



NIH Toolbox

Assessment of Neurological and Behavioral Function

Emotional Health and its Assessment within the NIH Toolbox

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Emotional Health Team



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- Plus our content expert-consultants***

Organizing Ideas



- ◆ Focus on emotional health and adaptation across the lifespan, not disorder or impairment
- ◆ Positive and negative affects are conceptually independent
- ◆ 30 minute Toolbox
 - ◆ Data-based assumption of 6 items / minute adults (5 items / minute peds)
 - ◆ Each subdomain allocated up to 45 questions for adults (37 for peds)

Domain Framework



Options for brief assessment



- ◆ Available, off-the-shelf instruments
 - ◆ Search produced 563 instruments across peds → adults
- ◆ Item Response Theory (IRT) models enable reliable and precise measurement of PROs
 - ◆ Fewer items needed for equal precision
 - ◆ Making assessment briefer
 - ◆ More precision gained by adding items
 - ◆ Reducing error and sample size requirements
 - ◆ Error is understood at the individual level
 - ◆ Enabling practical individual assessment
- ◆ Calibration and concurrent validation testing used to guide decisions

Items from
Instrument
A

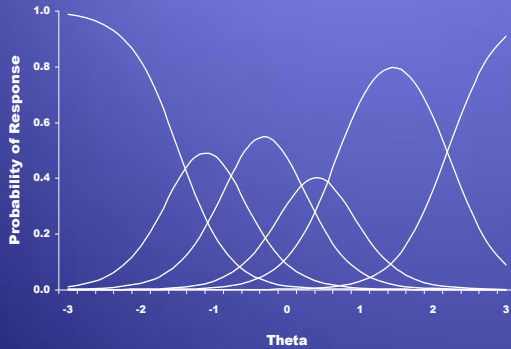
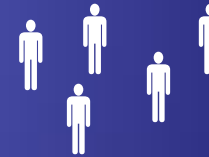
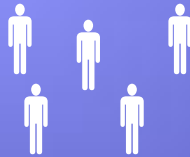
Items from
Instrument
B

Items from
Instrument
C

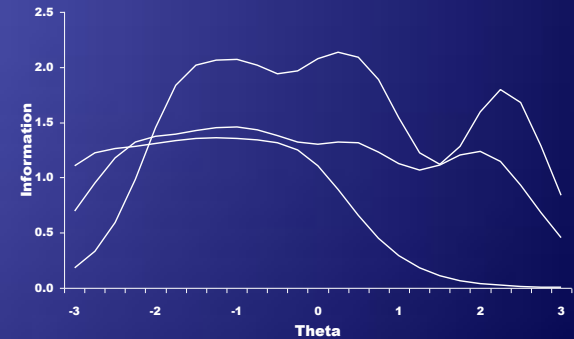
**New
Items**

Item Pool

Questionnaire
administered to
Toolbox Calibration
Sample



**CFA
and
IRT**



Item Bank

IRT-calibrated items administered
to Toolbox Norming Sample

**Short Form
Instruments**





Assessment CenterSM



In the past 7 days

I felt worthless

- Never
- Rarely
- Sometimes
- Often
- Always

Previous

Next



Assessment CenterSM

In the past 7 days

I felt sad

- Never
- Rarely
- Sometimes
- Often
- Always

Previous

Next

Exit

In a traditional static form, participants would answer items sequentially until they completed all items.



In the past 7 days

I felt depressed

- Never
- Rarely
- Sometimes
- Often
- Always

Previous

Response	Theta	Score	SE
EDDEP29=3	0.82	58.2	0.43

CAT Settings

Selection Criterion	Max SE	Pop. Mean
MPWI	0.30	0.00

Min # of Items to Admin: 5
Max # of Items to Admin: 20

In the past 7 days

I felt hopeless

- Never
- Rarely
- Sometimes
- Often
- Always

Previous Next Exit

Response	Theta	Score	SE
EDDEP29=3	0.82	58.2	0.43

CAT Settings

Selection Criterion	Max SE	Pop. Mean	Pop. SD
MPWI	0.30	0.00	1.00

Min # of Items to Admin: 5
Max # of Items to Admin: 20

In the past 7 days

I felt worthless

- Never
- Rarely
- Sometimes
- Often
- Always

Previous Next Exit

Response	Theta	Score	SE
EDDEP41=3	1.12	61.2	0.30
EDDEP29=3	0.82	58.2	0.43

CAT Settings

Selection Criterion	Max SE	Pop. Mean	Pop. SD
MPWI	0.30	0.00	1.00

Min # of Items to Admin: 5
Max # of Items to Admin: 20

In an IRT-driven CAT, participants would see items selected on the basis of their response to the previous item, reducing the number of items needed for reliable measurement.

