Utilizing the NIH Patient-Reported Outcomes Measurement Information System

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Broad Objectives of PROMIS

•Develop and test a large bank of items measuring patient-reported outcomes

•Create a computerized adaptive testing (CAT) system that allows for efficient, psychometrically robust assessment of patient-reported outcomes in clinical trial research involving a wide range of chronic diseases

•Create a publicly available system that can be added to and modified periodically and that allows clinical researchers to access a common repository of items and computerized adaptive tests
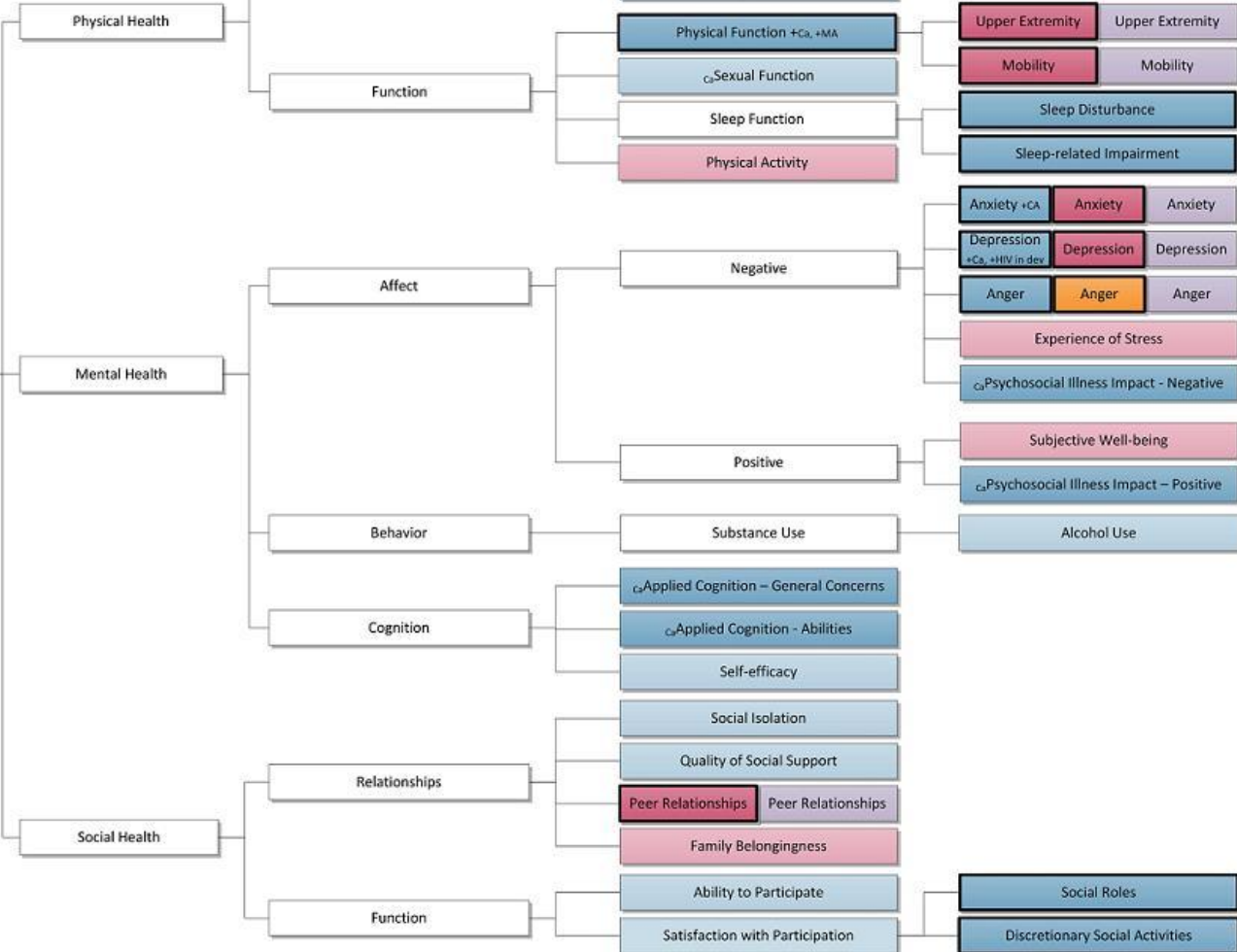
(Objectives from: http://www.nihpromis.org/Web%20Pages/History.aspx Assessed: 01/19/11)

PROMIS Domain Framework
August 27, 2010 Draft

(From: http://www.nihpromis.org/Web%20Pages/Domain%20Framework.aspx Assessed 1/19/11.

3

PROMIS Adult Self-Reported Health — Global Health

Physical Health

PROMIS Profile Domains

Physical Function

Pain Intensity

Pain Interference

Fatigue

Sleep Disturbance

PROMIS Additional Domains

Pain Behavior

Sleep-related Impairment

Sexual Function

Mental Health

Depression

Anxiety

Anger

Applied Cognition

Alcohol Use, Consequences, & Expectancies

Psychosocial Illness Impact

Social Health

Satisfaction with Participation in Social Roles

Satisfaction with Social Roles & Activities

Ability to Participate in Social Roles & Activities

Social Support

Social Isolation

Companionship

12/12/2012

(From: http://www.nihpromis.org/measures/domainframework1#pb Assessed 10/30/13)

PROMIS History

The Patient Reported Outcomes Measurement Information System (PROMIS):
A Walk Through the First Four Years

Classical Test Theory

- Scale is the unit of analysis
- High score – the person is higher on the trait
- Low score – the person is lower on the trait

Item Response Theory

- Item is the unit of analysis
- Person endorses better rating on "hard items" – the person is higher on the trait
- Person endorses worse rating on "easy items" – the person is lower on the trait

(Modified From: http://www.nihpromis.org/Lists/Assessment%20Center%20Link/Attachments/4/IRT-_CAT_Workshop_7-17-08%5B1%5D.pdf Accessed: 01/19/10)

COMMON IRT MODELS

IRT Model	Response Format (i.e., dichotomous or polytomous)	IRT Model Parameters (discrimination and difficulty)
1PL	dichotomous	discrimination = and difficulty varies
2PL	dichotomous	discrimination varies and difficulty varies
3PL	dichotomous	discrimination , difficulty and guessing vary
GRM	polytomous	discrimination varies across items and difficulty varies

Streiner and Norman 2008 p. 304-309

2 ASSUMPTION OF ITEM RESPONSE THEORY

1. Data are unidimensional: Items tap only one trait or ability

2. Local independence: Probability of answering any item in a positive direction unrelated to probability of answering any other item positively

Streiner and Norman 2008 p. 302

If the assumptions are met, then...

