

Psychometric Evaluation of the Motivation and Energy Inventory – Short Form (MEI-SF)

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Overview

- Development of the MEI
- Item selection and preliminary evaluation of the MEI-SF
- Psychometric evaluation of the MEI-SF
- Conclusions and future directions

Development of the MEI: Objective

- Create a comprehensive patient-reported assessment of changes in energy and motivation due to treatment
 - Initially developed for use in antidepressant trials

Development of the MEI: Process

- Literature review and patient focus groups
- Four iterative sets of cognitive interviews
- Psychometric evaluation using data from two clinical trials
- Additional study to evaluate test-retest reliability and estimate minimal clinically important difference (MCID)

Development of the MEI: Example Items

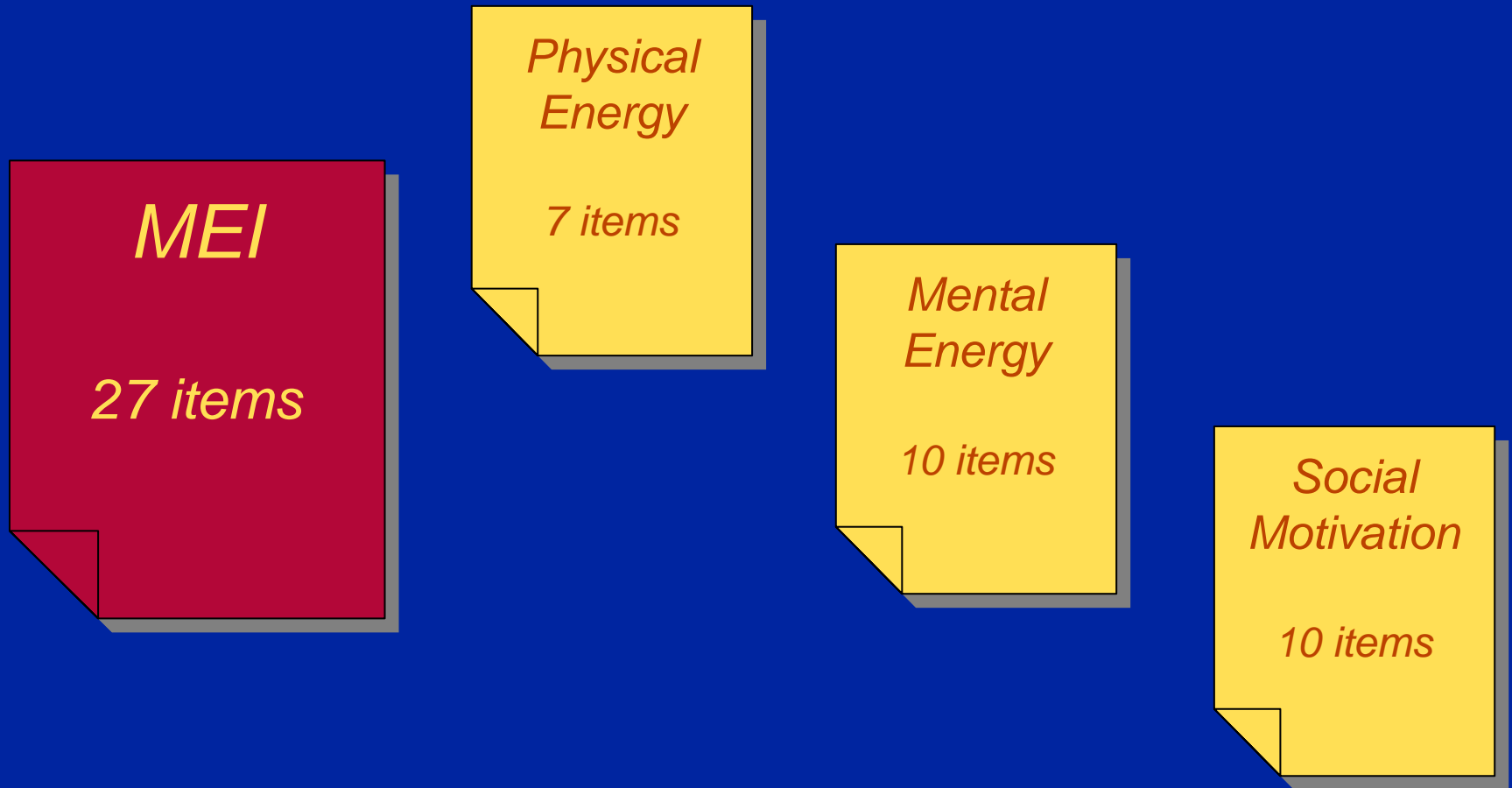
During the past 4 weeks, how often did you feel satisfied with what you accomplished during the day?

