Methods for Assessing Safety Culture: A View from the Outside

October 2, 2014 (9:30 – 10:30 EDT)

Safety Culture Conference

(AHRQ Watts Branch Conference Room)

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Patient Safety Culture Measures

- AHRQ Hospital Survey on Patient Safety Culture (HSOPSC)
  - http://www.ahrq.gov/legacy/qual/patientsafetyculture/hospsurvindex.htm
- Safety Attitudes Questionnaire (SAQ)
  - https://med.uth.edu/chqs/surveys/safety-attitudes-and-safety-climate-questionnaire/
- Patient Safety Climate in Healthcare Organizations (PSCHO) Survey
  - http://www.midss.org/content/patient-safety-climate-healthcare-organizations-pscho

AHRQ Hospital Survey on Patient Safety Culture (HSOPSC)

- 42 items measuring 12 domains
  - Supervisor/manager expectations (k = 4)
  - Organizational learning/Cont. improve (k = 3)
  - Teamwork within units (k = 4)
  - Teamwork across units (k = 4)
  - Communication openness (k = 3)
  - Feedback/comm. about error (k = 3)
  - Non-punitive response to error (k = 3)
  - Staffing (k = 4)
  - Management support for safety (k = 3)
  - Handoffs/transitions (k = 4)
  - Frequency of events reports (k = 3)
  - Overall perceptions of patient safety (k = 4)

Safety Attitudes Questionnaire (SAQ)

- 30 items measuring 6 domains
  - Safety climate (k = 7)
  - Teamwork climate (k = 6)
  - Perceptions of management (k = 4)
  - Job satisfaction (k = 5)
  - Working conditions (k = 4)
  - Stress recognition (k = 4)

Patient Safety Climate in Healthcare Organizations (PSCHO) Survey

- 37 items measuring 7 domains
  - Senior managers' engagement (k = 7)
  - Organizational resources (k = 3)
  - Overall emphasis on patient safety (k = 3)
  - Unit safety norms (k = 7)
  - Unit support/recognition for safety effort (k = 4)
  - Fear of blame (k = 2)
  - Fear of shame (k = 5)
  - Provision of safe care (k = 3)
  - Learning (k = 3)

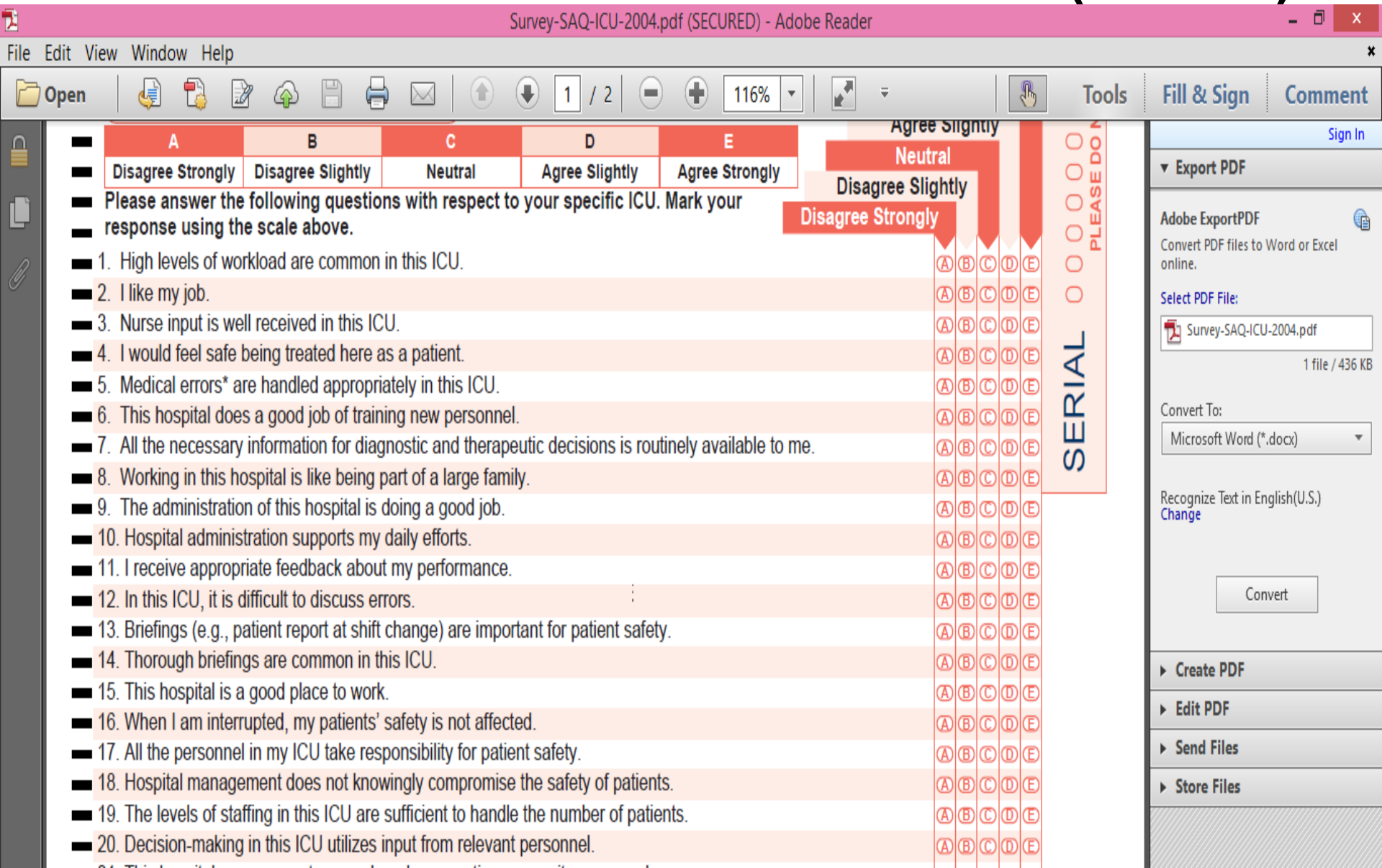
Qualitative Observations (HSOPSC)