- Subject's performance on a test can be predicted by a set of factors called traits (theta)
- Subject's performance on any item and the theta can be described by an item characteristic curve

Streiner and Norman 2008 p. 302

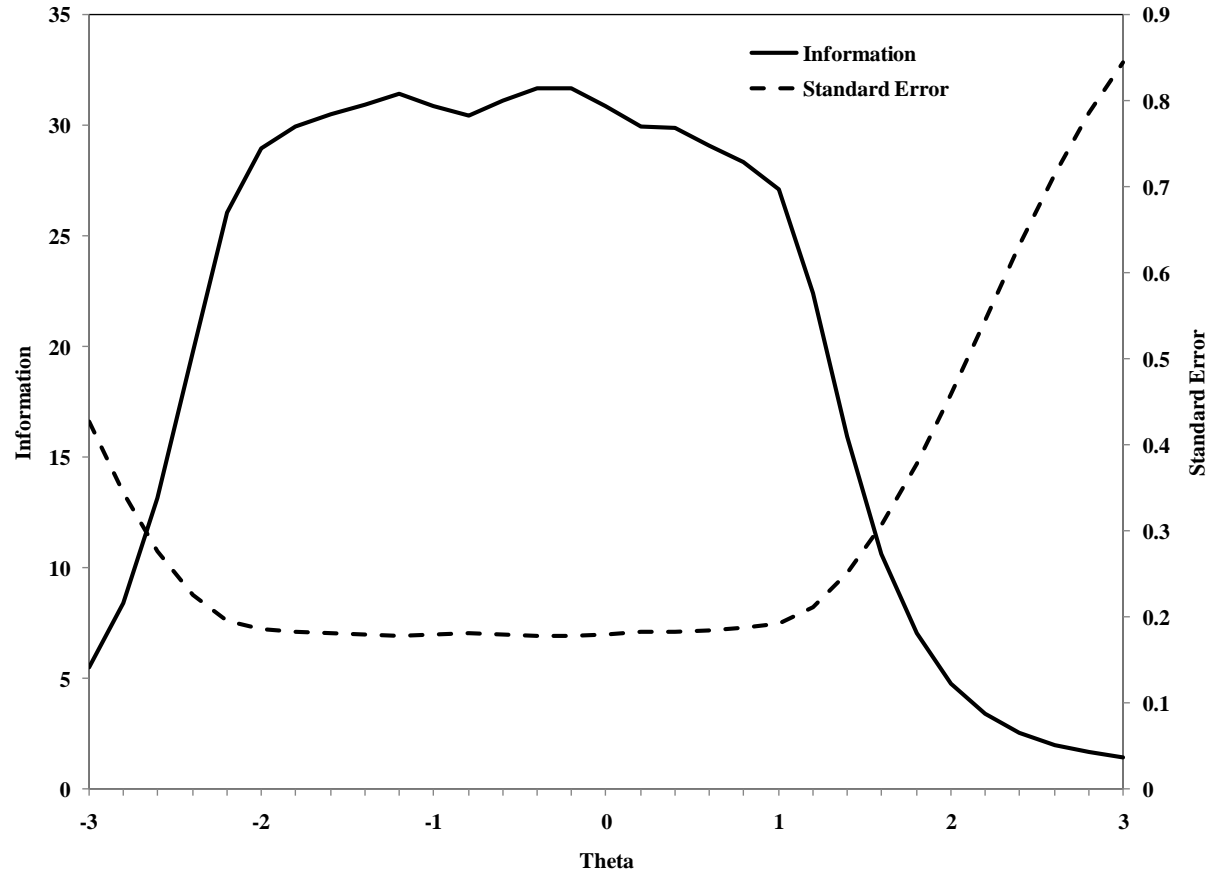# Example of Item Information Functions and Standard Error Curves.

Figure 2 from Mielenz et al. Arthritis 2010

PROMIS Instructional Videos

Conceptual Introduction to Item Response Theory
The video below connects to a series of six training videos item response theory developed by Karon F. Cook (Northwestern University).

The six videos are:

Part 1. The Logic of IRT Scoring
Part 2. IRT Is a Probability Model
Part 3. Plotting Along: How item responses are related to person and item characteristics
Part 4. Understanding Item Parameters: Difficulty and Discrimination
Part 5. Information: A Better Measure of Measurement Precision
Part 6. Applications of Item Response Theory

