



SLEEP SCORING MANUAL

A brief guide to scoring the PROMIS[®] Sleep instruments:

ADULT	PEDIATRIC	EARLY CHILDHOOD PARENT-REPORT	PARENT PROXY FOR PEDIATRIC
PROMIS Bank v1.0 – Sleep Disturbance	PROMIS Pediatric Bank v1.0 – Sleep Disturbance	PROMIS Early Childhood Parent-Report Bank v1.0 - Sleep Problems	PROMIS Parent Proxy Bank v1.0 – Sleep Disturbance
PROMIS Bank v1.0 – Sleep-Related Impairment	PROMIS Pediatric Bank v1.0 – Sleep-Related Impairment	PROMIS Early Childhood Parent-Report Short Form v1.0 - Sleep Problems 4a	PROMIS Parent Proxy Bank v1.0 – Sleep-Related Impairment
PROMIS Short Form v1.0 – Sleep Disturbance 4a	PROMIS Pediatric Short Form v1.0 – Sleep Disturbance 4a	PROMIS Early Childhood Parent-Report Short Form v1.0 - Sleep Problems - Disturbance 4a	PROMIS Parent Proxy Short Form v1.0 – Sleep Disturbance 4a
PROMIS Short Form v1.0 – Sleep-Related Impairment 4a	PROMIS Pediatric Short Form v1.0 – Sleep-Related Impairment 4a	PROMIS Early Childhood Parent-Report Short Form v1.0 - Sleep Problems - Impairment 4a	PROMIS Parent Proxy Short Form v1.0 – Sleep-Related Impairment 4a
PROMIS Short Form v1.0 – Sleep Disturbance 6a	PROMIS Pediatric Short Form v1.0 – Sleep Disturbance 8a	PROMIS Early Childhood Parent-Report Short Form v1.0 - Sleep Problems 8a	PROMIS Parent Proxy Short Form v1.0 – Sleep Disturbance 8a
PROMIS Short Form v1.0 – Sleep Disturbance 8a	PROMIS Pediatric Short Form v1.0 – Sleep-Related Impairment 8a		PROMIS Parent Proxy Short Form v1.0 – Sleep-Related Impairment 8a
PROMIS Short Form v1.0 – Sleep-Related Impairment 8a			
PROMIS Short Form v1.0 – Sleep Disturbance 8b			

COMPARING SCORES ACROSS VERSIONS

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 instrument 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.

For PROMIS adult, pediatric, early childhood parent-report, and parent proxy report measures for sleep, there is only one version (v1.0). The PROMIS Early Childhood Parent Report Sleep Problems measures were previously named PROMIS Early Childhood Parent Report Sleep Health. This name change was implemented in 2021. No other modifications were made. Scores are equivalent and can be compared with each other.

SCORING SLEEP INSTRUMENTS

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_scoringervice) or a data collection tool that automatically calculates scores (e.g., 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.



To use the scoring tables in this manual, calculate a summed score. 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 Sleep Disturbance v2.0 adult 4-item form, the lowest possible raw score is 4; the highest possible raw score is 16 (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.

With the total raw score for a measure, 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 Sleep Disturbance 8a short form v1.0, a raw score of 10 converts to a T-score of 35.9 with a standard error (SE) of 3.3 (see scoring table for the 4a v1.0 short form in the Appendix). Thus, the 95% confidence interval around the observed score ranges from 29.4 to 42.4 (T-score \pm (1.96*SE) or 35.9 \pm (1.96*3.3)).

CAT: A minimum number of items (4 for adult CATs and 5 for peds and parent proxy) must be answered in order to receive a score for Sleep 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. CAT will continue until either the standard error drops below a specified level (on the T-score metric 3.0 for adult CATs, 4.0 for pediatric and parent proxy), or the participant has answered the maximum number of questions, whichever occurs first.

SCORES

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 on HealthMeasures.net (<http://www.healthmeasures.net/score-and-interpret/interpret-scores/promis>). 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 negatively-worded concepts, like Sleep Disturbance, Sleep-Related Impairment and Sleep Problems, T-scores of 60 are one SD worse than average. By comparison, Sleep Disturbance, Sleep-Related Impairment and Sleep Problems T-scores of 40 are one SD better than average.

