

PROMIS and Neuro-QOL: New NIH Initiatives to Standardize Patient Reported Outcome Assessment in Clinical Research

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Neuro-QOL
Quality of Life in Neurological Disorders



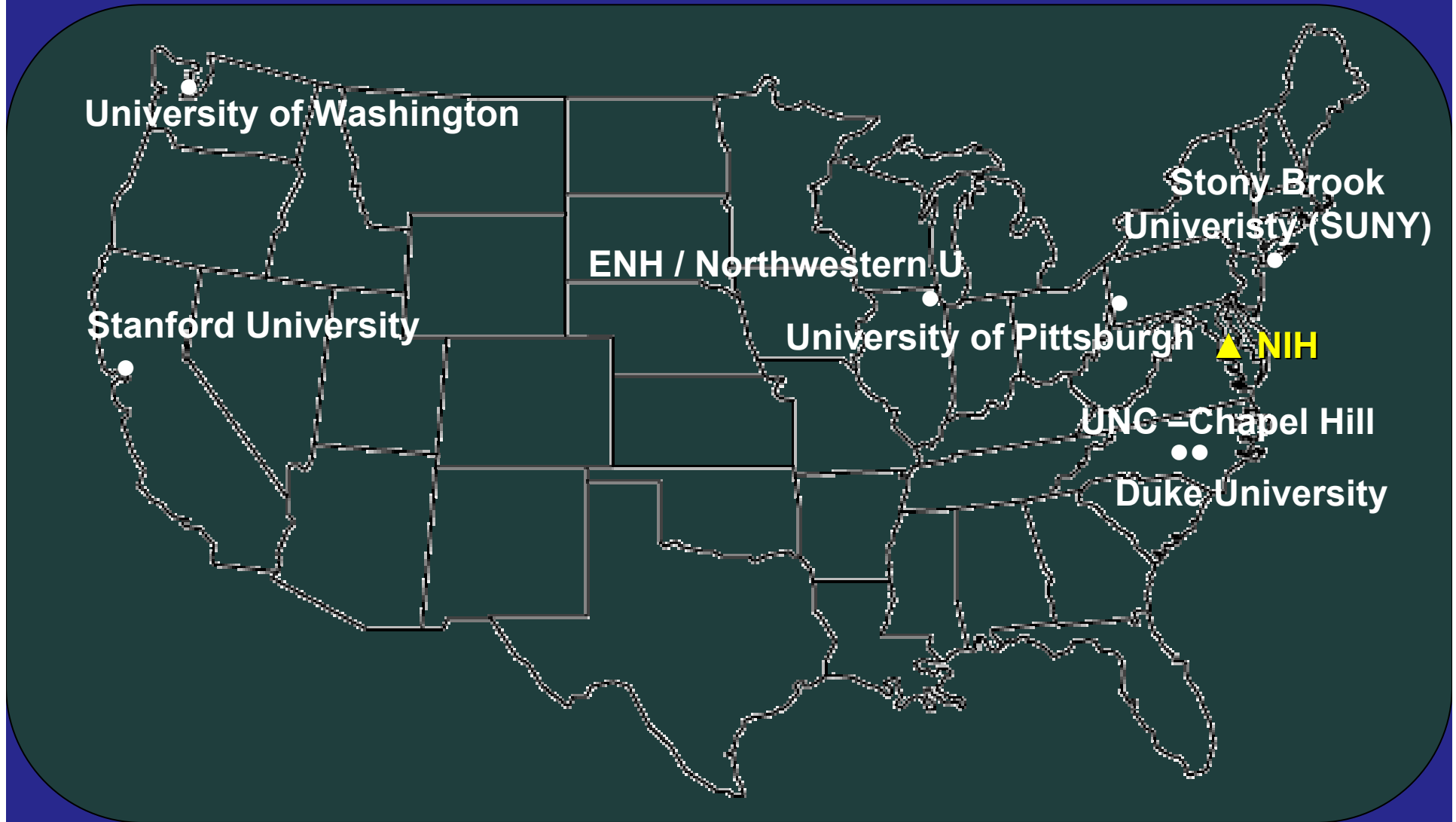
National Institutes of Health
The Nation's Medical Research Agency

Broad Objectives of PROMIS

RFA-RM-04-011

- Develop and test large item banks measuring patient-reported outcomes (PROs)
- Create a computerized adaptive testing (CAT) system for efficient, psychometrically robust assessment of patient-reported outcomes for a wide range of chronic disease outcome research
- Create a publicly available item repository and CAT platform that can be modified periodically

PROMIS Network



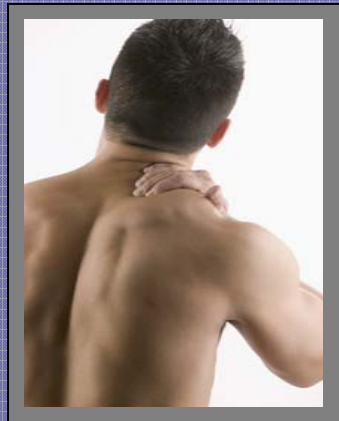
“PROMIS-1” Highlights

- Consensus-driven PRO Framework
- Qualitative Study of > 1,000 people
- Quantitative study of > 20,000 people
- Nine Item Banks Available to Collaborators
- Website and Functioning Assessment Center
- Upcoming Clinical Validation in Chronic Disease Populations
- Clear Path/Agenda for “PROMIS-2”

