

USER MANUAL AND SCORING INSTRUCTIONS

PROMIS PHYSICAL FUNCTION



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INTRODUCTION

This **User Manual and Scoring Instructions** includes information on measure development, administration, scoring, and interpretation for the measures listed below. For information on distinguishing one measure from another, look to the [Measure Differences](http://www.HealthMeasures.net) summary, which can be found with additional information at www.HealthMeasures.net. Information specific to the Patient-Reported Outcomes Measurement Information System (PROMIS)/Quality of Life in Neurological Disorders (Neuro-QoL) Physical Function Measure for Multiple Sclerosis (MS) (*PROMISnq Short Form v2.0 – Physical Function-Multiple Sclerosis 15a*) is included in [Appendix 6](#).

PROMIS PHYSICAL FUNCTION MEASURES

ADULT	PEDIATRIC	PARENT PROXY
PROMIS Bank v1.0 – Physical Function for Samples with Mobility Aid Users	PROMIS Pediatric Bank GenPop v3.0 – Mobility	PROMIS Parent Proxy Bank GenPop v3.0 – Mobility
PROMIS Short Form v1.0 – Physical Function Samples with Mobility Aid Users 11a	PROMIS Pediatric Bank GenPop v3.0 – Mobility (screen-to-CAT)	PROMIS Parent Proxy Bank GenPop v3.0 – Mobility (screen-to-CAT)
PROMIS-Ca Bank v1.1 – Physical Function	PROMIS Pediatric Short Form GenPop v3.0 – Mobility 7a	PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 7a
PROMIS Bank v2.1 – Mobility	PROMIS Pediatric Bank GenPop v3.0 – Upper Extremity	PROMIS Parent Proxy Bank GenPop v3.0 – Upper Extremity
PROMIS Bank v2.0 – Physical Function	PROMIS Pediatric Bank GenPop v3.0 – Upper Extremity (screen-to-CAT)	PROMIS Parent Proxy Bank GenPop v3.0 – Upper Extremity (screen-to-CAT)
PROMIS Bank v2.0 – Physical Function (recommended)	PROMIS Pediatric Short Form GenPop v3.0 – Upper Extremity 8a	PROMIS Parent Proxy Short Form GenPop v3.0 – Upper Extremity 8a
PROMIS Bank v2.0 – Physical Function (screen-to-CAT)	PROMIS Pediatric Bank v2.0 – Mobility*	PROMIS Parent Proxy Bank v2.0 – Mobility*
PROMIS Short Form v2.0 – Physical Function 4a	PROMIS Pediatric Bank v2.0 – Mobility (recommended)*	PROMIS Parent Proxy Bank v2.0 – Mobility (recommended)*
PROMIS Short Form v2.0 – Physical Function 6b	PROMIS Pediatric Bank v2.0 – Mobility (screen-to-CAT)*	PROMIS Parent Proxy Bank v2.0 – Mobility (screen-to-CAT)*
PROMIS Short Form v2.0 – Physical Function 8b	PROMIS Pediatric Short Form v2.0 – Mobility 8a*	PROMIS Parent Proxy Short Form v2.0 – Mobility 8a*
PROMIS Short Form v2.0 – Physical Function 8c	PROMIS Pediatric Bank v2.0 – Upper Extremity*	PROMIS Parent Proxy Bank v2.0 – Upper Extremity*
PROMIS Short Form v2.0 – Physical Function 10a	PROMIS Pediatric Bank v2.0 – Upper Extremity (recommended)*	PROMIS Parent Proxy Bank v2.0 – Upper Extremity (recommended)*
PROMIS Short Form v2.0 – Physical Function 10b	PROMIS Pediatric Bank v2.0 – Upper Extremity (screen-to-CAT)*	PROMIS Parent Proxy Bank v2.0 – Upper Extremity (screen-to-CAT)*
PROMIS Short Form v2.0 – Physical Function 20a	PROMIS Pediatric Short Form v2.0 – Upper Extremity 8a*	PROMIS Parent Proxy Short Form v2.0 – Upper Extremity 8a*
PROMIS Short Form v2.0 – Physical Function 24a (PROMIS HAQ)	PROMIS Pediatric Bank v1.0 – Mobility*	PROMIS Parent Proxy Bank v1.0 – Mobility*
PROMISnq Short Form v2.0 – Physical Function– Multiple Sclerosis 15a (PROMISnq PFMS-15a)	PROMIS Pediatric Short Form v1.0 – Mobility 8a*	PROMIS Parent Proxy Short Form v1.0 – Mobility 8a*
PROMIS+OA-Knee Short Form v2.0 – Physical Function 13a	PROMIS Pediatric Bank v1.0 – Upper Extremity*	PROMIS Parent Proxy Short Form v1.0 – Upper Extremity*
PROMIS Bank v2.1 – Upper Extremity	PROMIS Pediatric Short Form v1.0 – Upper Extremity*	PROMIS Parent Proxy Short Form v1.0 – Upper Extremity*
PROMIS Bank v2.1 – Upper Extremity (recommended)	PROMIS Pediatric Short Form v1.0 – Upper Extremity 8a*	PROMIS Parent Proxy Short Form v1.0 – Upper Extremity 8a*
PROMIS Bank v2.1 – Upper Extremity (screen-to-CAT)		
PROMIS Short Form v2.1 – Upper Extremity 7a		
PROMIS Bank v2.0 – Mobility*		
PROMIS Bank v2.0 – Upper Extremity*		
PROMIS Short Form v2.0 – Upper Extremity 7a*		
PROMIS Bank v1.2 – Physical Function*		
PROMIS Short Form v1.2 – Physical Function 6b*		
PROMIS Short Form v1.2 – Physical Function 8b*		
PROMIS Bank v1.2 – Mobility*		
PROMIS Bank v1.2 – Upper Extremity*		
PROMIS Bank v1.1 – Physical Function*		
PROMIS Bank v1.0 – Physical Function*		
PROMIS Short Form v1.0 – Physical Function 4a*		
PROMIS Short Form v1.0 – Physical Function 6a*		
PROMIS Short Form v1.0 – Physical Function 8a*		
PROMIS Short Form v1.0 – Physical Function 10a*		
PROMIS Short Form v1.0 – Physical Function 12a		
PROMIS Short Form v1.0 – Physical Function 20a*		
PROMIS-Ca Bank v1.0 – Physical Function*		

*Retired measure

Ca=cancer, GenPop=general population, HAQ=Health Assessment Questionnaire, OA=osteoarthritis

DESCRIPTION OF PHYSICAL FUNCTION

Physical Function

PROMIS Physical Function instruments measure 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 instrument 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). Adult instruments (18+) include: Physical Function, Mobility, Upper Extremity, Physical Function – Cancer, and Physical Function for Samples with Mobility Aid Users instruments. Pediatric and parent proxy instruments were developed for each Physical Function sub-domains of Mobility and Upper Extremity.

Mobility

Focuses on activities of physical mobility such as getting out of bed or a chair to activities such as running. The adult Mobility measures include selected items from the full Physical Function item bank.

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. The adult Upper Extremity measures include selected items from the full Physical Function item bank.

Physical Function for Samples with Mobility Aid Users

This item bank and short form include screening items about one's ability to stand and walk. Based upon one's response, some items may be skipped. These measures are intended for samples that may include those who use mobility aids like wheelchairs. It is not restricted for use to only those that use mobility aids.

PROMIS Physical Function versus Mobility versus Upper Extremity

Within PROMIS there are adult self-report measures of Physical Function, Mobility, and Upper Extremity function.

- For most patient populations including those with lower extremity concerns, we recommend PROMIS Physical Function measures. PROMIS Physical Function is a core measure used extensively in a variety of clinical settings, thus facilitating benchmarking and score interpretation given the large amount of data and publications. As compared to PROMIS Mobility, PROMIS Physical Function has a greater range of measurement from very poor function to exceptional function.
- PROMIS Upper Extremity measures are a useful addition to Physical Function for patients who have concerns specific to the upper body (e.g., hand, wrist, shoulder, elbow). PROMIS Upper Extremity and Physical Function measures are scored on different metrics and cannot be compared.

OBTAINING MEASURES

All English and some Spanish PROMIS measures are available to download in respondent-ready PDF format at [Search & View Measures](https://www.healthmeasures.net) on [HealthMeasures.net](https://www.healthmeasures.net). These measures may be used in **paper administration** without permission or fees as long as the text is not changed.

PROMIS measures are also available in many **digital administration platforms** in patient-reported outcome measure libraries (e.g., REDCap shared library, Epic PROMIS CAT application). These platforms use the [Assessment Center API](#) or have a license agreement for distribution of PROMIS measures.

Non-commercial users¹ can program a PROMIS measure into a digital administration platform for research² without permission or fees as long as the text is not changed. Programming PROMIS measures into digital administration platforms for other purposes (e.g., registries, routine outcome assessment, quality measurement) and any use by commercial users³ requires a permission letter and screenshot review (HealthMeasures Electronic Administration Permission or HEAP). The screenshot review ensures the digital implementation retains validity. Contact Help@HealthMeasures.net for permission and to learn more about HEAP.

PROMIS measures are also available in **additional languages**. Information on currently available translations can be found at HealthMeasures.net under [Available Translations](#). Contact translations@HealthMeasures.net to request a translated measure or to learn more.

INTRODUCTION TO ASSESSMENT OPTIONS

There are two administration options for assessing Physical Function: 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 (165 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.

CAT

Stopping rules applied to the CAT assessment determine the number of items required to receive a score for Physical Function. 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. CAT will continue until either the standard error drops below a specified level (e.g., on the T-score metric 3.0), or the participant has answered the maximum number of questions (e.g., 12), whichever occurs first. For some CATs, specifically "recommended" and "screen-to-CAT" there are additional stopping rules. These include stopping when the standard error isn't improving much or if a respondent is asymptomatic. For details on the exact stopping rules for Physical Function CATs, see below.

¹ A non-commercial user is any institution, organization, or other incorporated entity which is defined as a Tax-exempt Organization under the regulations of the United States' Internal Revenue Service; for users outside the United States, all not-for-profit entities including national health services and their affiliate providers and academic institutions.

² Research includes randomized controlled trials, cohort studies, case control studies, and cross-sectional studies.

³ A commercial user is any company, organization, or other incorporated limited liability entity which does not fit the definition of a Tax-exempt Organization under the regulations of the United States' Internal Revenue Service or which otherwise operates under the rubric of financial profit.

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 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 illustrates the correlations (strength of relationship) of the full v1.0 Physical Function bank with CAT and with v1.0 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.

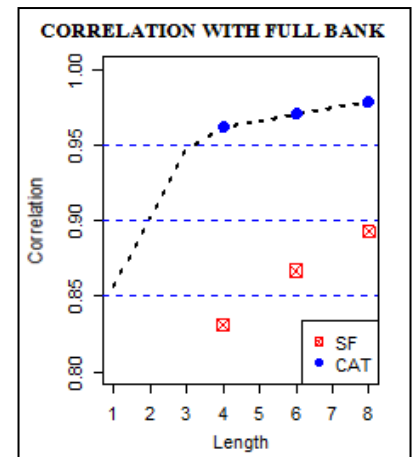


FIGURE 1

RECOMMENDED SHORT FORMS

PROMIS includes multiple short form options. Here are recommendations for which short form to use.

Comparing Large Groups

These short forms are appropriate for large scale data collection and comparing groups (subgroups larger than 50-75 people).

- **Adult:** PROMIS Short Form v2.0 – Physical Function 8c or 10a
- **Pediatric:** PROMIS Pediatric Short Form GenPop v3.0 – Mobility 7a and PROMIS Pediatric Short Form GenPop v3.0 – Upper Extremity 8a
- **Parent Proxy:** PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 7a and PROMIS Parent Proxy Short Form GenPop v3.0 – Upper Extremity 8a

Individual Evaluations and Comparing Small Groups

More detailed or precise assessment can be achieved by administering a slightly longer short form or additional short forms. These short forms are recommended when looking at an individual or making comparisons between smaller groups (subgroups of 50-75 people).

- **Adult:** PROMIS Short Form v2.0 – Physical Function 10a and PROMIS Short Form v2.0 – Upper Extremity 7a
- **Pediatric:** PROMIS Pediatric Short Form GenPop v3.0 – Mobility 7a and PROMIS Pediatric Short Form GenPop v3.0 – Upper Extremity 8a
- **Parent Proxy:** PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 7a and PROMIS Parent Proxy Short Form GenPop v3.0 – Upper Extremity 8a

DIFFERENCES BETWEEN MEASURES

Detailed information about the differences between short forms, version numbers, calibration samples, pediatric versus parent proxy, and more is housed in the [Measure Differences](#) summary.

MEASURE DEVELOPMENT

PROMIS utilizes rigorous methodology for developing its measures, also known as item banks, and testing their validity.

