

NICOTINE DEPENDENCE

SCORING MANUAL

A brief guide to scoring the PROMIS® Smoking – Nicotine Dependence and PROMIS E-Cigarette Nicotine Dependence instruments:

ADULT
PROMIS Item Bank v1.0 – Smoking – Nicotine Dependence for All Smokers
PROMIS Item Bank v1.0 – Smoking – Nicotine Dependence for Daily Smokers
PROMIS Item Bank v1.0 – Smoking – Nicotine Dependence for Nondaily Smokers
PROMIS Short Form v1.0 – Smoking – Nicotine Dependence for All Smokers 4a
PROMIS Short Form v1.0 – Smoking – Nicotine Dependence for Daily Smokers 4a
PROMIS Short Form v1.0 – Smoking – Nicotine Dependence for Nondaily Smokers 4a
PROMIS Short Form v1.0 – Smoking – Nicotine Dependence for All Smokers 8a
PROMIS Short Form v1.0 – Smoking – Nicotine Dependence for Daily Smokers 8a
PROMIS Short Form v1.0 – Smoking – Nicotine Dependence for Nondaily Smokers 8a
PROMIS Bank v1.0 - E-Cigarette Nicotine Dependence
PROMIS Short Form v1.0 - E-Cigarette Nicotine Dependence 4a
PROMIS Short Form v1.0 - E-Cigarette Nicotine Dependence 8a

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.

There is only one version (v1.0) each for the Smoking and the E-Cigarette Dependence instruments. Scores for the Smoking – Nicotine Dependence and E-Cigarette Nicotine Dependence measures are on different scales. That is, scores from Smoking – Nicotine Dependence measures cannot be compared to scores from E-Cigarette Nicotine Dependence measures.

SCORING

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) (https://www.assessmentcenter.net/ac_scoring-service) 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.

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 a 4-item short form, the lowest possible raw score is 4; the highest possible raw score is 20 (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_scoringervice) to generate a final score.

For Smoking – Nicotine Dependence, there is one short form that is applicable for all smokers, regardless of daily/nondaily smoking status. However, there are three score conversion tables in Appendix 1; the All Smokers Short Form Conversion Table is appropriate for scoring smokers without considering their daily/nondaily status. The Daily and Nondaily Smokers Short Form Conversion Tables can be used when respondents' smoking status is known. If you are not sure which table to use, the All Smokers Short Form Conversion Table is recommended.

For E-Cigarette Nicotine Dependence, there is a 4-item and 8-item short form appropriate for all users irrespective of use status (i.e., daily vs. nondaily).

For both the Smoking and E-Cigarette short forms, locate the applicable score conversion table in Appendix 1. Use the appropriate table to translate the total raw summed score into a T-score for each participant. For example, for the adult PROMIS Nicotine Dependence All Smokers 8a short form, a raw score of 25 converts to a T-score of 50.7 with a standard error (SE) of 3.2 (see scoring table for the All Smokers 8a short form in Appendix 1). For the adult PROMIS E-Cigarette Nicotine Dependence 8a short form, a raw score of 25 converts to a T-score of 50.0 with a standard error (SE) of 2.5.

The Smoking – Nicotine Dependence scores are standardized relative to the daily smokers sample (i.e., the mean of the daily smokers is 50 with an SD of 10). Therefore, a person with a T-score of 40 is one SD below the daily smokers mean.

The E-Cigarette Nicotine Dependence scores are standardized relative to daily e-cigarette users (i.e., the mean of the daily e-cigarette users is 50 with an SD of 10). Therefore, a person with a T-score of 40 is one SD below the mean for daily e-cigarette users.

CAT: A minimum number of items (4 for adult CATs) must be answered in order to receive a score for the Smoking – Nicotine Dependence CAT or the E-Cigarette Nicotine Dependence CAT. 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), or the participant has answered the maximum number of questions (12), whichever occurs first.

INTERPRETING SCORES

For most PROMIS instruments, a T-score of 50 is the average for the United States general population with a standard deviation of 10 because calibration testing was performed on the general population. However, for the nicotine dependence instruments, 50 is the mean for the samples of individuals who smoke or vape, respectively. 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 Nicotine Dependence, a T-score of 60 is one SD worse than average. This means one is experiencing greater dependence than average. By comparison, a Nicotine Dependence T-score of 40 is one SD better than average, meaning that one is experiencing less dependence 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 $(T\text{-score} \pm (1.96 * SE))$. 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 (FAQs)

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 1—SCORING TABLES

Nicotine Dependence 4a <i>All Smokers Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
4	26.9	6.3
5	32.0	5.4
6	35.3	5.2
7	38.3	5.0
8	41.0	4.9
9	43.5	4.8
10	45.9	4.7
11	48.2	4.7
12	50.5	4.6
13	52.8	4.6
14	55.1	4.6
15	57.5	4.6
16	60.0	4.7
17	62.6	4.7
18	65.5	4.9
19	68.7	5.2
20	73.2	6.0
SE* = Standard Error on T-score metric		