- Response options

Please indicate your agreement or disagreement with the following statements about your work area/unit.

Think about your hospital work area/unit…	**Strongly Disagree** ▼	**Disagree** ▼	**Neither** ▼	**Agree** ▼	**Strongly Agree** ▼
1. People support one another in this unit	☐1	☐2	☐3	☐4	☐5
2. We have enough staff to handle the workload	☐1	☐2	☐3	☐4	☐5
3. When a lot of work needs to be done quickly, we work together as a team to get the work done	☐1	☐2	☐3	☐4	☐5
4. In this unit, people treat each other with respect	☐1	☐2	☐3	☐4	☐5
5. Staff in this unit work longer hours than is best for patient care	☐1	☐2	☐3	☐4	☐5

Qualitative Observations (SAQ)



Qualitative Observations (PSCHO)

INSTRUCTIONS

For the following statements, please answer if you "strongly disagree," "disagree," "neither agree nor disagree," "agree," or "strongly agree." If you wish to change an answer, fill in the square for your preferred answer and circle it.

CORRECT MARKS ☒ ■ □ □ **INCORRECT MARKS** ☑ ◻ ◼ ○

SECTION I

This set of statements relates to your experiences regarding patient safety in your unit *and* at your facility as of today, unless otherwise noted.

Some statements refer to "my unit." Physicians and other care providers who are not unit-based should respond to these statements based on their experiences in their service, such as medicine or surgery. All others should respond to these statements based on their experiences in the work unit where they spend the majority of their time, such as ICU, 6 South, or Ambulatory Care Blue Team.

Definition: Patient Safety – Activities to avoid, prevent, or correct adverse patient outcomes which may result from the delivery of healthcare.

	Not Applicable	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1. Good communication flow exists up and down the chain of command regarding patient safety issues		□	□	□	□	□
2. I am provided with adequate resources (personnel, budget, and equipment) to provide safe patient care		□	□	□	□	□
3. Senior management supports a climate that promotes patient safety		□	□	□	□	□
4. Senior management has a clear picture of the risks associated with patient care		□	□	□	□	□
5. My unit takes the time to identify and assess risks to ensure patient safety		□	□	□	□	□

Reliability

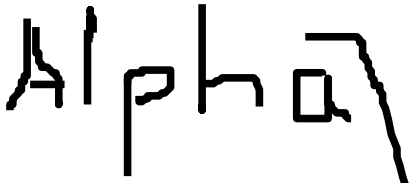
Degree to which the same score is obtained when the *target* or thing being measured (person, plant or whatever) hasn't changed.