- Never
- Less than 1 day a week
- 1 or 2 days a week
- 3 or 4 days a week
- 5 or 6 days a week
- Every day or nearly every day

During the past 4 weeks, to what extent were you interested in meeting new people?

- Not at all interested
- A little interested
- Somewhat interested
- Quite interested
- Extremely interested

Development of the MEI: Results



Development of the MEI: Results

- Established test-retest reliability, internal consistency, construct and discriminant validity, and responsiveness of each subscale

Fehnel SE, Bann CM, Hogue SL, Kwong WJ, Mahajan SS (2004). The Development and Psychometric Evaluation of the Motivation and Energy Inventory (MEI). Quality of Life Research, 13(7): 1321-1336.

Development of the MEI-SF: Objective

- Develop a short, acute form of the MEI
 - Minimize patient burden
 - Maximize responsiveness for use in trials of short duration

Development of the MEI-SF: Process

- Item Reduction
 - Responsiveness – ability to discriminate between responders and non-responders (50% reduction in HAM-D scores)
 - 4 behaviorally oriented items deleted
 - Inter-item correlations
 - 5 items deleted to minimize redundancy
- Reference period changed to “past 7 days”

Development of the MEI-SF: Results

- 18-item, acute form of the MEI
 - Original 3-factor structure not fully supported with remaining 18 items
 - Preliminary psychometric results for global score using MEI data from 3 previous studies were promising

Fehnel SE, Edin HM, McLeod LD, Hogue SL (2004). Development and Preliminary Psychometric Evaluation of the MEI-SF. Poster presented at the ISOQOL 2004 Symposium, Stating the Art: Advancing Outcomes Research Methodology and Clinical Applications. Boston, MA.