- Comprehensive literature searches (e.g., Klem et al., 2009) of existing measures, yielding hundreds of potential items, are performed to ensure content validity (i.e., the assurance that each measure represents all facets of a domain).
- To ensure comprehensive coverage of the conceptual area, focus groups are conducted with relevant participants and thematic analyses are performed of the topics discussed. Following the focus groups, an initial item-review process is completed involving elimination of items that are redundant, confusing, or poorly written (DeWalt et al., 2007).
- Cognitive interviews are also performed so that each candidate item is reviewed by multiple individuals with diverse characteristics (i.e., both genders, members of minority groups, participants with modest reading levels) for feedback on the language and clarity of items and the relevance of the content (DeWalt et al., 2007; Irwin et al., 2009).
- Responses to candidate items are collected from relevant participants, usually via computer administration to both community and clinical samples, during the psychometric testing stage of item bank development (Cella et al., 2010). Data from large samples confirm the factor structure of the domains and allow for analyses at the item and bank level. This approach is described by Reeve et al. (2007) with an update from Hansen et al. (2014). Techniques from both classical test theory (CTT) and item response theory (IRT) were used.
- Validity studies are conducted to determine the degree to which an instrument measures what it is intended to measure. This includes:
 - Cross-sectional validity (e.g., Cella et al., 2010)
 - Responsiveness to change (e.g., Forrest et al., 2019; Pilkonis et al., 2014; Wohlfahrt et al., 2019)
 - Clinical validity (see 2016 Journal of Clinical Epidemiology series with a summary by Cook et al.)
- Translations result from a process of forward and back-translation, multiple expert reviews, harmonization across languages, and cognitive debriefing with a sample of native speakers of the target language (linguistic validation). A universal approach to translation ensures that, whenever possible, one language version is created for multiple countries instead of country-specific versions of the same language (Eremenco et al., 2005; Eremenco et al., 2017).

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Primary Citations

Adult	v1.0 – v1.2 Physical Function Bank	Rose, M., Bjorner, J. B., Becker, J., Fries, J. F., & Ware, J. E. (2008). Evaluation of a preliminary physical function item bank supports the expected advantages of the Patient-Reported Outcomes Measurement Information System (PROMIS). <i>Journal of Clinical Epidemiology</i>, 61, 17-33. Rose, M., Bjorner, J. B., Gandek, B., Bruce, B., Fries, J. F., & Ware Jr, J.E. (2014). The PROMIS Physical Function Item Bank Was Calibrated to a Standardized Metric and Shown to Improve Measurement Efficiency. <i>Journal of Clinical Epidemiology</i>, 67(5), 516-526.
	v2.0 Physical Function Bank	Schalet, B. D., Kaat, A., Vrahas, M., Buckenmaier III, C. T., Barnhill, R., & Gershon, R. C. (2016, October). Extending the ceiling of an item bank: development of above-average physical function items for PROMIS. <i>In Quality of Life Research</i> (Vol. 25, pp. 109).
	v2.0 Physical Function – Multiple Sclerosis 15a Short Form	Kamudoni, P., Amtmann, D., Johns, J., Cook, K. F., Salem, R., Salek, S., Raab, J., Middleton, R., Repovic, P., Alschuler, K. N., von Geldern, G., Wundes, A., Barrett, A., Olayinka-Amao, O., & Henke, C. (2022). The validity, responsiveness, and score interpretation of the PROMIS [®] Physical Function - Multiple Sclerosis 15a short form in multiple sclerosis. <i>Multiple Sclerosis and Related Disorders</i> , 62:103753. doi: 10.1016/j.msard.2022.103753
	v1.0 Mobility, v2.0 Mobility, v1.0 Upper Extremity	Hays, R.D., Spritzer, K.L., Amtmann, D., Lai, J.-S., DeWitt, E.M., Rothrock, N., et al. (2013). Upper Extremity and Mobility Subdomains from the Patient-Reported Outcomes Measurement Information System (PROMIS [®]) Adult Physical Functioning Item Bank. <i>Archives of Physical Medicine and Rehabilitation</i> , 94(11), 2291-2296.
	v2.0 Upper Extremity	Kaat AJ, Buckenmaier C, Cook KF, Rothrock NE, Schalet BD, Gershon RC, Vrahas MS. The expansion and validation of a new upper extremity item bank for the Patient-Reported Outcomes Measurement Information System [®] (PROMIS). <i>Journal of Patient-Reported Outcomes</i> (2019) 3:69. https://doi.org/10.1186/s41687-019-0158-6 .
Pediatric	v1.0 Mobility, v1.0 Upper Extremity	DeWitt, E. M., Stucky, B. D., Thissen, D., Irwin, D. E., Langer, M., Varni, J. W., Lai, J-S, Yeatts, K. B., & DeWalt, D. A. (2011). Construction of the eight item PROMIS Pediatric Physical Function Scales: Built using item response theory. <i>Journal of Clinical Epidemiology</i> , 64(7), 794-804.
	v2.0 Mobility, v2.0 Upper Extremity	Quinn H, Thissen D, Liu Y, Magnus B, Lai JS, Amtmann D, Varni JW, Gross HE, DeWalt DA. (2014) Using item response theory to enrich and expand the PROMIS [®] pediatric self-report banks. <i>Health and Quality of Life Outcomes</i> . 2014 Oct 25; 12:160.
	v3.0 Mobility, v3.0 Upper Extremity	Lai, J. S., Tang, X., Schalet, B. D., Kallen, M. A., Kaat, A. J., & Cella, D. (2023). The PROMIS Pediatric Item Banks Norming Project. <i>Journal of Patient-Reported Outcomes</i> , 7(1): O84.

[Continued on next page]

Primary Citations Continued

Parent Proxy	v1.0 – v2.0 Mobility, v1.0 – v2.0 Upper Extremity	Irwin, D., Gross, H., Stucky, B., Thissen, D., Morgan DeWitt, E., Lai, J.S., et al. (2012). Development of Six PROMIS Pediatrics Proxy-Report Item Banks. <i>Health and Quality of Life Outcomes</i> , 10(1), 22.
	v3.0 Mobility, v3.0 Upper Extremity	Lai, J. S., Tang, X., Schalet, B. D., Kallen, M. A., Kaat, A. J., & Cella, D. (2023). The PROMIS Pediatric Item Banks Norming Project. <i>Journal of Patient-Reported Outcomes</i> , 7(1): O84.

BEST PRACTICES IN ADMINISTRATION

- PROMIS self-report measures are intended to be completed by the respondent without help from anyone else.
- If respondents are unable to answer on their own, have someone else (“proxy”) report on their behalf. Respondents requiring a proxy may include: young children, people in the early stages of dementia who may not recognize the extent of their impairment, people with cognitive or communication deficits, and people with severe disease burden. PROMIS includes measures for parents to report for young children (ages 1-5) and older children (ages 5-17). Note, however, that proxy respondents are not acceptable for measures used to support endpoints in clinical trials.
- Use the same proxy across multiple assessments. Different proxies may have different perspectives.
- Keep respondents’ privacy in mind, but have staff readily available to help with any technology issues that may arise.
- It is acceptable for staff to define a term (e.g., “nausea”), but not to define a concept where the respondent’s subjective interpretation is the goal of the question (e.g., “quality of life”).
- Respondents should be instructed to answer all items to the best of their ability. For a respondent who indicates the item asks about an activity they don’t do, instruct them to consider what that activity would be like, and imagine or predict how it would be for them. For example, for the item “Are you able to use a hammer to pound a nail?” imagine the upper body strength, coordination, and dexterity needed to pound a nail with a hammer and evaluate to what degree they have that level of function. Respondents should always have the opportunity to skip an item if needed as well.
- Utilize the same method (e.g., computer, telephone, or paper) and mode (e.g., self vs. interviewer) of administration. However, this is not always possible, and PROMIS measures have produced similar scores when the method of administration varied.
- In clinical settings, give respondents the optimal time needed to capture the most relevant perspective and complete data (e.g., before/after clinician visit or in between visits). This may depend on the study aims and/or clinic workflow.

GUIDANCE ON THE APPEARANCE OF ITEMS

PROMIS measures have requirements for how they appear to the respondent. This helps support administration that is consistent with how the measures were developed, tested, and validated. The PDF versions of PROMIS measures from HealthMeasures.net’s [Search & View Measures](#) meet these requirements. If you are integrating PROMIS measures into a digital administration platform, please contact Help@HealthMeasures.net to learn about how to have your implementation approved.

HANDLING MULTIPLE RESPONSES ON A PAPER FORM

Guidelines on how to deal with multiple responses have been established. Resolution depends on the responses noted by the respondent.

- 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.

MEASURE NAMES IN ADMINISTRATION PLATFORMS

Measure names may be abbreviated or use altered terms in some administration platforms.

- Measures named “Item Banks” are administered as Computer Adaptive Tests (CATs). In any administration platform, a measure named Item Bank is the same as a CAT.
- SF = short form
- Ped = pediatric
- NRS = numeric rating scale (e.g., 0 to 10)
- Scale = a set of items that are administered in their entirety. They are not a subset of items from an item bank.
- Profile = a fixed set of short forms or CATs that are administered together (e.g., PROMIS-29). They produce scores for multiple domains (e.g., physical function, pain interference, anxiety).
- Pool = a collection of items that are not calibrated using item response theory. Item pools only generate raw response scores for each item and no summary score.
- Recommended = CAT uses different stopping rules than standard administration. See the [Measure Differences](#) summary for details.
- Screen-to-CAT = CAT uses different stopping rules than standard administration. See the [Measure Differences](#) summary for details.

SCORING INSTRUCTIONS

Short Forms

Response Pattern Scoring

PROMIS instruments are scored using item-level calibrations. This means that the most accurate way to score a PROMIS short form is to use the HealthMeasures Scoring Service (https://www.assessmentcenter.net/ac_scoringervice) or an administration platform 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 summed 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 short form using a subset of items from a PROMIS item bank.

Instructions for the HealthMeasures Scoring Service

1. Download the Input Template from the HealthMeasures Scoring Service home page.
2. Add your data (all respondents' individual answers to questions) for one PROMIS measure to the [Input Template](#) (multiple timepoints are okay).
3. Determine how much data is missing. In order to produce a precise score, a respondent must answer at least 4 items in measures that include 4 or more items. If a precise score is required, remove respondents who answered less than 4 items from the input template and do not calculate a T-score.
4. Upload your input data (saved as a .csv file) to the HealthMeasures Scoring Service. If this is your first time, register as a new user.
5. Access your email to receive an output spreadsheet with calculated scores.

Platforms that use response pattern scoring can produce a T-score for a respondent as long as 1 item has been answered. However, in order to produce a **precise** score using response pattern scoring, a respondent must answer at least 4 items in a short form that includes 4 or more items. If fewer than 4 items have been answered, the resulting T-score may not be sufficiently precise. Depending on how the score will be used, you may want to discard the score or proceed with caution. For short forms with 1-3 items, all items should be answered before using response pattern scoring.

Instructions for Using Raw Sum Score to T-score Conversion Tables

To use the scoring tables in this manual, calculate a summed score. 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 v2.0 adult 4-item form, the lowest possible raw score is 4; the highest possible raw score is 16 (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.

A small number of items within the PROMIS Physical Function measures for adults (and in fact for other item banks as well) there are collapsed response categories. That is, two response options are associated with the same score (e.g., 1=Unable to do, 1=With much difficulty, 2=With some difficulty). This is not an error. Use the response scores that are included in the respondent-ready measure PDFs in HealthMeasures.net Search & View Measures.

Within the PROMIS v1.0 Pediatric Upper Extremity 8-item 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. The PROMIS v2.0 Pediatric Upper Extremity short form has already made this modification to response scores in the PDF version of the measure.

With the total raw score for a measure, 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 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.

For the adult PROMIS Physical Function 4a short form v2.0, a raw score of 10 converts to a T-score of 34.4 with a standard error (SE) of 2.3 (see scoring table for the 4a v2.0 short form in [Appendix 1](#)). Thus, the 95% confidence interval around the observed score ranges from 29.9 to 38.9 (T-score $\pm$ (1.96*SE) or 34.4 $\pm$ (1.96*2.3)).

PROMIS HAQ

The PROMIS Short Form v2.0 - Physical Function 24a (PROMIS-HAQ) includes 24 items. Of these, 21 items contribute to a PROMIS Physical Function T-score. The first 20 items are from PROMIS Bank v2.0 – Physical Function. The PROMIS Global06 item was originally developed to be part of the PROMIS Global Health scale but

was also adopted into the PROMIS Physical Function item bank. Consequently, it has item level calibrations that can contribute to the PROMIS Physical Function T-score. To use the table in this scoring manual that converts a raw response score sum to a PROMIS T-score, sum the raw response scores for the first 21 items in the 24a (PROMIS HAQ) short form. Like other short forms, all items must be answered in order to use the scoring table. If there is missing data, utilize the HealthMeasures Scoring Service. Three items from the short form do not contribute to a summary score. Global03 (In general, how would you rate your health), PFScreen (statement about use of mobility aids), and Global07 (How would you rate your pain on average) all use raw response scores only. No T-score or other summary score is produced. Their response scores should not be summed with the response scores from the Physical Function items.

CAT

A minimum number of items (e.g., 4) must be answered in order to receive a score for the Physical Function 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 (e.g., on the T-score metric 3.0), or the participant has answered the maximum number of questions (e.g., 12), whichever occurs first. For some CATs, specifically "recommended" and "screen-to-CAT" there are additional stopping rules. These include stopping when the standard error isn't improving much or if a respondent is asymptomatic. For details on the exact stopping rules for Physical Function CATs, view the Measure Differences summary.

DIRECTION OF SCORES

For most PROMIS instruments, a score of 50 is the average for the general population with a standard deviation of 10 because calibration testing was performed on a large sample of the general population. You can read more about the calibration and centering samples in the Reference Population section below. 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 positively-worded concepts like Physical Function, Mobility, and Upper Extremity 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.

REPORTING SCORES

T-scores and associated Standard Errors should be reported as integers. Additional decimal places may be retained in interim computations, but the reported value should be rounded to an integer to maintain the appropriate level of significant figures.

A Publication Checklist should be used when writing about PROMIS measures in publications and presentations. Checklist categories include measure details, administration, scoring, and reporting. The checklist is available on HealthMeasures.net at [Publication Checklist](#) as well as in Hanmer et al., 2020.