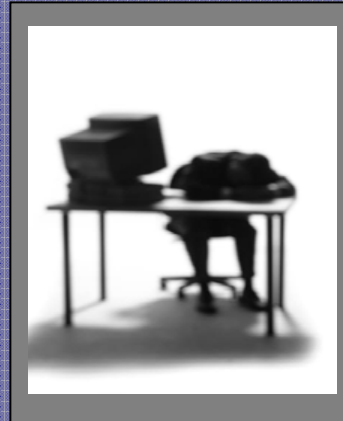
Initial Target Domains Identified



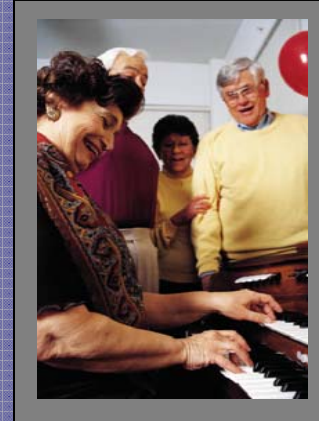
**Physical
Function**



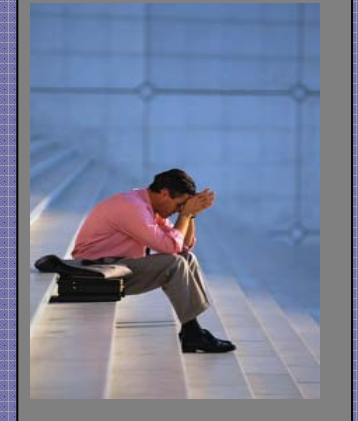
Pain



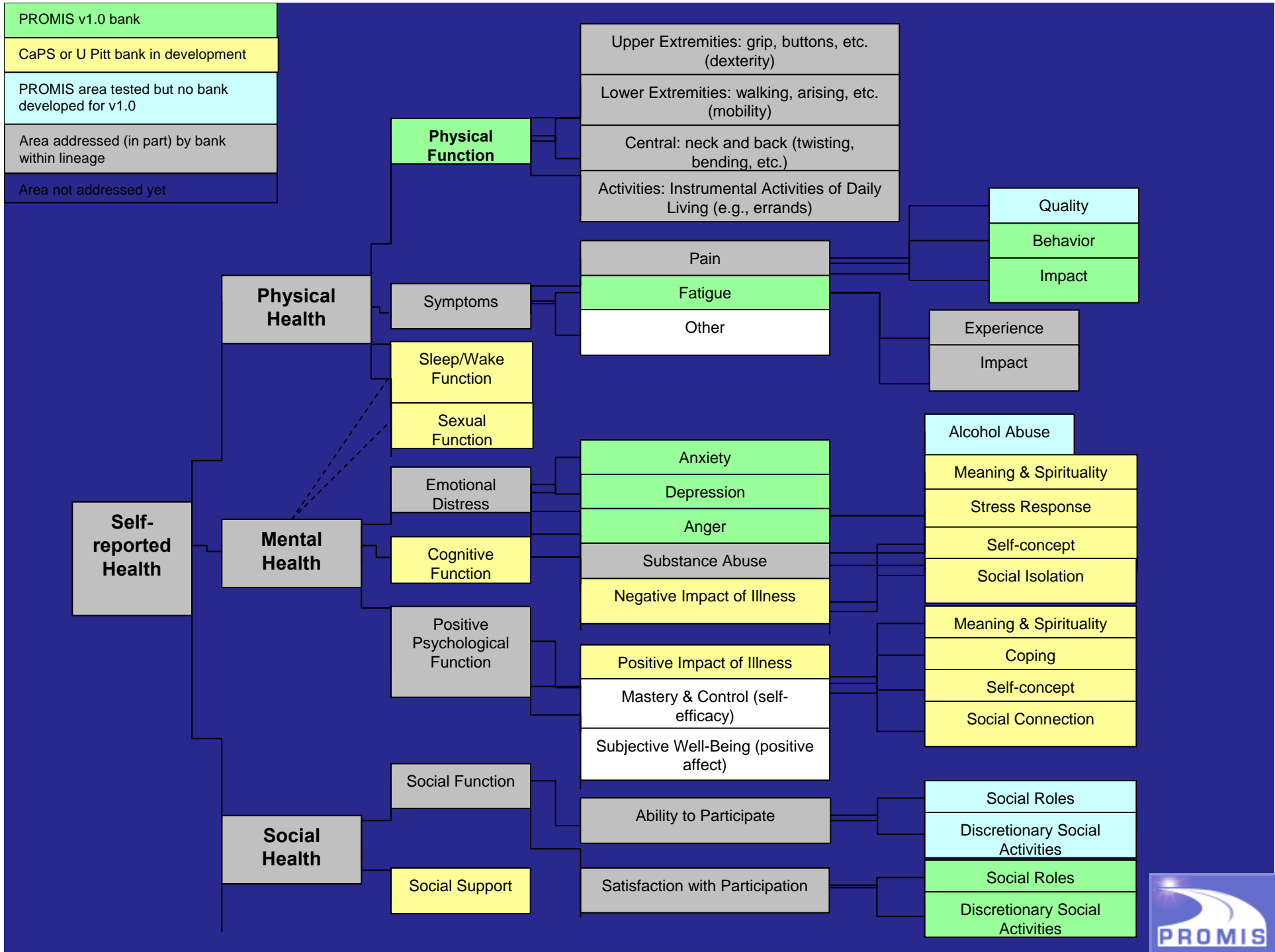
Fatigue



**Social
Function**



**Emotional
Distress**

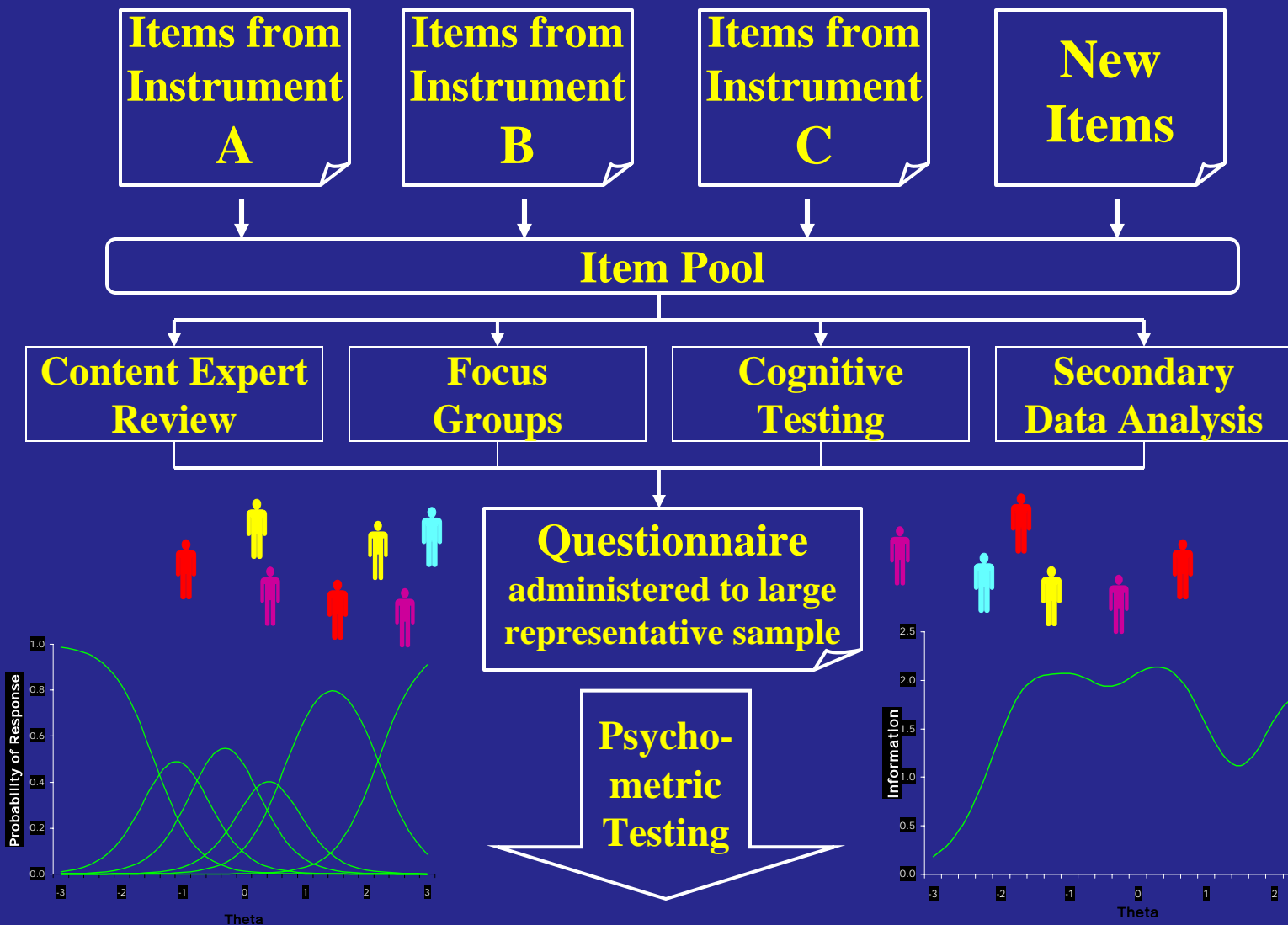


Benefits of IRT

- Precision
- Tailored Tests
- Less Items
- Equating
- Item equivalence

“Item Bank”

- A large collection of items measuring a single domain
- Basis for tailored/adaptive testing
