Patient-Reported Outcomes Measurement Information System
Dynamic Tools to Measure Health Outcomes From the Patient Perspective

PHYSICAL FUNCTION

A brief guide to the PROMIS Physical Function instruments:

ADULT	ADULT CANCER	PEDIATRIC	PARENT PROXY
PROMIS Bank v1.0 - Physical Function PROMIS Bank v1.0 – Physical Function for Samples with Mobility Aid Users PROMIS Bank v1.1 - Physical Function PROMIS Bank v1.2 – Mobility PROMIS Bank v1.2 – Physical Function PROMIS Bank v1.2 – Upper Extremity PROMIS Short Form v1.0 – Physical Function 4a PROMIS Short Form v1.0-Physical Function 6a PROMIS Short Form v1.2 – Physical Function 6b PROMIS Short Form v1.0-Physical Function 8a PROMIS Short Form v1.2 – Physical Function 8b PROMIS Short Form v1.0 – Physical Function 10a PROMIS Short Form v1.0 – Physical Function Samples with Mobility Aid Users 11a PROMIS Short Form v1.0 - Phys. Function 12a PROMIS Short Form v1.0 – Physical Function 20a	PROMIS-Ca Bank v1.0 – Physical Function PROMIS-Ca Bank v1.1 – Physical Function	PROMIS Pediatric Bank v1.0 – Mobility PROMIS Pediatric Short Form v1.0 – Mobility 8a PROMIS Pediatric Bank v1.0 – Upper Extremity PROMIS Pediatric Short Form v1.0 – Upper Extremity 8a	PROMIS Parent Proxy Bank v1.0 – Mobility PROMIS Parent Proxy Bank v1.0 – Upper Extremity PROMIS Parent Proxy Short Form v1.0 – Mobility 8a PROMIS Parent Proxy Short Form v1.0 – Upper Extremity 8a

ABOUT PHYSICAL FUNCTION

Physical Function measures self-reported capability rather than actual performance of physical activities. This includes the functioning of one's upper extremities (dexterity), lower extremities (walking or mobility), and central regions (neck, back), as well as instrumental activities of daily living, such as running errands. A single Physical Function capability score is obtained from a short form. Each Physical Function short form is appropriate for the adult general population and adults with chronic health conditions. The forms are universal rather than disease-specific. Each form assesses current function rather than function over a specified time period.

Physical Function instruments are available for adults (ages 18+), pediatric self-report (ages 8-17) and for parents serving as proxy reporters for their child (youth ages 5-17). Pediatric and parent proxy instruments were developed for each Physical Function sub-domains of Mobility and Upper Extremity.

Physical Function for Samples with Mobility Aid Users instruments are available for adults (ages 18+).

MOBILITY

Focuses on activities of physical mobility such as getting out of bed or a chair to activities such as running.

UPPER EXTREMITY

Focuses on activities that require use of the upper extremity including shoulder, arm, and hand activities. Examples include writing, using buttons, or opening containers.

(For complete definition see http://nihpromis.org/measures/domainframework2)

INTRODUCTION TO ASSESSMENT OPTIONS

There are two administration options for assessing Physical Function: 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 (121 items in total in adult bank). 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 Physical Function 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 physical function 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.

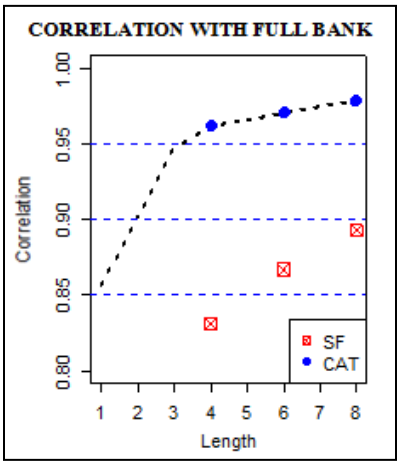


Figure 1

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 CAT to choose more informative questions offers more precision.

Some PROMIS domains have multiple versions of instruments (i.e. Item Banks/Computerized Adaptive Tests (CATs) and Short Forms). Generally, it is recommended that you use the most recent version available which can be identified as the instruments with the highest version number.

Instruments are changed for various reasons. For example, the original PROMIS Bank version 1.0 – Physical Function included 124 items after being tested in a diverse sample. Later, during an effort to translate instrument items into multiple languages, translation challenges were identified. Therefore, minor modifications to the English source items were required (e.g. metric equivalents to measurements such as "Over 10 pounds/ 5 kg" were added). These modifications (19 in total) resulted in the creation of a version 1.1 item bank. Later, version 1.2 was created by eliminating three items due to restrictions in their use.

