content equitably
 - Borrow!
 - Tap expert and lay judgments
 - Be clear
 - Minimize cognitive burden
 - Choose response format judiciously
 - Avoid common biases
 - Grade reading/comprehension level

Designing Questions

- Shorter words are better, usually
 - “principal” versus “main”
 - “Intelligible” versus “clear”
- Shorter sentences are often better
 - 20 words or less
 - But: “filler” and “memory cue” words which lengthen the question without adding new information
 - “depressed” versus “sad, blue, depressed or down in the dumps”
 - “Have you experienced an assault?” Versus “Has anyone used force against you by grabbing, punching, hitting, choking, or biting you?”
- Avoid double-barreled questions
 - “Do you think women and children should be given the first available flu shots?”
 - “Do you agree or disagree: Teachers should not be required to supervise students in the halls, lunchroom, and school parking lots.”
- Dating Issues
 - Narrow the reference period (six months or less)
 - Use temporal anchors (“Since last New Year”
- Make the question meaningful as spoken (even if grammatically incorrect)
 - “Physical fitness is an idea the time of which has come.”
 - “The prophets have never been better.”
- Calculate Grade Reading Level (MS Word: this slide is 6th grade)

- Thanks to:
- Rasha Khatib (Dignity)
- Renee Gindi (Concurrency)
- Lindsay Jorgensen (Job Efficacy)
- Amy Bore (Trust in physicians)
- Rachel Weber (CUSES)

- *Choose a Response Format*
 - Likert (e.g., Concurrency; CUSES)
 - Subjective Intensity (e.g., GHQ)
 - Frequency (e.g., CES-D, PHQ-9)
 - Intrusion/Impairment (e.g., DIS)
 - Explicit anchors (e.g., HAM-D, Beck)
 - Visual analogue with adjective-based endpoints (Semantic Differential)

Concurrency Scale (Likert response format)

Now I have a few questions about the experiences that you and your friends have in finding sex partners. For each of these questions, I will read a statement, and you can tell me whether you strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree.

1. → It is easy for my male friends to find female sex partners.

- Strongly Agree ☐ 1
- Agree ☐ 2
- Neither Agree nor Disagree ☐ 3
- Disagree ☐ 4
- Strongly Disagree ☐ 5
- Refused to answer ☐ 77

¶
¶

2. → It is easy for my male friends to find main female sex partners. By "main partner" I mean a female he has sex with and feels committed to above anyone else. This is a partner he would call a girlfriend, wife, significant other, or life partner.

- Strongly Agree ☐ 1
- Agree ☐ 2
- Neither Agree nor Disagree ☐ 3
- Disagree ☐ 4
- Strongly Disagree ☐ 5
- Refused to answer ☐ 77

¶

General Health Questionnaire (Response format: Subjective intensity)