 - Items in the same bank are linked on a common metric.
 - Items are selected to maximize precision and retain clinical relevance



Items from Instrument A

Items from Instrument B

Items from Instrument C

New Items

Item Pool

Content Expert Review

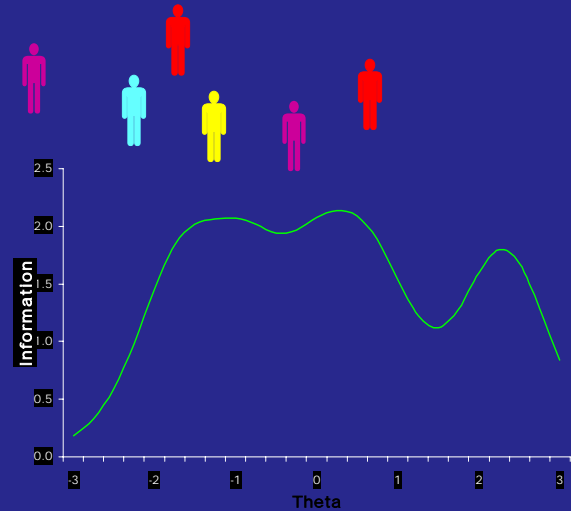
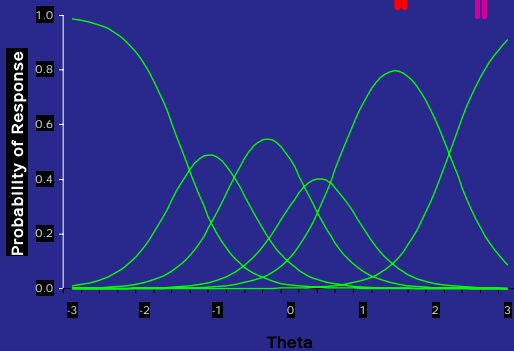
Focus Groups

Cognitive Testing

Secondary Data Analysis

Questionnaire administered to large representative sample

Psychometric Testing



Item Bank (IRT-calibrated items)