Standard Error (SE): A PROMIS score includes a T-score and a standard error (SE). The standard error is a measure of the variability for a given T-score across hypothetical repeated measurements. The standard error can be used to construct confidence intervals around a T-score. A 95% confidence interval is common. A 95% confidence interval means there is a 95% probability that the true T-score is within this range. The formula for a 95% confidence interval is (T-score \pm (1.96*SE)). For example, if T=52 and SE=2, the lower boundary of the confidence interval is (52 - (1.96*2)) = 48 and the upper boundary is (52 + (1.96*2)) = 56.



FREQUENTLY ASKED QUESTIONS (FAQ)

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

Review the HealthMeasures website at www.healthmeasures.net.

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-SCORING TABLES

Sleep Disturbance 8b Short Form Conversion Table		
Raw Score	T-score	SE*
8	28.9	4.8
9	33.1	3.7
10	35.9	3.3
11	38.0	3.0
12	39.8	2.9
13	41.4	2.8
14	42.9	2.7
15	44.2	2.7
16	45.5	2.6
17	46.7	2.6
18	47.9	2.6
19	49.0	2.6
20	50.1	2.5
21	51.2	2.5
22	52.2	2.5
23	53.3	2.5
24	54.3	2.5
25	55.3	2.5
26	56.3	2.5
27	57.3	2.5
28	58.3	2.5
29	59.4	2.5
30	60.4	2.5
31	61.5	2.5
32	62.6	2.5
33	63.7	2.6
34	64.9	2.6
35	66.1	2.7
36	67.5	2.8
37	69.0	3.0
38	70.8	3.2
39	73.0	3.5
40	76.5	4.4

*SE = Standard Error on T-score metric

Sleep Disturbance 4a Short Form Conversion Table		
Raw Score	T-score	SE*
4	32.0	5.2
5	37.5	4.0
6	41.1	3.7
7	43.8	3.5
8	46.2	3.5
9	48.4	3.4
10	50.5	3.4
11	52.4	3.4
12	54.3	3.4
13	56.1	3.4
14	57.9	3.3
15	59.8	3.3
16	61.7	3.3
17	63.8	3.4
18	66.0	3.4
19	68.8	3.7
20	73.3	4.6

*SE = Standard Error

Sleep Disturbance 6a Short Form Conversion Table		
Raw Score	T-score	SE*
6	31.7	5.1
7	36.9	3.9
8	40.1	3.5
9	42.5	3.3
10	44.6	3.2
11	46.4	3.1
12	48.0	3.0
13	49.5	3.0
14	50.9	3.0
15	52.3	2.9
16	53.6	2.9
17	54.8	2.9
18	56.1	2.9
19	57.3	2.9
20	58.5	2.9
21	59.7	2.9
22	61.0	2.9
23	62.3	2.9
24	63.6	2.9
25	65.0	2.9
26	66.5	3.0
27	68.1	3.1
28	70.0	3.3
29	72.4	3.6
30	76.1	4.4

*SE = Standard Error

Adult v1.0

Adult v1.0 - Sleep Disturbance 8a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
8	30.5	4.9
9	35.3	3.7
10	38.1	3.3
11	40.4	3.1
12	42.2	3
13	43.9	2.9
14	45.3	2.8
15	46.7	2.7
16	47.9	2.7
17	49.1	2.6
18	50.2	2.6
19	51.3	2.6
20	52.4	2.6
21	53.4	2.6
22	54.3	2.5
23	55.3	2.5
24	56.2	2.5
25	57.2	2.5
26	58.1	2.5
27	59.1	2.5
28	60	2.5
29	61	2.5
30	62	2.6
31	63	2.6
32	64	2.6
33	65.1	2.6
34	66.2	2.7
35	67.4	2.8
36	68.7	2.9
37	70.2	3
38	72	3.2
39	74.1	3.5
40	77.5	4.2
*Standard Error on T-score metric		



Note: The Sleep Disturbance 8a table was revised on 5/22/2014. Instruments scored prior to this date should be re-scored using this table.

Conversion table applies only when ALL items on the short form have been answered. T-score metric is a linear transformation from the IRT theta scale: $T\text{-score} = 10 * \theta + 50$.

