ASTHMA IMPACT

A brief guide to the PROMIS Asthma Impact instruments:

PEDIATRIC	PARENT PROXY
PROMIS Pediatric Item Bank v1.0 – Asthma Impact PROMIS Pediatric Short Form v1.0 – Asthma Impact 8a	PROMIS Parent Proxy Item Bank v1.0 – Asthma Impact PROMIS Parent Proxy Short Form v1.0 – Asthma Impact 8a

ABOUT ASTHMA IMPACT

The PROMIS Pediatric and Parent Proxy Asthma Impact item banks assess symptoms and impacts specific to asthma that are not adequately captured by other general item banks. Asthma specific symptoms include cough, wheeze, shortness of breath, and avoidance of triggers. Asthma is also associated with impacts such as missing school or activities with other children.

Asthma Impact instruments are available for pediatric self-report (ages 8-17) and for parents serving as proxy reporters for their child (youth ages 5-17).

(For complete definition see http://nihpromis.org/measures/domainframework1)

INTRODUCTION TO ASSESSMENT OPTIONS

There are two administration options for assessing Asthma Impact: 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 CAT, participant responses guide the system's choice of subsequent items from the full item bank (17 items in total). Although items differ across respondents taking 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 CAT. This guide provides information on all Asthma Impact 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 asthma impact represented by all items in the item bank. When choosing between CAT and a 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.

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.

WHICH CALIBRATION SAMPLE SHOULD I USE?

The PROMIS Parent Proxy instruments have two calibration samples – Parent Proxy and Parent Proxy without Local Dependence. The former includes calibrations for all items. This is the default calibration sample. If you aren't sure which calibration sample to use, utilize this one. The Parent Proxy without Local Dependence does not include calibrations for some items. When using the Scoring Service, use the default calibration sample (e.g., "Parent Proxy"). Other calibration samples may exist from past research.

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 utilize scoring tools within Assessment Center or API that look at responses to each item for each participant. Data collected in either of these platforms will automatically score in this way. We refer to this as "response pattern scoring." Response pattern scoring can be used when data was collected on paper or in another software package through the Assessment Center Scoring Service. Because response pattern scoring is more accurate than the use of raw score/scale score look up tables, it is preferred. However, if you aren't able to use response pattern scoring, you can use the instructions below which rely on raw score/scale score look-up tables.

For pediatrics and parent proxy, each question has five response options ranging in value from zero to four. 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 pediatric 8-item form, the lowest possible raw score is 0; the highest possible raw score is 32 (see all short form scoring tables in Appendix).

A score can be approximated if a participant skips a question. If items are missing, first check how many items were answered. For short forms with at least 5 items, confirm that 4 or 50% of items, whichever is greater, were answered. For example, a 4-item short form can only be scored with complete data. A 5-item short form can be scored as long as 4 items were answered. A 10-item short form can be scored as long as the participant answered at least 5 items. For branched instruments (e.g., Alcohol Use), the screening question is not used in calculating the score and therefore shouldn't be counted when assessing if the minimum number of items were answered. After confirming that enough responses were provided, sum the response scores from the items that were answered (not including any screening question). Multiply this sum by the total number of items in the short form. Finally, divide by the number of items that were answered. For example, if a respondent answered 5 of 8 questions and answered all items with the second lowest response option (2), you would sum all responses (10), multiply by the number of items in the short form (8) and divide by the number of items that were answered (5). Here (10x8)/5=16. If the result is a fraction, round up to the nearest whole number. This is a pro-rated raw score.

Again, the formula is:

$$\frac{\text{(Raw sum x number of items on the short form)}}{\text{Number of items that were actually answered}}$$

Locate the applicable score conversion table in Appendix and use this table to translate the total raw score or pro-rated 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. It is important to note that Assessment Center will convert a participant's pattern of responses to a

standardized T-score after they have finished a CAT. The standardized T-score is reported as the final score for each participant.

For the pediatric Asthma Impact 8a short form, a raw score of 10 converts to a T-score of 48.4 with a standard error (SE) of 3.0 (see scoring table for the 8a short form in appendix). Thus, the 95% confidence interval around the observed score ranges from 42.5 to 54.3 (T-score $\pm$ (1.96*SE) or 48.4 $\pm$ (1.96*3.0).

For pro-rated scores, this calculation assumes that responses are missing at random. This isn't always true. Therefore, use caution when interpreting the final pro-rated T-score.

CAT: A minimum number of items (5 for Peds and Parent Proxy CATs) must be answered in order to receive a score for Asthma Impact CAT. The first item is selected because it provides the most information about the U.S. general population. The response to this item will guide the system's choice of the next item for the participant. The participant's response to this 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, 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. However, Asthma Impact instruments were not calibrated on a national sample and so a score of 50 represents the average of the calibration sample which was generally more enriched for chronic illness. As these instruments, a score of 50 likely represents somewhat sicker people than the general population. 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 Asthma Impact, a T-score of 60 is one SD higher than average for kids with asthma. By comparison, an Asthma Impact T-score of 40 is one SD below average for kids with asthma.

STATISTICAL CHARACTERISTICS

There are four key features of the score for Asthma Impact:

- **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 online via Assessment Center (assessmentcenter.net).