Short Form Instruments

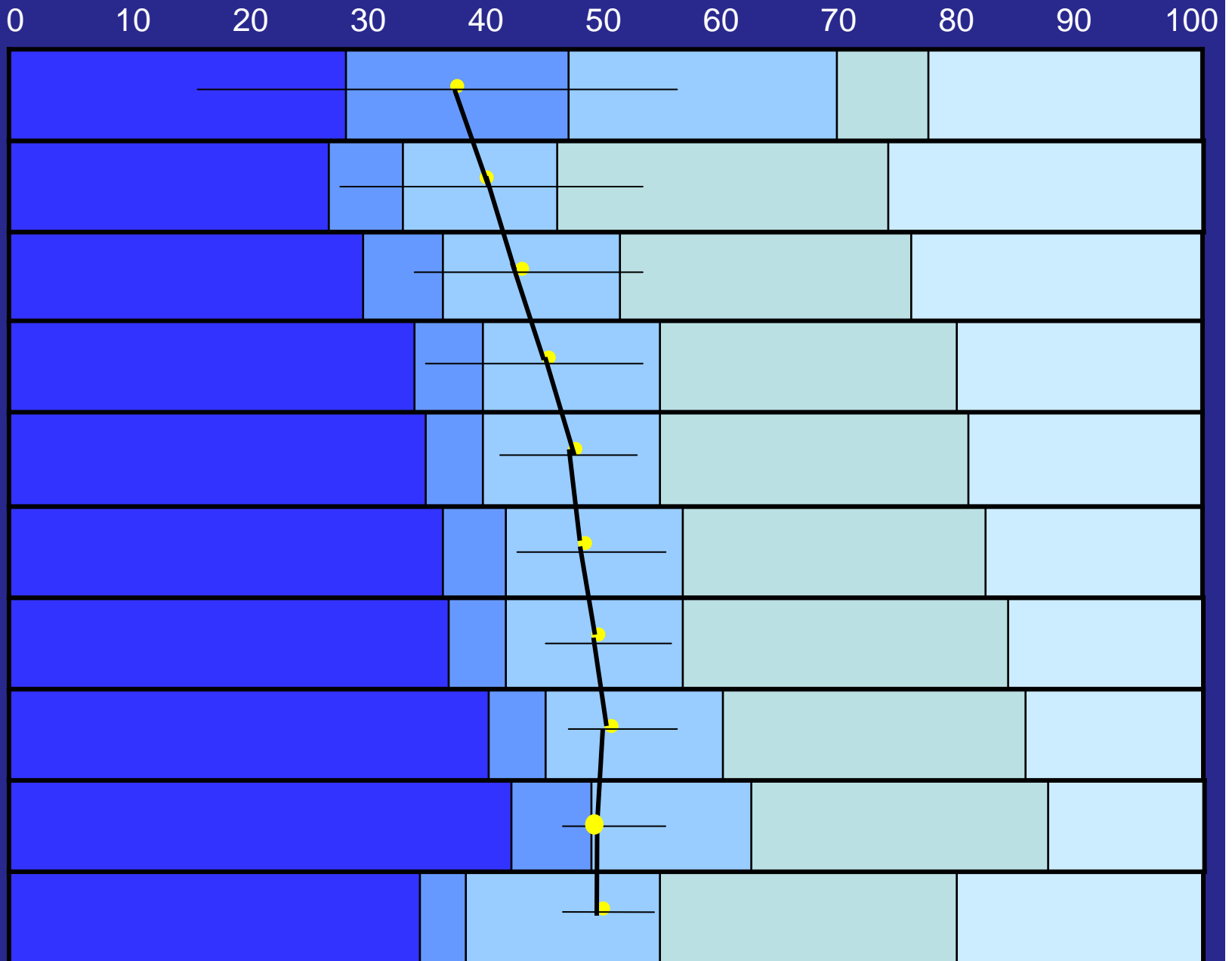


Computerized Adaptive Testing (CAT)

- Selects questions based on response to previous questions
- Iteratively estimates a person's standing on the domain (e.g., depressive symptoms)
- Desired level of precision can be obtained using a minimum number of questions.

Fatigue CAT Illustration: Score = 48

Item	Meas	SE
1	37	21
2	40	12
3	42	9
4	44	8
5	45	7
6	46	7
7	47	6
8	48	6
9	47	5
10	48	5



Advantages of Short-Forms Developed from Item Banks

- Select a set of items that are matched to the severity level of the target population.
- All scales built from the same item bank are linked on a common metric.

Depressive
Symptoms
Form C

Depression
Symptoms
Form A

Depression
Symptoms
Form B

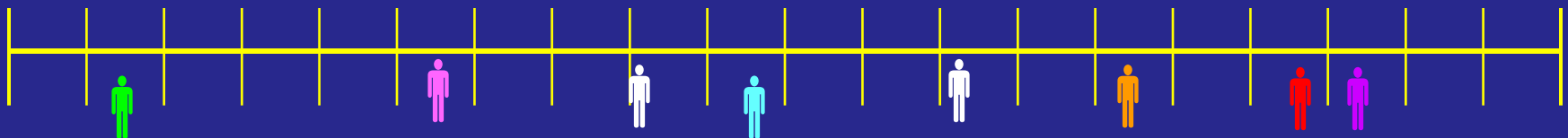
no
depression

mild
depression

moderate
depression

severe
depression

extreme
depression



Depressive Symptoms Item Bank

- ↑ Item 1
- ↑ Item 2
- ↑ Item 3
- ↑ Item 4
- ↑ Item 5
- ↑ Item 6
- ↑ Item 7
- ↑ Item 8
- ↑ Item 9
- ↑ Item n

