NICOTINE DEPENDENCE

MEASURE DIFFERENCES

A brief guide to differences between 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

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.

ABOUT E-CIGARETTE NICOTINE DEPENDENCE

The E-Cigarette Nicotine Dependence item bank assesses multiple features that are associated with e-cigarette nicotine dependence. Although the full measure and the two short forms are unidimensional (i.e., a single factor), items cover features such as tolerance, craving, withdrawal severity, and temptations to vape. The E-

Cigarette Nicotine Dependence item bank is generic rather than disease specific. It assesses e-cigarette nicotine dependence with no time frame specified. It includes 20 items.

E-Cigarette Nicotine Dependence instruments are available for adults (ages 18+).

E-Cigarette Dependence is assessed for all users irrespective of daily versus non-daily use status. There are three forms: the full, 20-item bank (PROMIS Item Bank v1.0 – E-Cigarette Nicotine Dependence for All Users), an 8-item short form (PROMIS Short Form v1.0 - E-Cigarette Nicotine Dependence for All Users 8a), and a 4-item short form (PROMIS Short Form v1.0 - E-Cigarette Nicotine Dependence for All Users 4a).

ASSESSMENT OPTIONS FOR SMOKING – NICOTINE DEPENDENCE AND E-CIGARETTE NICOTINE DEPENDENCE

There are two administration options for assessing Nicotine Dependence: 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 (20 items for the Smoking – Nicotine Dependence for All Smokers bank, 27 items for the Smoking – Nicotine Dependence for Daily Smokers bank, 27 items for the Smoking – Nicotine Dependence for Nondaily Smokers bank, and 20 items for E-Cigarette Nicotine Dependence bank). Although items differ across respondents taking a CAT, scores from the same CAT (e.g., E-Cigarette Nicotine Dependence CAT) are comparable across participants. However, please note that **Smoking - Nicotine Dependence scores are not directly comparable to E-Cigarette Nicotine Dependence scores.**

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 and E-Cigarette Nicotine Dependence short form and CAT instruments.

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 and 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 Smoking – Nicotine Dependence CATs and E-Cigarette Nicotine Dependence CAT), or the participant has answered the maximum number of questions (12), whichever occurs first.

CAT versus Short Form: 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 (e.g., 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 Smoking - Nicotine Dependence bank with CAT and with short forms of varying length for daily and nondaily smokers. 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. The same is true for E-Cigarette Nicotine Dependence.

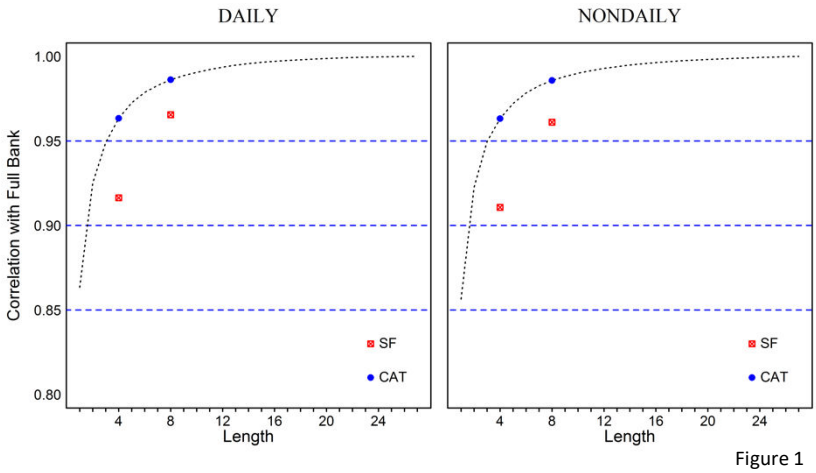

Figure 1

8-item versus 4-item Short Forms. Both Smoking – Nicotine Dependence and E-Cigarette Nicotine Dependence have 8-item and 4-item short forms. As indicated above, a longer form offers greater correlation with the full item bank and greater precision than a shorter form. Thus, a longer form should be used when time and resources permit. However, both the 4-item Smoking – Nicotine Dependence and E-Cigarette Nicotine Dependence short forms have adequate psychometric properties and can be used when time/resources are limited.

Selecting between daily, non-daily and all smokers for Smoking – Nicotine Dependence. In situations where you know the respondents smoke, not vape, you need to select between the Smoking – Nicotine Dependence measures for daily smokers, non-daily smokers, or all smokers. If smoking status is not known prior to administration, the All Smokers item bank and scoring algorithms should be used. However, when 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. For E-Cigarette Nicotine Dependence, measures are applicable to all users irrespective of daily versus non-daily use status.

