

COGNITIVE FUNCTION

A brief guide to the PROMIS® Cognitive Function instruments:

ADULT	PEDIATRIC	PARENT PROXY
PROMIS Item Bank v1.0 – Applied Cognition - Abilities*	PROMIS Pediatric Item Bank v1.0 – Cognitive Function	PROMIS Parent Proxy Item Bank v1.0 – Cognitive Function*
PROMIS Item Bank v1.0 – Applied Cognition - General Concerns*	PROMIS Pediatric Short Form v1.0 – Cognitive Function 7a	PROMIS Parent Proxy Short Form v1.0 – Cognitive Function 7a
PROMIS Short Form v1.0 – Applied Cognition - Abilities 4a*		PROMIS Parent Proxy Item Bank v1.1 – Cognitive Function
PROMIS Short Form v1.0 – Applied Cognition - General Concerns 4a*		
PROMIS Short Form v1.0 – Applied Cognition - Abilities 6a*		
PROMIS Short Form v1.0 – Applied Cognition - General Concerns 6a*		
PROMIS Short Form v1.0 – Applied Cognition - Abilities 8a*		
PROMIS Short Form v1.0 – Applied Cognition - General Concerns 8a*		
PROMIS Item Bank v2.0 – Cognitive Function Abilities Subset		
PROMIS Short Form v2.0 – Cognitive Function 4a		
PROMIS Short Form v2.0 – Cognitive Function Abilities Subset 4a		
PROMIS Short Form v2.0 – Cognitive Function 6a		
PROMIS Short Form v2.0 – Cognitive Function Abilities Subset 6a		
PROMIS Short Form v2.0 – Cognitive Function 8a		
PROMIS Short Form v2.0 – Cognitive Function Abilities Subset 8a		

*Retired measure

ABOUT COGNITIVE FUNCTION

The PROMIS Cognitive Function and Cognitive Function Abilities Subset item banks assess patient-perceived cognitive deficits. Facets include mental acuity, concentration, verbal and nonverbal memory, verbal fluency, and perceived changes in these cognitive functions. The extent to which cognitive impairments interfere with daily functioning, whether other people observe cognitive impairments, and the impact of cognitive dysfunction on quality of life are also assessed.

The cognitive function instruments are universal rather than disease-specific. All assess cognitive function over 4 weeks. Cognitive Function instruments are available for adults (ages 18+), pediatric self-report (ages 8-17) and for parents serving as proxy reporters for their child (youth ages 8-17).

INTRODUCTION TO ASSESSMENT OPTIONS

There are two administration options for assessing cognitive function: short forms and computer adaptive tests (CATs). When administering a short form, instruct participants to answer all of the items (i.e., questions or statements) presented. With a CAT, participant responses guide the system’s choice of subsequent items from the full item bank. (32 items in total for the adult Cognitive Function bank and 31 for the adult Cognitive Function Abilities Subset bank). Although items differ across respondents taking a CAT, scores are comparable across participants. Some administrators may prefer to ask the same question of all respondents or of the same



respondent over time, to enable a more direct comparability across people or time. In these cases, or when paper administration is preferred, a short form would be more desirable than a CAT. This guide provides information on all cognitive function short form and CAT instruments.

Whether one uses a short form or CAT, the score metric is Item Response Theory (IRT), a family of statistical models that link individual questions to a presumed underlying trait or concept of cognitive function represented by all items in the item bank. When choosing between a CAT and short form, it is useful to consider the demands of computer-based assessment, and the psychological, physical, and cognitive burden placed on respondents as a result of the number of questions asked.

VERSION DIFFERENCES

Some PROMIS domains have multiple versions of instruments (i.e. v1.0, v1.1, v2.0). Generally, **it is recommended that you use the most recent version available which can be identified as the instruments with the highest version number.** In most cases, an instrument that has a decimal increase (v1.0 to v1.1) retains the same item-level parameters as well as instrument reliability and validity. In cases where a version number increases by a whole number (e.g., v1.0 to v2.0), the changes to the instrument are more substantial.