SECTION G: GENERAL HEALTH

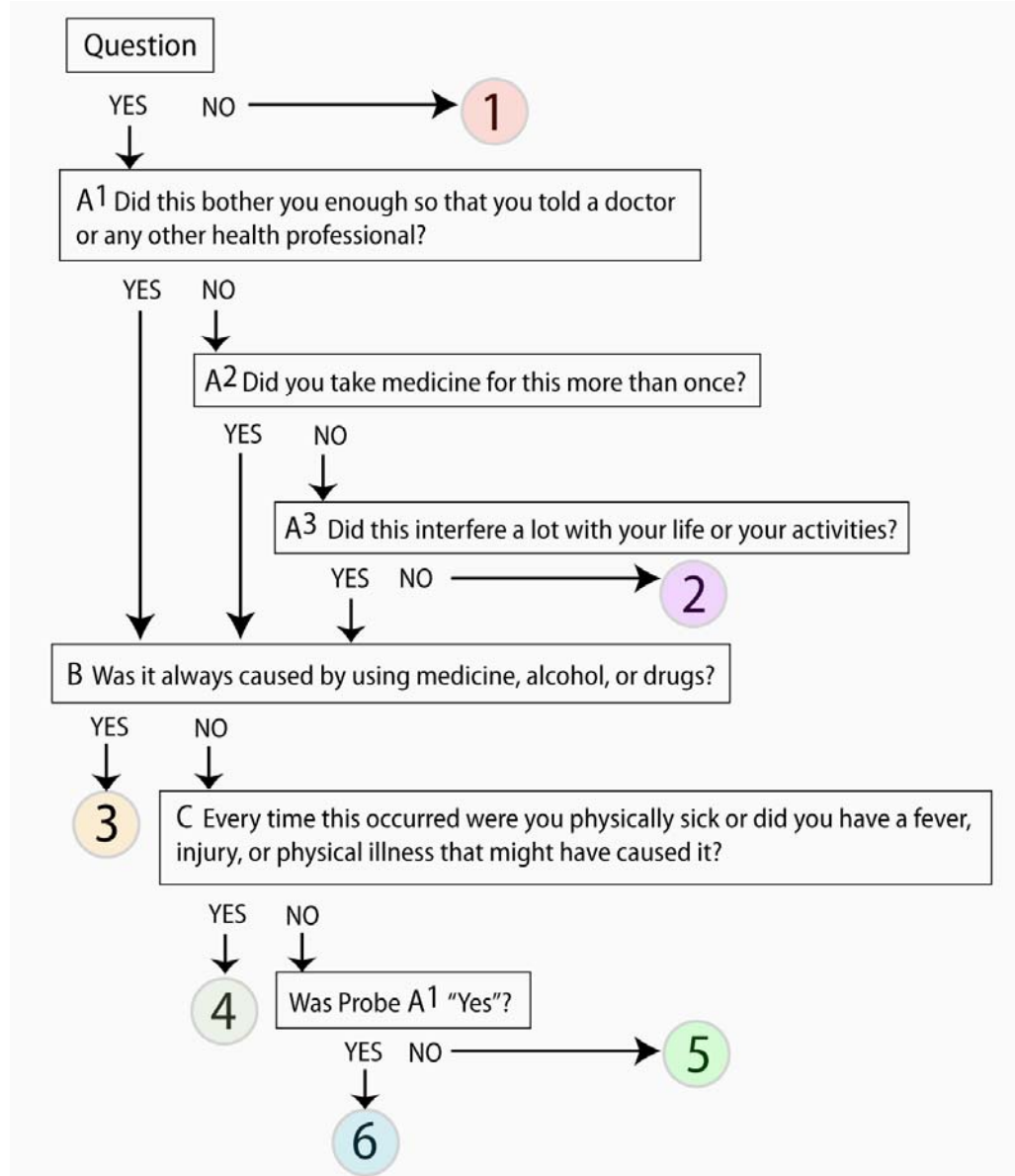
- 58 -

Over the past few weeks...				DECK 20	
G11.	Have you been able to enjoy your normal day-to-day activities as much as usual?	YES	More than usual.....	1	75
		YES	Same as usual.....	2	
		NO	Less than usual	3	
		NO	Much less than usual	4	
		DK.....	8		
G12.	Have you been taking things hard?	NO	Not at all.....	1	76
		YES NO	No more than usual	2	
		YES	More than usual	3	
		YES	Much more than usual	4	
		DK.....	8		
G13.	Have you been able to face up to your problems?	YES	More than usual.....	1	77
		NO YES	Same as usual.....	2	
		NO	Less than usual	3	
		NO	Much less than usual	4	
		DK.....	8		

PHQ-9 (Frequency Response Format)

- Over the past **2 weeks**, how often have you been bothered by any of the following problems?
 - *For each item, the answer choice are “Not at all” - 0 points, “Several days” - 1 point, “More than half the days” - 2 points and “Nearly every day” - 3 points.*

Diagnostic Interview Probes (Impairment Response Format)