DIFFERENCES AND SIMILARITIES BETWEEN SMOKING - NICOTINE DEPENDENCE AND E-CIGARETTE NICOTINE DEPENDENCE MEASURES

Although all cigarettes and most e-cigarettes contain nicotine, smoking and using e-cigarettes are different behaviors and are associated with different terminology (e.g., “smoking” versus “vaping” to describe engaging in the behavior). As such, nicotine dependence resulting from smoking should be assessed with the Smoking – Nicotine Dependence banks, and dependence resulting from using e-cigarettes should be assessed with the E-Cigarette Nicotine Dependence bank.

The Smoking – Nicotine Dependence and E-Cigarette Nicotine Dependence banks are very similar because the E-Cigarette Nicotine Dependence measure was developed by modifying the Smoking – Nicotine Dependence bank. As such, the wording of most items is identical across the two measures except that terminology related to smoking was modified to reflect e-cigarette use (e.g., “cigarette” to “e-cigarette” and “smoke” to “vape”). The measures also have slightly different response scales. For Smoking – Nicotine Dependence, response options for each item are “never,” “rarely,” “sometimes,” “often,” and “always.” For E-Cigarette Nicotine Dependence, the final response was changed to “almost always” with the goal of increasing the number of people who may endorse the response; “almost always” is less absolute than “always.”

Despite the similarities in the measures, statistical analyses indicate that **Smoking - Nicotine Dependence scores cannot be compared directly to E-Cigarette Nicotine Dependence scores.**

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 negatively-worded concepts like Nicotine Dependence, a T-score of 60 is one SD worse than average (i.e., a person is experiencing more dependence than average). By comparison, a Nicotine Dependence T-score of 40 is one SD better than average (i.e., a person is experiencing less dependence than average). Despite the similarities in the measures, statistical analyses indicate that **Smoking - Nicotine Dependence scores cannot be compared directly to E-Cigarette Nicotine Dependence scores.**

STATISTICAL CHARACTERISTICS

There are four key features of the scores for Smoking – Nicotine Dependence and E-Cigarette 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 (Smoking – Nicotine Dependence), 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

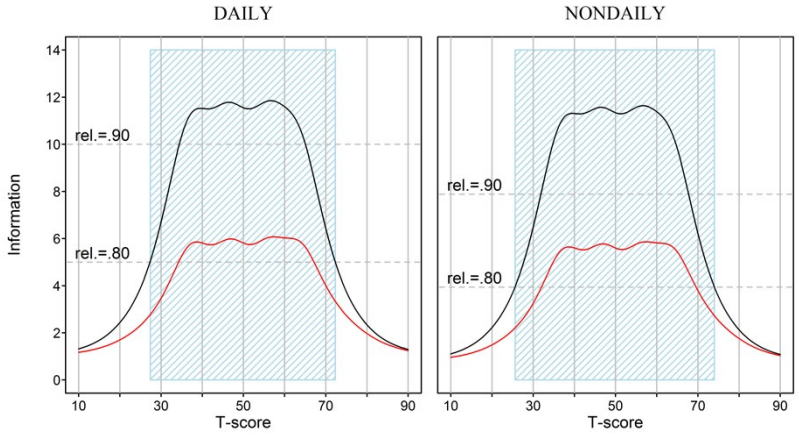

Figure 1

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).

Similarly, in Figure 3 (E-Cigarette Nicotine Dependence), you can see that the full item bank (red curve) is more informative than the 8a short form (blue curve), which, in turn, is more informative than the 4a short form (green curve).

More information is available at www.HealthMeasures.net.

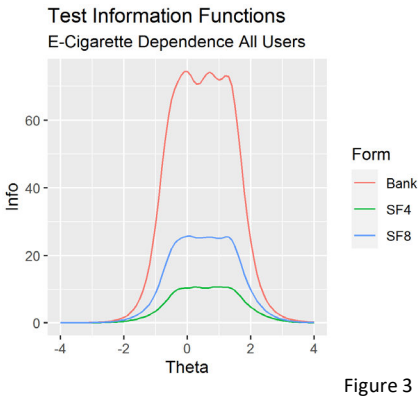

Figure 3

PREVIEW OF SAMPLE ITEMS

Figure 4 is an excerpt from the paper version of the adult Smoking – Nicotine Dependence four-item short form, and Figure 5 is an excerpt from the paper version of the adult E-cigarette Nicotine Dependence four-item short form. It is important to note that the CAT is not available for paper administration.

		Never	Rarely	Sometimes	Often	Always
SMKNDEP01	When I haven't been able to smoke for a few hours, the craving gets intolerable…...	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SMKNDEP02	I find myself reaching for cigarettes without thinking about it……	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Figure 4

		Never	Rarely	Sometimes	Often	Almost Always
EDS_4	When I haven't been able to vape for a few hours, the craving gets intolerable….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
EDS_1	I find myself reaching for my e-cigarette without thinking about it. …….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Figure 5

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: 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_scoringservice).