Adult Instruments

The first version of PROMIS cognition instruments were named PROMIS v1.0 Applied Cognition - General Concerns and PROMIS v1.0 Applied Cognition – Abilities. These item banks assess a person’s perception of cognitive function in areas such as concentration, memory, and mental acuity. In 2015, the relationship between the two Applied Cognition v1.0 item banks was re-evaluated (Lai et al 2014). Based on the results, General Concerns and Abilities could be measured using one unidimensional item bank. Yet, results also supported measuring each construct separately. We recommend a conservative approach by measuring and reporting General Concerns and Abilities separately. We therefore recommended two separate but co-calibrated item banks in PROMIS: Cognitive Function (formerly named General Concerns) and Cognitive Function – Abilities subset. These banks include different items. Both item banks showed good psychometric properties and are available for research and clinical purposes. Consequently, PROMIS released v2.0 instruments intended to replace the version 1.0 instruments.

As cognition deficits (rather than cognitive abilities) are commonly used by clinicians for treatment, **PROMIS recommends Cognitive Function v2.0 as the primary measure.** PROMIS v2.0 Cognitive Function is an improvement from v1.0 Applied Cognition – General Concerns. Specifically, two items (PC15 & PC16) demonstrating local dependency to other items were removed, resulting a total of 32 items. The scoring direction was reversed so that in v2.0, higher scores represent better cognitive function. A new item bank was created as items were re-calibrated to reflect the new item set as well as the new scoring direction. The PROMIS Bank v2.0 – Cognitive Function can be administered as a computer adaptive test or with a 4-, 6-, or 8-item short form. PROMIS v1.0 Applied Cognition – General Concerns T-scores cannot be compared to PROMIS v2.0 Cognitive Function scores. Instructions for converting PROMIS v1.0 Applied Cognition – General Concerns to the v2.0 Cognitive Function metric to enable comparisons across versions are below.

PROMIS v2.0 Cognitive Function- Abilities Subset was an improvement from v1.0 Applied Cognition – Abilities. Specifically, two items (PC24 & PC-CaPS7) demonstrating local dependency to other items were removed, resulting a total of 31 items. The scoring direction stayed the same as the v1.0 instrument. A new item bank was created as items were re-calibrated. PROMIS v1.0 Applied Cognition – Abilities T-scores cannot be compared to PROMIS v2.0 Cognitive Function – Abilities Subset scores. Instructions for converting PROMIS v1.0 Applied Cognition – Abilities to the v2.0 Cognitive Function – Abilities Subset metric to enable comparisons across versions are below.

Reference: Lai, J-S., Wagner, L.I., Jacobsen, P.B., Cella, D. (2014). Self-reported Cognitive Concerns and Abilities: Two sides of one coin? Psycho-Oncology. 23(10):1133-41

Pediatric and Parent Proxy Instruments

The PROMIS v1.0 pediatric and parent proxy instruments were initially developed via an R01 grant from the National Cancer Institute. It was published with the name Pediatric Perceived Cognitive Function (PedsPCF). The measures were renamed “PROMIS Cognitive Function.” PedsPCF and PROMIS Pediatric Cognitive Function measures are identical. The following publications describe the development of these measures.

PROMIS Parent Proxy Bank v1.1 - Cognitive Function replaced PROMIS Parent Proxy Bank v1.0 - Cognitive Function. The v1.0 measure included an incorrect item stem with item NQCOG62_2Ar. This error was removed in v1.1 with the creation of item NQCOG62_2Ar2. Use the scoring tables (v1.0 or v1.1) that correspond to the version of the measure used.

Lai, J-S, Butt, Z., Zelko, F., Cella, D., Krull, K., Kieran, M., Goldman, S. (2011). Development of a Parent-reported Cognitive Function Item Bank Using Item Response Theory and Exploration of Its Clinical Utility in Computerized Adaptive Testing. *Journal of Pediatric Psychology. 36(7):766-79.*

Lai, J-S., Zelko, F., Krull, K., Cella, D., Nowinski, C., Manley, P., Goldman, S. (2014). Parent-reported cognition of children with cancer and its potential clinical usefulness. *Quality of Life Research, 23, 1049-1058.*

SHORT FORM DIFFERENCES

Adult Short Forms

There are 3 Cognitive Function and 3 Cognitive Function Abilities Subset adult short forms. Items were selected based on content and psychometric characteristics. Short form items are nested or overlap (e.g., an 8 item short form is the 4-item short form plus two additional items).