Nicotine Dependence 8a <i>All Smokers Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
8	23.0	5.7
9	27.2	4.7
10	29.8	4.3
11	31.9	4.0
12	33.8	3.8
13	35.5	3.6
14	37.0	3.5
15	38.4	3.4
16	39.8	3.3
17	41.1	3.3
18	42.3	3.2
19	43.6	3.2
20	44.8	3.2
21	46.0	3.2
22	47.1	3.2
23	48.3	3.2
24	49.5	3.2
25	50.7	3.2
26	51.8	3.2
27	53.0	3.2
28	54.2	3.2
29	55.4	3.2
30	56.6	3.2
31	57.9	3.2
32	59.2	3.2
33	60.5	3.3
34	61.9	3.3
35	63.5	3.5
36	65.1	3.6
37	66.9	3.8
38	69.1	4.1
39	71.6	4.5
40	75.5	5.4
SE* = Standard Error on T-score metric		

Nicotine Dependence 4a <i>Daily Smokers Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
4	29.3	5.6
5	33.5	5.0
6	36.5	4.9
7	39.3	4.8
8	41.8	4.7
9	44.2	4.6
10	46.4	4.6
11	48.7	4.6
12	50.8	4.5
13	53.0	4.5
14	55.2	4.5
15	57.5	4.5
16	59.9	4.5
17	62.4	4.6
18	65.2	4.7
19	68.2	5.0
20	72.2	5.6
SE* = Standard Error on T-score metric		

Nicotine Dependence 8a <i>Daily Smokers Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
8	25.1	5.0
9	28.5	4.3
10	30.8	4.0
11	32.8	3.8
12	34.5	3.6
13	36.1	3.5
14	37.5	3.4
15	38.9	3.3
16	40.2	3.2
17	41.5	3.2
18	42.7	3.2
19	43.9	3.2
20	45.1	3.2
21	46.2	3.2
22	47.4	3.2
23	48.5	3.2
24	49.7	3.2
25	50.8	3.2
26	52.0	3.1
27	53.1	3.1
28	54.3	3.1
29	55.5	3.1
30	56.7	3.1
31	57.9	3.2
32	59.2	3.2
33	60.5	3.2
34	61.9	3.3
35	63.3	3.4
36	64.9	3.5
37	66.7	3.7
38	68.7	4.0
39	71.1	4.3
40	74.6	5.0
SE* = Standard Error on T-score metric		

Nicotine Dependence 4a <i>Nondaily Smokers Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
4	24.0	7.0
5	30.0	5.7
6	33.4	5.5
7	36.6	5.2
8	39.4	5.0
9	42.0	4.9
10	44.4	4.8
11	46.7	4.7
12	49.1	4.7
13	51.4	4.7
14	53.7	4.6
15	56.1	4.6
16	58.6	4.6
17	61.2	4.7
18	64.0	4.8
19	67.1	5.0
20	71.1	5.6
SE* = Standard Error on T-score metric		

Nicotine Dependence 8a <i>Nondaily Smokers Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
8	20.6	6.3
9	25.7	5.0
10	28.4	4.6
11	30.8	4.3
12	32.8	4.0
13	34.6	3.7
14	36.2	3.6
15	37.7	3.4
16	39.1	3.4
17	40.4	3.3
18	41.6	3.3
19	42.9	3.2
20	44.1	3.2
21	45.3	3.2
22	46.5	3.2
23	47.7	3.2
24	48.8	3.2
25	50.0	3.2
26	51.2	3.2
27	52.4	3.2
28	53.6	3.2
29	54.8	3.2
30	56.0	3.2
31	57.2	3.2
32	58.5	3.2
33	59.8	3.2
34	61.2	3.3
35	62.7	3.4
36	64.3	3.5
37	66.0	3.7
38	68.0	3.9
39	70.4	4.2
40	73.8	5.0
SE* = Standard Error on T-score metric		

E-Cigarette - Nicotine Dependence 4a <i>Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
4	36.2	5.9
5	41.7	4.3
6	44.0	4.2
7	46.3	3.9
8	48.3	3.6
9	50.2	3.5
10	51.9	3.4
11	53.6	3.3
12	55.2	3.3
13	56.8	3.3
14	58.4	3.3
15	60.1	3.3
16	61.9	3.4
17	63.9	3.5
18	66.2	3.7
19	68.8	4.0
20	73.6	5.2
SE* = Standard Error on T-score metric		

E-Cigarette - Nicotine Dependence 8a <i>Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
8	33.6	5.4
9	38.4	3.8
10	40.2	3.6
11	42.1	3.1
12	43.5	2.8
13	44.9	2.6
14	46.0	2.4
15	47.0	2.3
16	48.0	2.3
17	48.9	2.2
18	49.8	2.2
19	50.7	2.2
20	51.6	2.2
21	52.4	2.2
22	53.2	2.2
23	54.1	2.2
24	54.9	2.2
25	50.0	2.5
26	56.6	2.2
27	57.5	2.2
28	58.3	2.2
29	59.2	2.2
30	60.1	2.2
31	61.0	2.2
32	61.9	2.2
33	62.9	2.3
34	63.9	2.3
35	65.0	2.4
36	66.3	2.6
37	67.6	2.8
38	69.3	3.1
39	71.5	3.5
40	75.6	4.7
SE* = Standard Error on T-score metric		