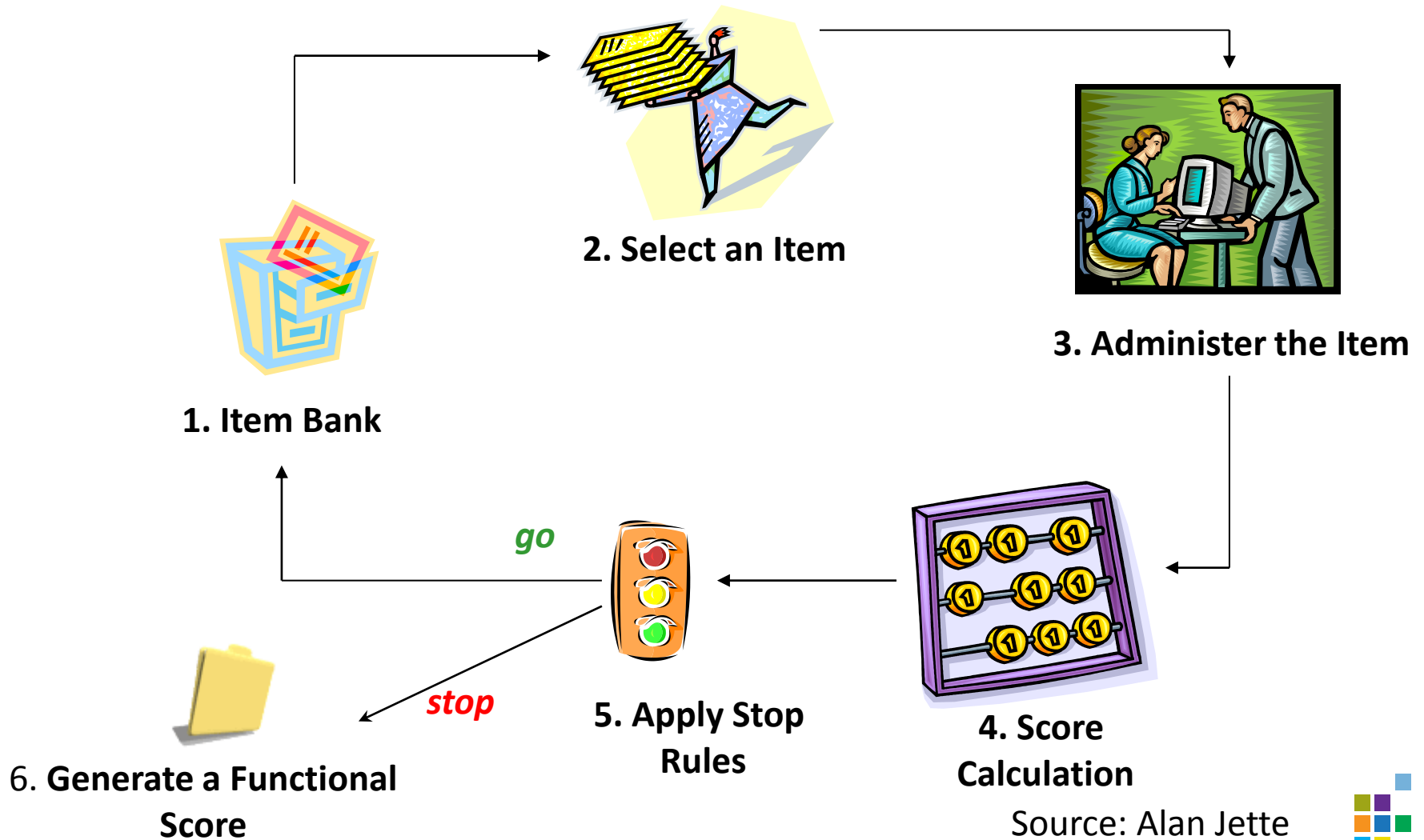(From: http://www.nihpromis.org/about/instructional Assessed 10/30/13)

Item Response Theory and Computer-Adaptive Testing

- Reduces the amount of time required to complete assessments and increases precision by asking only those questions that are relevant to the person's functional level.

- In an adaptive test, as the person responds to items, revised estimates of functional levels are estimated, and then subsequent items for administration are chosen accordingly.

- Computer-adaptive testing (CAT) employs an algorithm that selects items directly tailored to the person, and shortens or lengthens the test to achieve either the desired precision or a preassigned item stopping rule.

- Item response theory (IRT) methods are used to create hierarchically ordered item banks, and then CAT software algorithms select items to match the person's functional level.

Haley et al. *J Clin Epidemiol* 2006;59:1174-82

CAT process ....

1. Item Bank

2. Select an Item

3. Administer the Item

4. Score Calculation

5. Apply Stop Rules

go

stop

6. **Generate a Functional Score**

Source: Alan Jette

Steps involved in creating a CAT

1	• Specify construct
2	• Develop item pool
3	• Evaluate and modify pool (clean the pool)
4	• Assessment properties of measure (IRT fit)
5	• Create item bank and short forms
6	• Calibrate to IRT model
7	• Test for differential item functioning (DIF)
8	• Starting and stopping rules
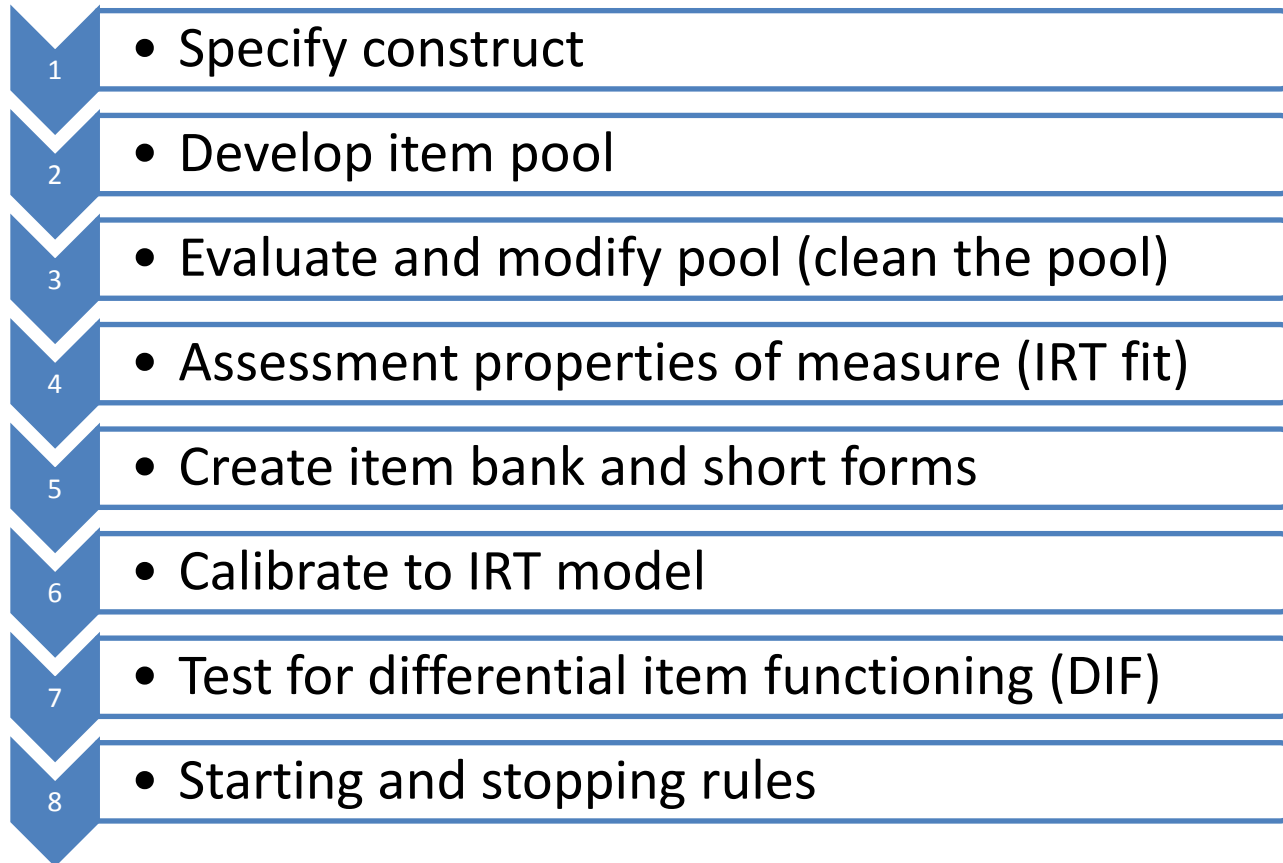
Lecture by: Karon F. Cook, PhD, Dept. of Rehab. Medicine, University of Washington, Seattle, WA March 10, 2011