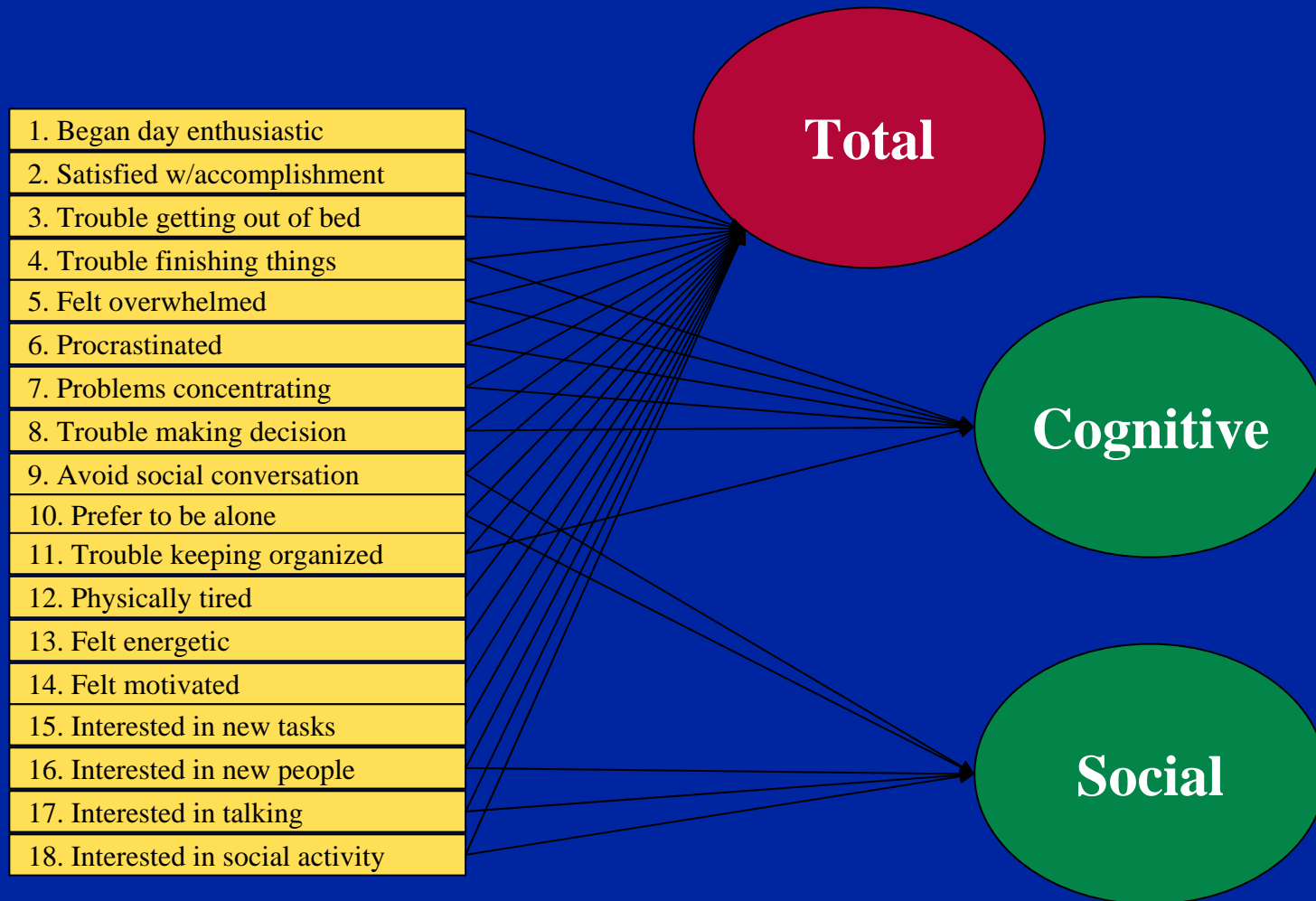
Evaluation of the MEI-SF: Process

- Data obtained from two 8-week, double-blind, randomized trials comparing several antidepressants to placebo
 - 785 patients completed the MEI-SF
 - 388 in Trial 1 and 397 in Trial 2
- Investigated subscale structure
 - Exploratory factor analyses (Trial 1) and confirmatory factor analyses (Trial 2)
- Evaluated internal consistency, validity, MCID, responsiveness, and item characteristics

Evaluation of the MEI-SF: EFA Results (Trial 1)

- Exploratory results favorable for a 1-factor solution
 - All loadings .50 or greater
- 2 subsets of items consistently loaded together in multi-factor solutions
 - 6 items addressing cognitive or mental energy (concentration, decision-making)
 - 5 items addressing social motivation (prefer to be alone, interest in social activities)
- Considered possibility of a 3-factor solution
 - 1 general factor and 2 specific factors

Evaluation of the MEI-SF: Scale Structure



Evaluation of the MEI-SF: CFA Results (Trial 2)

3-Factor Structure

GFI = 0.98

CFI = 0.99

RMSEA = 0.07

Loadings:

0.49 to 0.79 (Total)

0.38 to 0.54 (Cognitive)

0.46 to 0.78 (Social)

1-Factor Structure

GFI = 0.95

CFI = 0.95

RMSEA = 0.13

Loadings:

0.53 to 0.74 (Total)

Evaluation of the MEI-SF: Internal Consistency

Cronbach's Alpha at Baseline

	Total	Cognitive	Social
Trial 1	.90	.84	.83
Trial 2	.88	.84	.81

Evaluation of the MEI-SF: Construct Validity

Correlations with Other Measures at Baseline

	Total	Cognitive	Social
HAM-D	-.32	-.26	-.25
HADS-D	-.67	-.54	-.51
HADS-A	-.36	-.40	-.22
CGI-S	-.23	-.26	-.25

Note: HADS-D is patient-reported and assesses depression severity.

Evaluation of the MEI-SF: Discriminant Validity

Ability to Differentiate Between Known Groups Post-Treatment (F , p -value)

	Total	Cognitive	Social
Treatment	14.6 ($p=.0001$)	14.8 ($p=.0001$)	8.3 ($p=.0040$)
CGI-S	108.4 ($p<.0001$)	81.0 ($p<.0001$)	67.8 ($p<.0001$)
CGI-I	97.3 ($p<.0001$)	65.0 ($p<.0001$)	63.9 ($p<.0001$)

Evaluation of the MEI-SF: Responsiveness

Treated vs. Placebo Patients

	Total	Cognitive	Social
Effect Size	.33	.33	.25

$$\frac{\text{mean change in treated patients} - \text{mean change in placebo patients}}{\text{standard deviation of change in placebo patients}}$$

Evaluation of the MEI-SF: Responsiveness

Responders vs. Non-Responders

	Total	Cognitive	Social
Effect Size	1.87	1.44	1.47

mean change in responders – mean change in non-responders
standard deviation of change in non-responders