Pediatric and Parent Proxy Short Forms

There is 1 pediatric and 1 parent proxy short form. Items were selected based on content and psychometric characteristics.

Selecting a Short Form for Adults

In selecting between short forms, the difference is instrument length. The reliability and precision of the short forms within a domain is highly similar. If you are working with a sample in which you want the most precise

measure, select the longest short form. If you have little room for additional measures but really wanted to capture something as a secondary outcome, select one of the shorter instruments (e.g., 4-item short form).

SELECTING A PEDIATRIC OR PARENT PROXY INSTRUMENT

In selecting whether to use the pediatric or parent proxy instrument for this domain, it is important to consider both the population and the domain which you are studying. Pediatric self-report should be considered the standard for measuring patient-reported outcomes among children. However, circumstances exist when the child is too young, cognitively impaired, or too ill to complete a patient-reported outcome instrument. While information derived from self-report and proxy-report is not equivalent, it is optimal to assess both the child and the parent since their perspectives may be independently related to healthcare utilization, risk factors, and quality of care.

SCORING THE INSTRUMENT

Short Forms: PROMIS instruments are scored using item-level calibrations. This means that the most accurate way to score a PROMIS instrument is to use the HealthMeasures Scoring Service (https://www.assessmentcenter.net/ac_scoring-service) or a data collection tool that automatically calculates scores (e.g., Assessment CenterSM, REDCap auto-score). This method of scoring uses responses to each item for each participant. We refer to this as “response pattern scoring.” Because response pattern scoring is more accurate than the use of raw score/scale score look up tables included in this manual, it is preferred. Response pattern scoring is especially useful when there is missing data (i.e., a respondent skipped an item), different groups of participants responded to different items, or you have created a new questionnaire using a subset of questions from a PROMIS item bank.

Each question usually has five response options ranging in value from one to five. To find the total raw score for a short form with all questions answered, sum the values of the response to each question. For example, for the adult 8-item short form, the lowest possible raw score is 8; the highest possible raw score is 40 (see all short form scoring tables in Appendix 1). **All questions must be answered in order to produce a valid score using the scoring tables.** If a participant has skipped a question, use the HealthMeasures Scoring Service (https://www.assessmentcenter.net/ac_scoring-service) to generate a final score.

Locate the applicable score conversion table in Appendix 1 and use this table to translate the total raw score into a T-score for each participant. The T-score rescales the raw score into a standardized score with a mean of 50 and a standard deviation (SD) of 10. Therefore, a person with a T-score of 40 is one SD below the mean.

For the adult PROMIS v2.0 Adult Cognitive Function 4a short form, a raw score of 10 converts to a T-score of 37.69 with a standard error (SE) of 2.98 (see scoring table for the 4a short form in Appendix 1). Thus, the 95% confidence interval around the observed score ranges from 31.8 to 43.53 (T-score \pm (1.96*SE) or 37.69 \pm (1.96*2.98)).

Converting v1.0 Measures to the v2.0 Metric

- The v1.0 Applied Cognition short forms should be scored as v2.0 Cognitive Function measures. To do this: For PROMIS v1.0 Applied Cognition – General Concerns short forms, flip the direction of scores so that Never = 5 and Very often (several times a day) = 1. Amend the item IDs with an “r”. You can see the correct item IDs and response scores in a PDF of a v2.0 Cognitive Function measure PDF. Then, follow the usual scoring instructions and the Cognitive Function v2.0 short form look-up table in this manual. When writing about the measure, it should be described as a Cognitive Function v2.0.



- For PROMIS v1.0 Applied Cognition – Abilities, retain the v1.0 response scores. Use the Cognitive Function – Abilities subset short form look-up table in this manual. When writing about the measure, it should be described as a Cognitive Function – Abilities Subset v2.0.