Form A Items

#	<i>In the past 7 days...</i>	Mean	% Never
2	I felt disappointed in myself.	2.05	41
4	I felt discouraged about the future.	2.03	44
10	I found that things in my life were overwhelming.	1.85	51
18	I felt like a failure.	1.68	62
21	I felt that I had nothing to look forward to.	1.61	65
24	I felt that nothing could cheer me up.	1.56	66
26	I felt worthless.	1.51	71
28	I felt I had no reason for living.	1.29	82

Response Options: *Never, Rarely, Sometimes, Often, Always*



Form B Items

#	<i>In the past 7 days...</i>	Mean	% Never
1	I felt sad.	2.08	36
3	I felt unhappy.	2.05	39
9	I felt depressed.	1.87	50
17	I felt that nothing was interesting.	1.69	55
19	I felt that my life was empty.	1.67	64
23	I felt helpless.	1.56	67
25	I felt hopeless.	1.53	68
27	I felt I wanted to give up on everything.	1.46	73

Response Options: *Never, Rarely, Sometimes, Often, Always*

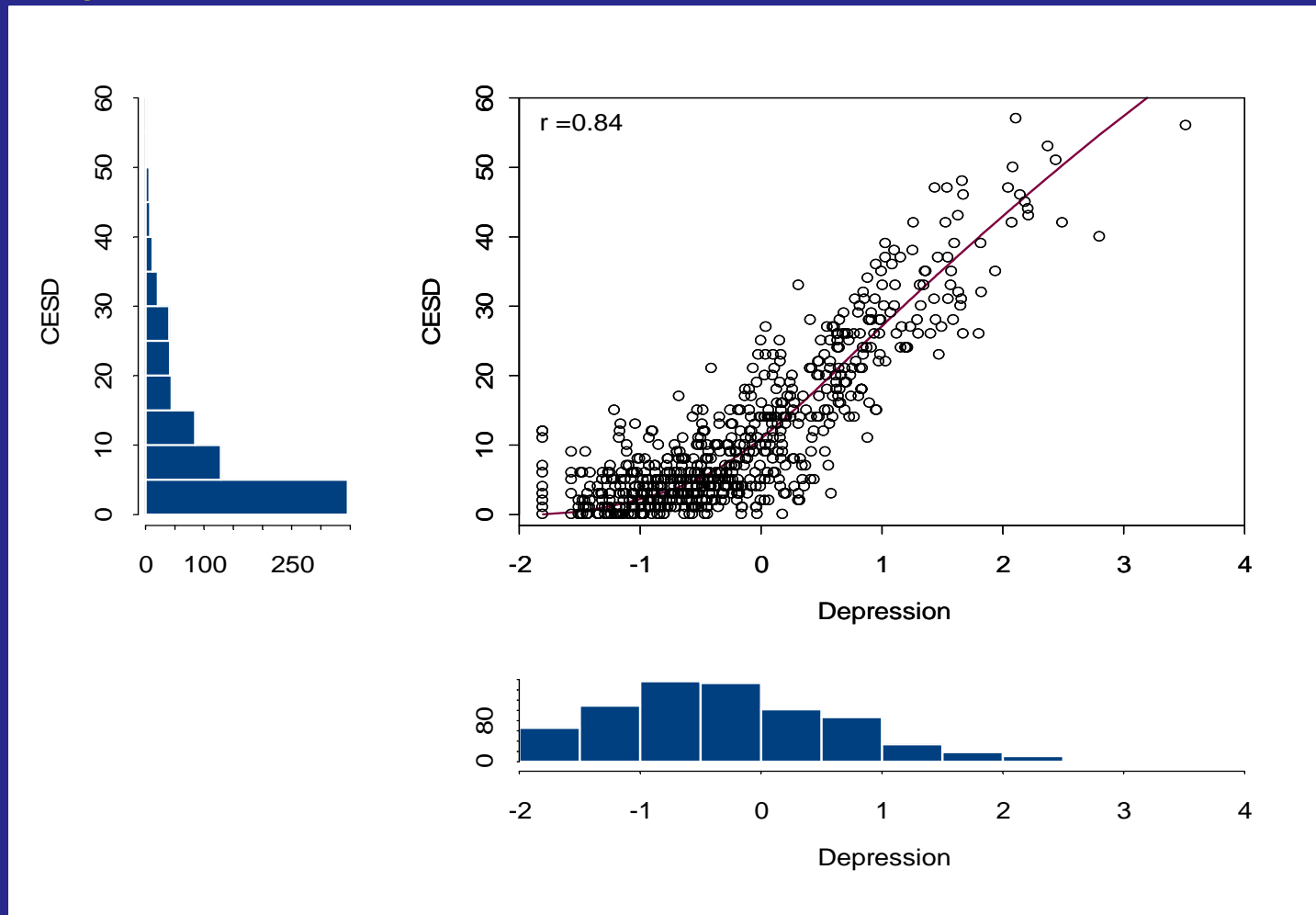
Mean, Minimum and Maximum Scores

	Form A (8 items)	Form B (8 items)	CAT (8 items)	Full Bank (28 items)
Mean	49	49	49	49
Minimum	38	37	35	33
Maximum	82	82	84	86