Pediatric v1.0 - Sleep Disturbance 4a			
<i>Short Form Conversion Table</i>			
Raw Summed Score	T-Score	SE*	Theta Score
4	38.8	6	-1.12
5	45.4	4	-0.46
6	48.8	3.4	-0.12
7	51.5	3.1	0.15
8	53.7	3	0.37
9	55.8	3	0.58
10	57.9	3.1	0.79
11	60	3.1	1
12	61.9	3.1	1.19
13	63.7	3.2	1.37
14	65.5	3.2	1.55
15	67.5	3.1	1.75
16	69.3	3.1	1.93
17	71.2	3.1	2.12
18	73.3	3.3	2.33
19	75.5	3.4	2.55
20	79.1	3.8	2.91
*SE = Standard Error on T-score metric			

Pediatric v1.0 - Sleep Disturbance 8a			
<i>Short Form Conversion Table</i>			
Raw Summed Score	T-Score	SE*	Theta Score
8	36.6	5.6	-1.34
9	42.1	3.8	-0.79
10	44.8	3.4	-0.52
11	46.8	3	-0.32
12	48.5	2.8	-0.15
13	50	2.6	0
14	51.3	2.5	0.13
15	52.5	2.5	0.25
16	53.7	2.4	0.37
17	54.9	2.4	0.49
18	56	2.4	0.6
19	57.1	2.5	0.71
20	58.2	2.5	0.82
21	59.3	2.5	0.93
22	60.3	2.5	1.03
23	61.4	2.5	1.14
24	62.4	2.5	1.24
25	63.5	2.5	1.35
26	64.5	2.5	1.45
27	65.6	2.5	1.56
28	66.6	2.4	1.66
29	67.6	2.4	1.76
30	68.7	2.4	1.87
31	69.7	2.4	1.97
32	70.7	2.4	2.07
33	71.8	2.5	2.18
34	72.9	2.5	2.29
35	74.1	2.6	2.41
36	75.4	2.7	2.54
37	76.8	2.9	2.68
38	78.5	3.1	2.85
39	80.3	3.3	3.03
40	82.7	3.5	3.27

*SE = Standard Error on T-score metric

Parent Proxy v1.0 – Sleep Disturbance 4a			
<i>Short Form Conversion Table</i>			
Raw Summed Score	T-Score	T-Score SE*	Theta Score
4	41.4	6.4	-0.86
5	48.2	4.4	-0.18
6	52.1	3.5	0.21
7	55.0	3.1	0.5
8	56.9	3.3	0.69
9	59.1	3.1	0.91
10	61.3	3.2	1.13
11	63.3	3.3	1.33
12	65.0	3.3	1.5
13	66.6	3.4	1.66
14	68.1	3.3	1.81
15	70.1	3.1	2.01
16	71.8	3.1	2.18
17	73.6	3.2	2.36
18	75.3	3.2	2.53
19	76.9	3.0	2.69
20	80.2	3.5	3.02
*Standard Error on T-score metric			

Parent Proxy v1.0 – Sleep Disturbance 8a			
<i>Short Form Conversion Table</i>			
Raw Summed Score	T-Score	T-Score SE*	Theta Score
8	38.7	6.1	-1.13
9	44.4	4.4	-0.56
10	47.3	3.8	-0.27
11	49.7	3.3	-0.03
12	51.5	3.1	0.15
13	53.2	2.8	0.32
14	54.7	2.7	0.47
15	56.0	2.6	0.6
16	57.2	2.6	0.72
17	58.4	2.6	0.84
18	59.6	2.6	0.96
19	60.8	2.6	1.08
20	62.0	2.6	1.2
21	63.1	2.6	1.31
22	64.2	2.6	1.42
23	65.3	2.6	1.53
24	66.3	2.6	1.63
25	67.3	2.6	1.73
26	68.4	2.6	1.84
27	69.4	2.6	1.94
28	70.5	2.5	2.05
29	71.5	2.5	2.15
30	72.5	2.5	2.25
31	73.5	2.5	2.35
32	74.6	2.5	2.46
33	75.7	2.6	2.57
34	76.8	2.7	2.68
35	78.0	2.8	2.8
36	79.3	2.9	2.93
37	80.7	3.0	3.07
38	82.3	3.1	3.23
39	84.1	3.1	3.41
40	85.6	2.9	3.56
*Standard Error on T-score metric			