In most cases, an instrument that has a decimal increase (v1.0 to v1.1 or v1.2) 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 example, the PROMIS Bank

v1.0 – Satisfaction with Participation in Social Roles is a small item bank comprised of 14 role function items. While the PROMIS Bank v2.0 – Satisfaction with Social Roles and Activities instrument includes a broader range of item content. Version 2.0 was re-calibrated independent of version 1.0, and is a larger (44 items), superior item bank. Details on the specific differences between instrument versions can be found in scoring manuals available on the Assessment Center homepage.

SHORT FORM DIFFERENCES

You will notice that there are 5 Physical Function short forms for adults. Items in the 4a, 6a, and 8a short forms were selected based on rankings using two psychometric criteria: (1) maximum interval information; and 2) CAT simulations. Item rankings were similar for both criteria. For the maximum interval criterion, each item information function was integrated (without weighting) for the interval from the mean to 2 SDs worse than the mean. For the CAT simulations, responses to all items in each bank were generated using a random sample of 1,000 simulees drawn separately for each bank (centered on 0.5 SD worse than the general population mean). Items were rank ordered based on their average administration rank over the simulees. Content experts reviewed the items and rankings and made cuts of 4, 6, and 8 items. For each domain, 4-item, 6-item and 8-items have been selected so that the items are nested/overlap (e.g., the 8-item form is the 6-item form plus two additional items). The 4a, 6a, and 8a short forms can be administered with short forms of similar length from other domains (Depression, Anxiety, Pain Interference, Fatigue, Sleep Disturbance, and Satisfaction with Participation in Social Roles v1.0) as part of a PROMIS Profile (see PROMIS-29, 43 or 57 Profile v2.0), though they can also be administered individually.

The original short forms (10a, 20a) were constructed by the domain team with a focus on representing the range of the trait and also representing the content of the item bank. Domain experts reviewed short forms to give input on the relevance of each item. Each domain group worked independently and the original short forms are 6-10 items long depending on the domain. Psychometric properties and clinical input were both used and likely varied in importance across domains.

In selecting between short forms, the difference is instrument length. The reliability and precision of the short forms within a domain is highly similar. If you are working with an adult sample in which you wanted the most precise measure, select the 8a short form. If you are working in an adult sample in which you expected huge variability in a domain area and wanted different subdomains covered, you should select the 10a (or 20a if space allows) short form. If you had little room for additional measures but really wanted to capture something as a secondary outcome, you should use one of the shorter instruments (4a, 6a). For pediatric self-report and parent proxy report, there is only one short form available per sub-domain.

For adults, there are multiple versions of the item bank –v1.2 and Physical Function for Samples with Mobility Aid Users. Physical Function v1.2 is the current item bank. It was initially released as v1.0. A v1.1 included minor revisions to 19 items in order to improve translatability. Revisions consist of adding equivalent metric conversion and other minor changes to item wording. Item calibrations in v1.1 remain identical to version 1.0. Version 1.2 retains these improved items and calibrations but removes 2 items. The Physical Function for Samples with Mobility Aid Users item bank also started with the v1.0 item bank. It was further refined in order to be more useful in samples where some participants utilize mobility aids such as wheelchairs. There are two screening questions that ask about one's ability stand and to walk. Based on responses to the screening items, the computerized adaptive test selects subsets of relevant items. Specifically, if an individual is not able to walk or stand, items asking about being able to walk specific distances or jog are not eligible for administration. Likewise, short forms from the Physical Function for Samples with Mobility Aid Users item bank include

screening items and skip logic. Note that this is not a bank intended only for those who use mobility aids. No items ask specifically about mobility aid use.

SELECTING THE ADULT CANCER INSTRUMENT

In selecting whether to use the adult cancer instrument (PROMIS-Ca) for this domain, it is important to consider the patient population being studied. All PROMIS-Ca instruments were developed for use with any cancer patient. This was done by having content experts review the adult PROMIS item bank to determine if there was a need to develop additional items or remove items because they conveyed a different meaning in cancer. Next, calibration testing with cancer patients with different diagnoses and treatments was conducted and data was analyzed to determine the final set of items and calibrations. The PROMIS-Ca Physical Function CAT contains a total of 45 items, 38 of which are also in the PROMIS Physical Function CAT. Some PROMIS-Ca items use calibrations that are different from the PROMIS adult calibrations. The Cancer calibration sample is selected by default when you add the PROMIS-Ca CATs to a study in Assessment Center. There are no short form instruments created specifically for an adult cancer population in Assessment Center.

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. The items without calibrations are enemy items. That is, a dyad or triad of items was identified in which there are psychometric reasons to only administer one of those items to a given respondent. For example, item Pf1mobil1 and Pf1mobil3 are enemy items. A participant should only see one of these items in a CAT.