PROMIS Qualitative Item Review

1. • Identification of items
2. • Item classification and selection
3. • Creation of items
4. • Item revision
5. • Focus group studies
6. • Cognitive interviews
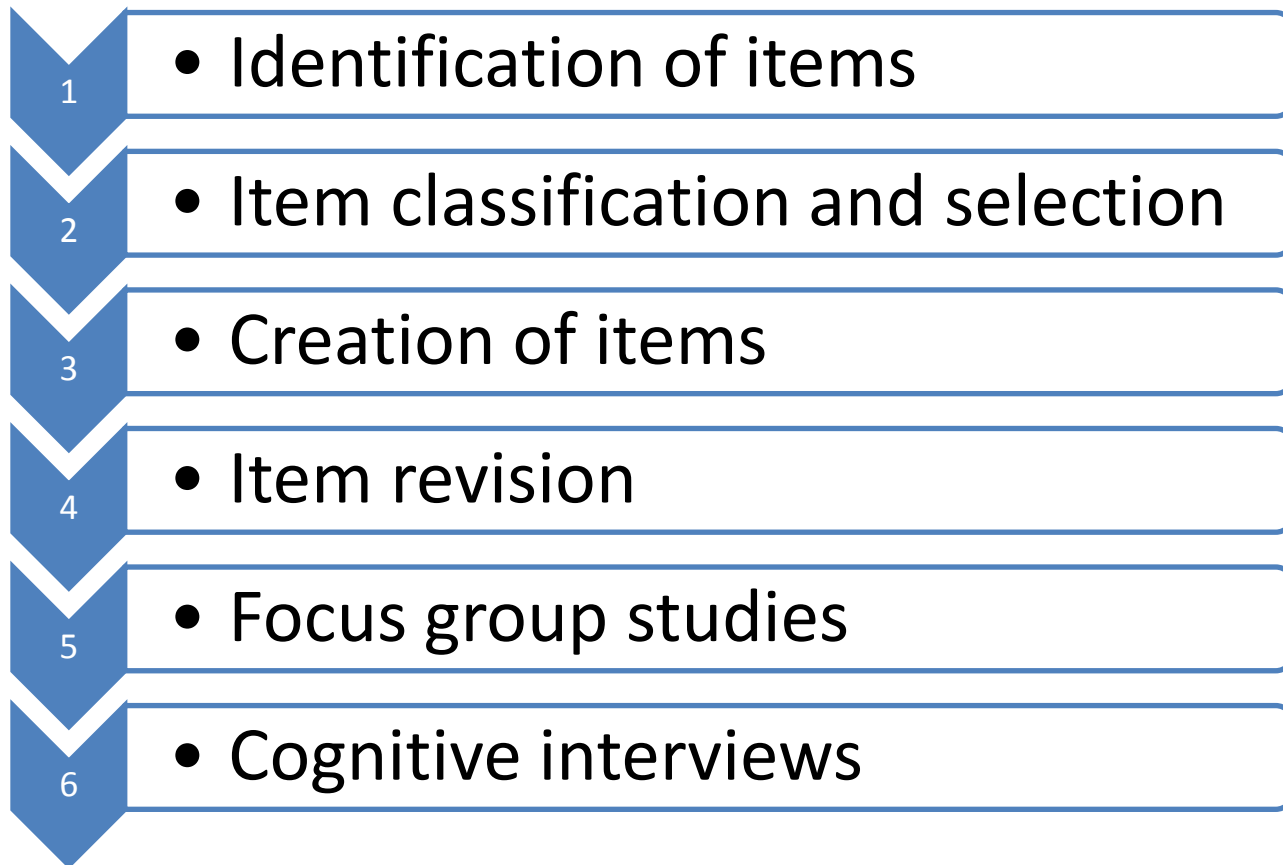
From DeWalt DA, Rothrock N, Yount S, Stone AA. Evaluation of Item Candidates: The PROMIS Qualitative Item Review. Medical Care; 2007(5):S12-S21.