Hamilton Depression Scale

- “The appearance of yet another rating scale for measuring symptoms of mental disorder may seem unnecessary, since there are so many already in existence “(Hamilton, 1960).
- 21 items with 0-2 or 0-4 categorical response values of increasing intensity
- “No distinction between intensity and frequency, the rater having to give due weight to both...”
- Range 0-65 for 21 items
- Structured Interview Guide created later
- Most widely used Depression scale in Clinical Trials

Hamilton Rating Scale for Depression

21 items rated by health professional
(Response Format is explicit anchors)
(Hedlung and Vieweg, JOP, 1979)

- 1. DEPRESSED MOOD (Sadness, hopeless, helpless, worthless)
 - 0 = Absent
 - 1 = These feeling states indicated only on questioning
 - 2 = These feeling states spontaneously reported verbally
 - 3 = Communicates these feeling states non-verbally– i.e., through facial expression, posture, voice, and tendency to weep
 - 4 = Patient reports VIRTUALLY ONLY these feeling states in his spontaneous verbal and non-verbal communication
- 13. SOMATIC SYMPTOMS GENERAL
 - 0 = None
 - 1 = Heaviness in limbs, back or head. Backaches, headache, muscle aches. Loss of energy and fatigability
 - 2 = Any clear-cut symptom rates 2
- 14. GENITAL SYMPTOMS (Symptoms such as: loss of libido, impaired sexual performance; menstrual disturbances)
 - 0 = Absent
 - 1 = Mild
 - 2 = Severe

Adult Beck Depression Inventory-II

(Response Format is explicit anchors)

(Aaron Beck, 1996)

- Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. If several statements in the group seem to apply equally well, choose the highest number for that group. Be sure that you do not choose more than one statement for any group.
- 1. Sadness
 - I do not feel sad. (0)
 - I feel sad much of the time. (1)
 - I am sad all the time. (2)
 - I am so sad or unhappy that I can't stand it (3)
- 2. Pessimism
 - I am not discouraged about my future. (0)
 - I feel more discouraged about my future than I used to be. (1)
 - I do not expect things to work out for me. (2)
 - I feel my future is hopeless and will only get worse. (3)
- 8. Self-criticalness
 - I don't criticize or blame myself more than usual. (0)
 - I am more critical of myself than I used to be. (1)
 - I criticize myself for all of my faults. (2)
 - I blame myself for everything bad that happens. (3)
- 10. Crying
 - I don't cry any more than I used to. (0)
 - I cry more than I used to. (1)
 - I cry over every little thing. (2)
 - I feel like crying, but I can't (3)

Trust in Physicians Scale

- I can tell my health care provider anything.
 - My health care provider sometimes pretends to know things when he/she is not really sure.
 - I completely trust my health care provider's judgment about my medical care.
 - My health care provider would always tell me the truth about my health, even if there was bad news.
 - My health care provider cares as much as I do about my health.
- **Response format: Likert with no neutral**
- Strongly Disagree Disagree Agree Strongly Agree)
- **Response format: Visual Analogue**
- On a scale from 1 to 10, how much do you trust your health care provider? (circle one number)
- 1 2 3 4 5 6 7 8 9 10
- (Not At All) (Completely)

Question Order

- Usually does not matter
- Change of context: e.g.
 - Father, may I smoke while I pray?
 - No, my son . . .
 - Then, father, may I pray while I smoke?
- Fatigue, e.g.,
 - cognitive tests at end or beginning will show differences

Acquiescence bias

10% agree to both items:

It is hardly fair to bring children into the world, the way things look for the future

Children born today have a wonderful future to look forward to

Years of Education	0-11	12	13+
Most men are better suited emotionally for politics than most women, men and women are equally suited, or women are better suited than men.			
Percent “Men better suited”	33	38	28
Most men are better suited emotionally for politics than most women.			
Percent “agree”	57	44	39

After Converse and Presser, 1986

Social Desirability Bias

- Putting the best foot forward
- Faking good
- Trait versus State
- Adjusting items
 - Neutral questions
 - Forced choice
 - Randomized response
 - Self or computer administered scales
 - Indirect questions (“How would the average person respond?”)
- Scales to adjust
 - Marlow Crowne, Desirability Scale
 - “I know everything about the candidates before I vote”
 - “My manners are as good at home as when I eat out”
 - “I never read sexy books or magazines”
 - “When I was young I sometimes stole things”

End-avoidance bias

Version 1 with no neutral midpoint: “Should divorce in this country be easier or more difficult to obtain than it is now?”