REFERENCE POPULATIONS

A PROMIS score of 50 is the mean score for a specific, relevant group of people (e.g., the general population, kids with a painful condition). That group is the **reference population**.

Centering Sample and Calibration Sample

Multiple steps are used to create T-scores.

1. Items are completed by a large sample of respondents. This is the **Calibration Sample**. The purpose of a calibration sample is to estimate item parameters (item characteristics such as difficulty and discrimination) using an item response theory (IRT) model.
2. Measure developers then decide which score on the IRT metric is going to be the middle score—a score of 50. This is done by collecting scores from a large sample that represents the reference population and then calculating the mean for that sample. That sample is the **Centering Sample**. That score becomes the middle score (e.g., 50 for T-scores).
3. A linear transformation spaces all other scores along the continuum so they have the correct values relative to the middle score (the mean of the Centering Sample).

Sometimes a single sample was used as both the Calibration Sample AND the Centering Sample. Other times one sample was used as the Calibration Sample and another was used as the Centering Sample. Sometimes, a subset of the Calibration Sample served as the Centering Sample.

For some PROMIS measures the reference population (and the centering sample) was a clinical population. This is the case for PROMIS Smoking measures, for which the reference populations was daily smokers; the Centering Sample was a sample of daily smokers. For many PROMIS measures, the reference population was the general population.

The Reference Population tables show the Calibration and the Centering samples for PROMIS. Most users will be particularly interested in the last column (Centering Sample). **If you want to know the reference population (what sample has a mean of 50), go to the Centering Sample column.**

Item Bank	Calibration Sample	Centering Sample
PROMIS Adult		
Physical Function	General population	General population
Physical Function—Multiple Sclerosis	General population + People with Multiple Sclerosis	General population
PROMIS-Ca Physical Function	Hybrid*	General population
Mobility	General population	General population
Upper Extremity	General population	General population
Physical Function for Samples with Mobility Aid Users	Clinical sample	Clinical sample

[Continued on next page]

Item Bank	Calibration Sample	Centering Sample
PROMIS Pediatric		
Mobility v1.0, v2.0	General population subset + Clinical sample	General population subset + Clinical sample
Upper Extremity v1.0, v2.0	General population subset + Clinical sample	General population subset + Clinical sample
Mobility v3.0	General population	General population
Upper Extremity v3.0	General population	General population
PROMIS Parent Proxy		
Mobility v1.0, v2.0	General population subset + Clinical sample	General population subset + Clinical sample
Upper Extremity v1.0, v2.0	General population subset + Clinical sample	General population subset + Clinical sample
Mobility v3.0	General population	General population
Upper Extremity v3.0	General population	General population

*Hybrid: Items that did not have differential item functioning (DIF) between general population and cancer patients used the PROMIS parameters. Items with DIF used cancer-based parameters.

STATISTICAL AND PSYCHOMETRIC TERMS

PROMIS measures produce T-scores and standard errors.

T-score

A T-score is a standardized score, like z-scores and IQ scores. All standardized scores have a “middle” score; it is zero for z-scores, 100 for IQ scores, and 50 for T-scores. This middle score is the mean of a large group of people. This group is known as the reference population. T-scores have a standard deviation (SD) of 10. Consequently, if a respondent produces a score of 60, that is one SD higher than the mean.

Precision and Standard Error (SE)

A PROMIS score includes a T-score and a standard error (SE). The standard error is a measure of precision or the variability for a given T-score across hypothetical repeated measurements. It represents the “margin of error” for a T-score. The standard error can be used to estimate precision by calculating confidence intervals around a T-score. A 95% confidence interval is commonly used. 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 $(52 + (1.96 * 2)) = 56$. Similarly, a 68% confidence interval can be calculated by $(T\text{-score} \pm SE)$. If $T=52$ and $SE=2$, the lower boundary of the confidence interval is $(52 - 2) = 49$ and the upper boundary is $(52 + 2) = 54$. T-scores should be rounded to whole numbers due to the number of significant figures in their computation.

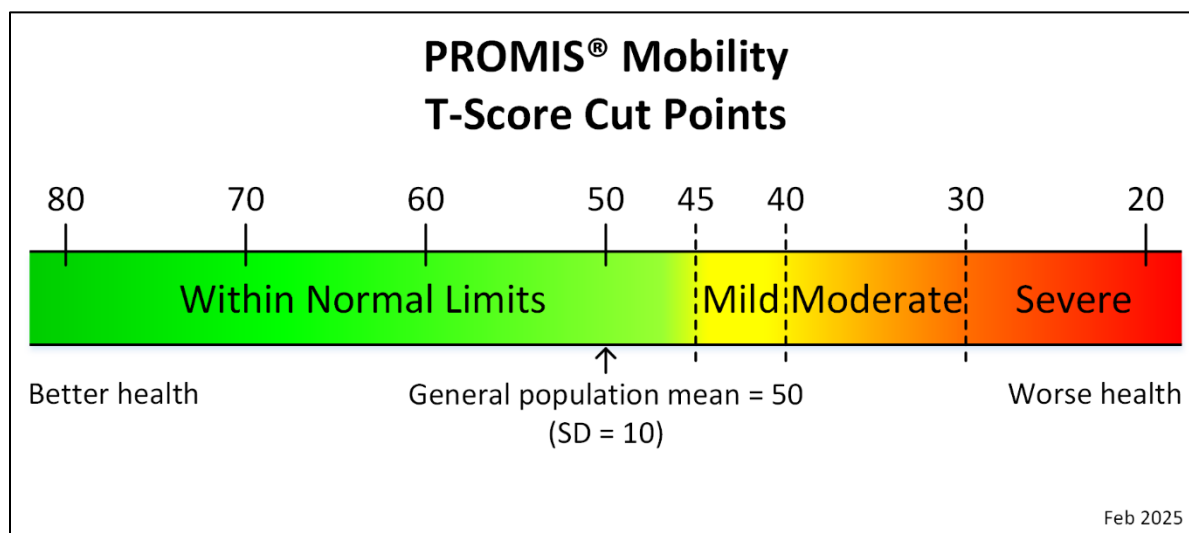
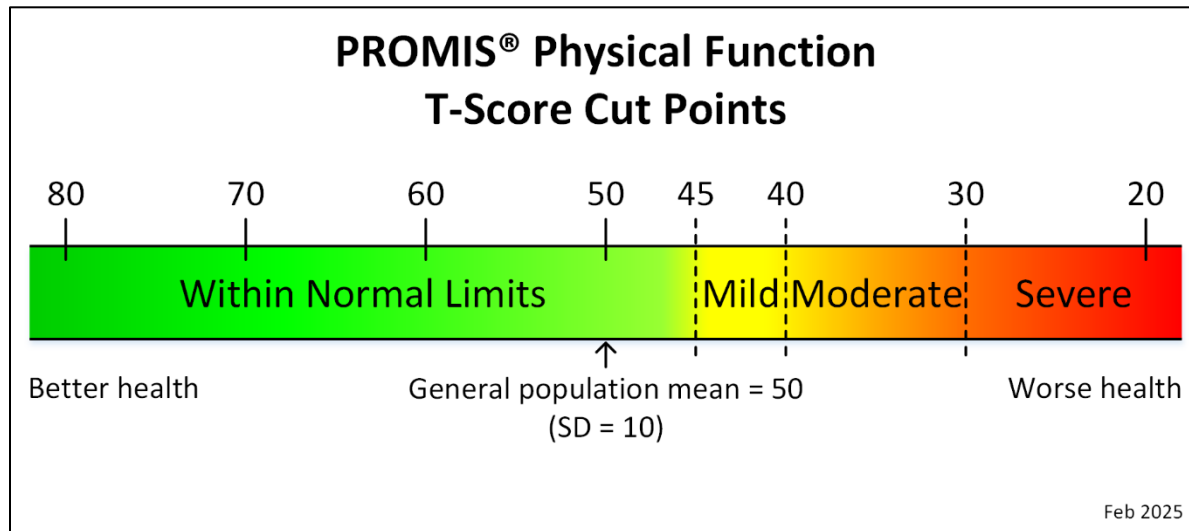
Reliability

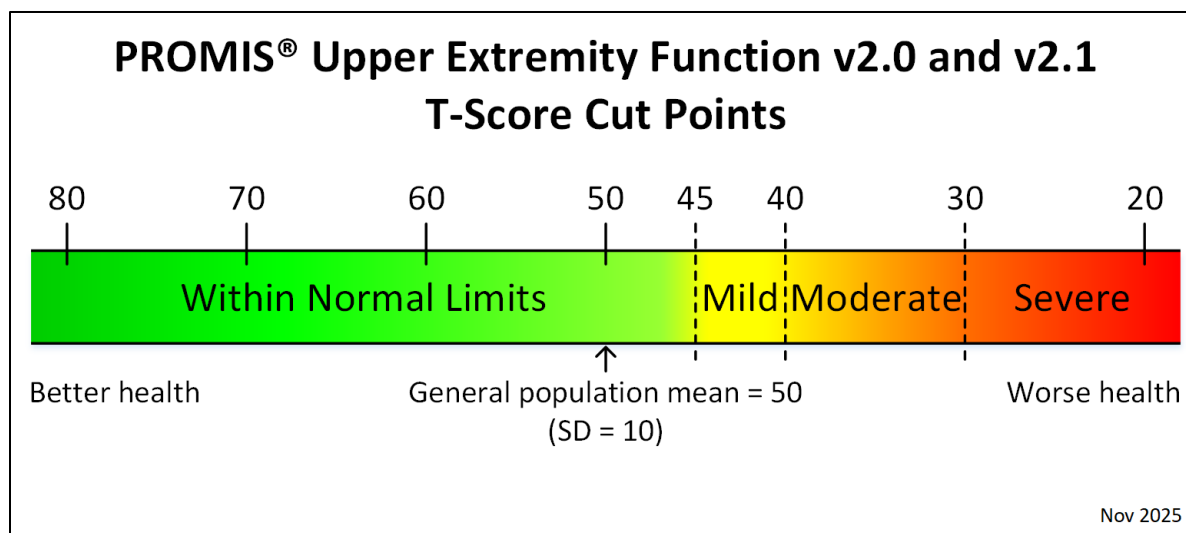
Reliability is the degree to which a measure is free of error. For IRT-based scaled scores (including PROMIS), $\text{reliability} = 1 - SE^2$ using SEs on the theta metric (i.e., the T-score SE divided by 10). IRT-based reliability varies across the measurement continuum. That is, a measure may have much higher reliability for some score ranges (e.g., near the mean) compared to other score ranges (e.g., extreme ends of the continuum such as ± 2 SDs from the mean).

SCORE CUT POINTS

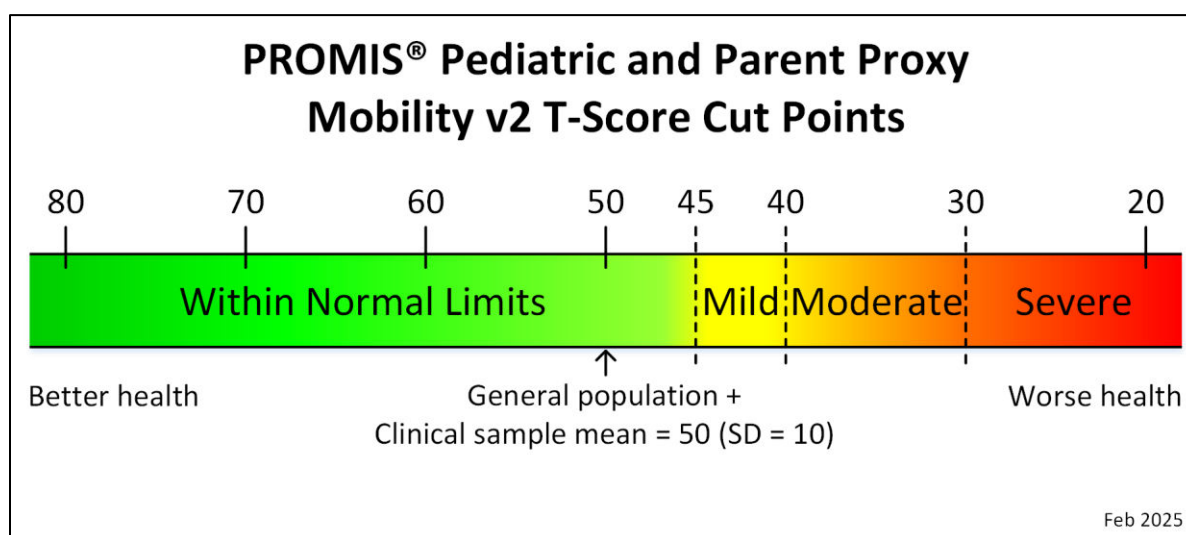
Below, each figure shows score ranges and descriptive labels for PROMIS Physical Function item banks. The information in the figure applies to short forms and computer adaptive tests from that item bank. Be sure to select the correct figure for the measure you are using (e.g., respondent, version).