- ✓ Internal consistency (items)
  - ✓ Need 2 or more items
- ✓ Test-retest (administrations)
  - ✓ Need 2 or more time points
- ✓ Inter-rater (rater)
  - ✓ Need 2 or more raters of the thing being measured

Reliability Formulas

Model	Reliability	Intraclass Correlation
Two-way random	$\frac{N(MS_{BMS} - MS_{EMS})}{NMS_{BMS} + MS_{JMS} - MS_{EMS}}$	$\frac{MS_{BMS} - MS_{EMS}}{MS_{BMS} + (k-1)MS_{EMS} + k(MS_{JMS} - MS_{EMS})/N}$
Two-way mixed	$\frac{MS_{BMS} - MS_{EMS}}{MS_{BMS}}$	$\frac{MS_{BMS} - MS_{EMS}}{MS_{BMS} + (k-1)MS_{EMS}}$
One-way	$\frac{MS_{BMS} - MS_{WMS}}{MS_{BMS}}$	$\frac{MS_{BMS} - MS_{WMS}}{MS_{BMS} + (k-1)MS_{WMS}}$

BMS = Between Ratee Mean Square **N = n of ratees**
WMS = Within Mean Square **k = n of items or raters**
JMS = Item or Rater Mean Square
EMS = Ratee x Item (Rater) Mean Square



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r_{wg} (i)

- $1 - (Sx_j^2 / sigma_{EU}^2)$
  - Within-group interrater reliability for Xj (Proportion of non-error variance)
  - Sx_j^2 = observed variance on X_j
  - $Sigma_{EU}^2$ = variance on X_j if all judgements were due to random measurement error
    - Expected error variance based on uniform distribution.
    - $(NCAT^2 - 1)/12$
- James et al. (1984, J App Psych)

Item-scale correlation matrix

	Depress	Anxiety	Anger
Item #1	0.80*	0.20	0.20
Item #2	0.80*	0.20	0.20
Item #3	0.80*	0.20	0.20
Item #4	0.20	0.80*	0.20
Item #5	0.20	0.80*	0.20
Item #6	0.20	0.80*	0.20
Item #7	0.20	0.20	0.80*
Item #8	0.20	0.20	0.80*
Item #9	0.20	0.20	0.80*

*Item-scale correlation, corrected for overlap.

Item-scale correlation matrix

	Depress	Anxiety	Anger
Item #1	0.50*	0.50	0.50
Item #2	0.50*	0.50	0.50
Item #3	0.50*	0.50	0.50
Item #4	0.50	0.50*	0.50
Item #5	0.50	0.50*	0.50
Item #6	0.50	0.50*	0.50
Item #7	0.50	0.50	0.50*
Item #8	0.50	0.50	0.50*
Item #9	0.50	0.50	0.50*

*Item-scale correlation, corrected for overlap.

Confirmatory Factor Analysis

	Depress	Anxiety	Anger
Item #1	0.80*	0.00	0.00
Item #2	0.80*	0.00	0.00
Item #3	0.80*	0.00	0.00
Item #4	0.00	0.80*	0.00
Item #5	0.00	0.80*	0.00
Item #6	0.00	0.80*	0.00
Item #7	0.00	0.00	0.80*
Item #8	0.00	0.00	0.80*
Item #9	0.00	0.00	0.80*

*Factor loading.

Validity

Does scale represent what it is supposed to be measuring?

- Singer et al. (2009)
  - Hospitals with better safety climate overall had lower relative incidence of patient safety indicators
  - Frontline personnel's (not senior manager's) perceptions of better safety climate were associated with lower incidence of patient safety indicators

New Directions

- Standardized General Population Metric
- Category Response Curves
- Computer Adaptive Testing
- Differential Item Functioning
- Linking of Different Measures

T-score Metric

- T Score
  - Mean = 50
  - SD = 10
  - Referenced to US "General" Pop.
  - T = 50 + (z * 10)