PREVIEW OF SAMPLE ITEM

Figure 1 shows a pediatric Asthma Impact item from the full item bank as it would appear to a study participant during data collection in Assessment Center. Several formats for presenting the items are available for computer-based administration through Assessment Center (see FAQ section).

	In the past 7 days…..	Never	Almost Never	Sometimes	Often	Almost Always
5304R1	I felt scared that I might have trouble breathing because of my asthma.	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
2bR2	My chest felt tight because of my asthma.	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

Figure 1

Figure 2 is an excerpt from the paper version of the adult eight-item short form. This is the paper version format used for all Asthma Impact instruments. It is important to note, CAT is not available for paper administration.

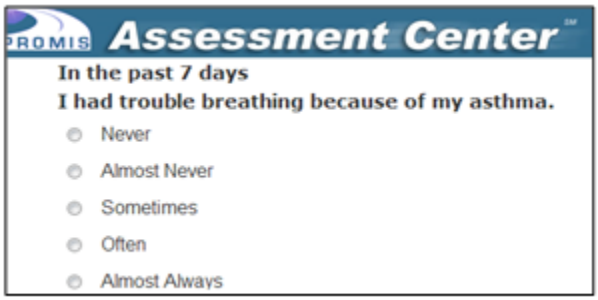

Figure 2

FREQUENTLY ASKED QUESTIONS (FAQ)

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

All instruments are available on the PROMIS website through Assessment Center, which houses all PROMIS instruments for each domain.

Assessment Center is a free online research management tool. It enables researchers to create study-specific websites for capturing participant data securely. Studies can include measures within the Assessment Center library, as well as custom instruments created or entered by the researcher. PROMIS instruments (short forms, CATs, profiles) are a central feature of the instrument library within Assessment Center. Any PROMIS measure can be included in an online study or downloaded for administration on paper.

Detailed statistical information and development history about PROMIS items and instruments are available for review at nihpromis.org or assessmentcenter.net. To learn more, contact help@assessmentcenter.net.

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

Yes, to get a copy of these instruments, we ask that you register with Assessment Center and endorse the PROMIS Terms and Conditions of Use, so that we are better able to track who has accessed instruments for research. Assessment Center is available at assessmentcenter.net.

Q: *Are these instruments available in other languages?*

Yes, these instruments are currently available in Spanish in Assessment Center. The PROMIS group is also working to translate this form into other languages. Information on available translations is updated periodically at http://nihpromis.org/measures/translations.

Q: Can I make my own short form?

Yes, custom Asthma Impact short forms can be made by selecting any items from the item bank. Instructions for creating a custom short form in Assessment Center can be found in the Assessment Center User Manual https://www.assessmentcenter.net/UserManuals.aspx.

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?*

This question is related to an area of active research in the PROMIS network, namely the determination of the "minimally important difference" or "MID" for a PROMIS instrument. A manuscript in the *Journal of Clinical Epidemiology* outlines the process for MIDs for adult PROMIS measures and estimates the MIDs for six PROMIS-Cancer scales: Yost, K. J., Eton, D. T., Garcia, S. F., & Cella, D. (2011). Minimally important differences were estimated for six PROMIS-Cancer scales in advanced-stage cancer patients. *Journal of Clinical Epidemiology, 64(5)*, 507-16.

As described in that manuscript, the MID is a tool to enhance the interpretability of patient-reported outcomes and is often defined as the "the smallest difference in score in the domain of interest which patients perceive as beneficial and which would mandate, in the absence of troublesome side effects and excessive cost, a change in the patient's management" (Jaeschke R, Singer J, Guyatt GH. Measurement of health status. Ascertaining the minimal clinically important difference. *Controlled Clinical Trials* 1989; 10(4):407-415).

APPENDIX-SCORING TABLES

Asthma Impact 8a *Short Form Conversion Table*		
Raw Score	**T-score**	**SE***
0	31.5	5.2
1	35.8	4.0
2	37.7	3.9
3	39.7	3.5
4	41.2	3.3
5	42.6	3.2
6	43.9	3.1
7	45.1	3.0
8	46.2	3.0
9	47.3	3.0
10	48.4	3.0
11	49.5	3.0
12	50.5	3.0
13	51.5	3.0
14	52.5	3.0
15	53.6	3.0
16	54.6	3.0
17	55.6	3.0
18	56.6	3.0
19	57.6	3.0
20	58.7	2.9
21	59.7	2.9
22	60.8	2.9
23	61.8	2.9
24	62.9	2.9
25	64.0	3.0
26	65.2	3.0
27	66.4	3.1
28	67.8	3.2
29	69.2	3.3
30	70.9	3.6
31	72.8	3.8
32	76.2	4.5
* SE = Standard error		

Pediatric version

Parent Proxy Asthma Impact 8-item Short Form Conversion Table		
Summed Raw Score	**Standard T-Score**	**SE***
0	32	6
1	39	4
2	41	3
3	43	3
4	44	2
5	46	2
6	47	2
7	48	2
8	49	2
9	50	2
10	51	2
11	52	2
12	53	2
13	54	2
14	55	2
15	56	2
16	58	2
17	59	2
18	60	2
19	61	2
20	63	2
21	64	2
22	65	2
23	66	2
24	67	2
25	68	2
26	69	2
27	70	2
28	71	2
29	73	2
30	74	3
31	76	3
32	80	5
*SE = Standard Error on T-score metric		

Parent Proxy version