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 adults, each question has five response options ranging in value from one to five (for pediatrics and parent proxy it is 0 to 4). 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 10-item form, the lowest possible raw score is 10; the highest possible raw score is 50 (see all short form scoring tables in Appendix 1). Within the Pediatric Upper Extremity short form, there are two items (3880R2 and 3881R1) with collapsed response categories. These items have response options scored as 3=With no trouble, 2=With a little trouble, 1=With some trouble, 0=With a lot of trouble, 0=Not able to do. This scoring should be implemented prior to summing up all responses.

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 1 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 adult PROMIS Physical Function 10a short form, a raw score of 10 converts to a T-score of 14.1 with a standard error (SE) of 3.3 (see scoring table for the 10a short form in Appendix 1). Thus, the 95% confidence interval around the observed score ranges from 7.7 to 20.5 (T-score $\pm$ (1.96*SE) or 14.1 $\pm$ (1.96*3.3).

For the PROMIS Short Form v1.0 – Physical Function for Samples with Mobility Aid Users 11a, don't include screening items for this instrument in the score. Answer 8 items, create a summed score and use the correct table located in the Appendix.

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.

When calculating the raw score for a short form from the Physical Function for Samples with Mobility Aid Users item bank, do not include the score from any screening items in the raw score sum.

There is a PROMIS Physical Function short form (PROMIS SF v1.0 – Physical Function 12a) that has been integrated into Epic, an electronic medical record system. This includes one screening item about the ability to walk. Based on the participant's response, some items may be skipped. The screening item is not used in calculating the final score. If you utilized this instrument in Epic, scores should be produced automatically. Scoring tables can be referenced in Appendix 1.

CAT: A minimum number of items (4 for adult and adult cancer CATs and 5 for Peds and Parent Proxy CATs) must be answered in order to receive a score for Physical Function CAT. The first item is selected because it provides the most information about the U.S. general population (or a general cancer population in the case of the adult cancer instruments). 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, adult cancer, pediatric and parent proxy 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 (i.e. cancer). In 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. Physical Function v1.2 includes minor revisions to 17 items in order to improve translatability. Revisions consist of adding equivalent metric conversion and other minor revisions to the item wording. Item calibrations in v1.2 remain identical to version v1.1.

For Parent Proxy Upper Extremity, there are instances when items collapse two response categories together because of infrequent responses in one of those categories. This means that the two responses are treated identically in an IRT model. When response categories are collapsed, you should change the response scores to reflect which categories are collapsed (i.e., the collapsed categories should have the same response score).

Important: *A higher PROMIS T-score represents more of the concept being measured.* For positively-worded concepts like Physical Function, a T-score of 60 is one SD better than average. By comparison, a Physical Function T-score of 40 is one SD worse than average.

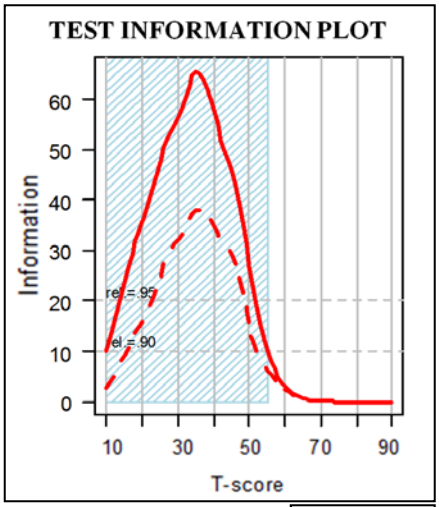


Figure 2

STATISTICAL CHARACTERISTICS

There are four key features of the score for Physical Function:

- **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 (adult 10a short form), the two dotted horizontal lines each represent a degree of internal consistency reliability (i.e., .90 or .95) typically regarded as sufficient for an accurate individual score. The shaded blue region marks the range of the scale where measurement precision is comparable to the reliability of .90 for the 20-item form. Figure 2 also tells us where on the scale the forms are most informative based upon the T-score: the 20-item form is more informative than the 10-item form, and the 20-item form offers sufficient reliability over a wider range of T-scores than the 10-item form.

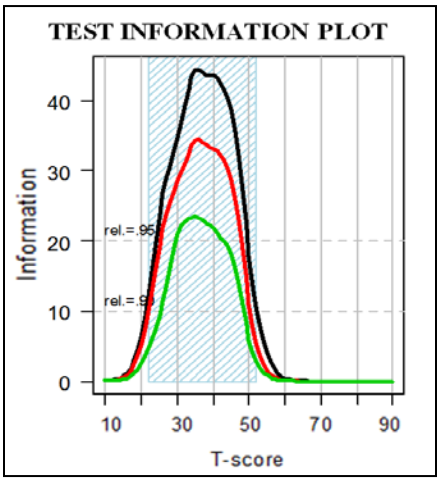


Figure 3

Figure 3 (Adult 4a, 6a & 8a short forms) also tells us where on the scale the form is most informative based upon the T-score: the 8-item form is more informative than the 6-item form, which is more informative than the 4-item form. See additional test information figures for Pediatric and Parent Proxy instruments in Appendix 2.