Identification of items

PROMIS began by depositing items into an item library from well-established instruments and from inclusive searches

Thousands of items relevant to the domains PROMIS was trying to measure were selected

For each item the instructions, the stem, the response options, the time frame, and the instrument of origin was documented

- http://www.nihpromis.org

Expert Review: Item Classification, Selection, Creation and Revision

In order to sort the thousands of items, they were placed in common "bins" by the content of their stem and "winnowed" out if they were deemed redundant or inferior to alternative items in the same bin.

Items were then reviewed and revised to: 1) be consistent in the style of questions, 2) meet the literacy requirements (6th grade level) and 3) be consistent in set of response options and timeframes.

- http://www.nihpromis.org

Focus Group Studies have 2 aims

1) to confirm the definitions and identify common language related to the domain and

2) to identify important gaps for future PROMIS item banks

- http://www.nihpromis.org

Cognitive Interviews

"To identify potentially problematic items and response scales and help to clarify items that were not easily understood and answered"

PROMIS used a retrospective verbal probing technique where a participant completes a paper and pencil version of the measure followed by an interviewer asking probes for the basis for the response.

- http://www.nihpromis.org

Developing the PROMIS Physical Function Item Bank

In PROMIS, the Physical Function latent trait is defined as the "ability to carry out various activities that require physical capability, ranging from self-care (basic activities of daily living (ADL)) to more-vigorous activities that require increasingdegrees of mobility, strength, or endurance" [http://www.nihpromis.org/].[1]

1. Bruce B, Fries J, Ambrosini D, Lingala B, Gandek B, Rose M and Ware J. Better assessment of physical function: item improvement is neglected but essential. Arth Res&Ther 2009, 11:R191.

2. Rose M, Bjorner J, Becker J, Fries J, Ware J. Evaluation of a preliminary physical function item bank supported the expected advantages of the PROMIS. J Clin Epi 2008, 61:17-33.

Figure 1

Item Identification
1,860 items identified from extensive, systematic searches

↓

Item Classification and Selection
"Binning and Winnowing"
Items organized into conceptual "bins" and reduced to a set reflecting the physical function latent trait for further testing.

↓

Item Review and Revision
Items evaluated by experts and by subjects for clarity, relevance, comprehension, and coverage of the physical function latent trait by survey, focus groups, and cognitive interviews and revised based on findings.

↓

Large-Scale Field Testing
168 newly developed physical function items tested in 21,133 subjects from the general U.S. population and selected clinical samples.

↓

Item Quantitative Evaluation
125-item PROMIS physical function item bank resulted from IRT analyses.

Overview of the stepwise qualitative and quantitative activities used to develop the PROMIS Physical Function Item Bank.

Bruce et al. 2009

Item Identification
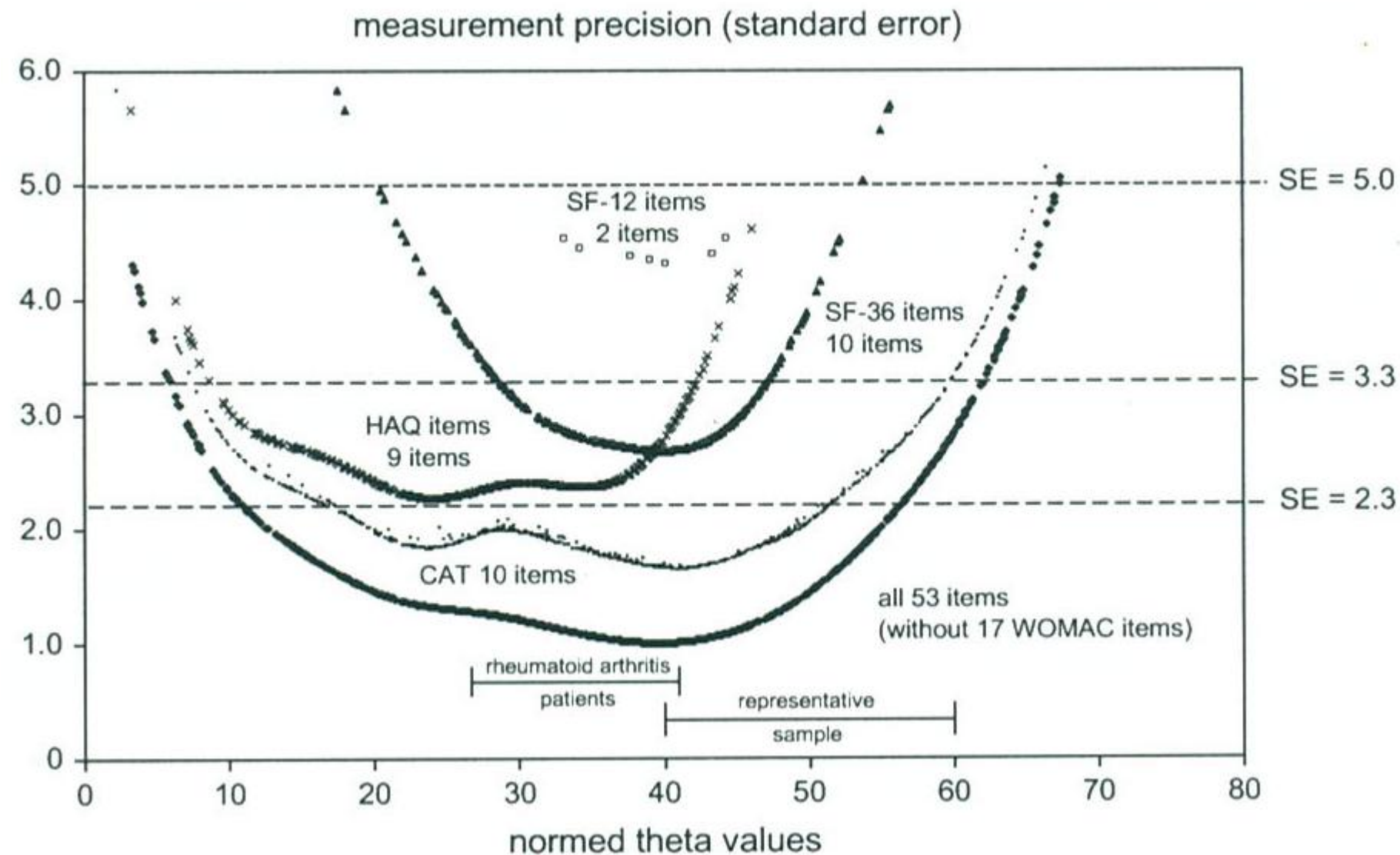
HAQ: Health Assessment Questionniare