Adult

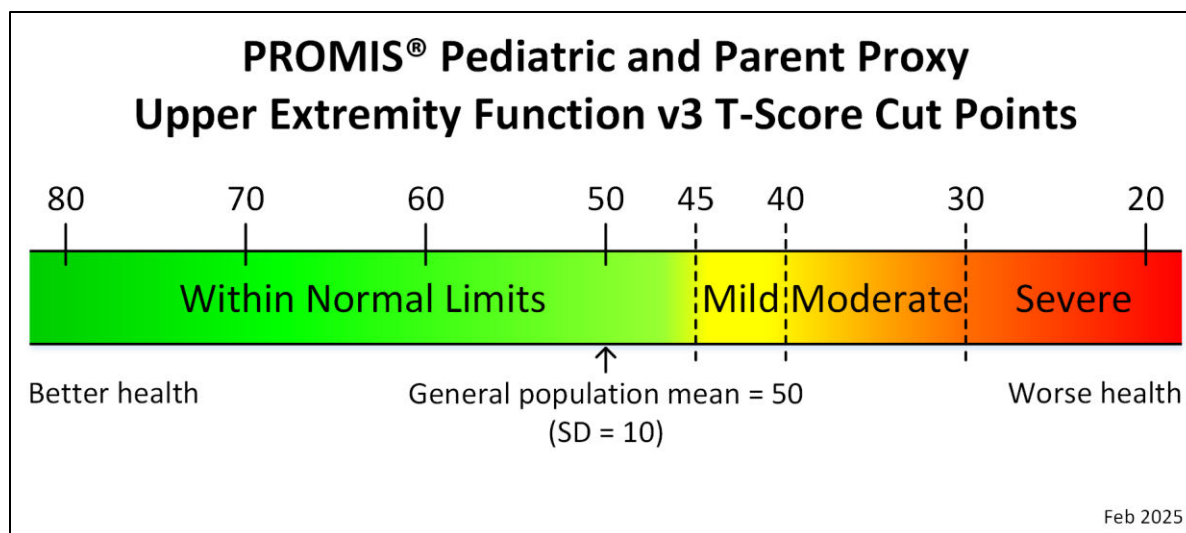
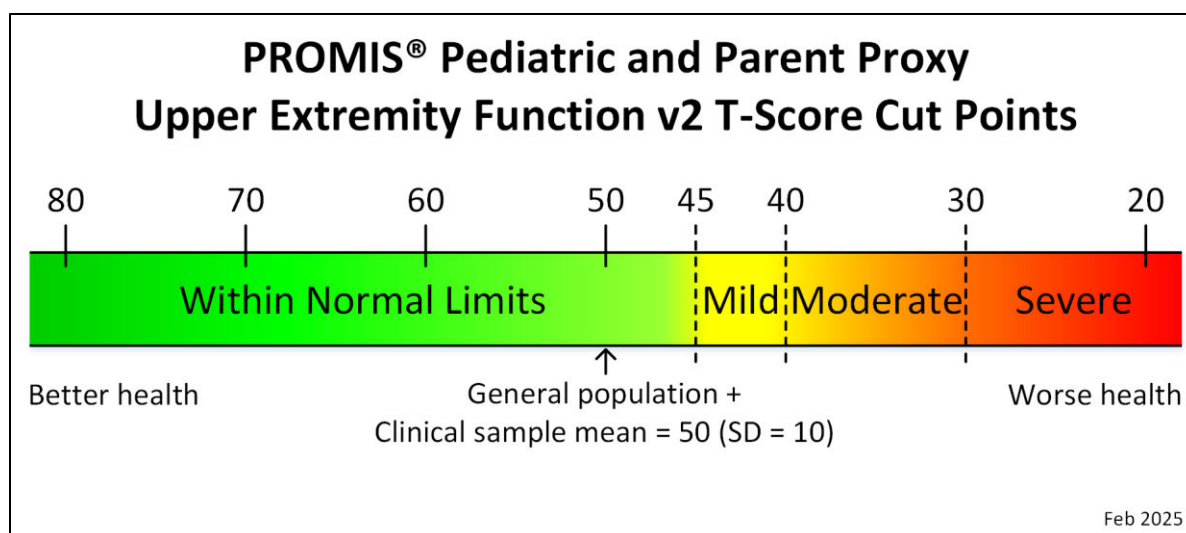
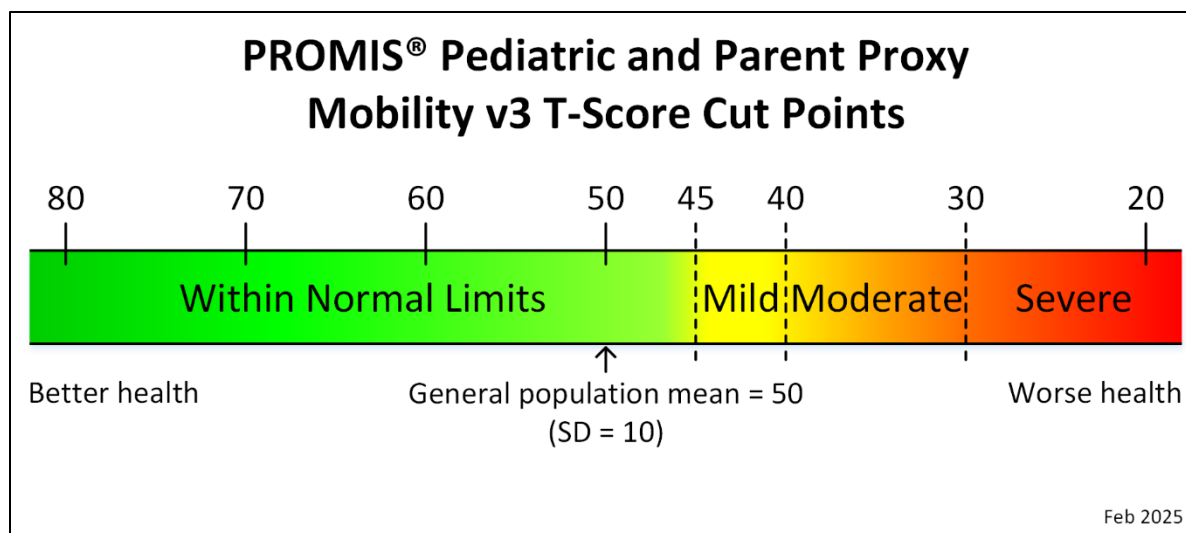




Pediatric and Parent Proxy



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REFERENCE VALUES FOR SPECIFIC PATIENT POPULATIONS

Few studies using representative samples have calculated reference values for individuals with specific health conditions or from countries other than the U.S. Using the general population mean of 50 is the best starting point for comparisons across all populations.

Oncology

Jensen et al. (2017) published reference values for people with cancer by age, stage, and cancer type (breast, prostate, uterine, cervical, colorectal, lung, and non-Hodgkin's lymphoma.) In general, physical function declines with increasing age and cancer stage, particularly for lung cancer.

Country-specific Reference Values

Many studies have evaluated the measurement properties of translations of PROMIS measures in different countries. Some of these include reference values specific to a country. For example, there are reference values for Dutch translations of PROMIS anxiety, depression, fatigue, sleep, and global health (Elsman et al., 2021; Elsman, 2022; Terwee, Elsman et al., 2022; Terwee, van Litsenburg et al., 2022). Kaman et al. (2021) published reference values for German translations of PROMIS pediatric anger. To learn more about PROMIS reference values within a specific country, contact your [PROMIS National Center](#) representative.

COMPARING SCORES ACROSS VERSIONS

Some PROMIS domains have multiple versions of instruments (i.e., v1.0, v1.1, v2.0, v3.0). 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.

Adult

- Scores obtained from Mobility v1.2, Mobility v2.1, and Mobility v2.0 are comparable. However, Version 2.1 is recommended over v2.0 and v1.2.
- Scores across PROMIS Physical Function v1.0, v1.1, v1.2, and v2.0 measures are comparable.
- Scores from PROMIS Short Form v2.0 – Physical Function-Multiple Sclerosis 15a can be compared with scores from PROMIS Physical Function v1.0, v1.1, v1.2, and v2.0 measures.
- Scores from v1.0 – v1.2 PROMIS Upper Extremity measures cannot be compared to scores from Upper Extremity v2.0 – v2.1.
- Scores from Upper Extremity v2.1 can be compared to scores from Upper Extremity v2.0 as the calibrations are identical.

Pediatric and Parent Proxy

- Scores for Pediatric Mobility v1.0 and v2.0 are comparable.
- Scores for Parent Proxy Mobility v1.0 and v2.0 are comparable.
- Scores for Pediatric Upper Extremity Function v1.0 and v2.0 are comparable.
- Scores for Parent Proxy Upper Extremity Function v1.0 and v2.0 are comparable.
- Scores from Pediatric and Parent Proxy GenPop v3.0 are NOT comparable with v1.0 or v2.0 measure scores.

Transforming Scores between Versions of Pediatric and Parent Proxy Measures:

To transform T-scores from Pediatric/Parent Proxy v1.0/v2.0 Mobility and/or Upper Extremity measures to the Pediatric/Parent Proxy GenPop v3.0 metric, rescore v1.0/v2.0 measures using the [HealthMeasures Scoring Service](#) or Assessment Center API. This is the preferred strategy as it produces precise scores. To do this, use the following instructions.

1. Download the v3.0 measure from [Search & View Measures](#) on HealthMeasures.net.
2. Revise your dataset as needed to match the v3.0 item IDs and response scores:
 - Several items were revised; see [Appendices 4 and 5](#) for a full list of v2.0 to v3.0 GenPop Mobility and Upper Extremity item changes.
3. Follow the instructions for using the [HealthMeasures Scoring Service](#). Contact help@HealthMeasures.net if using the Assessment Center API for rescoreing.

The crosswalk tables in [Appendix 3](#) may also be used as a reference to guide understanding of how scores have shifted from the older v1.0 and v2.0 measures to the v3.0 measures. If these tables are used to convert older T-scores to GenPop v3.0, please note that the resulting T-scores are not as precise as those generated by using HealthMeasures Scoring Service or Assessment Center API.

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APPENDIX 1—SCORING TABLES

Adult v2.0 - Physical Function 4a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
4	22.5	4.0
5	26.6	2.8
6	28.9	2.5
7	30.5	2.4
8	31.9	2.3
9	33.2	2.3
10	34.4	2.3
11	35.6	2.3
12	36.7	2.3
13	37.9	2.3
14	39.2	2.4
15	40.5	2.4
16	41.9	2.5
17	43.5	2.6
18	45.5	2.8
19	48.3	3.3
20	57.0	6.6
*SE = Standard Error on T-score metric		

Adult v2.0 – Physical Function 6b		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
6	21.0	3.8
7	25.0	2.7
8	27.1	2.4
9	28.8	2.2
10	30.1	2.1
11	31.3	2.0
12	32.3	2.0
13	33.2	1.9
14	34.2	1.9
15	35.0	1.9
16	35.9	1.9
17	36.8	1.9
18	37.6	1.9
19	38.5	1.9
20	39.3	1.9
21	40.2	1.9
22	41.2	1.9
23	42.1	1.9
24	43.2	2.0
25	44.3	2.0
26	45.6	2.2
27	47.1	2.3
28	48.9	2.7
29	51.3	3.0
30	59.0	6.2
*SE = Standard Error on T-score metric		

Adult v2.0 – Physical Function 8b		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
8	20.3	3.7
9	23.9	2.5
10	26.0	2.2
11	27.5	2.1
12	28.8	2.0
13	29.8	1.9
14	30.8	1.8
15	31.7	1.8
16	32.5	1.7
17	33.2	1.7
18	34.0	1.7
19	34.7	1.7
20	35.4	1.6
21	36.1	1.6
22	36.7	1.6
23	37.4	1.6
24	38.1	1.6
25	38.8	1.6
26	39.5	1.6
27	40.1	1.6
28	40.8	1.6
29	41.6	1.7
30	42.3	1.7
31	43.1	1.7
32	43.9	1.7
33	44.7	1.8
34	45.7	1.8
35	46.7	1.9
36	47.8	2.1
37	49.2	2.3
38	50.8	2.6
39	53.0	3.0
40	60.1	5.9
*SE = Standard Error on T-score metric		

PROMIS Adult SF v2.0 - Physical Function 8c & PROMIS Adult SF v2.0 - Physical Function 8c 7-day		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-Score	SE*
8	15.0	2.7
9	17.4	2.8
10	19.5	2.7
11	21.2	2.6
12	22.7	2.5
13	24.0	2.4
14	25.3	2.4
15	26.4	2.3
16	27.5	2.2
17	28.5	2.2
18	29.5	2.1
19	30.4	2.1
20	31.3	2.0
21	32.2	2.0
22	33.0	2.0
23	33.8	2.0
24	34.7	2.0
25	35.5	2.0
26	36.3	2.0
27	37.1	2.0
28	38.0	2.1
29	38.9	2.1
30	39.8	2.1
31	40.8	2.2
32	41.9	2.2
33	43.0	2.3
34	44.3	2.4
35	45.7	2.6
36	47.5	2.9
37	49.6	3.3
38	52.3	3.8
39	54.9	4.1
40	61.3	6.1