Evaluation of the MEI-SF: Estimating MCID

Minimal Clinically Important Difference Estimates

	Total	Cognitive	Social
SEM	5.0	2.8	2.3
1/2 SD	7.5	3.5	2.7
Anchor (CGI-I)	14.2	5.5	3.4

Evaluation of the MEI-SF: Item Characteristics

Parameter Estimates Using Samejima's Graded Response Model – Total Score

Slope (a)

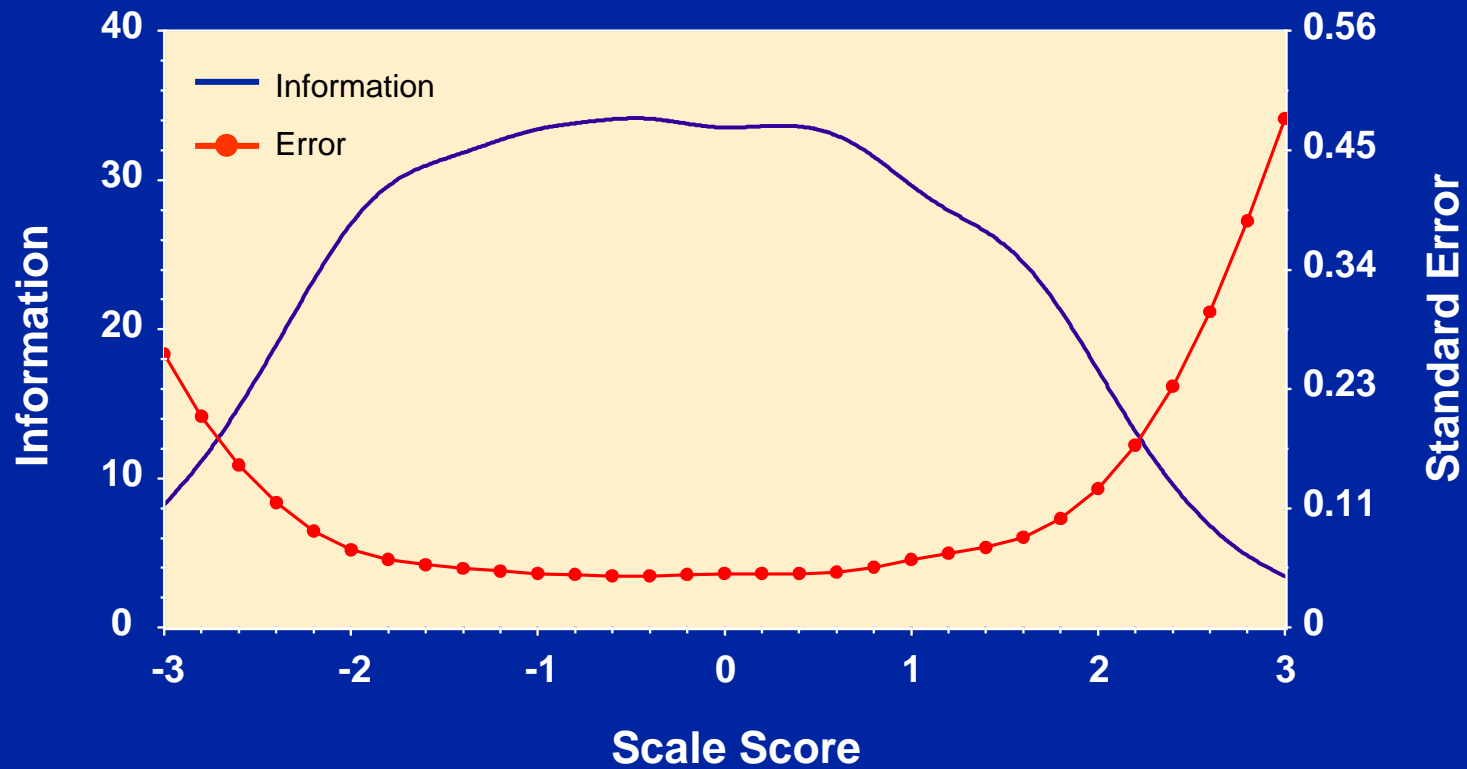
Range: 1.87 to 3.62

Threshold (b)

Range: -2.56 to 1.95

Evaluation of the MEI-SF: Total Information

Test Information and Measurement Error



Conclusions and Future Directions

- Results of present evaluation consistent with those of previous evaluations
- Strong evidence to support factor structure, reliability, validity, and responsiveness of MEI-SF within a depressed population
- More than 30 translations available – use in international trials anticipated
- Potential utility in additional therapeutic areas currently being explored

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