WOMAC: Western Ontario and McMaster Universities osteoarthritis index

SF-36

SIP: Sickness Impact Profile

Figure 3. Measurement Precision in Relationship to Theta

measurement precision (standard error)

Rose et al. 2008

PROMIS Assessment Center

•http://www.assessmentcenter.net/

•Create a publicly available system that can be added to and modified periodically and that allows clinical researchers to access a common repository of items and computerized adaptive tests

(Objectives from: http://www.nihpromis.org/Web%20Pages/History.aspx Assessed: 01/19/11

PROMIS Instructional Videos

What is PROMIS and PROMIS Instruments
The video below connects to a playlist of six training webinars on PROMIS, PROMIS instruments and Assessment Center, developed by Nan Rothrock (Northwestern University).

The six videos are:

Part 1. What is PROMIS?
Part 2. PROMIS Instruments
Part 3. What is CAT?
Part 4. PROMIS Instrument Development
Part 5. PROMIS Instrument Reliability and Validity
Part 6. Introduction to Assessment Center

(From: http://www.nihpromis.org/about/instructional Assessed 10/30/13)

(From: http://www.nihpromis.org/about/instructional Assessed 10/30/13)

Assessment Center SM

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Help Line: 877-283-0596

© 2007-2013
David Cella, Ph.D.,
Richard Gershon, Ph.D.,
Michael Bass, M.S. &
Nan Rothrock, Ph.D.

Support Hours:
9:00am - 5:00pm CST
Monday - Friday

WHAT IS ASSESSMENT CENTER^{SM}

Assessment Center^{SM} is a free, online data collection tool that enables researchers to create study-specific websites for capturing participant data securely online.

Studies can include measures within the Assessment Center library as well as custom instruments entered by the researcher. The instrument library includes self- and proxy-report short forms, computerized adaptive tests (CATs), and batteries or profiles from:

- Patient-Reported Outcomes Measurement Information System (PROMIS)
- Quality of Life in Neurological Diseases (Neuro-QOL)
- NIH Toolbox

Among other important features, Assessment Center also enables:

- Downloading library instruments for administration on paper
- Customization of items or instruments (e.g., format, randomization, skip patterns)
- Real-time scoring of CATs and short forms
- Storage of protected health information (PHI) in a separate, secure database
- Automated accrual reports
- Real-time data export
- Ability to capture endorsement of online consent forms

ANNOUNCEMENTS

- **Additional PROMIS Instruments now available in Spanish:** See the Instrument Library link at left to see what PROMIS instruments are available in Spanish.
- **New PROMIS Computer Adaptive Tests for Upper Extremity Function and Mobility:** Physical Function can now be assessed specifically for upper or lower body function. The full Physical Function CAT remains available.
- **Updated versions of some PROMIS Instruments:** Some PROMIS item banks have had minor modifications (typically removal of 1-2 items).

Demonstration CAT

Try out a PROMIS Computerized Adaptive Test and get an instant score report. CATs include Emotional, Physical, and Social Health. Click here to begin.

Request PDFs of PROMIS Short Forms

Sponsors

PROMIS

Neuro-QOL

NIH Toolbox

Studies of Interest

PROsetta Stone

Assessment Center reserves the right to have regular scheduled maintenance windows. Weekly maintenance may be performed on Sunday mornings from 7am to 9am CST. During this time, Assessment Center may be unavailable. We apologize for any inconvenience this may have. If you have any questions, please contact us at help@assessmentcenter.net

https://www.assessmentcenter.net/

Instruments Available for Use in Assessment Center

July 15, 2013

The Assessment Center Instrument Library includes instruments from PROMIS, Neuro-QOL, and the NIH Toolbox. All instruments are available for use in data collection through Assessment Center. Most instruments are also available as PDFs that can be used for paper/pencil data collection or to facilitate data collection in other applications. **To access PDFs:**

1. Register in Assessment Center (www.assessmentcenter.net)
2. Login
3. Click on the PDF hyperlink in the upper right corner of the application
4. Agree to the Terms and Conditions of Use and download the instruments of interest

PROMIS

PROMIS has many assessment options available to measure self-reported health for clinical research and practice. PROMIS assessment instruments are drawn primarily from calibrated item banks (sets of well-defined and validated items) measuring concepts such as pain, fatigue, physical function, depression, and social function. These calibrated item banks can be used to derive short forms (typically requiring 4-10 items per concept), or computerized adaptive tests (CAT; typically requiring 4-7 items per concept for more precise measurement). Instruments are available for adult self-report, child self-report, and parent proxy report for his/her child.

Tables 1 through 4 list the calibrated PROMIS item banks or scales, item pools, short forms, and profiles. **Item banks** are calibrated items from which a summary score can be obtained from a subset of items (i.e. via CAT or short form) whereas **scales** are calibrated items from which a summary score should be obtained only from the complete set of items. **Item pools** are collections of related items that are not intended to produce a summary score but instead are to be used as single items. **Short forms** are static subsets of item banks, and **profiles** are fixed collections of short forms measuring multiple concepts. Table 6 lists PROMIS instruments currently under development.