*SE = Standard error on T-score metric

Adult v2.0 – Physical Function 20a					
Short Form Conversion Table					
RS	TS	SE	RS	TS	SE
20	9.2	3.2	60	32.7	1.3
21	11.7	2.5	61	33.1	1.4
22	13.2	2.3	62	33.5	1.4
23	14.3	2.1	63	33.9	1.4
24	15.3	2.0	64	34.4	1.4
25	16.2	1.9	65	34.8	1.3
26	16.9	1.9	66	35.1	1.3
27	17.6	1.8	67	35.5	1.3
28	18.3	1.8	68	35.9	1.4
29	18.9	1.7	69	36.3	1.4
30	19.5	1.7	70	36.8	1.4
31	20.1	1.7	71	37.2	1.3
32	20.6	1.7	72	37.6	1.3
33	21.2	1.6	73	38.0	1.3
34	21.7	1.6	74	38.4	1.4
35	22.2	1.6	75	38.8	1.4
36	22.6	1.6	76	39.3	1.4
37	23.1	1.6	77	39.7	1.4
38	23.6	1.6	78	40.2	1.4
39	24.1	1.5	79	40.6	1.4
40	24.5	1.5	80	41.1	1.5
41	24.9	1.5	81	41.6	1.5
42	25.4	1.5	82	42.1	1.5
43	25.8	1.5	83	42.6	1.5
44	26.2	1.5	84	43.1	1.5
45	26.7	1.5	85	43.7	1.6
46	27.1	1.4	86	44.2	1.6
47	27.5	1.4	87	44.8	1.6
48	27.9	1.4	88	45.4	1.7
49	28.3	1.5	89	46.1	1.7
50	28.7	1.5	90	46.8	1.8
51	29.2	1.4	91	47.5	1.8
52	29.6	1.4	92	48.3	1.9
53	30.0	1.4	93	49.2	2.1
54	30.3	1.4	94	50.3	2.2
55	30.7	1.4	95	51.5	2.5
56	31.2	1.4	96	53.0	2.8
57	31.6	1.4	97	54.9	3.3
58	32.0	1.4	98	57.0	3.6
59	32.4	1.3	99	62.7	5.7
RS = Raw Score					
TS = T-score					
SE = Standard Error on T-score metric					

Adult v1.0 – Physical Function 12a					
Short Form Conversion Table for People Who Can Walk (answered 12 items)					
Raw Summed Score	T-Score	SE*	Raw Summed Score	Scale Score	SE*
12	13.3	3.3	37	37.8	1.7
13	16.1	2.9	38	38.5	1.7
14	18.1	2.7	39	39.2	1.7
15	19.6	2.5	40	39.9	1.7
16	20.9	2.4	41	40.6	1.7
17	22.1	2.3	42	41.3	1.8
18	23.1	2.3	43	42.0	1.8
19	24.1	2.2	44	42.8	1.8
20	25.1	2.2	45	43.5	1.9
21	26.0	2.2	46	44.3	1.9
22	26.8	2.1	47	45.2	2.0
23	27.7	2.1	48	46.1	2.0
24	28.5	2.1	49	47.0	2.1
25	29.3	2.0	50	47.9	2.2
26	30.0	2.0	51	48.9	2.2
27	30.8	2.0	52	50.0	2.3
28	31.5	1.9	53	51.1	2.5
29	32.3	1.9	54	52.4	2.6
30	33.0	1.9	55	53.8	2.9
31	33.7	1.9	56	55.8	3.6
32	34.4	1.8	57	57.3	3.7
33	35.1	1.8	58	59.5	4.1
34	35.8	1.8	59	61.7	4.5
35	36.5	1.8	60	66.1	5.8
36	37.1	1.7			
*SE = Standard Error on T-score metric					

Adult v1.0 – Physical Function 12a		
Short Form Conversion Table for People Who Cannot Walk (answered 6 items)		
Raw Summed Score	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		

PROMIS Adult Short Form v1.0 – Physical Function Samples with Mobility Aid Users 11a
Respondents Who Can Walk 25 Feet (answered 11 items)

Summary Score	Theta Score	SD (Theta)	T-Score	Estimated Proportion	Summary Score	Theta Score	SD (Theta)	T-Score	Estimated Proportion
11	-3.81	0.32	11.90	0.00007	34	-1.86	0.2	31.40	0.00394
12	-3.56	0.28	14.40	0.0001	35	-1.8	0.2	32.00	0.00444
13	-3.39	0.26	16.10	0.00014	36	-1.74	0.2	32.60	0.00499
14	-3.27	0.25	17.30	0.00019	37	-1.68	0.2	33.20	0.00561
15	-3.15	0.24	18.50	0.00023	38	-1.62	0.2	33.80	0.0063
16	-3.06	0.23	19.40	0.00029	39	-1.56	0.21	34.40	0.00708
17	-2.97	0.22	20.30	0.00035	40	-1.49	0.21	35.10	0.00797
18	-2.89	0.22	21.10	0.00042	41	-1.43	0.21	35.70	0.00898
19	-2.82	0.21	21.80	0.0005	42	-1.36	0.21	36.40	0.01015
20	-2.74	0.21	22.60	0.00059	43	-1.29	0.22	37.10	0.01151
21	-2.67	0.21	23.30	0.00069	44	-1.22	0.22	37.80	0.0131
22	-2.6	0.21	24.00	0.00081	45	-1.14	0.23	38.60	0.01501
23	-2.54	0.2	24.60	0.00094	46	-1.06	0.24	39.40	0.01734
24	-2.47	0.2	25.30	0.00109	47	-0.97	0.25	40.30	0.02023
25	-2.41	0.2	25.90	0.00125	48	-0.88	0.26	41.20	0.02382
26	-2.35	0.2	26.50	0.00144	49	-0.77	0.28	42.30	0.02865
27	-2.29	0.2	27.10	0.00164	50	-0.64	0.31	43.60	0.03557
28	-2.22	0.2	27.80	0.00187	51	-0.46	0.4	45.40	0.04722
29	-2.16	0.2	28.40	0.00213	52	-0.36	0.37	46.40	0.05582
30	-2.1	0.2	29.00	0.00242	53	-0.2	0.39	48.00	0.07547
31	-2.04	0.2	29.60	0.00274	54	0.04	0.41	50.40	0.12106
32	-1.98	0.2	30.20	0.0031	55	0.79	0.67	57.90	0.44923
33	-1.92	0.2	30.80	0.0035					

PROMIS Adult Short Form v1.0 – Physical Function Samples with Mobility Aid Users 11a <i>Respondents Who Cannot Walk 25 Feet (answered 8 items)</i>				
Raw Summed Score	Theta Score	SD (Theta)	T-Score	Estimated Proportion
8	-3.78	0.32	12.2	0.00008
9	-3.52	0.29	14.8	0.00012
10	-3.35	0.27	16.5	0.00017
11	-3.21	0.26	17.9	0.00022
12	-3.10	0.25	19.0	0.00029
13	-2.99	0.25	20.1	0.00037
14	-2.9	0.24	21.0	0.00047
15	-2.81	0.24	21.9	0.00058
16	-2.72	0.24	22.8	0.00071
17	-2.63	0.23	23.7	0.00087
18	-2.55	0.23	24.5	0.00106
19	-2.47	0.23	25.3	0.00129
20	-2.39	0.23	26.1	0.00155
21	-2.31	0.23	26.9	0.00187
22	-2.24	0.23	27.6	0.00224
23	-2.16	0.23	28.4	0.00267
24	-2.08	0.24	29.2	0.00318
25	-2.00	0.24	30.0	0.00379
26	-1.92	0.24	30.8	0.00451
27	-1.84	0.24	31.6	0.00536
28	-1.75	0.25	32.5	0.00638
29	-1.67	0.25	33.3	0.00761
30	-1.58	0.26	34.2	0.00912
31	-1.48	0.27	35.2	0.01101
32	-1.38	0.28	36.2	0.01342
33	-1.27	0.30	37.3	0.01658
34	-1.15	0.32	38.5	0.02084
35	-1.01	0.36	39.9	0.02695
36	-0.79	0.49	42.1	0.03768
37	-0.75	0.40	42.5	0.04442
38	-0.57	0.41	44.3	0.0558
39	-0.29	0.44	47.1	0.1187
40	0.59	0.72	55.9	0.59009

PROMIS Adult SF v2.1 Upper Extremity 7a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	TS	SE*
7	16.3	3.0
8	19.3	2.7
9	21.1	2.5
10	22.6	2.4
11	23.9	2.4
12	25.0	2.3
13	26.1	2.3
14	27.0	2.3
15	27.9	2.3
16	28.8	2.3
17	29.7	2.3
18	30.5	2.3
19	31.4	2.3
20	32.2	2.3
21	33.0	2.3
22	33.9	2.3
23	34.7	2.4
24	35.6	2.4
25	36.6	2.5
26	37.5	2.6
27	38.6	2.6
28	39.7	2.8
29	40.9	2.9
30	42.3	3.1
31	43.9	3.4
32	45.6	3.6
33	47.7	3.9
34	50.9	4.5
35	58.2	6.7
*SE = Standard Error on T-score metric		

Adult v2.0 – Physical Function 10a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
10	13.5	3.6
11	16.6	2.8
12	18.3	2.7
13	19.7	2.5
14	20.9	2.4
15	22.1	2.3
16	23.1	2.2
17	24.1	2.2
18	25.0	2.1
19	26.0	2.0
20	26.9	2.0
21	27.7	1.9
22	28.6	1.9
23	29.4	1.9
24	30.2	1.8
25	31.0	1.8
26	31.8	1.8
27	32.5	1.8
28	33.3	1.7
29	34.0	1.7
30	34.8	1.7
31	35.5	1.7
32	36.3	1.7
33	37.0	1.7
34	37.8	1.7
35	38.5	1.8
36	39.3	1.8
37	40.1	1.8
38	40.9	1.9
39	41.7	1.9
40	42.6	1.9
41	43.5	2.0
42	44.4	2.1
43	45.5	2.1
44	46.6	2.3
45	47.9	2.5
46	49.4	2.8
47	51.2	3.2
48	53.4	3.6
49	55.8	3.9
50	61.9	5.9
*SE = Standard Error on T-score metric		

Adult v2.0 – Physical Function 10b		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
10	13.8	3.9
11	17.2	3.1
12	19.3	2.8
13	21.0	2.6
14	22.4	2.4
15	23.6	2.3
16	24.7	2.2
17	25.7	2.1
18	26.6	2.0
19	27.4	2.0
20	28.2	1.9
21	28.9	1.9
22	29.6	1.9
23	30.3	1.8
24	31.0	1.8
25	31.7	1.8
26	32.3	1.8
27	32.9	1.8
28	33.5	1.8
29	34.2	1.8
30	34.8	1.8
31	35.4	1.8
32	36.0	1.8
33	36.7	1.8
34	37.3	1.8
35	37.9	1.8
36	38.6	1.8
37	39.3	1.8
38	40.0	1.8
39	40.7	1.9
40	41.5	1.9
41	42.3	2.0
42	43.2	2.0
43	44.2	2.1
44	45.2	2.2
45	46.5	2.4
46	48.1	2.8
47	50.0	3.2
48	52.5	3.7
49	55.0	4.0
50	61.3	6.1
*SE = Standard Error on T-score metric		

PROMIS Adult SF v2.0 Physical Function 24a (PROMIS HAQ)
Short Form Conversion Table

Raw Summed Score	T-Score	SE*	Raw Summed Score	T-Score	SE*	Raw Summed Score	T-Score	SE*
21	11.3	1.1	49	24.4	1.5	77	34	1.4
22	11.5	1.2	50	24.8	1.4	78	34.4	1.4
23	11.9	1.4	51	25.1	1.4	79	34.8	1.4
24	12.3	1.6	52	25.5	1.4	80	35.2	1.4
25	12.8	1.7	53	25.8	1.4	81	35.6	1.4
26	13.4	1.8	54	26.2	1.4	82	35.9	1.5
27	14	1.9	55	26.5	1.4	83	36.4	1.5
28	14.6	1.9	56	26.9	1.4	84	36.8	1.5
29	15.3	1.9	57	27.2	1.4	85	37.2	1.5
30	15.9	1.9	58	27.6	1.4	86	37.6	1.5
31	16.5	1.9	59	27.9	1.4	87	38.1	1.5
32	17.1	1.8	60	28.2	1.4	88	38.5	1.6
33	17.6	1.8	61	28.6	1.4	89	39	1.6
34	18.2	1.7	62	28.9	1.4	90	39.5	1.6
35	18.7	1.7	63	29.2	1.4	91	40.1	1.6
36	19.1	1.7	64	29.6	1.4	92	40.6	1.7
37	19.6	1.6	65	29.9	1.4	93	41.2	1.7
38	20.1	1.6	66	30.2	1.4	94	41.9	1.8
39	20.5	1.6	67	30.6	1.4	95	42.6	1.9
40	20.9	1.6	68	30.9	1.4	96	43.4	2
41	21.3	1.6	69	31.2	1.4	97	44.3	2.1
42	21.8	1.5	70	31.6	1.4	98	45.4	2.5
43	22.1	1.5	71	31.9	1.4	99	46.7	2.8
44	22.5	1.5	72	32.3	1.4	100	48.4	3.2
45	22.9	1.5	73	32.6	1.4	101	50.8	3.7
46	23.3	1.5	74	33	1.4	102	58.1	6.5
47	23.7	1.5	75	33.3	1.4			
48	24	1.5	76	33.7	1.4			

*SE = Standard Error on T-score metric

PROMISng Adult Short Form v2.0 – Physical Function–Multiple Sclerosis 15a <i>Short Form Conversion Table</i>					
Raw Summed Score	T-Score	SE*	Raw Summed Score	T-Score	SE*
15	14.7	2.6	46	37.7	1.4
16	16.8	2.5	47	38.2	1.4
17	18.6	2.4	48	38.6	1.4
18	19.9	2.2	49	39.1	1.4
19	21.1	2.1	50	39.6	1.4
20	22.2	2.0	51	40.0	1.4
21	23.2	2.0	52	40.5	1.4
22	24.0	1.9	53	41.0	1.4
23	24.9	1.9	54	41.4	1.4
24	25.7	1.8	55	41.9	1.4
25	26.4	1.8	56	42.4	1.5
26	27.1	1.8	57	42.9	1.5
27	27.8	1.8	58	43.5	1.5
28	28.5	1.7	59	44.0	1.5
29	29.1	1.7	60	44.5	1.5
30	29.7	1.7	61	45.1	1.6
31	30.3	1.6	62	45.7	1.6
32	30.9	1.6	63	46.3	1.6
33	31.4	1.6	64	47.0	1.7
34	32.0	1.5	65	47.6	1.7
35	32.5	1.5	66	48.3	1.7
36	33.0	1.5	67	49.1	1.8
37	33.5	1.5	68	49.9	1.9
38	34.0	1.5	69	50.8	2.0
39	34.5	1.5	70	51.8	2.1
40	35.0	1.4	71	53.0	2.4
41	35.4	1.4	72	54.3	2.6
42	35.9	1.4	73	56.1	3.1
43	36.4	1.4	74	58.1	3.4
44	36.8	1.4	75	63.6	5.4
45	37.3	1.4			