Version 2 with spoken neutral midpoint: “Should divorce in this country be easier to obtain, more difficult to obtain, or stay as it is now?”

	V. 1	V. 2
Easier	28.9	22.7
More difficult	44.5	32.7
Stay as is (version 1, volunteered)	21.7	40.2
Don't know	4.9	4.3

After Converse and Presser, 1986

Steps in the Construction of a Scale with High Validity

- 5. Conduct pilot tests
 - Conduct several pilots in stages
 - Increasing sample size, representativeness, and expense
 - Choose more items than target length (2-3X)
 - Include enough subjects to analyze internal consistency
 - Include items for validation

Steps in the Construction of a Scale with High Validity

- 5. Why Pretest?
 - Variation
 - 1/99 versus 50/50
 - Meaning
 - “traffic in the neighborhood” (trucks or drugs?)
 - “family planning” (birth control or save for vacation?)
 - Difficulty (% don’t knows)
 - Interest and reaction (% refusals)
 - Flow and order
 - Timing by section

After Converse and Presser, 1986

Steps in the Construction of a Scale with High Validity

- 6. Evaluating Pretests
 - Comments in the margin
 - Discussion with interviewers as a group
 - Questions about the questions
 - Marginal frequencies
 - Item total correlations
 - Field or video observation

Condom Use Self-Efficacy Scale (CUSES)

Keywords:

Self-Efficacy, Condom Use

Background:

The Condom Use Self-Efficacy Scale (CUSES) can be used to assess an individual's perception of his or her ability to use condoms. The scale contains 28 items (Brafford and Beck, 1991), but a later analysis to find subscales left 13 items unassigned (Brien et al., 1994). Here the 28-item scale is listed.

Developer(s):

Linda J. Brafford and Kenneth H. Beck

Copyright:

Publisher: Heldref Publications

Subscales:

CUSES has four subscales (Brien et al., 1994):

1. Mechanics (items 1, 27, 14, 22): putting a condom on self or other;
2. Partner Disapproval (items 9, 10, 16, 17, 18): use of a condom with a partner's approval;
3. Assertive (items 4, 5, 6): ability to persuade a partner to use a condom
4. Intoxicants (items 24, 25, 28): ability to use condoms while under the influence.

Reliability:

Internal consistency: Cronbach alpha (entire scale) = 0.91

Test-retest reliability (two-week) = 0.81 (Brafford and Beck, 1991)

Internal consistency for subscales:

Mechanics: Cronbach alpha = 0.78

Partner's Disapproval: Cronbach alpha = 0.81

Assertive: Cronbach alpha = 0.80

Intoxicants: Cronbach alpha = 0.82 (Brien et al., 1994)

Reading level

(MS Word): 12.0

Scale items:

1. I feel confident in my ability to put a condom on myself or my partner.
2. I feel confident I could purchase condoms without feeling embarrassed.
3. I feel confident I could remember to carry a condom with me should I need one.
4. I feel confident in my ability to discuss condom usage with any partner I might have.
5. I feel confident in my ability to suggest using condoms with a new partner.
6. I feel confident I could suggest using a condom without my partner feeling "diseased".
7. I feel confident in my own or my partner's ability to maintain an erection while using a condom.
8. I would feel embarrassed to put a condom on myself or my partner. **R**
9. If I were to suggest using a condom to a partner, I would feel afraid that he or she would reject me. **R**
10. If I were unsure of my partner's feelings about using condoms, I would not suggest using one. **R**
11. I feel confident in my ability to use a condom correctly.
12. I would feel comfortable discussing condom use with a potential sexual partner before we ever had any sexual contact (e.g. hugging, kissing, caressing, etc.)
13. I feel confident in my ability to persuade a partner to accept using a condom when we have intercourse.
14. I feel confident I could gracefully remove and dispose of a condom when we have intercourse.
15. If my partner and I were to try to use a condom and did not succeed, I would feel embarrassed to try to use one again (e.g. not being able to unroll condom, putting it on backwards, or awkwardness). **R**
16. I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I've had a homosexual experience. **R**
17. I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I have a sexually transmitted disease. **R**
18. I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I thought they had a sexually transmitted disease. **R**
19. I would feel comfortable discussing condom use with a potential partner before we ever engaged in intercourse.
20. I feel confident in my ability to incorporate putting a condom on myself or my partner into