Figure 4 is a sample of the statistical information available in Assessment Center for the adult Physical Function CAT.

More information is available online via Assessment Center (assessmentcenter.net).

Scaling Model Used For Calibration	Graded Response Model (GRM)
Total Number of Items	124

Sample	N	Alpha Reliability
PROMIS Wave 1 Full Bank	1700	0.99

Score Distributions									
	Mean	SD	P5	P10	P25	P50	P75	P90	P95
Raw	559.50	73.94	392.85	463.27	540.17	584.82	610.82	620.53	624.29
Scale	50.00	9.99	27.46	36.98	47.38	53.42	56.94	58.25	58.76

										Min	Max
Scale Score	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	10.0	90.0
SE	.10	.10	.10	.10	.10	.20	.40	.90	2.40		
Reliability	.98	.99	.99	.99	.99	.95	.80	.13	.00		

Figure 4

PREVIEW OF SAMPLE ITEM

Figure 5 shows a Physical Function item from the adult 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).

Figure 6 is an excerpt from the paper version of the adult ten-item short form. This is the paper version format used for all Physical Function instruments. It is important to note, CAT is not available for paper administration.

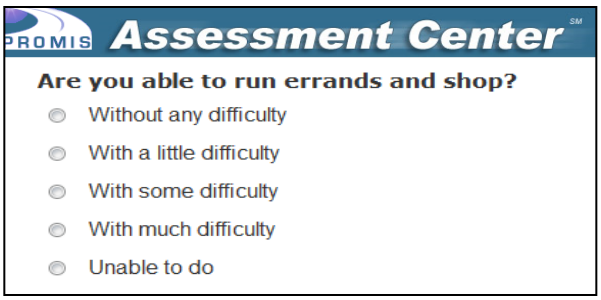
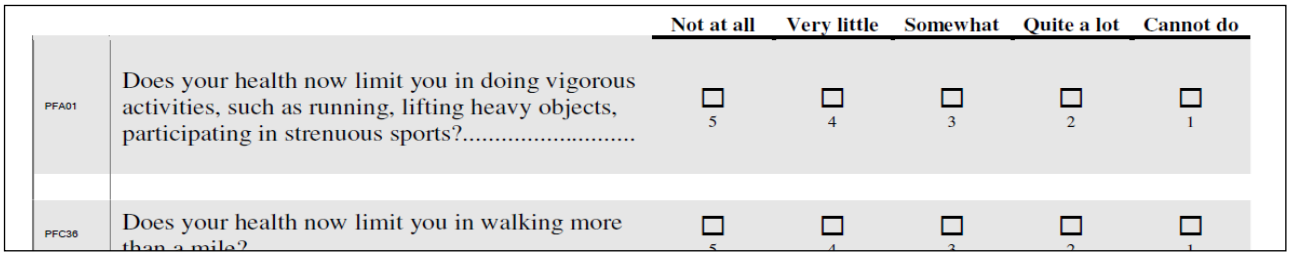


Figure 5



		Not at all	Very little	Somewhat	Quite a lot	Cannot do
PFA01	Does your health now limit you in doing vigorous activities, such as running, lifting heavy objects, participating in strenuous sports?.....	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
PFC36	Does your health now limit you in walking more than a mile?	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

Figure 6

DATA REPORTS

Upon completion of a CAT for adult Physical Function, Depression, Anxiety, Pain Interference, Fatigue, Sleep Disturbance, and Satisfaction with Participation in Social Roles v1.0, a data report is available in Assessment Center. Figure 7 demonstrates some of the information available on the data reports.

To access a sample report for Physical Function, complete the CAT demo at nihpromis.org. More than one CAT domain can be completed at a time; results for all domains selected will be generated and displayed within the one report.

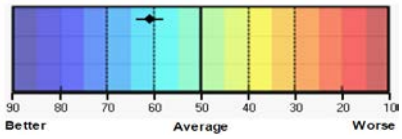
Data reports are also available if you choose to administer an adult PROMIS Profile instrument, which includes a short form from seven PROMIS domains (Physical Function, Depression, Anxiety, Fatigue, Pain Interference, Satisfaction with Participation in Social Roles, and Sleep Disturbance).

Your score on the Physical Function CAT is __. The average score is 50. Your score indicates that your level of physical function is higher (better) than:

· __ percent of people in the general population

· __ percent of (age group)

· __ percent of (gender)



Your score is shown below on the graph. The diamond (♦) is placed where we think your score lies. It represents your T-score, which is a standardized measure that is based on an average score of 50, based on responses to the same questions by the general population in the United States.