*SE = Standard Error on T-score metric

PROMIS+OA-Knee Adult Short Form v2.0 – Physical Function 13a					
Short Form Conversion Table					
Raw Summed Score	T-Score	SE*	Raw Summed Score	T-Score	SE*
13	15.8	2.9	40	36.6	1.5
14	18.1	2.8	41	37.1	1.5
15	19.7	2.6	42	37.6	1.5
16	21.1	2.4	43	38.1	1.5
17	22.2	2.2	44	38.6	1.5
18	23.3	2.1	45	39.1	1.5
19	24.2	2.0	46	39.6	1.5
20	25.1	1.9	47	40.1	1.6
21	25.8	1.9	48	40.6	1.6
22	26.6	1.8	49	41.1	1.6
23	27.3	1.8	50	41.7	1.6
24	27.9	1.7	51	42.2	1.6
25	28.6	1.7	52	42.8	1.6
26	29.2	1.7	53	43.4	1.6
27	29.8	1.7	54	44.0	1.7
28	30.3	1.6	55	44.7	1.7
29	30.9	1.6	56	45.3	1.8
30	31.4	1.6	57	46.0	1.8
31	32.0	1.6	58	46.8	1.9
32	32.5	1.6	59	47.7	2.1
33	33.0	1.6	60	48.7	2.2
34	33.5	1.6	61	50.0	2.6
35	34.1	1.6	62	51.2	2.8
36	34.6	1.6	63	52.9	3.1
37	35.1	1.6	64	55.4	3.6
38	35.6	1.6	65	61.7	5.8
39	36.1	1.5			

*SE = Standard Error on T-score metric

PROMIS Pediatric Short Form GenPop v3.0 – Mobility 4a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
4	15.7	3.3
5	17.9	3.5
6	19.9	3.6
7	21.8	3.6
8	23.6	3.7
9	25.4	3.7
10	27.3	4.0
11	29.3	4.2
12	31.7	4.6
13	35.5	6.1
14	37.9	6.1
15	41.6	6.2
16	52.6	8.5

*SE = Standard Error on T-score metric

PROMIS Pediatric Short Form GenPop v3.0 – Mobility 5a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
5	14.7	2.9
6	16.6	3.2
7	18.2	3.3
8	19.7	3.4
9	21.2	3.4
10	22.7	3.4
11	24.2	3.4
12	25.6	3.5
13	27.2	3.6
14	28.9	3.9
15	30.7	4.1
16	32.9	4.6
17	36.5	6.0
18	38.5	5.9
19	42.2	6.1
20	52.9	8.4

*SE = Standard Error on T-score metric

Note: 235R1r was removed from the item bank so should also be removed from Pediatric Mobility 5a and 7a.

PROMIS Pediatric Short Form GenPop v3.0 – Mobility 7a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
7	12.6	1.9
8	13.5	2.2
9	14.6	2.4
10	15.7	2.6
11	16.8	2.6
12	18.0	2.7
13	19.0	2.7
14	20.1	2.7
15	21.1	2.7
16	22.2	2.7
17	23.2	2.7
18	24.3	2.8
19	25.5	2.9
20	26.7	3.1
21	28.0	3.3
22	29.5	3.6
23	31.2	3.9
24	33.3	4.3
25	36.7	5.8
26	38.7	5.7
27	42.3	6.0
28	52.9	8.4

*SE = Standard Error on T-score metric

Note: 235R1r was removed from the item bank so should also be removed from Pediatric Mobility 5a and 7a.

PROMIS Pediatric Short Form GenPop v3.0 – Upper Extremity 8a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
8	13.0	2.1
9	14.2	2.4
10	15.4	2.6
11	16.5	2.7
12	17.7	2.7
13	18.8	2.7
14	19.8	2.6
15	20.8	2.6
16	21.8	2.6
17	22.8	2.6
18	23.7	2.6
19	24.7	2.6
20	25.7	2.6
21	26.6	2.7
22	27.7	2.7
23	28.8	2.8
24	29.9	2.9
25	31.2	3.1
26	32.6	3.2
27	34.2	3.5
28	36.0	3.8
29	38.5	4.6
30	40.8	4.7
31	44.8	5.3
32	54.4	7.8

*SE = Standard Error on T-score metric

PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 7a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
7	14.6	2.4
8	16.6	2.3
9	17.8	2.2
10	18.9	2.1
11	19.9	2.0
12	20.8	1.9
13	21.6	1.8
14	22.4	1.8
15	23.2	1.8
16	23.9	1.8
17	24.6	1.8
18	25.4	1.9
19	26.2	2.0
20	27.1	2.1
21	28.0	2.2
22	29.1	2.5
23	30.3	2.7
24	31.9	3.2
25	34.9	4.9
26	36.5	4.9
27	39.8	5.3
28	52.1	8.6

*SE = Standard Error on T-score metric

Note: Pf1mobil3r was removed from the item bank so should also be removed from Parent Proxy Mobility 7a.

PROMIS Parent Proxy Short Form GenPop v3.0 – Upper Extremity 8a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	T-score	SE*
8	14.1	2.4
9	15.5	2.6
10	16.7	2.7
11	17.9	2.6
12	19.0	2.5
13	20.0	2.4
14	21.0	2.4
15	21.9	2.3
16	22.8	2.3
17	23.6	2.3
18	24.5	2.3
19	25.3	2.3
20	26.2	2.3
21	27.0	2.4
22	28.0	2.4
23	28.9	2.5
24	30.0	2.6
25	31.2	2.8
26	32.5	3.0
27	34.1	3.3
28	35.9	3.8
29	38.5	4.9
30	40.7	4.9
31	44.7	5.5
32	54.2	7.9

*SE = Standard Error on T-score metric

APPENDIX 2—SCORING TABLES FOR RETIRED MEASURES

Adult v1.0 – Physical Function 4a		
<i>Short Form Conversion Table</i>		
Raw Summed 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 on T-score metric		

Adult v1.0 – Physical Function 6a		
<i>Short Form Conversion Table</i>		
Raw Summed 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 on T-score metric		

Adult v1.0 – Physical Function 8a		
<i>Short Form Conversion Table</i>		
Raw Summed 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 on T-score metric		

Adult v1.0 – Physical Function 10a		
Short Form Conversion Table		
Raw Summed 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

Adult v1.0 – 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

Adult v1.2 – Physical Function 6b		
Short Form Conversion Table		
Raw Summed 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 on T-score metric

Adult v1.2 – Physical Function 8b		
Short Form Conversion Table		
Raw Summed 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	1.9
14	31.1	1.7
15	31.0	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 on T-score metric

Pediatric v1.0 – Upper Extremity 8a		
<i>Short Form Conversion Table</i>		
Raw Summed 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 on T-score metric		

Pediatric v1.0 – Mobility 8a		
<i>Short Form Conversion Table</i>		
Raw Summed 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 on T-score metric		

Parent Proxy v1.0 – Upper Extremity 8a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	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 v1.0 – Mobility 8a		
<i>Short Form Conversion Table</i>		
Raw Summed Score	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	43	4
32	56	7
*SE = Standard Error on T-score metric		

Pediatric v2.0 – Upper Extremity 8a		
Short Form Conversion Table		
Raw Summed Score	T-Score	SE*
8	10	4
9	12	4
10	14	3
11	15	3
12	17	3
13	18	3
14	19	3
15	20	3
16	21	3
17	22	3
18	23	3
19	24	3
20	24	3
21	25	3
22	26	3
23	27	3
24	28	3
25	29	3
26	30	3
27	31	3
28	32	3
29	33	3
30	34	3
31	35	4
32	37	4
33	39	4
34	40	4
35	42	5
36	45	5
37	49	5
38	57	7
*SE = Standard Error on T-score metric		

Pediatric v2.0 – Mobility 8a		
Short Form Conversion Table		
Raw Summed Score	T-Score	SE*
8	14	4
9	17	3
10	19	3
11	20	3
12	21	3
13	22	3
14	23	3
15	24	3
16	25	3
17	26	3
18	27	3
19	28	3
20	28	3
21	29	3
22	30	3
23	31	3
24	32	3
25	33	3
26	33	3
27	34	3
28	35	3
29	36	3
30	37	3
31	38	3
32	39	3
33	40	3
34	41	3
35	43	4
36	45	4
37	46	4
38	48	4
39	52	5
40	59	7
*SE = Standard Error on T-score metric		

Parent Proxy v2.0 – Upper Extremity 8a			Parent Proxy v2.0 – Mobility 8a		
Short Form Conversion Table			Short Form Conversion Table		
Raw Summed Score	T-Score	SE*	Raw Summed Score	T-Score	SE*
8	13	3	8	14	4
9	16	3	9	17	3
10	17	3	10	20	3
11	18	2	11	21	3
12	19	2	12	22	3
13	20	2	13	23	2
14	21	2	14	24	2
15	22	2	15	25	2
16	22	2	16	26	2
17	23	2	17	27	2
18	24	2	18	27	2
19	24	2	19	28	2
20	25	2	20	29	2
21	25	2	21	29	2
22	26	2	22	30	2
23	26	2	23	31	2
24	27	2	24	31	2
25	28	2	25	32	2
26	28	2	26	33	2
27	29	2	27	33	2
28	30	2	28	34	2
29	30	2	29	35	2
30	31	2	30	35	2
31	32	2	31	36	2
32	33	2	32	37	2
33	34	3	33	38	3
34	35	3	34	39	3
35	37	3	35	40	3
36	38	4	36	42	4
37	40	4	37	43	4
38	42	4	38	45	4
39	45	5	39	48	4
40	55	8	40	56	7
*SE = Standard Error on T-score metric			*SE = Standard Error on T-score metric		

All scoring tables based on default Parent Proxy calibrations.

APPENDIX 3—CROSSWALK BETWEEN PEDIATRIC AND PARENT PROXY V2.0 T-SCORES AND PEDIATRIC AND PARENT PROXY GENPOP V3.0 T-SCORES

Table 1. PROMIS Pediatric Mobility: Crosswalk between v2.0 T-scores and GenPop v3.0 T-scores

PROMIS Pediatric Mobility T-Score		PROMIS Pediatric Mobility T-Score	
v2.0	v3.0 GenPop	v2.0	v3.0 GenPop
11	11.0	49	38.2
12	17.5	50	39.4
13	17.5	51	40.5
14	17.5	52	41.5
15	17.5	53	43.6
16	17.5	54	44.2
17	17.5	55	45.9
18	17.5	56	46.8
19	17.5	57	47.6
20	17.5	58	49.1
21	17.5	59	53.0
22	17.5	60	53.0
23	17.5	61	53.0
24	17.5	62	56.0
25	17.5		
26	17.5		
27	17.5		
28	18.0		
29	20.0		
30	22.0		
31	22.0		
32	22.0		
33	22.0		
34	23.8		
35	24.8		
36	26.0		
37	26.5		
38	27.0		
39	28.0		
40	29.6		
41	30.4		
42	31.2		
43	32.5		
44	33.1		
45	33.7		
46	35.2		
47	36.9		
48	37.5		

Table 2. PROMIS Parent Proxy Mobility: Crosswalk between v2.0 T-scores and GenPop v3.0 T-scores

PROMIS Parent Proxy Mobility T-Score		PROMIS Parent Proxy Mobility T-Score	
v2.0	v3.0 GenPop	v2.0	v3.0 GenPop
12	12.0	50	44.0
13	19.5	51	47.1
14	19.5	52	48.0
15	19.5	53	48.3
16	19.5	54	50.0
17	19.5	55	50.5
18	19.5	56	53.0
19	19.5	57	53.0
20	19.5	58	53.0
21	19.5	59	53.0
22	19.5	60	56.0
23	19.5		
24	19.5		
25	19.5		
26	19.5		
27	19.8		
28	20.5		
29	22.5		
30	22.5		
31	22.5		
32	24.8		
33	25.5		
34	25.8		
35	26.2		
36	27.5		
37	28.7		
38	29.0		
39	30.0		
40	31.0		
41	32.0		
42	33.5		
43	34.8		
44	35.8		
45	37.1		
46	38.5		
47	40.6		
48	41.5		
49	42.4		

Table 3. PROMIS Pediatric Upper Extremity: Crosswalk between v2.0 T-scores and GenPop v3.0 T-scores

PROMIS Pediatric Upper Extremity T-Score		PROMIS Pediatric Upper Extremity T-Score	
v2.0	v3.0 GenPop	v2.0	v3.0 GenPop
10	10.0	48	43.2
11	16.5	49	44.7
12	16.5	50	46.0
13	16.5	51	46.8
14	16.5	52	47.3
15	16.5	53	51.0
16	16.5	54	51.0
17	16.5	55	51.0
18	16.5	56	51.0
19	16.5	57	54.5
20	16.5	58	55.0
21	17.0		
22	18.0		
23	19.0		
24	20.0		
25	20.8		
26	21.2		
27	24.0		
28	24.0		
29	24.0		
30	24.0		
31	27.0		
32	28.0		
33	28.8		
34	29.2		
35	30.2		
36	31.6		
37	32.3		
38	33.1		
39	34.2		
40	35.6		
41	36.4		
42	37.4		
43	38.2		
44	39.4		
45	40.4		
46	41.5		
47	42.2		