Table 1: PROMIS Instruments Available in Assessment Center (www.assessmentcenter.net)

Domain	Adult # items		Pediatric # items		Parent Proxy Report for Pediatric Patients # items	
	Bank/ Scale/ Pool	Short Forms	Bank/ Scale	Short Form	Bank/ Scale	Short Form
Emotional Distress – Anger	22	8	6		5	
Emotional Distress – Anxiety	29	4, 6, 7, 8	13	8	13	8
PROMIS-Cancer – Anxiety	22					
Emotional Distress – Depression	28	4, 6, 8a, 8b	13	8	13	6
PROMIS-Cancer – Depression	30					

(From: http://www.nihpromis.org/about/instructional Assessed 10/30/13)

Assessment Center^{SM}

Study List (Physical Ability Assessment)

Study List

To get started, please select an existing study or create a new one. Then continue work in the system by selecting from the tabs above.

Create New Study

To select, click on study name: ☐ Hide Archived Studies

My Studies			
Name	**Created By**		
Physical Ability Assessment	Mikles, Sean (3/17/2013)	Properties	Team
Person-Centered Wellness Home	Hlavacek, Patrick (10/16/2013)	Properties	Team

Assessment Center ᔖᴹ

Current Study: Physical Ability Assessment

Study Content (Physical Ability Assessment)

Study Content

Click the Add button to add instruments to your study. Click the Create button to create custom instruments in your study.

You have selected the following instruments for this study.

Order the instruments by entering the desired position into the text box, then click Save.

To exclude an instrument from your study, click on the Include checkbox.

[Add] [Save] [Create]

☐ Hide Excluded Instruments

Study Content								
Order	**Name**	**Administration Study**				**Include**	**Terms of Use**	
1	⊞ Physical Assessment Survey	Physical Ability Assessment Customize	Preview	Properties Statistics		☑	Notes	
2	⊞ Screener Log	Physical Ability Assessment Customize	Preview	Properties Statistics		☑	Notes	
3	⊞ Hispanic Origin and Race	Physical Ability Assessment Customize	Preview	Properties Statistics		☑	Notes	
4	⊞ Physical Assessment Survey - Demographics	Physical Ability Assessment Customize	Preview	Properties Statistics		☑	Notes	
5	⊞ Physical Activity - CHAMPS	Physical Ability Assessment Customize	Preview	Properties Statistics		☑	Notes	
6	⊞ PROMIS SF v1.0-Depression 4a	PROMIS	Customize	Preview	Properties Statistics	☑	Notes	©
7	⊞ PROMIS SF v1.0-Fatigue 4a	PROMIS	Customize	Preview	Properties Statistics	☑	Notes	©
8	⊞ PROMIS SF v1.0 - Pain Behavior 7a	PROMIS	Customize	Preview	Properties Statistics	☑	Notes	©
9	⊞ PROMIS SF v1.0-Pain Interference 4a	PROMIS	Customize	Preview	Properties Statistics	☑	Notes	©
10	⊞ NewCustom PROMIS Scale v1.0 - Pain Intensity 3a	Physical Ability Assessment Customize	Preview	Properties Statistics		☑	Notes	

Assessment Center[SM]

Current Study: Physical Ability Assessment

Study Content (Physical Ability Assessment) >> Add an Instrument

Add an Instrument

First, select instrument or battery (a fixed set of instruments). Use search criteria to find and add instruments / batteries to your study.

◉ Instrument
◯ Battery

Study:	Type:	Domain:	
All Public	All	All	Show Result

Search Results

Add to Study

Select	Name	Administration Study	Type	Domain		Terms of Use	
☐	⊞ Neuro-QOL Bank v1.0 - Ability to Part. in SRA	Neuro-QOL	Item Bank/CAT (Computerized Adaptive Testing)	Social Function, Ability to Participate in Social Roles/Activities	Statistics	©	📄
☐	⊞ Neuro-QOL Bank v1.0 - AC - Executive Function	Neuro-QOL	Item Bank/CAT (Computerized Adaptive Testing)	Applied Cognition, Executive Function	Statistics	©	📄
☐	⊞ Neuro-QOL Bank v1.0 - AC - General Concerns	Neuro-QOL	Item Bank/CAT (Computerized Adaptive Testing)	Applied Cognition, General Concerns	Statistics	©	📄
☐	⊞ Neuro-QOL Bank v1.0 - Anxiety	Neuro-QOL	Item Bank/CAT (Computerized Adaptive Testing)	Anxiety/Fear	Statistics	©	📄
☐	⊞ Neuro-QOL Bank v1.0 - Depression	Neuro-QOL	Item Bank/CAT (Computerized Adaptive Testing)	Depression/Sadness	Statistics	©	📄
☐	⊞ Neuro-QOL Bank v1.0 - Emotional & Beh. Dyscontrol	Neuro-QOL	Item Bank/CAT (Computerized Adaptive Testing)	Emotional Distress/Negative Affect	Statistics	©	📄

Assessment Center ℠

Study Content (Physical Ability Assessment) >> Instrument Properties

Instrument Properties

Name*

Physical Assessment Survey - Demographics

Select the domain or domains for this instrument*

```
- Apathy
- Depression/Sadness
End of Life Concerns
Fatigue
Motor
Pain
- Pain Behavior
- Pain Intensity
- Pain Interference
Physical Function
```

Language: English ▾

| English |
| Spanish |
| German |
| French |

Status: lopment ▾ on 03/17/13 by Sean Mikles

Type*:   ▾

IRT Model: ▾

Upload PDF

Description*

Demographic information for the physical assessment survey.

Comments

(*) fields are required.

Assessment Center ᔆᴹ

Study Content (Physical Ability Assessment) >> Instrument Properties

Instrument Properties

Name*

Physical Assessment Survey - Demographics

Select the domain or domains for this instrument*

- Apathy
- Depression/Sadness
End of Life Concerns
Fatigue
Motor
Pain
- Pain Behavior
- Pain Intensity
- Pain Interference
Physical Function

Language: English

Status: Under Development on 03/17/13 by Sean Mikles

Type*: Short Form

IRT Model:

Item Bank/CAT (Computerized Adaptive Testing)
Short Form

Description*

Demographic information for the physical assessment survey.

Comments

(*) fields are required.