Figure 7

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?*

Physical Function instruments are currently available in Spanish in Assessment Center. Upper Extremity instruments, Mobility instruments, and Physical Function Samples with Mobility Aid Users instruments are not currently available in multiple languages 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 Physical Function 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 1-SCORING TABLES

Physical Function 10a
Short Form Conversion Table

Raw Score	T-score	SE*
10	14.1	3.3
11	17.0	2.8
12	18.7	2.7
13	20.1	2.5
14	21.3	2.4
15	22.4	2.3
16	23.4	2.2
17	24.4	2.2
18	25.3	2.1
19	26.2	2.0
20	27.1	2.0
21	28.0	1.9
22	28.8	1.9
23	29.6	1.9
24	30.4	1.8
25	31.2	1.8
26	32.0	1.8
27	32.7	1.7
28	33.5	1.7
29	34.2	1.7
30	35.0	1.7
31	35.7	1.7
32	36.4	1.7
33	37.2	1.7
34	37.9	1.7
35	38.7	1.7
36	39.4	1.7
37	40.2	1.8
38	41.0	1.8
39	41.8	1.8
40	42.6	1.8
41	43.5	1.9
42	44.4	2.0
43	45.4	2.0
44	46.4	2.2
45	47.7	2.4
46	49.1	2.6
47	50.8	3.0
48	53.0	3.4
49	55.3	3.7
50	61.7	5.9

*SE = Standard Error on T-score metric

Physical Function 20a
Short Form Conversion Table

RS	TS	SE	RS	TS	SE
20	12.1	1.5	60	32.9	1.4
21	12.8	1.8	61	33.3	1.4
22	13.7	1.9	62	33.7	1.3
23	14.7	2.0	63	34.1	1.3
24	15.6	2.0	64	34.5	1.3
25	16.4	1.9	65	34.9	1.3
26	17.2	1.9	66	35.3	1.3
27	17.9	1.9	67	35.7	1.3
28	18.5	1.8	68	36.1	1.3
29	19.2	1.8	69	36.5	1.3
30	19.8	1.7	70	36.9	1.3
31	20.3	1.7	71	37.3	1.3
32	20.9	1.7	72	37.7	1.3
33	21.4	1.7	73	38.1	1.3
34	21.9	1.6	74	38.5	1.4
35	22.4	1.6	75	38.9	1.4
36	22.9	1.6	76	39.3	1.4
37	23.4	1.6	77	39.8	1.4
38	23.8	1.6	78	40.2	1.4
39	24.3	1.6	79	40.7	1.4
40	24.7	1.5	80	41.1	1.4
41	25.2	1.5	81	41.6	1.4
42	25.6	1.5	82	42.1	1.5
43	26.0	1.5	83	42.6	1.5
44	26.5	1.5	84	43.1	1.5
45	26.9	1.5	85	43.6	1.5
46	27.3	1.5	86	44.2	1.5
47	27.7	1.5	87	44.7	1.6
48	28.1	1.5	88	45.3	1.6
49	28.5	1.4	89	46.0	1.7
50	28.9	1.4	90	46.6	1.7
51	29.3	1.4	91	47.4	1.8
52	29.7	1.4	92	48.2	1.9
53	30.1	1.4	93	49.0	2.0
54	30.5	1.4	94	50.0	2.1
55	30.9	1.4	95	51.2	2.4
56	31.3	1.4	96	52.6	2.7
57	31.7	1.4	97	54.4	3.1
58	32.1	1.4	98	56.5	3.5
59	32.5	1.4	99	62.5	5.6

RS = Raw Score; TS = T-score
SE = Standard Error on T-score metric

Physical Function 4a
Short Form Conversion Table

Raw Score	T-score	SE*
4	22.9	3.9
5	26.9	2.7
6	29.1	2.4
7	30.7	2.2
8	32.1	2.2
9	33.3	2.1
10	34.4	2.1
11	35.6	2.1
12	36.7	2.1
13	37.9	2.2
14	39.1	2.2
15	40.4	2.2
16	41.8	2.3
17	43.4	2.4
18	45.3	2.6
19	48.0	3.1
20	56.9	6.7

*SE = Standard Error

Physical Function 6a
Short Form Conversion Table

Raw Score	T-score	SE*
6	20.8	3.6
7	24.4	2.4
8	26.5	2.2
9	28.0	2.0
10	29.4	1.9
11	30.5	1.9
12	31.6	1.8
13	32.5	1.8
14	33.5	1.8
15	34.3	1.8
16	35.2	1.8
17	36.0	1.8
18	36.9	1.8
19	37.7	1.8
20	38.6	1.8
21	39.4	1.8
22	40.3	1.8
23	41.3	1.8
24	42.2	1.8
25	43.3	1.9
26	44.4	2.0
27	45.7	2.1
28	47.4	2.4
29	49.7	2.9
30	57.8	6.4