CAT: A minimum number of items (4 for adult CATs and 5 for peds and parent proxy CATs) must be answered in order to receive a score for the cognitive function CATs. The response to the first item will guide the system’s choice of the next item for the participant. The participant’s response to the second item will dictate the selection of the following question, and so on. As additional items are administered, the potential for error is reduced and confidence in the respondent’s score increases. The CAT will continue until either the standard error drops below a specified level (on the T-score metric 3.0 for adult CATs and 4.0 for peds and parent proxy CATs), or the participant has answered the maximum number of questions (12), whichever occurs first.

For most PROMIS instruments, a score of 50 is the average for the United States general population with a standard deviation of 10 because calibration testing was performed on a large sample of the general population. You can read more about the calibration and centering samples at HealthMeasures.net in the Interpret PROMIS (<http://www.healthmeasures.net/score-and-interpret/interpret-scores/promis>) section. The T-score is provided with an error term (Standard Error or SE). The Standard Error is a statistical measure of variance and represents the “margin of error” for the T-score.

Important: A higher PROMIS T-score represents more of the concept being measured. For concepts like cognitive function (v2.0), a T-score of 60 is one SD better than average. By comparison cognitive function T-score of 40 is one SD worse than average.

STATISTICAL CHARACTERISTICS

There are four key features of the score for cognitive function:

- **Reliability:** The degree to which a measure is free of error. It can be estimated by the internal consistency of the responses to the measure, or by correlating total scores on the measure from two time points when there has been no true change in what is being measured (for z-scores, reliability = $1 - SE^2$).
- **Precision:** The consistency of the estimated score (reciprocal of error variance).
- **Information:** The precision of an item or multiple items at different levels of the underlying continuum (for z-scores, information = $1/SE^2$).
- **Standard Error (SE):** The possible range of the actual final score based upon the scaled T-score. For example, with a T-score of 52 and a SE of 2, the 95% confidence interval around the actual final score ranges from 48.1 to 55.9 (T-score $\pm (1.96*SE) = 52 \pm 3.9 = 48.1$ to 55.9).

The final score is represented by the T-score, a standardized score with a mean of 50 and a standard deviation (SD) of 10. More information is available at [www. HealthMeasures.net](http://www.HealthMeasures.net).

PREVIEW OF SAMPLE ITEM

Figure 1 is an excerpt from the paper version of the adult v2.0 Cognitive Function eight-item short form. This is the paper version format used for all cognitive function instruments. It is important to note that the CAT is not available for paper administration.

In the past 7 days...		Never	Rarely (Once)	Sometimes (Two or three times)	Often (About once a day)	Very often (Several times a day)
PC1r	I have had trouble forming thoughts	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
PC2r	My thinking has been slow.....	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1

Figure 1

FREQUENTLY ASKED QUESTIONS (FAQs)

Q: I am interested in learning more. Where can I do that?

Review the HealthMeasures website at www.healthmeasures.net.

Q: Do I need to register with PROMIS to use these instruments?

No.

Q: Are these instruments available in other languages?

Yes! Look at the HealthMeasures website (<http://www.healthmeasures.net/explore-measurement-systems/promis/intro-to-promis/available-translations/117-available-translations>) for current information on PROMIS translations.

Q: Can I make my own short form?

Yes, custom short forms can be made by selecting any items from an item bank. This can be scored using the Scoring Service (https://www.assessmentcenter.net/ac_scoring-service).

Q: How do I handle multiple responses when administering a short form on paper?

Guidelines on how to deal with multiple responses have been established. Resolution depends on the responses noted by the research participant.

- If two or more responses are marked by the respondent, and they are next to one another, then a data entry specialist will be responsible for randomly selecting one of them to be entered and will write down on the form which answer was selected. Note: To randomly select one of two responses, the data entry specialist will flip a coin (heads - higher number will be entered; tails – lower number will be entered). To randomly select one of three (or more) responses, a table of random numbers should be used with a statistician’s assistance.
- If two or more responses are marked, and they are NOT all next to one another, the response will be considered missing.