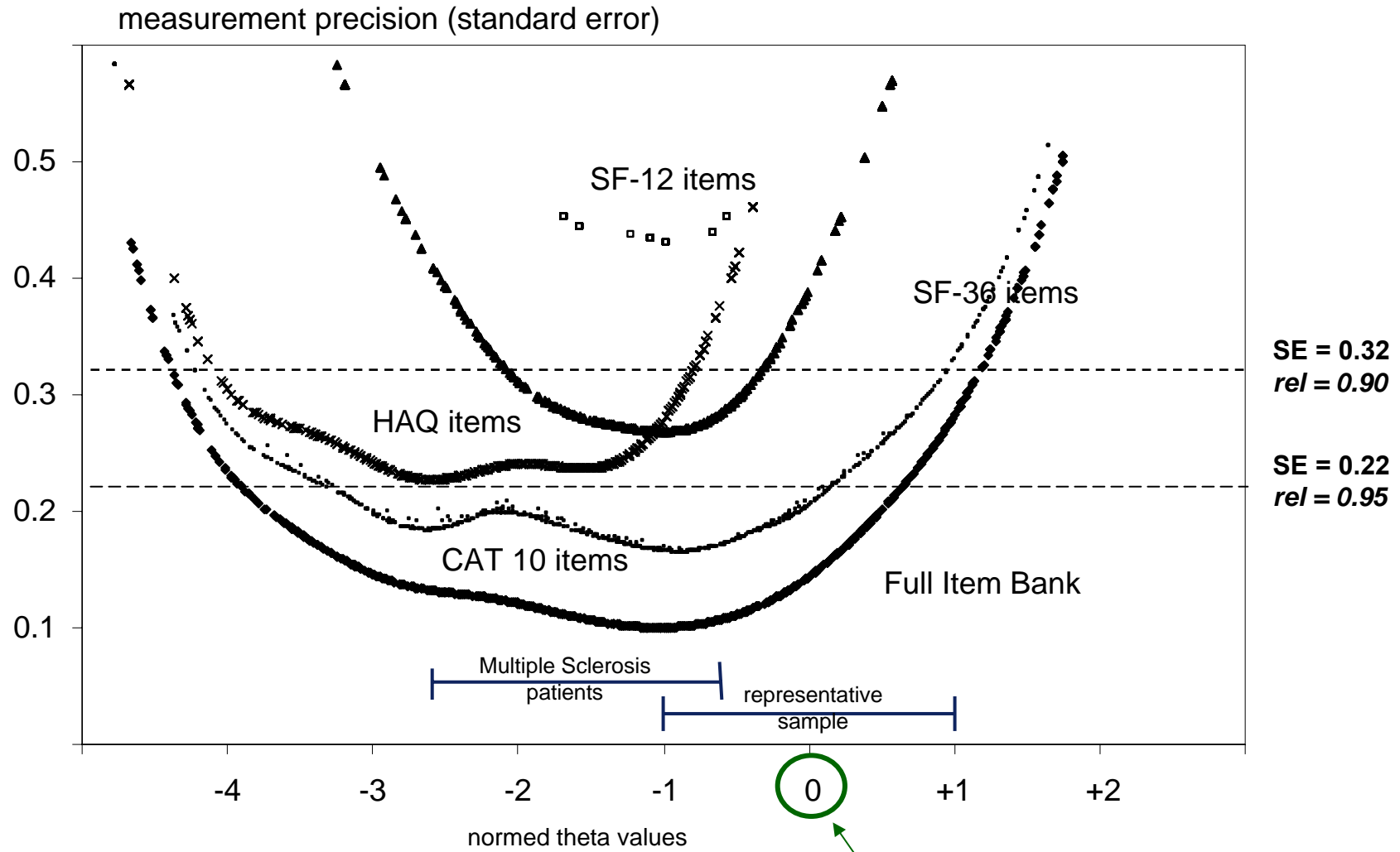
Correlations Among Forms

	Form A	Form B	CAT
Form A	1.000		
Form B	0.895	1.000	
CAT	0.946	0.958	1.000
Bank	0.953	0.955	0.976

Correlation of Depressive Symptoms Bank with CESD



CAT assessments can achieve higher precision than fixed forms



Sample PROMIS Fatigue Short Form

In the past 7 days ...		Never	Rarely	Some- times	Often	Always
FATEXP 20	How often did you feel tired?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
FATEXP 5	How often did you experience extreme exhaustion?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
FATEXP 18	How often did you run out of energy?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
FATIMP 33	How often did your fatigue limit you at work (include work at home)?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
FATIMP 30	How often were you too tired to think clearly?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
FATIMP 21	How often were you too tired to take a bath or shower?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
FATIMP 40	How often did you have enough energy to exercise strenuously?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