Assessment Center ᴿᴹ

Study Content (Physical Ability Assessment) >> Instrument Detail (Physical Assessment Survey - Demographics)

Instrument Detail

Instrument: Physical Assessment Survey - Demographics

| Save | Cancel |

Order items within the instrument by altering the Order column and clicking "Save".

To exclude an item from this instrument, click on the Include checkbox.

☐ Hide Excluded Items

| Create Item | Find Items | Upload Translation | Analyze | Preview | Export |

Instrument Detail

Order	ID		Responses	Administration Study			Include	
1	spm111	Is this baseline?	Yes ▾	Physical Ability Assessment	History	Statistics	☑	Notes
2	spm003	Please select the <i>highest</i> year of school completed: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23+ <i> (primary) (high school) (college/university) (graduate school)</i>	1 ▾	Physical Ability Assessment	History	Statistics	☑	Notes
3	spm004	Are you currently <i>(check only one):</i>	Married ▾	Physical Ability Assessment	History	Statistics	☑	Notes
4	spm012	Please indicate below which chronic condition(s) you have: Diabetes	No ▾	Physical Ability Assessment	History	Statistics	☑	Notes
5	spm013	Please indicate below which chronic condition(s) you have: Asthma	No ▾	Physical Ability Assessment	History	Statistics	☑	Notes
6	spm014	Please indicate below which chronic condition(s) you have: Emphysema or COPD	No ▾	Physical Ability Assessment	History	Statistics	☑	Notes
7	spm015	Please indicate below which chronic condition(s) you have: Other lung disease	No ▾	Physical Ability Assessment	History	Statistics	☑	Notes
8	spm020	Please indicate below which chronic condition(s) you have: Specify type of lung disease	TEXT ▾	Physical Ability Assessment	History	Statistics	☑	Notes

Item Block Number			Branching If	Then Go To	Template
1	spm111	Is this baseline?	Yes / **No**	End of Instrument ▾	Vertical 01 ▾
1	spm003	Please select the <i>highest</i> year of school completed: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23+ <i>(primary) (high school) (college/university) (graduate school) </i>	1 / 2 / 3 / 4 / 5	Please Select ▾	Vertical 01 ▾
1	spm004	Are you currently <i>(check only one):</i>	Married / Single / Separated / Divorced / Widowed	Please Select ▾	Vertical 01 ▾
1	spm012	Please indicate below which chronic condition(s) you have: Diabetes	No / Yes	Please Select ▾	Vertical 01 ▾
1	spm013	Please indicate below which chronic condition(s) you have: Asthma	No / Yes	Please Select ▾	Vertical 01 ▾
1	spm014	Please indicate below which chronic condition(s) you have: Emphysema or COPD	No / Yes	Please Select ▾	Vertical 01 ▾

Assessment Center ^{SM}

Current Study: Physical Ability Assessment

Study Content (Physical Ability Assessment) >> Instrument Detail (Physical Assessment Survey - Demographics) >> Item Details (spm004)

Item Detail

[New] [Copy] [Statistics] [Save] [Cancel]

ID*: spm004   Version: Text

Domain*
```
- Satisfaction with Social Roles and Activities
- - Satisfaction with Discretionary Social Activities
- - Satisfaction with Social Roles
Social Isolation
Social Relationships
Stigma
Stress
Urinary/Bladder Function
Other
```

Item Contains Protected
Health Information (PHI) ☐

Context
[   ]

Stem*
Are you currently <i>(check only one):</i>

Responses

Type: [Multiple Choice ⇅]   [Add another row]

	Score	Response Text	Show Response Score	
⬆⬇	1	Married	☐	Delete
⬆⬇	2	Single	☐	Delete
⬆⬇	3	Separated	☐	Delete
⬆⬇	4	Divorced	☐	Delete
⬆⬇	5	Widowed	☐	Delete

Administration Physical Ability   Original   Physical Assessment Survey -   Creation   3/17/2013
Study: Assessment   Instrument: Demographics   Date:

[Show Item History]

Are you currently *(check only one):*

○ Married

○ Single

○ Separated

○ Divorced

○ Widowed

[Previous] [Next]   [Exit]

¿Está usted actualmente: *(marque solo uno)*

○ Casado/a

○ Soltero/a

○ Seperado/a

○ Divorciado/a

○ Viudo/a

| Anterior | Siguiente | | Salir |

How do I score PROMIS instruments?

- CATs are scored as they are administered by Assessment Center. A theta estimate is calculated after each response.
- Short forms and Profiles are scored by Assessment Center after the instrument has been completed. Scoring instructions for short forms are also available on the Assessment Center homepage under the Scoring Manual hyperlink
- T-score metric
  - Mean =50
  - SD = 10
- Most PROMIS US General (note: not necessarily healthy) Population (from the 2000 Census)
- NIH effort called Prosetta Stone (www.prosettastone.org) which allows a researcher to transform scores (via score transformation tables) from other commonly used PROs measures to the PROMIS metric

From: Training webinars on PROMIS, PROMIS instruments and Assessment Center, developed by Nan Rothrock (Northwestern University) and
http://www.assessmentcenter.net/documents/FAQ.pdf, Accessed: 10/30/2013

Lessons Learned

- Server certifications from your own institution to use the PROMIS Assessment Center

- PROMIS AC Lite can be downloaded to a secure encrypted laptop for data collection and then transferred to your own institution's server

  - Cannot use tablets with AC Lite

  - For AC Lite, laptop needs certain hardware and software specifications

PROMIS Assessment Center Resources

•Assessment Center User Manual (pdf to download)

•Training workshops at Northwestern University

•Video Tutorials available on Assessment Center homepage:
www.assessmentcenter.net

•Software application has a help function

•Help Desk

- help@assessmentcenter.net

- (877)283-0596

From: Training webinars on PROMIS, PROMIS instruments and Assessment Center, developed by Nan Rothrock (Northwestern University) and
http://www.assessmentcenter.net/documents/FAQ.pdf, Accessed: 10/30/2013

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