*SE = Standard Error

Adult Versions

Physical Function 6b
Short Form Conversion Table

Raw Score	T-score	SE*
6	21.6	3.6
7	25.4	2.6
8	27.5	2.3
9	29.1	2.1
10	30.4	2.0
11	31.5	1.9
12	32.5	1.9
13	33.4	1.8
14	34.3	1.8
15	35.1	1.8
16	36.0	1.8
17	36.8	1.8
18	37.6	1.8
19	38.5	1.8
20	39.3	1.8
21	40.2	1.8
22	41.1	1.8
23	42.1	1.8
24	43.1	1.9
25	44.2	1.9
26	45.4	2.0
27	46.8	2.2
28	48.7	2.6
29	50.9	2.9
30	58.7	6.2

* SE = Standard error

Adult version

Physical Function 8a
Short Form Conversion Table

Raw Score	T-score	SE*
8	20.2	3.5
9	23.7	2.4
10	25.6	2.1
11	27.0	1.9
12	28.2	1.8
13	29.3	1.8
14	30.3	1.7
15	31.2	1.7
16	32.0	1.6
17	32.7	1.6
18	33.5	1.6
19	34.2	1.6
20	34.9	1.6
21	35.5	1.5
22	36.2	1.5
23	36.9	1.5
24	37.5	1.5
25	38.2	1.5
26	38.9	1.5
27	39.5	1.5
28	40.2	1.6
29	40.9	1.6
30	41.6	1.6
31	42.4	1.6
32	43.1	1.6
33	43.9	1.6
34	44.8	1.7
35	45.7	1.8
36	46.8	1.9
37	48.0	2.1
38	49.6	2.5
39	51.8	2.9
40	59.2	6.1

*SE = Standard Error

Adult version

Physical Function 8b
Short Form Conversion Table

Raw Score	T-score	SE*
8	20.9	3.5
9	24.4	2.5
10	26.4	2.2
11	27.9	2.0
12	29.1	1.9
13	30.1	1.8
14	31.1	1.7
15	31.9	1.7
16	32.7	1.6
17	33.4	1.6
18	34.1	1.6
19	34.8	1.6
20	35.5	1.6
21	36.2	1.5
22	36.8	1.5
23	37.5	1.5
24	38.1	1.5
25	38.8	1.5
26	39.4	1.5
27	40.1	1.6
28	40.8	1.6
29	41.5	1.6
30	42.2	1.6
31	43.0	1.6
32	43.7	1.6
33	44.6	1.7
34	45.5	1.7
35	46.4	1.8
36	47.5	1.9
37	48.8	2.1
38	50.4	2.5
39	52.5	2.9
40	59.7	5.9

* SE = Standard error

Adult version

Mobility 8a
Short Form Conversion Table

Raw Score	T-score	SE*
0	15.2	3.0
1	17.1	3.1
2	18.6	3.1
3	19.9	3.1
4	21.1	3.0
5	22.2	2.9
6	23.2	2.9
7	24.2	2.8
8	25.1	2.8
9	25.9	2.7
10	26.8	2.7
11	27.6	2.7
12	28.4	2.7
13	29.2	2.7
14	30.0	2.7
15	30.9	2.7
16	31.7	2.7
17	32.5	2.7
18	33.3	2.7
19	34.2	2.7
20	35.0	2.8
21	36.0	2.8
22	36.9	2.9
23	37.9	3.0
24	39.0	3.1
25	40.1	3.2
26	41.4	3.3
27	42.8	3.5
28	44.4	3.9
29	46.1	3.9
30	48.4	4.2
31	51.6	4.8
32	58.5	6.7
* SE = Standard error		

Pediatric version

Upper Extremity 8a
Short Form Conversion Table

Raw Score	T-score	SE*
0	12.6	2.2
1	13.6	2.5
2	14.7	2.8
3	15.7	2.9
4	16.8	3.0
5	17.9	3.0
6	18.9	2.9
7	19.9	2.9
8	20.8	2.9
9	21.7	2.9
10	22.6	2.9
11	23.5	2.9
12	24.4	2.9
13	25.3	2.9
14	26.1	2.9
15	27.0	2.9
16	27.9	2.9
17	28.8	3.0
18	29.8	3.0
19	30.8	3.1
20	31.8	3.1
21	32.9	3.2
22	34.1	3.3
23	35.4	3.5
24	36.8	3.7
25	38.5	4.0
26	40.4	4.4
27	42.3	4.5
28	44.9	4.7
29	49.0	5.4
30	56.7	7.3