CATEGRORY RESPONSE CURVE

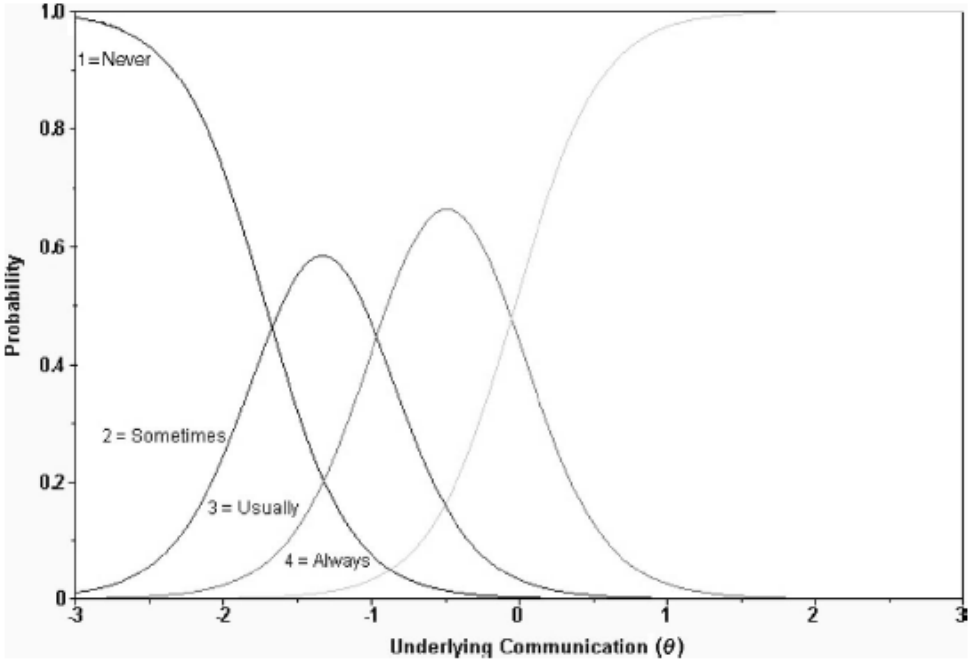


FIGURE 1. Item Characteristic Curve for Item 30.

attribute. Figure 1 shows the ICC for item 30. This ICC demonstrates the sort of picture one likes to see for an item because at most points along the underlying continuum there is one response category that has the highest probability of

standard error and is conditional on trait level: SE = 1/(information$\|\theta)^{1/2}$. Figure 3 shows the information curve and measurement error for the communication scale. Note that information is highest (standard error lowest) in the range of −2 to 0 on

always. Indeed, the item depicted in Figure 2, item 31, was 1 of the 5 items dropped from the communication scale based on the CTT analyses.

The information curve provides an indication of the amount of information the scale yields at different points along the underlying continuum. Information is inversely related to

Because the participation rate was 50%, some caution is warranted in interpreting the study results. Nonetheless, separate analyses of a CAHPS® item similar to item 27[6] revealed that the negative wording of this item confuses respondents. As a result, when CAHPS® 3.0 was released, the item was worded in terms of being seen within 15 minutes