PROMIS Sleep-Related Impairment - Adult 4a <i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
4	36.2	6.2
5	42.4	4.6
6	47.1	3.6
7	50.1	3.3
8	52.7	3.1
9	54.8	3.0
10	56.7	2.9
11	58.6	2.9
12	60.5	2.8
13	62.3	2.7
14	64.0	2.7
15	65.8	2.7
16	67.6	2.7
17	69.4	2.7
18	71.5	2.8
19	74.0	3.1
20	77.7	3.8
*SE = Standard Error on T-score metric		

Sleep-Related Impairment 8a		
<i>Short Form Conversion Table</i>		
Raw Score	T-Score	SE*
8	30.0	5.4
9	35.2	4.6
10	38.7	4.2
11	41.4	3.8
12	43.6	3.6
13	45.5	3.4
14	47.3	3.1
15	48.9	2.9
16	50.3	2.7
17	51.6	2.6
18	52.9	2.6
19	54.0	2.5
20	55.1	2.5
21	56.1	2.5
22	57.2	2.5
23	58.2	2.4
24	59.3	2.4
25	60.3	2.4
26	61.3	2.4
27	62.3	2.3
28	63.3	2.3
29	64.3	2.3
30	65.3	2.3
31	66.3	2.3
32	67.3	2.3
33	68.4	2.3
34	69.5	2.3
35	70.7	2.4
36	71.9	2.5
37	73.4	2.6
38	75.0	2.8
39	76.9	3.1
40	80.1	3.9

*SE= Standard Error on T-score

Adult version

Note: The Sleep-Related Impairment 8a table was revised on 5/22/2014. Instruments scored prior to this date should be re-scored using this table.

Conversion table applies only when ALL items on the short form have been answered. T-score metric is a linear transformation from the IRT theta scale: $T\text{-score} = 10 * \theta + 50$.

Pediatric v1.0 – Sleep-Related Impairment 4a			
<i>Short Form Conversion Table</i>			
Raw Summed Score	T-Score	T-Score SE*	Theta Score
4	38.3	6.0	-1.17
5	44.7	4.1	-0.53
6	47.8	3.7	-0.22
7	50.6	3.1	0.06
8	52.9	2.9	0.29
9	55.1	2.8	0.51
10	57.2	2.8	0.72
11	59.5	2.9	0.95
12	61.9	2.9	1.19
13	64.1	3.0	1.41
14	66.1	3.1	1.61
15	68.4	3.0	1.84
16	70.7	3.0	2.07
17	73.0	3.1	2.3
18	75.7	3.3	2.57
19	79.6	3.9	2.96
*Standard Error on T-score metric			

Pediatric v1.0 – Sleep-Related Impairment 8a			
<i>Short Form Conversion Table</i>			
Raw Summed Score	T-Score	T-Score SE*	Theta Score
8	37.4	5.7	-1.26
9	43.3	3.8	-0.67
10	45.9	3.3	-0.41
11	48.1	2.8	-0.19
12	49.7	2.5	-0.03
13	51.2	2.3	0.12
14	52.5	2.2	0.25
15	53.7	2.1	0.37
16	54.8	2.1	0.48
17	55.9	2.1	0.59
18	57.0	2.1	0.7
19	58.1	2.1	0.81
20	59.2	2.1	0.92
21	60.3	2.1	1.03
22	61.5	2.2	1.15
23	62.7	2.2	1.27
24	63.9	2.2	1.39
25	65.1	2.3	1.51
26	66.2	2.3	1.62
27	67.4	2.3	1.74
28	68.6	2.2	1.86
29	69.7	2.2	1.97
30	70.9	2.2	2.09
31	72.0	2.2	2.2
32	73.1	2.2	2.31
33	74.2	2.2	2.42
34	75.4	2.3	2.54
35	76.6	2.3	2.66
36	78.0	2.4	2.8
37	79.6	2.6	2.96
38	81.4	2.8	3.14
39	84.0	2.9	3.4
*Standard Error on T-score metric			

Parent Proxy v1.0 – Sleep-Related Impairment 4a			
<i>Short Form Conversion Table</i>			
Raw Summed Score	T-Score	T-Score SE*	Theta Score
4	40.0	6.4	-1
5	46.7	4.4	-0.33
6	50.7	3.7	0.07
7	54.0	3.0	0.4
8	56.5	2.8	0.65
9	58.7	2.8	0.87
10	61.1	2.8	1.11
11	63.7	2.9	1.37
12	66.4	2.9	1.64
13	68.9	3.1	1.89
14	71.3	3.1	2.13
15	73.8	3.0	2.38
16	76.1	2.9	2.61
17	78.4	3.0	2.84
18	80.9	3.2	3.09
19	84.3	3.0	3.43
*Standard Error on T-score metric			