Table 4. PROMIS Parent Proxy Upper Extremity: Crosswalk between v2.0 T-scores and GenPop v3.0 T-scores

PROMIS Parent Proxy Upper Extremity T-Score		PROMIS Parent Proxy Upper Extremity T-Score	
v2.0	v3.0 GenPop	v2.0	v3.0 GenPop
11	12.0	49	53.8
12	20.5	50	53.8
13	20.5	51	53.8
14	20.5	52	53.8
15	20.5	53	53.8
16	20.5	54	53.8
17	20.5	55	55.0
18	20.5		
19	20.5		
20	20.5		
21	20.5		
22	20.8		
23	21.2		
24	22.5		
25	23.8		
26	24.2		
27	25.0		
28	26.0		
29	27.0		
30	28.0		
31	29.5		
32	30.5		
33	31.2		
34	32.2		
35	33.1		
36	33.9		
37	35.1		
38	36.4		
39	37.7		
40	38.4		
41	39.2		
42	40.6		
43	41.9		
44	43.1		
45	43.8		
46	45.5		
47	47.0		
48	50.5		

APPENDIX 4—V3.0 GENPOP MOBILITY ITEM REVISIONS

PROMIS Pediatric Bank GenPop v3.0 – Mobility, PROMIS Pediatric Short Form GenPop v3.0 – Mobility 4a, PROMIS Pediatric Short Form GenPop v3.0 – Mobility 5a, and PROMIS Pediatric Short Form GenPop v3.0 – Mobility 7a:

- The Item ID **4124R1r** was changed to **4124R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **2707R2r** was changed to **2707R2r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **5023R1r** was changed to **5023R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **236R1r** was changed to **236R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

PROMIS Pediatric Bank GenPop v3.0 – Mobility, PROMIS Pediatric Short Form GenPop v3.0 – Mobility 5a, and PROMIS Pediatric Short Form GenPop v3.0 – Mobility 7a:

- The Item ID **4185R1r** was changed to **4185R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

PROMIS Pediatric Bank GenPop v3.0 – Mobility and PROMIS Pediatric Short Form GenPop v3.0 – Mobility 7a:

- The Item ID **3892R1r** was changed to **3892R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **2646R1r** was changed to **2646R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

PROMIS Pediatric Bank GenPop v3.0 – Mobility:

- The Item ID **2118R1r** was changed to **2118R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **219R1r** was changed to **219R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **2642aR1r** was changed to **2642aR1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **2642bR1r** was changed to **2642bR1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **2647R2r** was changed to **2647R2r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **3799R1r** was changed to **3799R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4079R1r** was changed to **4079R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4137R1r** was changed to **4137R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4190R1r** was changed to **4190R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

- The Item ID **676R1r** was changed to **676R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **7026** was changed to **7026r** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

PROMIS Parent Proxy Bank GenPop v3.0 – Mobility, PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 4a, PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 5a, and PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 7a:

- The Item ID **Pf3mobil9r** was changed to **Pf3mobil9r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf2mobil4r** was changed to **Pf2mobil4r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf1mobil1r** was changed to **Pf1mobil1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4mobil4r** was changed to **Pf4mobil4r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

PROMIS Parent Proxy Bank GenPop v3.0 – Mobility, PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 5a, and PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 7a:

- The Item ID **Pf2mobil7r** was changed to **Pf2mobil7r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

PROMIS Parent Proxy Bank GenPop v3.0 – Mobility and PROMIS Parent Proxy Short Form GenPop v3.0 – Mobility 7a:

- The Item ID **Pf3mobil8r** was changed to **Pf3mobil8r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf3mobil3r** was changed to **Pf3mobil3r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

PROMIS Parent Proxy Bank GenPop v3.0 – Mobility:

- The Item ID **Pf3mobil2r** was changed to **Pf3mobil2r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf3mobil12r** was changed to **Pf3mobil12r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4mobil10r** was changed to **Pf4mobil10r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4mobil2r** was changed to **Pf4mobil2r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4mobil3r** was changed to **Pf4mobil3r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf2mobil6r** was changed to **Pf2mobil6r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf1mobil5r** was changed to **Pf1mobil5r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4mobil6r** was changed to **Pf4mobil6r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

- The Item ID **Pf1mobil6r** was changed to **Pf1mobil6r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4mobil9r** was changed to **Pf4mobil9r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf3mobil10r** was changed to **Pf3mobil10r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

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APPENDIX 5—V3.0 GENPOP UPPER EXTREMITY ITEM REVISIONS

PROMIS Pediatric Bank GenPop v3.0 – Upper Extremity and PROMIS Pediatric Short Form GenPop v3.0 – Upper Extremity 8a

- The Item ID **3880R2r** was changed to **3880R2r2** and the Item Stem from "**I could button my shirt or pants.**" to "**I could button my shirt or pants (trousers).**" This change was made to improve the understandability of the item in English-speaking countries outside of the U.S. without changing the interpretation of the item in the U.S.
- The Item ID **2671R1r** was changed to **2671R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4143R1r** was changed to **4143R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4112R1r** was changed to **4112R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1. The Item Stem was also changed from "**I could pour a drink from a full pitcher.**" to "**I could pour a drink from a full pitcher (jug).**" This change was made to improve the understandability of the item in English-speaking countries outside of the U.S. without changing the interpretation of the item in the U.S.
- The Item ID **4130R1r** was changed to **4130R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **2657bR1r** was changed to **2657bR1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4109R1r** was changed to **4109R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

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PROMIS Pediatric Bank GenPop v3.0 – Upper Extremity

- The Item ID **2657aR1r** was changed to **2657aR1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **2659R1r** was changed to **2659R1r2** to account for the revised Response Scores from 4-3-2-1-1 to 5-4-3-2-1.
- The Item ID **2727R1r** was changed to **2727R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **3334aR1r** was changed to **3334aR1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **3334bR1r** was changed to **3334bR1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **3907aR1r** was changed to **3907aR1r2** to account for the revised Response Scores from 4-3-2-1-1 to 3-2-1-1-1.
- The Item ID **3908R2r** was changed to **3908R2r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4097bR2r** was changed to **4097bR2r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4098R1r** was changed to **4098R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4107R2r** was changed to **4107R2r2** to account for the revised Response Scores from 5-4-3-2-1 to 3-2-1-1-1.
- The Item ID **4118R1r** was changed to **4118R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4156R1r** was changed to **4156R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4173R1r** was changed to **4173R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **4174R1r** was changed to **4174R1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **7029** was changed to **7029r** to account for the revised Response Scores from 4-3-2-1-1 to 3-2-1-1-1.
- The Item ID **7031** was changed to **7031r** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **7032** was changed to **7032r** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

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PROMIS Parent Proxy Bank GenPop v3.0 – Upper Extremity and PROMIS Parent Proxy Short Form GenPop v3.0 – Upper Extremity 8a

- The Item ID **Pf3uprext4r** was changed to **Pf3uprext4r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf2uprext2r** was changed to **Pf2uprext2r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf2uprext3r** was changed to **Pf2uprext3r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1. The Item Stem was also changed from "**My child could button his/her shirt or pants.**" to "**My child could button his/her shirt or pants (trousers).**" This change was made to improve the understandability of the item in English-speaking countries outside of the U.S. without changing the interpretation of the item in the U.S.
- The Item ID **Pf3uprext7r** was changed to **Pf3uprext7r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf3uprext11r** was changed to **Pf3uprext11r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4uprext10r** was changed to **Pf4uprext10r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1. The Item Stem was also changed from "**My child could pour a drink from a full pitcher.**" to "**My child could pour a drink from a full pitcher (jug).**" This change was made to improve the understandability of the item in English-speaking countries outside of the U.S. without changing the interpretation of the item in the U.S.
- The Item ID **Pf4uprext1r** was changed to **Pf4uprext1r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf3uprext9r** was changed to **Pf3uprext9r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

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PROMIS Parent Proxy Bank GenPop v3.0 – Upper Extremity

- The Item ID **Pf3uprext6r** was changed to **Pf3uprext6r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf3uprext3r** was changed to **Pf3uprext3r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf1uprext2r** was changed to **Pf1uprext2r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf1uprext4r** was changed to **Pf1uprext4r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf3uprext2r** was changed to **Pf3uprext2r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4uprext9r** was changed to **Pf4uprext9r2** to account for the revised Response Scores from 5-4-3-2-1 to 3-2-1-1-1.
- The Item ID **Pf2uprext8r** was changed to **Pf2uprext8r2** to account for the revised Response Scores from 3-2-1-1-1 to 4-3-2-1-1.
- The Item ID **Pf4uprext12r** was changed to **Pf4uprext12r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4uprext4r** was changed to **Pf4uprext4r2** to account for the revised Response Scores from 5-4-3-2-1 to 3-2-1-1-1.
- The Item ID **Pf3uprext8r** was changed to **Pf3uprext8r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.
- The Item ID **Pf4uprext3r** was changed to **Pf4uprext3r2** to account for the revised Response Scores from 5-4-3-2-1 to 4-3-2-1-1.

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APPENDIX 6—SUPPLEMENTAL INFORMATION FOR *PROMIS_{nq} SHORT FORM V2.0 – PHYSICAL FUNCTION-MULTIPLE SCLEROSIS 15A (PROMIS_{nq} PFMS-15A)*

OVERVIEW OF PHYSICAL FUNCTION IN MULTIPLE SCLEROSIS

Multiple sclerosis (MS) is a chronic, disabling disease that affects the central nervous system and causes a range of neurological symptoms and impacts on activities of daily living¹⁻³. As of 2017, approximately 900,000 individuals in the United States are living with an MS diagnosis⁴. Currently, there is no cure for MS; treatment is a lifelong process that includes medication, rehabilitation, and emotional support³.

MS is a major cause of non-traumatic disability in younger adults^{5,6}. The multiple neurologic deficits that lead to substantial disability also lead to significantly decreased health-related quality of life (HRQOL)⁵⁻⁸. In particular, the disease impacts physical functioning, which is a determinant of HRQOL. For example, many of the symptoms of MS (e.g., fatigue, weakness, spasticity, numbness)⁹ limit physical function, such as the ability to carry out activities of daily living (e.g., household chores and personal care) and other important physical activities (e.g., standing, walking, and climbing up and down stairs)¹⁰⁻¹².

Mobility, in particular, is impacted by MS and in turn affects the HRQOL of individuals with MS^{12,13}. Persons living with MS more frequently reported problems with mobility than the other dimensions measured by the EQ-5D, such as self-care, usual activities, pain/discomfort, and anxiety/depression¹⁴. Between 33-50% of people with MS have difficulty walking and require at least some assistance with walking within 10 to 15 years from onset of MS¹⁵⁻¹⁷. Moreover, a substantial number of individuals with MS report that impaired walking has a negative impact on their ability to perform activities of daily living and other daily activities, including recreational activities^{10,13,18}. Furthermore, problems with walking not only negatively affect mobility but also significantly restrict other types of activities and emotional health, such as self-esteem, ability to work, and ability to travel, resulting in missed events, limited socializing outside of the home, and negative impacts on financial status due to reduced ability to work and loss of income^{10,19}.

OVERVIEW OF THE *PROMIS_{nq} PFMS—15a*

Description

The *PROMIS_{nq} PFMS—15a* is a short form consisting of 12 items from the PROMIS Physical Function Item Bank v2.0, one new item, and two items from the Neuro-QoL Mobility Item Bank. The short form uses the following instructions, “Please respond to each question or statement by marking one box per row.” All items use a 5-point verbal rating scale. Nine of the items assess degree of difficulty in completing select physical activities (Without any difficulty; With a little difficulty; With some difficulty; With much difficulty; Unable to do). The activities assessed vary in their level of difficulty from less physically demanding tasks (e.g., “Are you able to hold a plate of food?”) to strenuous activities (e.g., “Are you able to exercise hard for half an hour?”). Four items assess physical function limitations (Not at all; Very little; Somewhat; Quite a lot; Cannot do). Two items assess the amount of difficulty associated with select physical activities (No difficulty; A little difficulty; Some difficulty; A lot of difficulty; Can’t do).

These PROMIS and NeuroQoL item banks were psychometrically linked using an IRT fixed parameter approach which allows the items on the *PROMIS_{nq} PFMS—15a* to be scored using 1 set of parameters²⁰. Scores on the *PROMIS_{nq} PFMS—15a* are reported as a T-score metric (mean = 50 and standard deviation [SD] = 10), with higher scores reflecting better physical functioning.