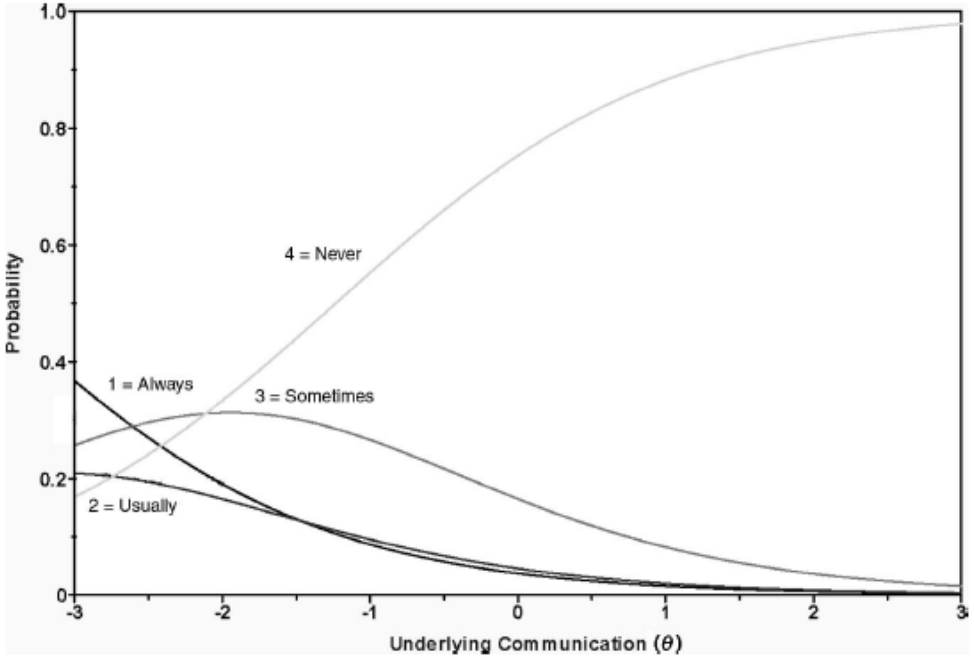
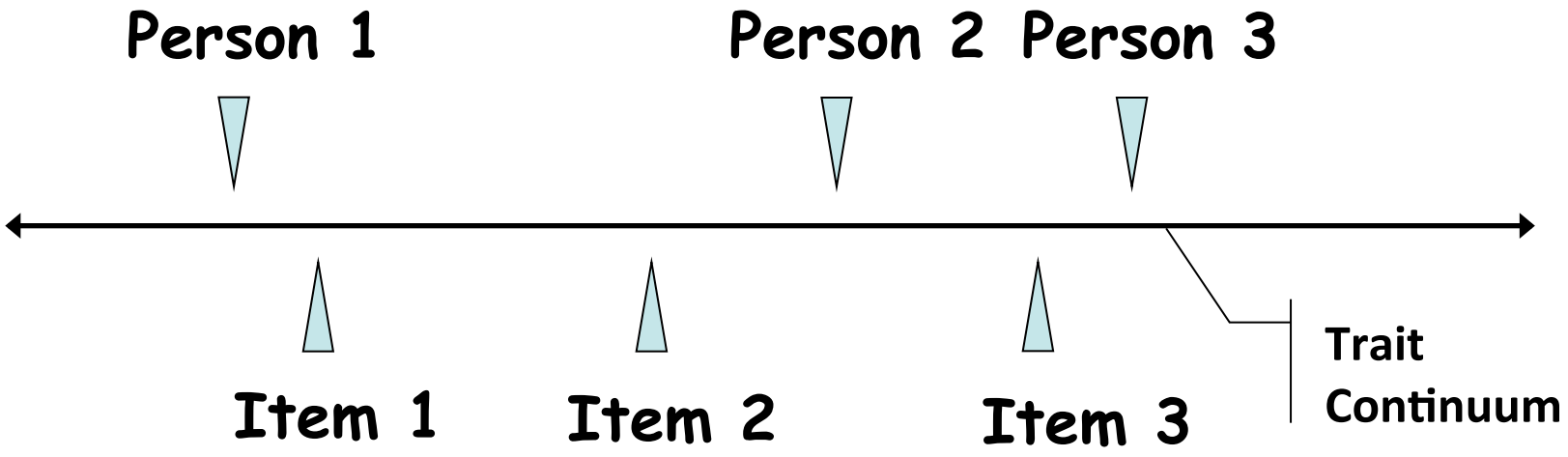


FIGURE 2. Item Characteristic Curve for Item 31.