Q: What is the minimum change on a PROMIS instrument that represents a clinically meaningful difference?

To learn more about research on the meaning of a change in scores, we suggest conducting a literature review to identify the most current information. The HealthMeasures website (<http://www.healthmeasures.net/score-and-interpret/interpret-scores/promis>) has additional information on interpreting scores.



APPENDIX 1 – SCORING TABLES

Adult v2.0 - Cognitive Function 4a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
4	24.99	4.41
5	28.95	3.39
6	31.07	3.22
7	32.94	3.07
8	34.61	3.01
9	36.17	2.98
10	37.69	2.98
11	39.19	2.99
12	40.70	3.00
13	42.25	3.02
14	43.86	3.04
15	45.54	3.07
16	47.33	3.14
17	49.28	3.24
18	51.62	3.51
19	54.58	3.89
20	61.13	5.96
*SE= Standard Error on T-score metric		



Adult v2.0 - Cognitive Function 6a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
6	23.13	4.25
7	26.64	3.28
8	28.55	3.05
9	30.18	2.84
10	31.58	2.72
11	32.85	2.64
12	34.04	2.59
13	35.17	2.57
14	36.28	2.57
15	37.37	2.57
16	38.45	2.57
17	39.53	2.58
18	40.63	2.59
19	41.74	2.60
20	42.87	2.62
21	44.04	2.63
22	45.23	2.64
23	46.47	2.67
24	47.77	2.71
25	49.17	2.79
26	50.72	2.94
27	52.49	3.14
28	54.69	3.51
29	57.60	4.04
30	63.17	5.75

*SE= Standard Error on T-score metric



Adult v2.0 - Cognitive Function 8a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
8	22.41	4.10
9	25.73	3.10
10	27.45	2.85
11	28.90	2.60
12	30.11	2.45
13	31.18	2.34
14	32.15	2.26
15	33.06	2.21
16	33.92	2.18
17	34.75	2.16
18	35.56	2.15
19	36.36	2.15
20	37.15	2.15
21	37.93	2.15
22	38.71	2.16
23	39.50	2.16
24	40.29	2.17
25	41.09	2.18
26	41.90	2.19
27	42.72	2.19
28	43.57	2.20
29	44.43	2.21
30	45.31	2.23
31	46.22	2.25
32	47.17	2.28
33	48.18	2.33
34	49.26	2.40
35	50.45	2.51
36	51.80	2.70
37	53.36	2.93
38	55.36	3.34
39	58.08	3.91
40	63.48	5.65

*SE= Standard Error on T-score metric



Adult v2.0 - Cognitive Function Abilities Subset 4a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
4	26.56	4.76
5	30.70	3.83
6	33.24	3.60
7	35.36	3.45
8	37.26	3.37
9	39.03	3.33
10	40.73	3.32
11	42.41	3.33
12	44.09	3.34
13	45.81	3.37
14	47.59	3.39
15	49.45	3.41
16	51.43	3.45
17	53.59	3.54
18	56.12	3.71
19	59.29	4.08
20	64.86	5.53

*SE= Standard Error on T-score metric



Adult v2.0 - Cognitive Function Abilities Subset 6a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
6	24.50	4.53
7	28.03	3.66
8	30.31	3.34
9	32.11	3.16
10	33.71	3.02
11	35.15	2.92
12	36.48	2.87
13	37.74	2.84
14	38.96	2.83
15	40.15	2.82
16	41.33	2.82
17	42.51	2.83
18	43.69	2.85
19	44.89	2.87
20	46.11	2.89
21	47.37	2.91
22	48.65	2.93
23	49.98	2.95
24	51.38	2.99
25	52.87	3.06
26	54.53	3.18
27	56.38	3.35
28	58.51	3.57
29	61.31	4.03
30	66.16	5.38