foreplay.

21. I feel confident that I could use a condom with a partner without "breaking the mood."
22. I feel confident in my ability to put a condom on myself or my partner quickly.
23. I feel confident I could use a condom during intercourse without reducing any sexual sensations.
24. I feel confident that I would remember to use a condom even after I have been drinking.
25. I feel confident that I would remember to use a condom even if I were high.
26. If my partner didn't want to use a condom during intercourse, I could easily convince him or her that it was necessary to do so.
27. I feel confident that I could use a condom successfully.
28. I feel confident I could stop to put a condom on myself or my partner even in the heat of passion.

USE THE FOLLOWING RESPONSE CATEGORIES

0. Strongly agree
1. Agree
2. Undecided
3. Disagree
4. Strongly disagree

Note: Items followed by an R should be reversed when coding.

References:

- Mahoney, C., Thombs, D.L., and Ford, O.J. (1995). Health belief and self-efficacy models: their utility in explaining college student condom use. AIDS Education and Prevention, 7, 32-49.
- Brafford, L.J., and Beck, K.H. (1991). Development and validation of a condom self-efficacy scale for college students. Journal of American College Health, 39, 219-225.
- Brien, T.M., Thombs, D.L., Mahoney, C.A., and Wallnau, L. (1994) Dimensions of self-efficacy among three distinct groups of condom users. Journal of American College Health, 42, 167-174.

Download this page as a PDF file

Concurrency Scale

Now I have a few questions about the experiences that you and your friends have in finding sex partners. For each of these questions, I will read a statement, and you can tell me whether you strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree.

1. → It is easy for my male friends to find female sex partners.

- Strongly Agree ☐ 1
- Agree ☐ 2
- Neither Agree nor Disagree ☐ 3
- Disagree ☐ 4
- Strongly Disagree ☐ 5
- Refused to answer ☐ 77

¶
¶

2. → It is easy for my male friends to find main female sex partners. By "main partner" I mean a female he has sex with and feels committed to above anyone else. This is a partner he would call a girlfriend, wife, significant other, or life partner.

- Strongly Agree ☐ 1
- Agree ☐ 2
- Neither Agree nor Disagree ☐ 3
- Disagree ☐ 4
- Strongly Disagree ☐ 5
- Refused to answer ☐ 77

¶

Concurrency Scale (continued)

||
Now I have a few questions about how you feel about the kinds of relationships that men and women normally have. ||

||
7. → It is normal for males to have more than one girlfriend or sexual relationship at the same time. ||

- Strongly Agree ☐ 1 ||
- Agree ☐ 2 ||
- Neither Agree nor Disagree ☐ 3 ||
- Disagree ☐ 4 ||
- Strongly Disagree ☐ 5 ||
- Refused to answer ☐ 77 ||

||
8. → It is normal for females to have more than one boyfriend or sexual relationship at the same time. ||

- Strongly Agree ☐ 1 ||
- Agree ☐ 2 ||
- Neither Agree nor Disagree ☐ 3 ||
- Disagree ☐ 4 ||
- Strongly Disagree ☐ 5 ||
- Refused to answer ☐ 77 ||

||

Concurrency Scale

- Reading level: 7.0
- Correlation with a scale measuring Power in sexual relationships = external validity?
- Multidimensionality?
- Correlation with acceptance of suspected concurrency = criterion validity?