General Analytic Strategies Across Subdomains



- ◆ Dimensionality based upon EFA/CFA
- ◆ IRT Modeling, DIF & CAT simulations
- ◆ Convergent validity

Key Considerations:

- Conceptual similarity across age bands
- Age-appropriate items/measures

Validation/Calibration Sampling Plan



	8-12 Self		13-17 Self		18+ Self	
	Sample n	(item n)	Sample n	(item n)	Sample n	(item n)
Negative Affect	500	(153)	500	(153)	600	(169*)
Psychological Well-Being	500	(64)	500	(72)	600	(94)
Stress & Coping	500	(94)	500	(86)	600	(99)
Social Relationships	500	(119)	500	(119)	600	(164)

Proxy: Children with ages 3-7 & with ages 8-12

Sample Demographic



	Proxy 3-7 Yr (N=1,000)	Proxy 8-12 Yr (N=1,086)	8-12 Yr (N=1,553)	13-17 Yr (N=1,525)	18+ Yr (N=2,551)
Mean Age	5.05	10.10	10.09	14.99	45.56
	%	%	%	%	%
Sex					
Male	51.0	49.2	50.5	50.3	43.3
Ethnicity					
Not-Hispanic/Latino	87.8	88.8	88.5	92.5	90.0
Race					
American Indian/Alaska Native	1.8	2.0	1.8	1.8	2.7
Asian	3.4	1.9	2.4	2.0	3.6
Black/African-American	12.0	12.9	11.7	10.0	10.3
Native Hawaiian/Pac Islander	1.3	0.6	0.5	0.4	0.6
White	80.4	80.7	82.0	84.7	81.6
Other	6.8	5.2	5.3	3.5	3.9
Proxy Relationship					
Mother/Female Guardian	75.0	71.6			
Father/Male Guardian	17.4	22.5			
Grandmother	4.8	4.3			

Toolbox Validation Results: Negative Affect - Adults



CFA Model	# Items	CFI	RMSEA	Cronbach's Alpha	Convergent Validity
Buss-Perry Aggression Questionnaire – Physical Aggression	5	.981	.097	.83	
Buss-Perry Aggression Questionnaire – Hostility	6	.956	.147	.84	
PROMIS-Anger SF	8	.988	.085	.94	.61 ^a
PROMIS-Anxiety SF	7	.995	.086	.95	.86 ^b
Mood and Anxiety Symptom Questionnaire – Somatic Anxiety	6	.958	.124	.85	
PROMIS – Depression SF	8	.985	.171	.97	.88 ^c

Validation Scales: ^aBuss-Perry Aggression Questionnaire, combined subscales for anger and verbal aggression; ^bGeneralized Anxiety Disorder-7; ^cCenter for Epidemiologic Studies Depression Scale

Toolbox Validation Results: Psychological Well-Being - Adults



CFA Model	# Items	CFI	RMSEA	Cronbach's Alpha	Convergent Validity
Toolbox-Positive Affect	21	.932	.106	.96	.92 ^a
Satisfaction with Life Scale	5	.943*	.100*	.91	
Students' Life Satisfaction Scale	7			.91	
Toolbox-Meaning & Purpose SF	8			.89	.64 ^b

**Results from a Bi-Factor Analysis.*

Validation Scales ^aPANAS-Positive; ^bSatisfaction with Life Scale

Toolbox Validation Results: Stress & Self-Efficacy - Adults



CFA Model	# Items	CFI	RMSEA	Cronbach's Alpha
Perceived Stress Scale-14	14	.942*	.104	.91
General Self-Efficacy Scale	10	.982	.081	.93

**Results from a Bi-Factor Analysis with positively and negatively-scored group factors.*

Toolbox Validation Results: Social Relationships - Adults



CFA Model	# Items	CFI	RMSEA	Cronbach's Alpha	Convergent Validity
Toolbox Emotional Support	8	.994	.112	.97	.78 ^a
Toolbox Instrumental Support	8	.966	.166	.95	.69 ^a
Toolbox Loneliness	5	.992	.267	.94	.83 ^b
Toolbox Friendship	8	.975	.148	.95	.80 ^b
Toolbox Perceived Hostility	8	.979	.101	.94	.64 ^c
Toolbox Perceived Rejection/Insensitivity	8	.975	.142	.93	.60 ^c

Validation Scales ^aISEL Scale; ^bUCLA Loneliness Scale; ^cKrause's Negative Interaction Scale

Limitations



- ◆ Some of the convergent validity coefficients are modest (coefficient range = 0.10 – 0.30).
 - ◆ the conceptual link between the Toolbox measure and the comparison measure is weak
 - ◆ the psychometric properties of the identified comparison measures were not strong
 - ◆ some of these data come from different informants
- ◆ Another limitation is the use of informants in general for some concepts in children.

Conclusions



- ◆ Planned norming studies will enable:
 - ◆ comparisons of Emotional Health measures with other Toolbox domains of Cognition, Sensation, and Motor Function
 - ◆ further refinement of the assessments to determine optimal (i.e., ultra-brief) SFs
- ◆ Such work, to be completed in 2012 promises to provide flexible, efficient and precise measurement of key emotional health factors linked to health outcomes.

Norming Strategies



Subdomain	Concept	Adult (18+ yrs)		Adolescent (13-17 yrs)		Child (8-12 yrs)	
		CAT vs Fixed Form	item #	CAT vs Fixed Form	item #	CAT vs Fixed Form	item #
Negative Affect	Anger	CAT	29	Fixed	6	Fixed	6
	Fear	CAT	28	Fixed	8	Fixed	8
	Sadness	CAT	28	Fixed	8	Fixed	8
Psychological Well-Being	Positive Affect	CAT	21	Fixed	16	Fixed	20
	Life Satisfaction	Fixed	14	Fixed	24	Fixed	16
	Meaning & Purpose	Fixed	8				
Stress & Self-Efficacy	Perceived Stress	Fixed	15	Fixed	14	Fixed	14
	Self-Efficacy	Fixed	20	Fixed	30	Fixed	30
Social Relationships	Social Support	Fixed	16	Fixed	13	Fixed	13
	Companionship	Fixed	13	Fixed	12	Fixed	12
	Social Distress	Fixed	16	Fixed	12	Fixed	12



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QUESTIONS?

For more information, please visit www.nihtoolbox.org

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