* SE = Standard error

Pediatric version

Parent Proxy Upper Extremity 8-item Short Form Conversion

Summed Raw Score	Standard T-Score	SE
0	13	3
1	16	3
2	17	3
3	18	2
4	19	2
5	20	2
6	21	2
7	22	2
8	22	2
9	23	2
10	24	2
11	24	2
12	25	2
13	25	2
14	26	2
15	26	2
16	27	2
17	28	2
18	28	2
19	29	2
20	30	2
21	30	2
22	31	2
23	32	2
24	33	2
25	34	3
26	35	3
27	37	3
28	38	4
29	40	4
30	42	4
31	45	5
32	55	8

*SE=Standard error on T-score metric

Parent Proxy Versions

Parent Proxy Mobility 8-item Short Form Conversion Table

Summed Raw Score	Standard T-Score	SE
0	14	4
1	17	3
2	20	3
3	21	3
4	22	3
5	23	2
6	24	2
7	25	2
8	26	2
9	27	2
10	27	2
11	28	2
12	29	2
13	29	2
14	30	2
15	31	2
16	31	2
17	32	2
18	33	2
19	33	2
20	34	2
21	35	2
22	35	2
23	36	2
24	37	2
25	38	3
26	39	3
27	40	3
28	42	4
29	43	4
30	45	4
31	48	4
32	56	7

*SE=Standard Error on T-score metric

Mobility Aid Users 8a
Short Form Conversion Table

Summary Score	Theta Score	SD (Theta)	Estimated Proportion
0	-3.78	0.32	0.00008
1	-3.52	0.29	0.00012
2	-3.35	0.27	0.00017
3	-3.21	0.26	0.00022
4	-3.1	0.25	0.00029
5	-2.99	0.25	0.00037
6	-2.9	0.24	0.00047
7	-2.81	0.24	0.00058
8	-2.72	0.24	0.00071
9	-2.63	0.23	0.00087
10	-2.55	0.23	0.00106
11	-2.47	0.23	0.00129
12	-2.39	0.23	0.00155
13	-2.31	0.23	0.00187
14	-2.24	0.23	0.00224
15	-2.16	0.23	0.00267
16	-2.08	0.24	0.00318
17	-2	0.24	0.00379
18	-1.92	0.24	0.00451
19	-1.84	0.24	0.00536
20	-1.75	0.25	0.00638
21	-1.67	0.25	0.00761
22	-1.58	0.26	0.00912
23	-1.48	0.27	0.01101
24	-1.38	0.28	0.01342
25	-1.27	0.3	0.01658
26	-1.15	0.32	0.02084
27	-1.01	0.36	0.02695
28	-0.79	0.49	0.03768
29	-0.75	0.4	0.04442
30	-0.57	0.41	0.0658
31	-0.29	0.44	0.1187
32	0.59	0.72	0.59009

Adult version

Not Mobility Aid Users 11a
Short Form Conversion Table

Summary Score	Theta Score	SD (Theta)	Estimated Proportion
0	-3.81	0.32	0.00007
1	-3.56	0.28	0.0001
2	-3.39	0.26	0.00014
3	-3.27	0.25	0.00019
4	-3.16	0.24	0.00023
5	-3.06	0.23	0.00029
6	-2.97	0.22	0.00035
7	-2.89	0.22	0.00042
8	-2.82	0.21	0.0005
9	-2.74	0.21	0.00059
10	-2.67	0.21	0.00069
11	-2.6	0.21	0.00081
12	-2.54	0.2	0.00094
13	-2.47	0.2	0.00109
14	-2.41	0.2	0.00125
15	-2.35	0.2	0.00144
16	-2.29	0.2	0.00164
17	-2.22	0.2	0.00187
18	-2.16	0.2	0.00213
19	-2.1	0.2	0.00242
20	-2.04	0.2	0.00274
21	-1.98	0.2	0.0031
22	-1.92	0.2	0.0035
23	-1.86	0.2	0.00394
24	-1.8	0.2	0.00444
25	-1.74	0.2	0.00499
26	-1.68	0.2	0.00561
27	-1.62	0.2	0.0063
28	-1.56	0.21	0.00708
29	-1.49	0.21	0.00797
30	-1.43	0.21	0.00898
31	-1.36	0.21	0.01015
32	-1.29	0.22	0.01151
33	-1.22	0.22	0.0131
34	-1.14	0.23	0.01501
35	-1.06	0.24	0.01734
36	-0.97	0.25	0.02023
37	-0.88	0.26	0.02382
38	-0.77	0.28	0.02865
39	-0.64	0.31	0.03557
40	-0.46	0.4	0.04722
41	-0.36	0.37	0.05582
42	-0.2	0.39	0.07547
43	0.04	0.41	0.12106
44	0.79	0.67	0.44923

Adult version

Physical Function 12a
Short Form Conversion Table for People Who Can Walk (answered 12 items)

