



## Smoking – Nicotine Dependence

A brief guide to the PROMIS<sup>®</sup> Smoking – 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

### ABOUT SMOKING – NICOTINE DEPENDENCE

The PROMIS Smoking – Nicotine Dependence item banks assess multiple features that are associated with cigarette nicotine dependence. These items cover features such as smokers’ self-reported tolerance, craving, withdrawal severity, temptations to smoke, and smoking as a behavioral priority. The smoking – nicotine dependence short forms are universal rather than disease-specific. The item banks do not use a time frame (e.g. over the past seven days) when assessing smoking – nicotine dependence.

Smoking – nicotine dependence instruments are available for adults (ages 18+).

Items banks are available for all current smokers (PROMIS Item Bank v1.0 – Smoking – Nicotine Dependence for All Smokers), and specifically for daily smokers (PROMIS Item Bank v1.0 – Smoking – Nicotine Dependence for Daily Smokers) and nondaily smokers (PROMIS Item Bank v1.0 – Smoking – Nicotine Dependence for Nondaily Smokers). The three item banks share 20 common items. There are 7 additional items that are unique to the Daily Smokers bank and 7 additional items that are unique to the Nondaily Smokers bank.

In situations where smoking status is not known prior to computer administration, the All Smokers bank items and scoring algorithms should be used. However, where the smoking status of respondents is known, the Daily Smokers or Nondaily Smokers item banks and scoring algorithms may be more appropriate as these provide additional items and information specific to each status.

Two short forms are available with a 4-item version (PROMIS Short Form v1.0 – Smoking – Nicotine Dependence for All, Daily, and Nondaily Smokers 4a) and an 8-item version (PROMIS Short Form v1.0 – Smoking – Nicotine Dependence for All, Daily, and Nondaily Smokers 8a). Both short form versions are appropriate for use with all current smokers, regardless of daily/nondaily smoking status.

### INTRODUCTION TO ASSESSMENT OPTIONS

There are two administration options for assessing smoking – nicotine dependence: short forms and computerized adaptive test (CAT). 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 (20 items for the All Smokers bank, 27 items for the Daily Smokers bank and 27 items for the Nondaily Smokers 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 smoking – nicotine dependence 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 smoking – nicotine dependence 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.

Figure 1 illustrates the correlations (strength of relationship) of the full bank with CAT and with short forms of varying length. The correlation of CAT scores with the full bank score is greater than a short form of any length. A longer CAT or longer short form offers greater correlation, as well as greater precision. When evaluating precision, not all questions are equally informative. The flexibility of a CAT to choose more informative questions offers more precision.

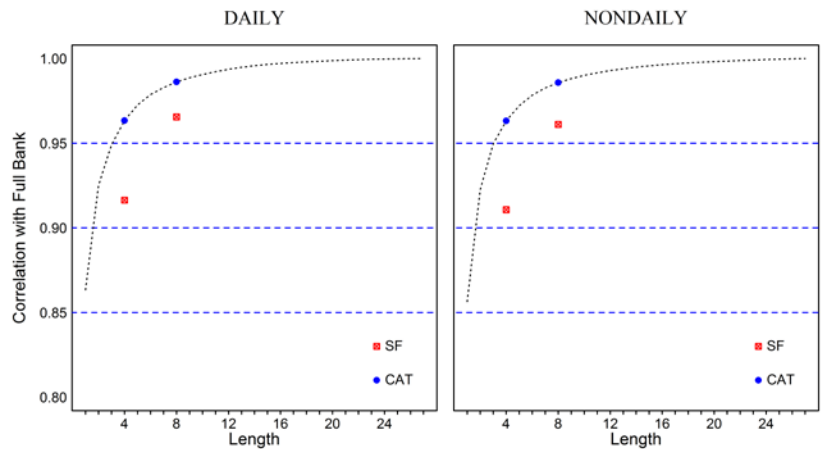


Figure 1

## 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) ([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., Assessment Center<sup>SM</sup>, 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 4-item 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\\_scoring-service](https://www.assessmentcenter.net/ac_scoring-service)) to generate a final score.