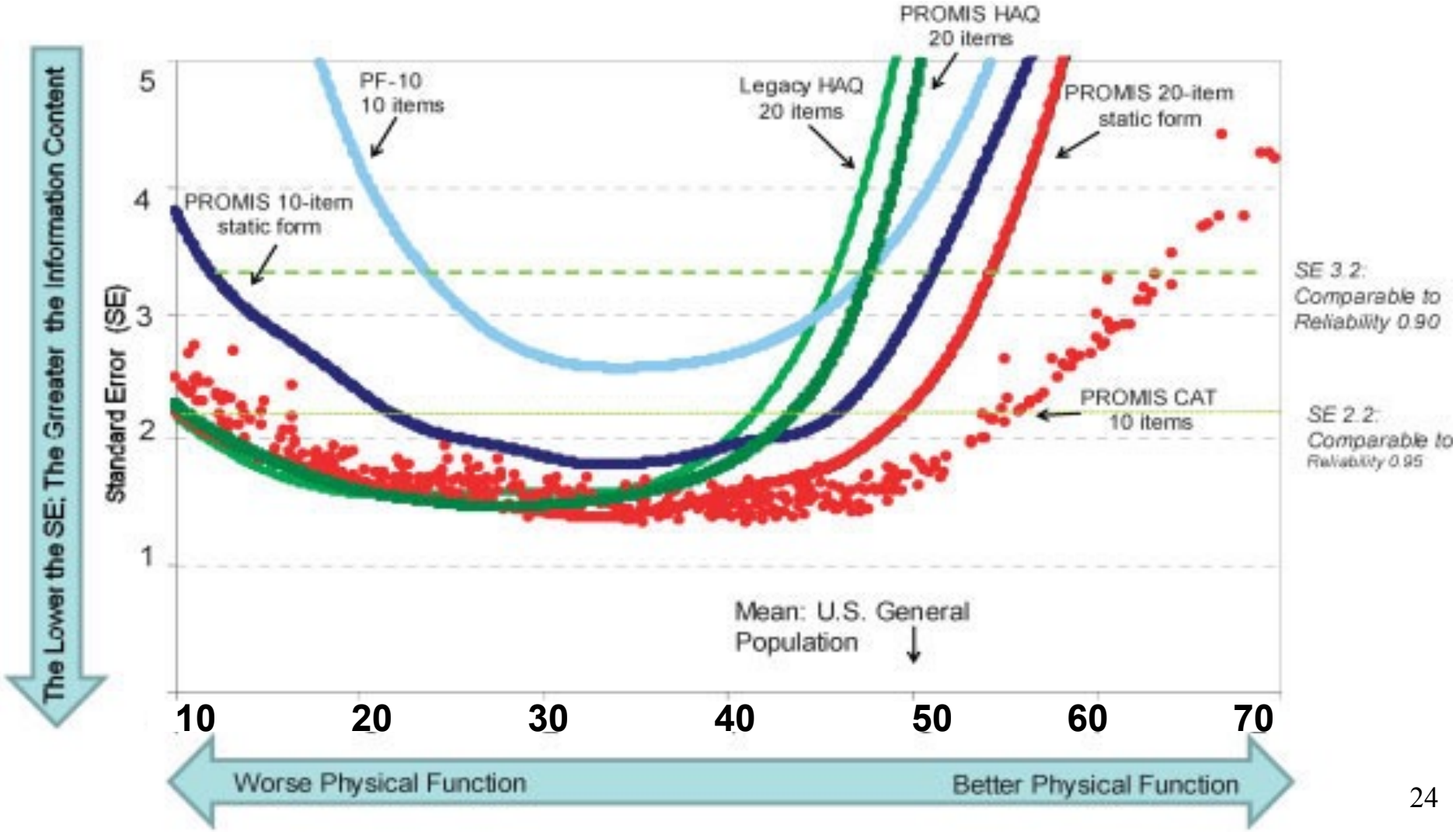
Item Responses and Trait Levels



www.nihpromis.org

Computer Adaptive Testing (CAT)