Summed Raw Score	Standard T-Score	SE*
12	13.3	3.3
13	16.1	2.9
14	18.1	2.7
15	19.6	2.5
16	20.9	2.4
17	22.1	2.3
18	23.1	2.3
19	24.1	2.2
20	25.1	2.2
21	26.0	2.2
22	26.8	2.1
23	27.7	2.1
24	28.5	2.1
25	29.3	2.0
26	30.0	2.0
27	30.8	2.0
28	31.5	1.9
29	32.3	1.9
30	33.0	1.9
31	33.7	1.9
32	34.4	1.8
33	35.1	1.8
34	35.8	1.8
35	36.5	1.8
36	37.1	1.7
37	37.8	1.7
38	38.5	1.7
39	39.2	1.7
40	39.9	1.7
41	40.6	1.7
42	41.3	1.8
43	42.0	1.8
44	42.8	1.8
45	43.5	1.9
46	44.3	1.9
47	45.2	2.0
48	46.1	2.0
49	47.0	2.1
50	47.9	2.2
51	48.9	2.2
52	50.0	2.3
53	51.1	2.5
54	52.4	2.6
55	53.8	2.9
56	55.8	3.6
57	57.3	3.7
58	59.5	4.1
59	61.7	4.5
60	66.1	5.8

*SE = Standard Error on T-score metric
Adult version

Physical Function 12a
Short Form Conversion Table for People Who Cannot Walk (answered 6 items)

Summed Raw Score	Standard T-Score	SE*
6	13.8	3.5
7	16.8	3.1
8	19.0	2.9
9	20.7	2.8
10	22.3	2.7
11	23.7	2.7
12	25.0	2.6
13	26.2	2.6
14	27.4	2.6
15	28.6	2.6
16	29.8	2.6
17	31.0	2.6
18	32.2	2.6
19	33.4	2.6
20	34.6	2.6
21	35.9	2.6
22	37.3	2.7
23	38.8	2.7
24	40.4	2.8
25	42.2	3.0
26	44.7	3.7
27	46.9	3.9
28	49.8	4.2
29	52.8	4.4
30	59.9	6.5

*SE = Standard Error on T-score metric
Adult version

APPENDIX 2-ADDITIONAL FIGURES

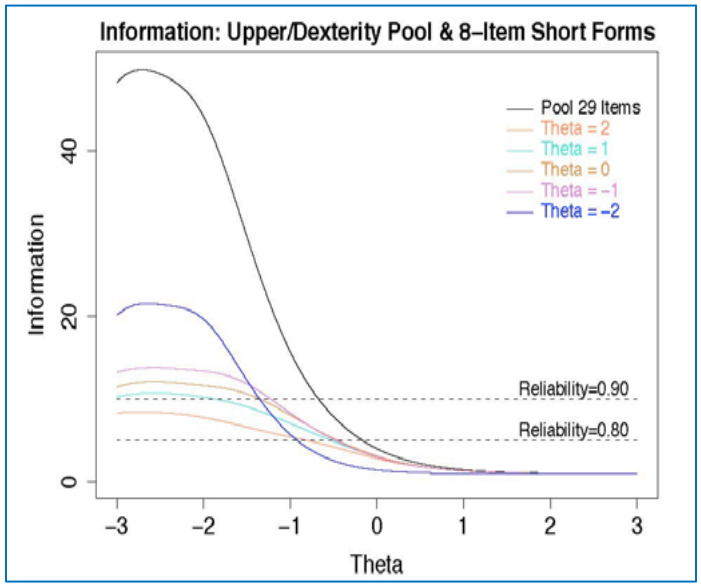


Figure 8 Pediatric Test Information Upper Extremity

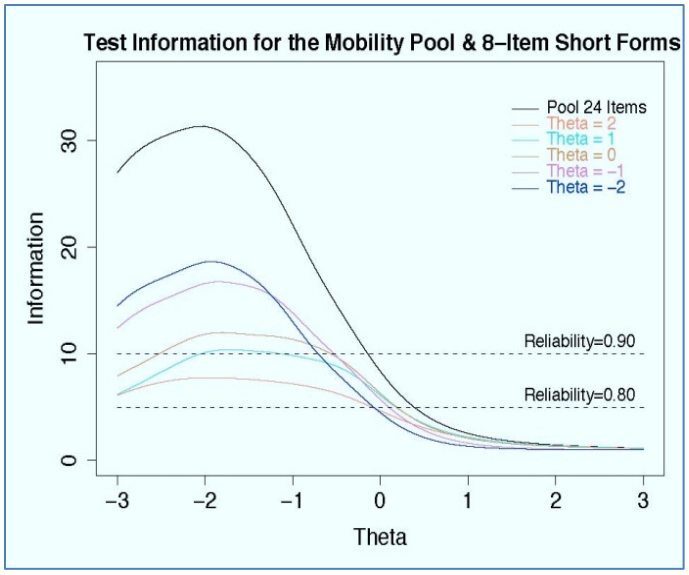


Figure 9 – Pediatric Test Information Mobility