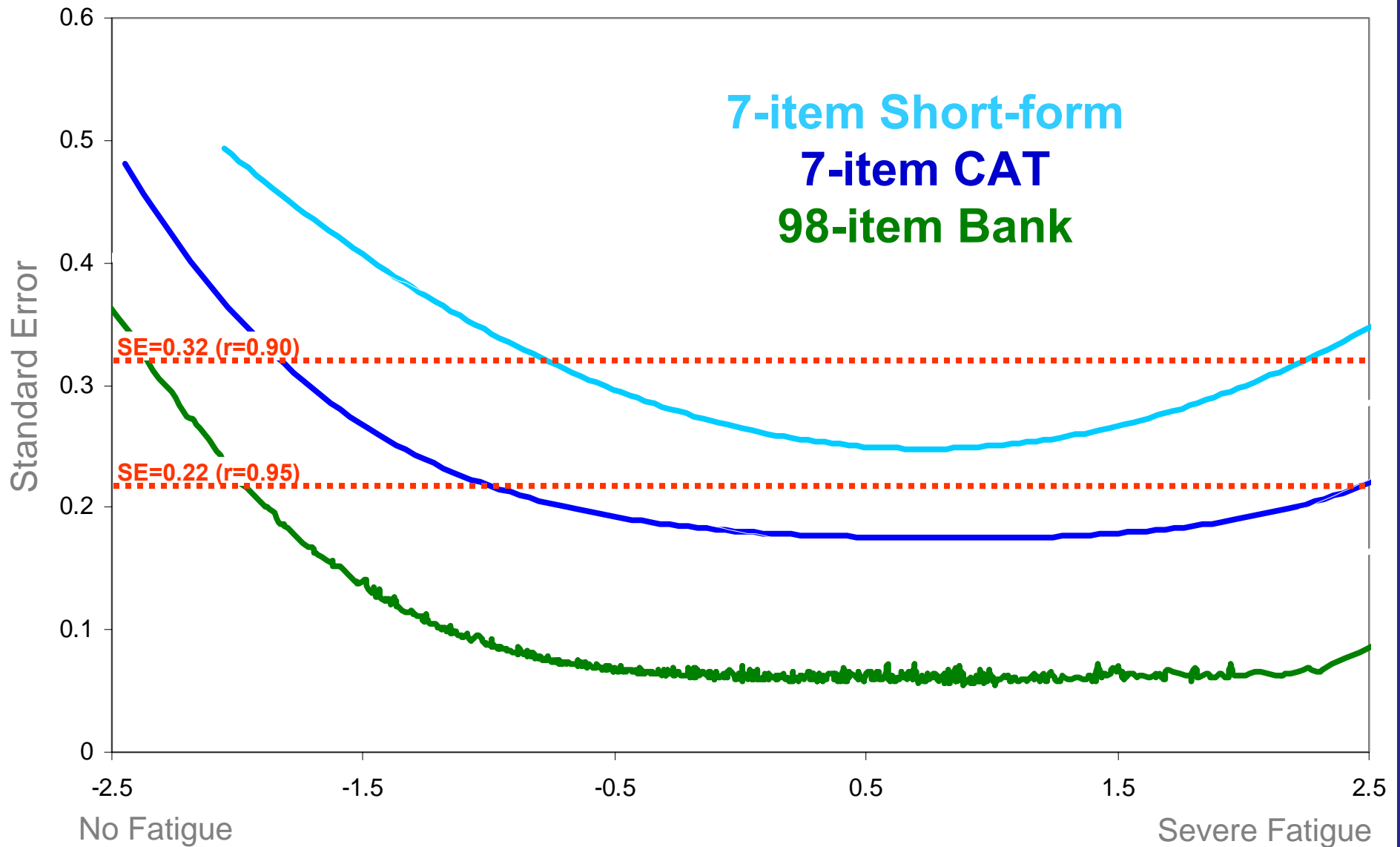


Patient-Reported Outcomes Measurement Information System
Dynamic Tools to Measure Health Outcomes From the Patient Perspective

Garcia SF et al, J Clin Onc, 2007. Reprinted with permission of the PROMIS Health Organization and the PROMIS Cooperative Group © 2007.



Comparison of Measurement Precision Full-length Item Bank vs. Legacy vs. CAT vs. Short-form



In Summary, Calibrated Item Banks can be used to:

- Create a standard static instrument
- Construct short forms
- Enable CAT
- Select items based on unique content interests and formulate custom short-form or full-length instruments
- Produce scores on a COMMON METRIC

Neuro-QOL: Integrating PROMIS and Related Tools Work into Neuro Conditions

RFP-NIH-NINDS-03-04

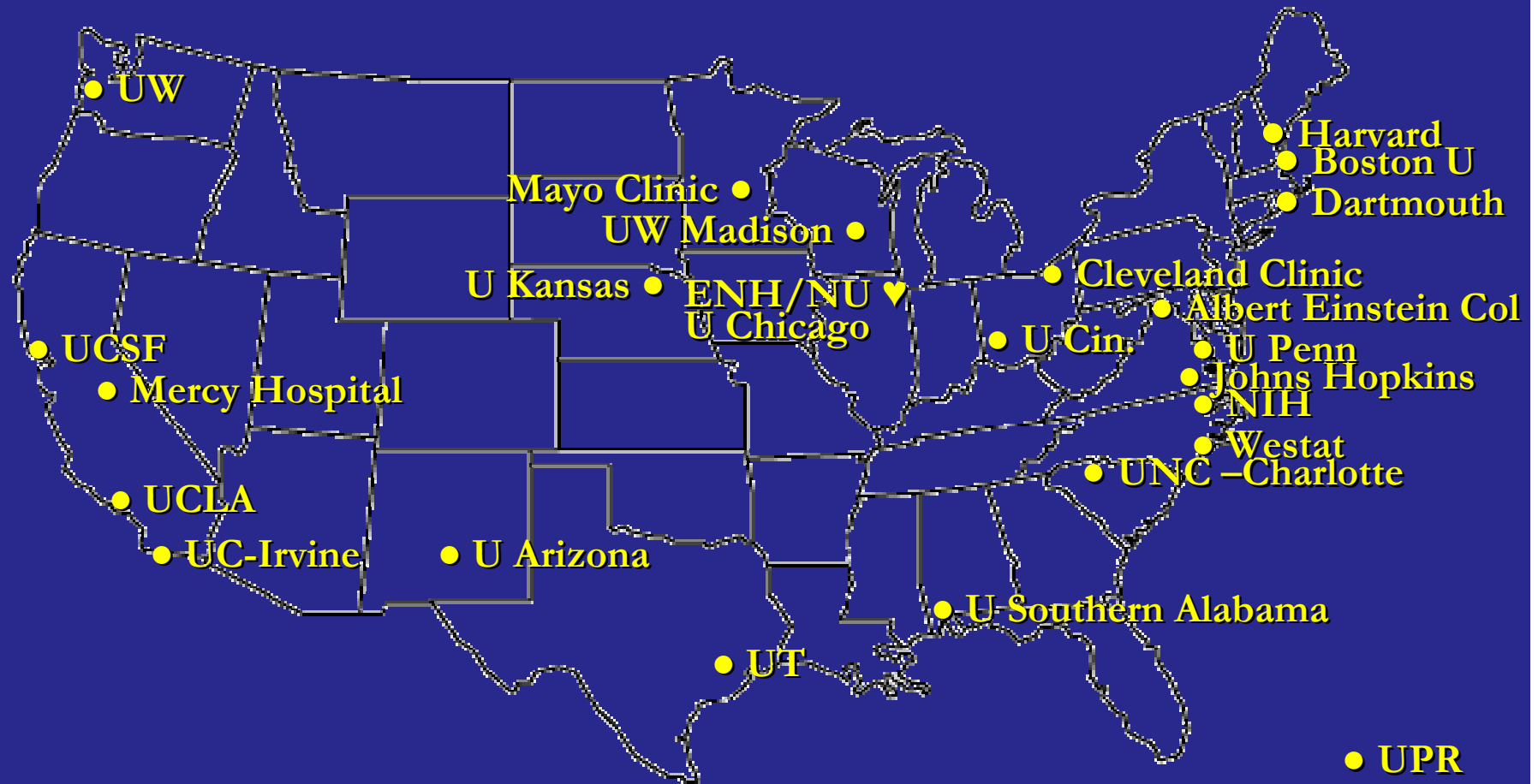
- Develop a core set of questions that cut across chronic neurological disorders
- Develop supplemental questions that address additional concerns of specific diseases, subgroups of patients
- Create a publicly available, adaptable and sustainable system allowing clinical researchers access to a common item repository and CAT