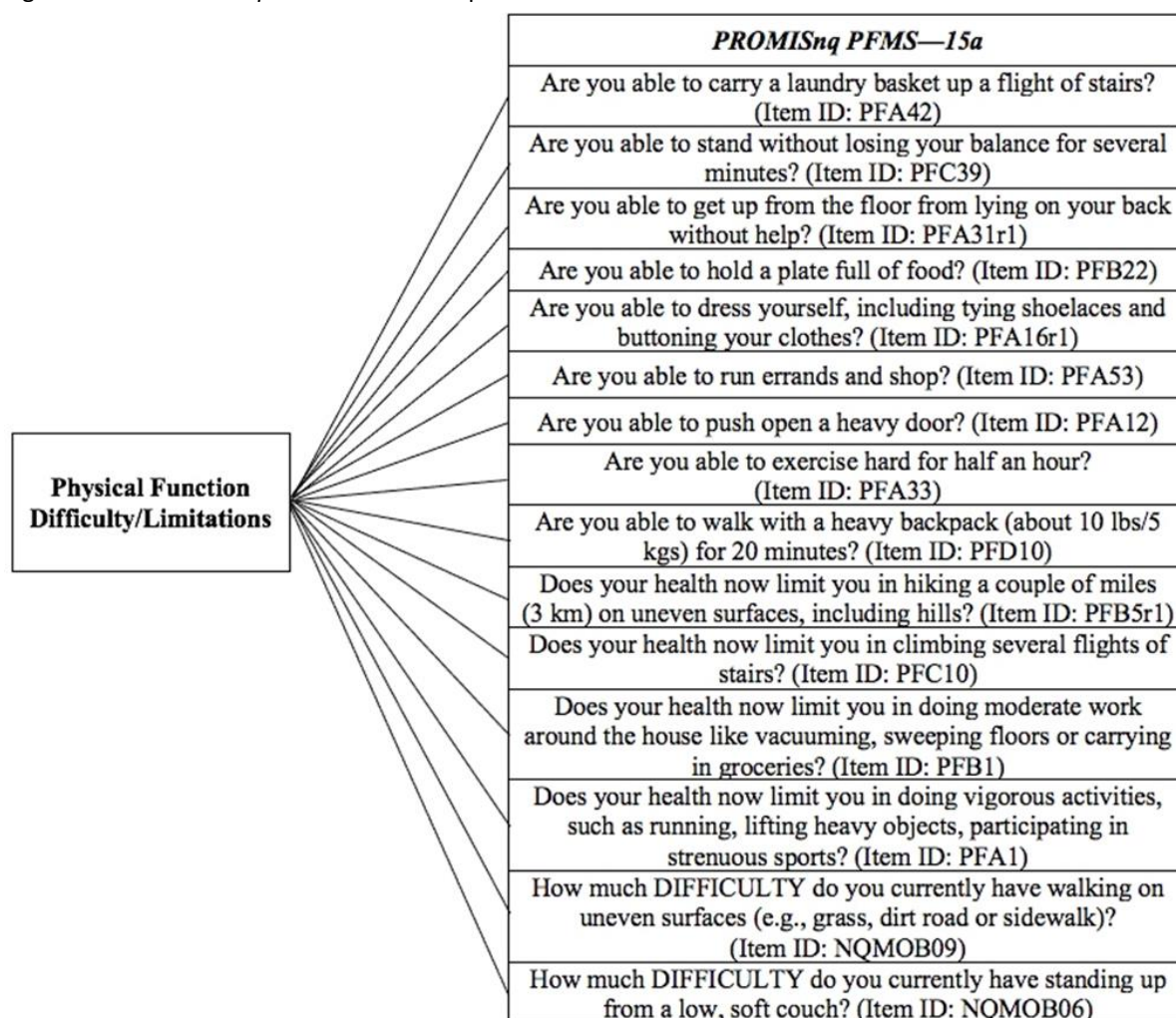
Reporter

The *PROMIS_{nq} PFMS—15A* is a self-report measure. Respondents choose the response option that most accurately captures their capability to perform the activity described in the item.

Conceptual Framework

The conceptual framework for the assessment of physical function in MS based on the *PROMIS[®] PFMS—15a* is shown in Figure 1. This short form is hypothesized as a unidimensional construct of physical functioning difficulties/limitations in MS. The measure includes the following content: carrying a laundry basket upstairs, balance while standing, getting up from the floor, holding a plate of food, dressing oneself, running errands and shopping, pushing open a heavy door, exercising hard, walking with a heavy backpack, hiking for miles on uneven surfaces or hills, climbing stairs, moderate housework, vigorous activities, walking on uneven surfaces, and standing from a low, seated position.

Figure 1. The *PROMIS[®] PFMS—15a* Conceptual Framework



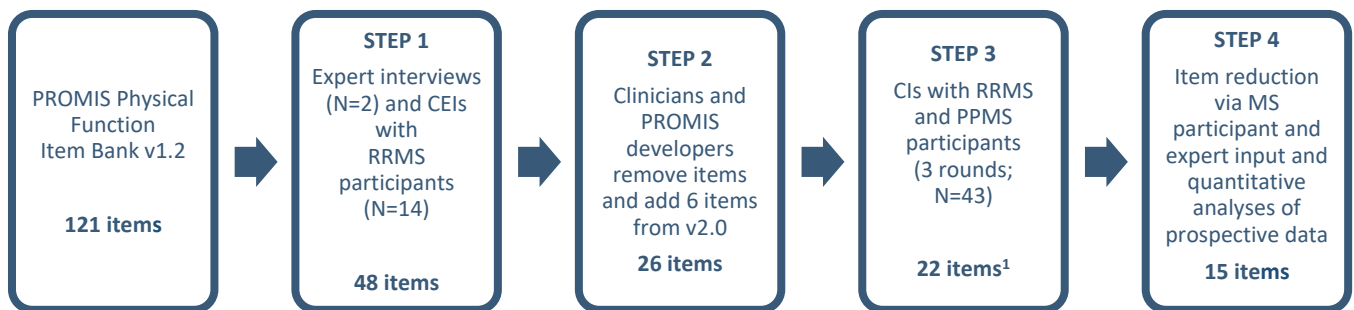
DEVELOPMENT AND EVALUATION OF THE *PROMIS[®] PFMS—15a*

Development

Prior to development of the *PROMIS[®] PFMS—15a*, there were 12 existing PROMIS Physical Function short forms for adults; however, none were created specifically for use among individuals with MS. Therefore, EMD Serono/Merck KGaA, Darmstadt, Germany sought to develop a content valid PROMIS short form of physical function for individuals with MS.

As shown in Figure 2, the *PROMIS[®] PFMS—15a* was developed via concept elicitation interviews with individuals with MS, expert item review and reduction of items, cognitive interviews of a draft item set with MS participants, quantitative analysis of prospective data, and final item selection. The development process is further described below, under Content Validity. Of note, during development of the short form, MS patient input indicated the measure should include an item(s) related to mobility for individuals with lower levels of impairment. There were no PROMIS items to cover this concept; thus, two items were added from the Neuro-QoL Mobility Item Bank. One de novo item was also added to capture a concept important to MS participants (walking while carrying something heavy) that was not covered by either PROMIS or Neuro-QoL. Thus, the *PROMIS[®] PFMS—15a* draws upon the extensive development history of PROMIS and Neuro-QoL and provides a physical function measure that has appropriate content for MS populations.

Figure 2. Overview of item selection process for the *PROMIS[®] PFMS—15a*



CIs = cognitive interviews; CEIs = concept elicitation interviews; MS = multiple sclerosis; PROMIS = Patient Reported Outcomes Measurement Information System; RRMS = relapsing-remitting multiple sclerosis; PPMS = primary progressive multiple sclerosis

Evidence of Content Validity

Content validity of the *PROMIS[®] PFMS—15a* was established through qualitative input from individuals with MS (Steps 1, 3 and 4 of Figure 2); expert input (Steps 1, 2 and 4 of Figure 2); and literature review, which occurred prior to item selection and informed the measure development process. Each of the steps shown in Figure 2 are briefly described below.

Step 1: Items selected from PROMIS Physical Function Item Bank v1.2 based on concept elicitation interviews and expert input. The results of the concept elicitation and expert interviews were summarized and used to select 48 highly relevant physical function items from the 121-item PROMIS Physical Function v1.2 item bank, based on the alignment of available items with the identified key concepts (Step 1 of Figure 2).

Step 2: Clinicians and PROMIS Developers Reduce Items. A clinician expert panel (N=6) was assembled to evaluate the initial 48 PROMIS Physical Function items through a ranking exercise. To facilitate the ranking exercise, a content evaluation form including 2 key tasks was employed as follows:

- The first task involved selection of no more than 2 items that the expert considered the most relevant for the content group.
- The second task involved selection of: (1) 5 items providing a good summary of the patient's physical function, and (2) selection of items which best summarized high/low levels of physical function in individuals with MS.

Next, a 6-person multi-disciplinary content definition panel (including a patient advisor, a psychometrician, an epidemiologist, a therapeutic expert responsible for the evobrutinib program, and 2 outcomes scientists) met over 3 sessions to make the final item selection recommendations. The panel assimilated all prior information, including parameters from the calibration of the PROMIS Physical Function v1.2 Item Bank (including IRT item information

functions and positioning of items along the physical function continuum), as well as the results of interviews with individuals with MS and the clinician expert panel. The content definition panel recommended 26 items for further development, based on the concepts identified from interviews with participants with MS, item relevance based on clinician expert ratings, and prior (known) item parameters of the items in the physical function item.

Step 3. Cognitive Interviews. The 26 draft items underwent three rounds of cognitive interviews with individuals with MS. The cognitive interviews were an iterative process of dropping and adding items based upon participant input and expert review. At the end of round 3, the cognitive interview process yielded 22 candidate items which consisted of 19 PROMIS Physical Function items, two Neuro-QoL items, and one new item.

Step 4. Item reduction via MS participant and expert input and quantitative analyses of prospective data.

Further item reduction occurred via two rounds of quantitative analysis, input from people with MS, and input from an expert panel. Specifically, a Patient-Focused Drug Development (PFDD) Council comprised of individuals with MS and convened by the Accelerated Cure Project, in collaboration with EMD Serono, participated in a teleconference to provide feedback on items being considered for removal. Moreover, a panel of five measurement experts reviewed all available evidence for the measure. This process resulted in the final set of 15 items.

Measurement Properties and Psychometric Evaluation

Psychometric properties of the *PROMIS[®] PFMS—15a* were evaluated by using data from two projects: 1) a survey study of individuals with MS in the United Kingdom (UK-MS Study), and 2) a survey study of individuals with MS in the United States via the University of Washington (UW-MS Study). Cross-sectional analyses were conducted using baseline data from the UW-MS Study and week-52 data from the UK-MS Study. Descriptive statistics included frequency distributions of both item response and overall scores, floor and ceiling effects, and percentage of missing responses.

To describe the distribution of items in the *PROMIS[®] PFMS—15a*, the frequency and percentage of each response option selected for each item at baseline on both studies were calculated. A threshold of 35% (approximately one-third) of the sample selecting either the highest or lowest response was used to indicate a floor or ceiling effect for that item. For MS-UK Study data, ceiling effects were found on two items (PFB22 “Are you able to hold a plate full of food?” and PFA16R1 “Are you able to dress yourself, including tying shoelaces and buttoning your clothes?”), and two items showed floor effects (PFA33 “Are you able to exercise hard for half an hour?” and PFNEW4 “Are you able to walk with a heavy backpack (about 10 lbs/5kgs) for 20 minutes?”). For MS-UW Study data, all but 4 items (PFA33 “Are you able to exercise hard for half an hour?”; PFNEW4 “Are you able to walk with a heavy backpack (about 10 lbs/5kgs) for 20 minutes?”; PFB1 “Does your health now limit you in doing moderate work around the house like vacuuming, sweeping floors or carrying in groceries?”; and PFA1 “Does your health now limit you in doing vigorous activities, such as running, lifting heavy objects, participating in strenuous sports?”) showed ceiling effects, suggesting MS-UW Study participants were less symptomatic than MS-UK participants. No missing data was found on either study. Inter-item consistency was supported with Cronbach’s Alpha ≥ 0.95 on both studies. Strong test-retest reliability was found on UW-MS Study data with the intraclass correlation coefficients (ICCs) = 0.97. Regarding IRT-based reliabilities, the *PROMIS[®] PFMS—15a* has excellent reliability (≥ 0.70) across a wide range of fatigue scores reported by participants from both studies.

Our convergent validity analyses yielded strong Spearman’s rank correlations between the *PROMIS[®] PFMS—15a* and other clinical outcomes measures on both studies. The known-groups validity analysis based on both studies examined differences in *PROMIS[®] PFMS—15a* scores between subgroups of participants with known status using different outcome measures as anchors. The *PROMIS[®] PFMS—15a* scores showed expected and statistically significant ($p < 0.001$) differences across patient subgroups for all anchor measures applied, except MS phenotype (UW-MS Study, $p=0.041$).

Results from our longitudinal evaluation of the measurement properties of the *PROMIS[®] PFMS—15a* using UK-MS Study data indicate that the measure is sensitive to change from week 24 to week 96 using the following anchors: Patient Global Rating of Change (PGRC) in Physical Health item score, change in PROMIS GHS global06, change in PROMIS GHS GPH summary, change in MSIS-29 Physical Impact, and change in MSWS-12 scores. Taken

together, these analyses demonstrate the measure's ability to detect change over time, as well as its strong psychometric properties.

Scoring and Interpretation Procedures

Please see the section on scoring of short forms in the PROMIS Physical Function User Manual.

Handling of Missing Data

- **Form-level missing data.** Form-level missing data refers to a respondent missing an entire PRO assessment for a given time point. In general, form-level data may be missing due to a respondent's early withdrawal from the study, the inability to evaluate an endpoint at a particular time point, or non-compliance. Imputation is not recommended for *PROMISng PFMS—15a* form-level missing data. If a participant does not complete the *PROMISng PFMS—15a*, such as due to attrition in longitudinal studies or due to forgetting to complete an individual assessment, his or her *PROMISng PFMS—15a* should not be computed for that time point.
- **Item-level missing data.** Administrators may decide to allow respondents to skip individual items within the *PROMISng PFMS—15a*. If respondents are allowed to skip items, missing data at the item level may be present. Based on missing data simulation analyses, a 4-item rule will be employed for missing data at the item level with scores only calculated if data for 4 or more items in each assessment are available, with the available item values summed and divided by the number of items available. If 5 or more items are missing, the assessment itself will be considered missing and will be handled under the form-level missing data procedures.

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