*SE= Standard Error on T-score metric



Adult v2.0 - Cognitive Function Abilities Subset 8a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
8	23.27	4.36
9	26.59	3.47
10	28.63	3.13
11	30.23	2.93
12	31.63	2.76
13	32.87	2.64
14	34.01	2.56
15	35.07	2.51
16	36.07	2.48
17	37.04	2.46
18	37.97	2.45
19	38.90	2.44
20	39.81	2.44
21	40.71	2.44
22	41.61	2.45
23	42.51	2.46
24	43.42	2.46
25	44.34	2.48
26	45.27	2.49
27	46.21	2.50
28	47.18	2.52
29	48.16	2.53
30	49.17	2.55
31	50.21	2.56
32	51.29	2.59
33	52.42	2.63
34	53.63	2.68
35	54.94	2.78
36	56.39	2.93
37	58.03	3.14
38	59.95	3.41
39	62.52	3.90
40	67.09	5.24
*SE= Standard Error on T-score metric		



Pediatric v1.0 - Cognitive Function 7a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
7	24.01	3.98
8	27.66	2.72
9	29.47	2.42
10	30.9	2.23
11	32.11	2.11
12	33.18	2.04
13	34.18	1.99
14	35.11	1.97
15	36.01	1.95
16	36.89	1.95
17	37.76	1.94
18	38.62	1.95
19	39.47	1.95
20	40.33	1.95
21	41.19	1.95
22	42.07	1.96
23	42.96	1.97
24	43.88	1.99
25	44.83	2.01
26	45.82	2.03
27	46.84	2.04
28	47.90	2.06
29	49.02	2.08
30	50.22	2.11
31	51.54	2.17
32	53.02	2.30
33	54.79	2.57
34	57.26	3.13
35	63.09	5.40
*SE= Standard Error on T-score metric		



Parent Proxy v1.1 - Cognitive Function 7a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
7	22.3	3.9
8	25.9	2.8
9	27.8	2.5
10	29.3	2.3
11	30.6	2.2
12	31.8	2.1
13	32.9	2.1
14	34.0	2.1
15	35.0	2.1
16	35.9	2.1
17	36.9	2.1
18	37.8	2.0
19	38.7	2.0
20	39.7	2.0
21	40.6	2.0
22	41.5	2.0
23	42.4	2.1
24	43.4	2.1
25	44.4	2.1
26	45.4	2.1
27	46.5	2.1
28	47.6	2.2
29	48.7	2.2
30	50.0	2.2
31	51.3	2.3
32	52.9	2.4
33	54.7	2.7
34	57.2	3.2
35	63.0	5.4

*SE= Standard Error on T-score metric



APPENDIX 2 – SCORING TABLES FOR RETIRED MEASURES

It is recommended that you use the most recent version available which can be identified as the instruments with the highest version number.

Adult v1.0 - Applied Cognition - General Concerns 4a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
4	26.2	4.0
5	30.4	2.7
6	32.3	2.5
7	34.0	2.3
8	35.5	2.3
9	36.9	2.3
10	38.4	2.3
11	39.9	2.3
12	41.4	2.3
13	43.0	2.3
14	44.7	2.3
15	46.3	2.3
16	48.0	2.3
17	49.7	2.4
18	51.7	2.6
19	54.3	3.0
20	61.1	5.7
*SE= Standard Error on T-score metric		



Adult v1.0 - Applied Cognition - General Concerns 6a		
<i>Short Form Conversion Table</i>		
Raw Score	T -Score	SE*
6	24.8	3.9
7	28.5	2.6
8	30.4	2.3
9	31.8	2.1
10	33.1	2.0
11	34.2	2.0
12	35.3	1.9
13	36.3	1.9
14	37.3	2.0
15	38.4	2.0
16	39.4	2.0
17	40.5	2.0
18	41.6	2.0
19	42.7	2.0
20	43.9	2.0
21	45.0	2.0
22	46.1	2.0
*SE= Standard Error on T-score metric		