There is one common 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.

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 smoking bank 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.

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). Thus, the 95% confidence interval around the observed score ranges from 44.4 to 57.0 (T-score  $\pm$  (1.96\*SE) or 50.7  $\pm$  (1.96\*3.2)).

**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. 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.

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. 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 negatively-worded concepts like nicotine dependence, a T-score of 60 is one SD worse than average. By comparison, a nicotine dependence T-score of 40 is one SD better than average.

## STATISTICAL CHARACTERISTICS

There are four key features of the score for smoking – nicotine dependence:

- **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.

In Figure 2, the two dotted horizontal lines each represent a degree of internal consistency reliability (i.e., .80 or .90) typically regarded as sufficient for an accurate individual score. The shaded blue regions mark the ranges of the scales where measurement precision is comparable to the reliability of .80 for the eight-item form. Figure 2 also tells us where on the scales the forms are most informative based upon the T-score. The 8a short form (indicated by the black curve) is more informative than the 4a short form (indicated by the red curve).

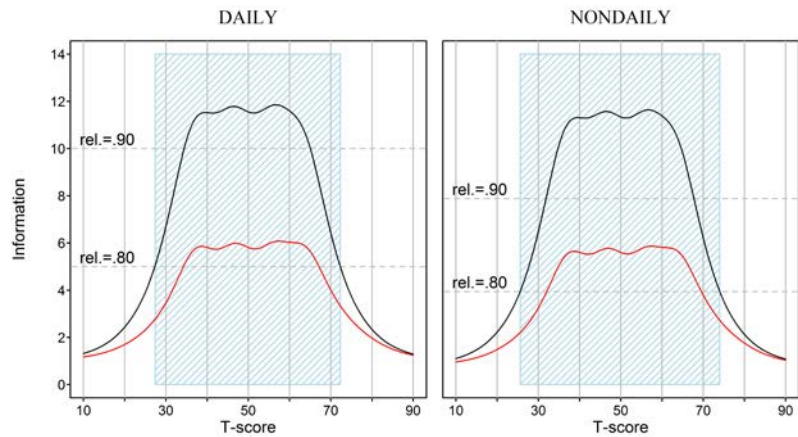


Figure 2

More information is available at [www.HealthMeasures.net](http://www.HealthMeasures.net).

### PREVIEW OF SAMPLE ITEM

Figure 3 is an excerpt from the paper version of the adult four-item short form. This is the paper version format used for all smoking – nicotine dependence instruments. It is important to note that the CAT is not available for paper administration.

		Never	Rarely	Sometimes	Often	Always
8MKNDP01	When I haven't been able to smoke for a few hours, the craving gets intolerable.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8MKNDP02	I find myself reaching for cigarettes without thinking about it.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

Figure 3



## FREQUENTLY ASKED QUESTIONS (FAQs)

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

Review the HealthMeasures website at [www.healthmeasures.net](http://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](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-SCORING TABLES

<b>Nicotine Dependence 4a</b> <i>All Smokers Short Form Conversion Table</i>		
<b>Raw Score</b>	<b>T Score</b>	<b>SE*</b>
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		

<b>Nicotine Dependence 8a</b> <i>All Smokers Short Form Conversion Table</i>		
<b>Raw Score</b>	<b>T Score</b>	<b>SE*</b>
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		



<b>Nicotine Dependence 4a</b>		
<i>Daily Smokers Short Form Conversion Table</i>		
<b>Raw Score</b>	<b>T Score</b>	<b>SE*</b>
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

<b>Nicotine Dependence 8a</b>		
<i>Daily Smokers Short Form Conversion Table</i>		
<b>Raw Score</b>	<b>T Score</b>	<b>SE*</b>
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



<b>Nicotine Dependence 4a</b> <i>Nondaily Smokers Short Form Conversion Table</i>		
<b>Raw Score</b>	<b>T Score</b>	<b>SE*</b>
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		

<b>Nicotine Dependence 8a</b> <i>Nondaily Smokers Short Form Conversion Table</i>		
<b>Raw Score</b>	<b>T Score</b>	<b>SE*</b>
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		