Parent Proxy v1.0 – Sleep-Related Impairment 8a			
<i>Short Form Conversion Table</i>			
Raw Summed Score	T-Score	T-Score SE*	Theta Score
8	37.9	6.1	-1.21
9	43.8	4.5	-0.62
10	47.0	3.9	-0.3
11	49.6	3.3	-0.04
12	51.7	2.8	0.17
13	53.5	2.5	0.35
14	55.0	2.3	0.5
15	56.4	2.3	0.64
16	57.7	2.3	0.77
17	58.9	2.3	0.89
18	60.2	2.3	1.02
19	61.5	2.3	1.15
20	62.9	2.3	1.29
21	64.3	2.3	1.43
22	65.6	2.3	1.56
23	67.0	2.4	1.7
24	68.4	2.4	1.84
25	69.8	2.4	1.98
26	71.2	2.4	2.12
27	72.6	2.4	2.26
28	73.9	2.3	2.39
29	75.3	2.3	2.53
30	76.6	2.3	2.66
31	77.9	2.4	2.79
32	79.2	2.5	2.92
33	80.6	2.6	3.06
34	82.1	2.7	3.21
35	83.7	2.7	3.37
36	85.3	2.5	3.53
37	86.6	2.2	3.66

*Standard Error on T-score metric

**Early Childhood Parent-Report v1.0 - Sleep
Problems 4a**

Short Form Conversion Table

Raw Summed Score	T-Score	SE*
4	36.5	6.0
5	42.2	4.7
6	45.5	4.5
7	48.4	4.2
8	51.0	4.1
9	53.4	4.0
10	55.8	4.0
11	58.2	4.0
12	60.7	4.1
13	63.1	4.1
14	65.5	4.1
15	67.9	4.1
16	70.3	4.0
17	72.8	4.0
18	75.4	4.1
19	78.3	4.2
20	82.0	4.6
*SE = Standard Error on T-score metric		

Early Childhood Parent-Report v1.0 - Sleep Problems - Disturbance 4a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
4	37.4	6.2
5	43.3	5.0
6	46.8	4.7
7	49.8	4.4
8	52.5	4.3
9	55.0	4.2
10	57.5	4.2
11	59.9	4.2
12	62.3	4.3
13	64.7	4.3
14	67.1	4.3
15	69.5	4.3
16	71.9	4.3
17	74.4	4.3
18	77.1	4.3
19	80.0	4.4
20	83.5	4.6

*SE = Standard Error on T-score metric

Early Childhood Parent-Report v1.0 - Sleep Problems - Impairment 4a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
4	35.7	5.8
5	41.3	4.5
6	44.4	4.2
7	47.2	4.0
8	49.8	3.9
9	52.2	3.9
10	54.6	3.9
11	57.0	3.9
12	59.5	3.9
13	62.0	3.9
14	64.5	3.9
15	66.9	3.9
16	69.3	3.9
17	71.7	3.9
18	74.3	3.9
19	77.2	4.1
20	81.1	4.5
*SE = Standard Error on T-score metric		

Early Childhood Parent-Report v1.0 - Sleep Problems 8a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
8	33.7	5.5
9	38.5	4.2
10	41.2	3.8
11	43.4	3.5
12	45.2	3.3
13	46.9	3.2
14	48.4	3.1
15	49.8	3.0
16	51.2	3.0
17	52.6	3.0
18	53.9	3.0
19	55.2	3.0
20	56.6	3.0
21	57.9	3.0
22	59.2	3.0
23	60.6	3.0
24	61.9	3.0
25	63.3	3.0
26	64.6	3.0
27	65.9	3.0
28	67.2	3.0
29	68.6	3.0
30	69.9	3.0
31	71.2	3.0
32	72.5	3.0
33	73.9	3.0
34	75.2	3.0
35	76.6	3.0
36	78.1	3.1
37	79.7	3.1
38	81.5	3.3
39	83.6	3.5
40	86.3	3.8
*SE = Standard Error on T-score metric		