PROMIS Physical Functioning vs. "Legacy" Measures

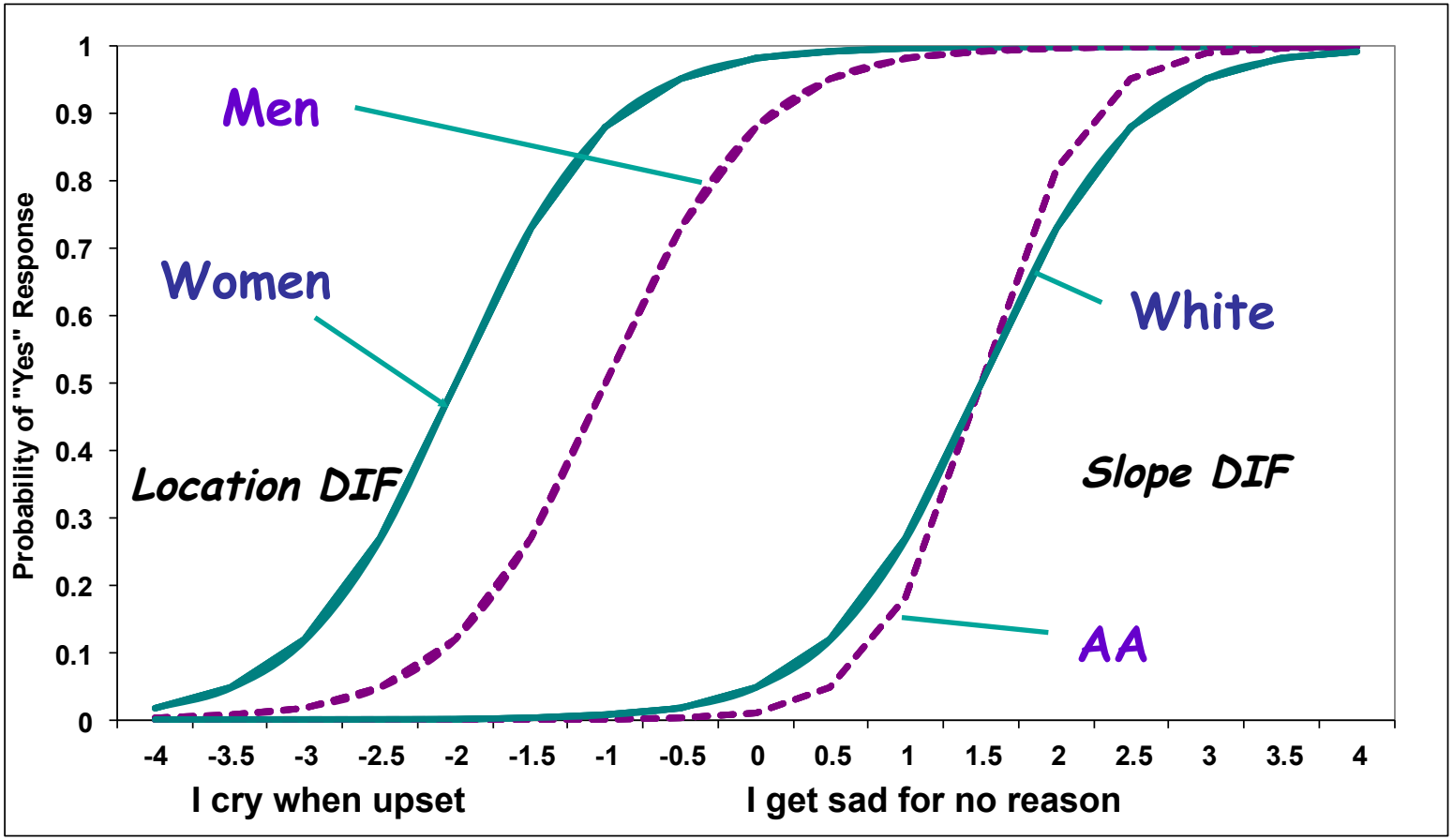


Differential Item Functioning (DIF)

- Probability of choosing each response category should be the same for those who have the same estimated scale score, regardless of other characteristics

- Evaluation of DIF by subgroups

DIF (2-parameter model)



Higher Score = More Depressive Symptoms

Linking of Measures (Etchegaray & Thomas, 2012)

- R-squared for SAQ teamwork = 54%

0.83 + 0.34* HSOPSteamwork + 0.51* HSOPScommun.

- R-squared for SAQ safety = 42%

1.63 + 0.65* HSOPorganizational learning

Linking

- Assumes
  - Instruments are measuring essentially the same thing (unidimensional)
- Correlations among SAQ and HSOPS
  - Etchegaray & Thomas (2012) Table 4
  - Predominantly unidimensional
    - 8.2, 1.28 and 0.96 are 1st 3 principal components
  - If two factors rotated 2nd factor shows common variance among 5 HSOPS scales
    - Teamwork within, non-punitive, number of events reported, expectations, and staffing

Linking

- Assumes
  - Instruments are measuring essentially the same thing (unidimensional)
  - Scores from the two instruments are highly correlated (> 0.80); compare actual with estimated scores
  - Subgroup invariance (standardized root mean square deviation)
- Equipercentile linking of scores
  - Scores associated with equivalent % ranks
- IRT linking

Thank You!

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