Adult v1.0 - Applied Cognition - General Concerns 8a					
<i>Short Form Conversion Table</i>					
Raw Score	T-Score	SE*	Raw Score	T-Score	SE*
8	23.3	3.8	25	41.6	1.8
9	26.8	2.6	26	42.5	1.8
10	28.4	2.3	27	43.3	1.8
11	29.8	2.1	28	44.2	1.8
12	30.9	1.9	29	45.1	1.8
13	31.8	1.8	30	45.9	1.8
14	32.7	1.8	31	46.8	1.8
15	33.6	1.8	32	47.7	1.8
16	34.4	1.7	33	48.6	1.8
17	35.2	1.7	34	49.5	1.8
18	36.0	1.7	35	50.6	1.9
19	36.7	1.7	36	51.7	2.0
20	37.5	1.8	37	53.0	2.1
21	38.3	1.8	38	54.6	2.5
22	39.1	1.8	39	56.8	3.0
23	40.0	1.8	40	62.7	5.4
24	40.8	1.8			
*SE= Standard Error on T-score metric					



Adult v1.0 - Applied Cognition - Abilities 4a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
4	30.1	4.4
5	34.6	2.7
6	36.6	2.4
7	38.2	2.2
8	39.5	2.1
9	40.8	2.1
10	42.2	2.1
11	43.5	2.2
12	44.9	2.2
13	46.4	2.2
14	48.0	2.2
15	49.7	2.2
16	51.4	2.2
17	53.2	2.2
18	55.2	2.4
19	57.8	2.7
20	63.8	5.2

*SE= Standard Error on T-score metric



Adult v1.0 - Applied Cognition - Abilities 6a		
<i>Short Form Conversion Table</i>		
Raw Score	T -Score	SE*
6	27.4	4.1
7	32.1	2.5
8	34.1	2.1
9	35.5	1.9
10	36.7	1.8
11	37.8	1.7
12	38.7	1.7
13	39.6	1.7
14	40.5	1.7
15	41.5	1.7
16	42.4	1.7
17	43.4	1.8
18	44.4	1.8
19	45.4	1.7
20	46.5	1.7
21	47.6	1.7
22	48.7	1.8
23	49.9	1.8
24	51.0	1.8
25	52.2	1.8
26	53.5	1.8
27	54.8	1.8
28	56.4	2.1
29	58.5	2.6
30	64.1	5.1
*SE= Standard Error on T-score metric		



Adult v1.0 - Applied Cognition - Abilities 8a					
<i>Short Form Conversion Table</i>					
Raw Score	T-Score	SE*	Raw Score	T-Score	SE*
8	27.0	4.0	25	45.1	1.5
9	31.4	2.4	26	45.9	1.5
10	33.3	2.0	27	46.7	1.5
11	34.5	1.8	28	47.5	1.5
12	35.6	1.7	29	48.4	1.5
13	36.5	1.6	30	49.3	1.5
14	37.3	1.5	31	50.1	1.6
15	38.0	1.5	32	51.0	1.6
16	38.7	1.4	33	52.0	1.6
17	39.4	1.4	34	52.9	1.5
18	40.0	1.4	35	53.9	1.6
19	40.7	1.5	36	54.9	1.6
20	41.4	1.5	37	56.0	1.7
21	42.1	1.5	38	57.4	2.0
22	42.8	1.5	39	59.4	2.5
23	43.6	1.5	40	64.8	5.0
24	44.3	1.5			
*SE= Standard Error on T-score metric					



Parent Proxy v1.0 - Cognitive Function 7a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
7	22.3	3.9
8	25.9	2.8
9	27.8	2.5
10	29.3	2.3
11	30.6	2.2
12	31.8	2.1
13	32.9	2.1
14	34.0	2.1
15	35.0	2.1
16	35.9	2.1
17	36.9	2.1
18	37.8	2.0
19	38.7	2.0
20	39.7	2.0
21	40.6	2.0
22	41.5	2.0
23	42.4	2.1
24	43.4	2.1
25	44.4	2.1
26	45.4	2.1
27	46.5	2.1
28	47.6	2.2
29	48.7	2.2
30	50.0	2.2
31	51.3	2.3
32	52.9	2.4
33	54.7	2.7
34	57.2	3.2
35	63.0	5.4

*SE= Standard Error on T-score metric