Neuro-QOL Primary Investigators



- NINDS (Project Officer: Claudia Scala-Moy, Ph.D)
- Principal Investigator: David Cella, PhD

Neuro-QOL Network



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Neuro-QOL

Quality of Life in Neurological Disorders

Special Features

- Target neurological conditions
- Adult and pediatric disorders
- Inclusion of ethnic minorities
- Spanish-language version
- Evaluation of measurement issues in cognitively impaired patients
- Assessment of acceptability to neurology research and clinical community
- IRT-based approach/CAT
- Available in the public domain

Target Disorders for Field Testing

- **Adult conditions**
 - Stroke
 - Multiple Sclerosis
 - Parkinson's disease
 - Epilepsy
 - ALS
- **Pediatric conditions**
 - Epilepsy
 - Muscular dystrophies

Overlap between Neuro-QOL and PROMIS

Domain	Neuro-QOL	PROMIS	Linked
Social Role Performance	X	X	X
Social Role Satisfaction	X	X	X
Mobility/Ambulation	X	X	X
Self Care/Upper Extremity	X	X	X
Depression	X	X	X
Anxiety/Fear	X	X	X
Positive Psychological Function	X	X	X
Fatigue/Weakness	X	X	X
Sleep Disturbance	X	X	X
Pain	X	X	X
Stigma	X	--	--
Perceived Cognitive Deficits	X	--	--
Applied Cognition	X	--	--
Personality and Behavioral Change	X	--	--

Social Health Examples

Domain	Item Bank Name	Item Stem...	Sample Items
Social Health	Social Role Performance	In the past 7 days...	I can keep up with my family Responsibilities
			I feel limited in my ability to visit friends
			I have to do my work for shorter periods of time than usual
	Social Role Satisfaction	In the past 7 days...	I am disappointed in my ability to meet the needs of my family
			I am satisfied with the amount of time I spend visiting friends
			I am bothered by limitations in performing my work (include work at home)

Physical Health Examples

Domain	Item Bank Name	Item Stem...	Sample Items
Physical Health	Mobility/Ambulation	How much DIFFICULTY do you currently have...?	moving from lying on your back to sitting on the side of the bed?
			sitting on a bench without arms or back (maintaining posture)?
			propelling / driving a wheelchair several blocks?
	Upper Extremity/ADLs	How much DIFFICULTY do you currently have...?	managing toileting aftercare, including cleaning, managing undergarments, and arranging clothing?
			putting on a pullover shirt?
			opening small containers like aspirin or vitamins (regular screw top)?

Mental Health-Emotion Examples

Domain	Item Bank Name	Item Stem...	Sample Items
Mental Health (Emotion)	Depression	In the past 7 days...	I felt worthless.
			I felt that I had nothing to look forward to.
			I withdrew from other people.
	Fear / Anxiety	In the past 7 days...	I worried about my physical health.
			I felt anxious or fearful about my future.
			I felt anxious if my normal routine was disturbed.
	Stigma	In the past 7 days...	I feel that some people are uncomfortable with me.
			People I don't know stare at me
			I feel "left out" of things
	Positive Psychological Function	In the past 7 days...	I feel a sense of purpose in my life.
			I feel hopeful.
			My life is satisfying.

Mental Health-Cognitive Examples

Domain	Item Bank Name	Item Stem...	Sample Items
Mental Health (Cognitive)	Perceived Cognitive Function	Indicate how often each of the following has occurred during the past 7 days...	I felt confused or disoriented
			I reacted slowly to things that were said or Done
			I had trouble getting things organized.
	Applied Cognitive Function	How much DIFFICULTY do you currently have...?:	Remembering to take medications at the appropriate time
Understanding familiar people during ordinary conversations			
Reading the newspaper or magazine			

Neuro-QOL Timeline To Date

Year Completed	Task
2005	Identify neurological conditions for project focus
2005	Identify instrument criteria for acceptance by neurology clinical trials community
2007	Identify domains and items
2008	Spanish translation of @680 items
2008	Develop final protocol for field testing



Final Item Pools for Large Scale Testing

Next Steps for the Neuro-QoL Project:

Testing and refining final HRQOL
instrument

Phase II: Testing and Refinement of Final HRQL Instrument

- Primary Goals
 - Confirm factor structure and produce item calibrations for all items in each sub-domain
 - Create profile scores for each disease population
 - Develop short forms
 - Test-retest validation for short forms
 - Assess longitudinal use of the forms
- Public Release in 2009

Thank you

www.neuroqol.org

www.nihpromis.org



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