

# ENGAGEMENT

## SCORING MANUAL

A brief guide to scoring the PROMIS® Early Childhood Parent-Report Engagement – Curiosity and Engagement – Persistence instruments:

| EARLY CHILDHOOD PARENT-REPORT                                                 |
|-------------------------------------------------------------------------------|
| PROMIS Early Childhood Parent-Report Scale v1.0 – Engagement – Curiosity 6a   |
| PROMIS Early Childhood Parent-Report Scale v1.0 – Engagement – Persistence 6a |

### COMPARING SCORES ACROSS VERSIONS

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

There is currently only one version for each of the Engagement measures:

- PROMIS Early Childhood Parent-Report Scale v1.0: Engagement – Curiosity
- PROMIS Early Childhood Parent-Report Scale v1.0: Engagement – Persistence

### SCORING THE INSTRUMENT

PROMIS measures use Item Response Theory (IRT), a family of statistical models that link individual questions to a presumed underlying trait or concept of engagement represented by all items in the two scales. PROMIS instruments are scored using item-level calibrations. This means that the most accurate way to score a PROMIS instrument is to use the HealthMeasures Scoring Service ([https://www.assessmentcenter.net/ac\\_scoringservice](https://www.assessmentcenter.net/ac_scoringservice)) or a data collection tool 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 score/scale score look up tables included in this manual, it is preferred. Response pattern scoring is especially useful when there is missing data (i.e., a respondent skipped an item), different groups of participants responded to different items, or you have created a new questionnaire using a subset of questions from a PROMIS item bank.

#### Raw Sum Score to T-Score Conversion Tables

If the HealthMeasures Scoring Service is not an option, the conversion tables in Appendix 1 can be used to convert simple summed raw scores from PROMIS engagement scales into T-score values on an individual respondent. In all cases, these conversions only work accurately when all questions on the scale have been answered. T-score distributions are standardized such that a 50 represents the average (mean) for the US general population, and the standard deviation around that mean is 10 points.

## Using the Scoring Table

Locate the applicable score conversion table in Appendix 1 and use this table to translate the sum of raw scores into a T-score for each participant. The T-score rescales the raw sum score into a standardized score with a mean of 50 and a standard deviation (SD) of 10. Therefore, a child with a T-score of 40 is one SD below the mean. For example, for the PROMIS Early Childhood Parent-Report Scale v1.0 – Engagement – Curiosity 6a, raw score of 10 converts to a T-score of 27.1 with a standard error (SE) of 2.9. Thus, the 95% confidence interval around the observed score ranges from 21.4 to 32.8 (T-score  $\pm (1.96*SE)$  or  $27.1 \pm (1.96*2.9)$ ).

For Engagement – Curiosity 6a, item engage\_e2 (*My child asked “why,” “what,” and “how” questions*) requires children to be verbal in order for a parent to endorse the item. That is, selecting the response option “Never” means the child can talk but never asks why, what, and how questions. Given the PROMIS Early Childhood Parent-Report instruments cover children ages 1-5, it is not developmentally expected that the youngest children in this age group will be verbal. Therefore, this item includes an N/A response option for parents to select if their child does not talk yet. If a parent selects N/A, use the Engagement – Curiosity 6a T-Score Conversion Table B in the Appendix. Otherwise, use Table A.

## SCORES

For most PROMIS instruments, a score of 50 is the average for the United States general population with a standard deviation of 10 because calibration testing was performed on a large sample of the general population. You can read more about the calibration and centering samples on HealthMeasures.net (<http://www.healthmeasures.net/score-and-interpret/interpret-scores/promis>). 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. Thus, a child who has T-scores of 60 for the Engagement – Persistence or Curiosity scale is one standard deviation better (at persistence or curiosity) than the general population.

Standard Error (SE): A PROMIS score includes a T-score and a standard error (SE). The standard error is a measure of the variability for a given T-score across hypothetical repeated measurements. The standard error can be used to construct confidence intervals around a T-score. A 95% confidence interval is common. 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-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  $52 + (1.96*2) = 56$ .

## FREQUENTLY ASKED QUESTIONS (FAQs)

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

Review the HealthMeasures website at [www.healthmeasures.net](http://www.healthmeasures.net).

Q: How do I handle multiple responses when administering a short form on paper?

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

- If two or more responses are marked by the respondent, and they are next to one another, then a data entry specialist will be responsible for randomly selecting one of them to be entered and will write down

on the form which answer was selected. Note: To randomly select one of two responses, the data entry specialist will flip a coin (heads - higher number will be entered; tails – lower number will be entered). To randomly select one of three (or more) responses, a table of random numbers should be used with a statistician's assistance.

- If two or more responses are marked, and they are NOT all next to one another, the response will be considered missing.

Q: What is the minimum change on a PROMIS instrument that represents a clinically meaningful difference? To learn more about research on the meaning of a change in scores, we suggest conducting a literature review to identify the most current information. The HealthMeasures website (<https://www.healthmeasures.net/score-and-interpret/interpret-scores/promis>) has additional information on interpreting scores.

## APPENDIX-SCORING TABLES

### PROMIS Early Childhood Parent-Report Scale v1.0 – Engagement – Curiosity 6a

TABLE A.

| PROMIS Early Childhood Parent-Report Scale v1.0 – Engagement – Curiosity 6a |         |     |
|-----------------------------------------------------------------------------|---------|-----|
| Raw Summed Score to T-Score Conversion Table                                |         |     |
| Raw Summed Score                                                            | T-score | SE* |
| 6                                                                           | 16.3    | 3.3 |
| 7                                                                           | 18.9    | 3.2 |
| 8                                                                           | 20.8    | 3.2 |
| 9                                                                           | 22.5    | 3.2 |
| 10                                                                          | 24.1    | 3.2 |
| 11                                                                          | 25.6    | 3.2 |
| 12                                                                          | 27.2    | 3.2 |
| 13                                                                          | 28.7    | 3.3 |
| 14                                                                          | 30.3    | 3.3 |
| 15                                                                          | 31.9    | 3.4 |
| 16                                                                          | 33.5    | 3.5 |
| 17                                                                          | 35.2    | 3.6 |
| 18                                                                          | 36.8    | 3.7 |
| 19                                                                          | 38.4    | 3.8 |
| 20                                                                          | 40.1    | 3.8 |
| 21                                                                          | 41.8    | 3.8 |
| 22                                                                          | 43.6    | 3.7 |
| 23                                                                          | 45.4    | 3.6 |
| 24                                                                          | 47.3    | 3.6 |
| 25                                                                          | 49.3    | 3.6 |
| 26                                                                          | 51.5    | 3.8 |
| 27                                                                          | 53.6    | 3.7 |
| 28                                                                          | 56.3    | 4.0 |
| 29                                                                          | 59.6    | 4.5 |
| 30                                                                          | 64.7    | 5.7 |
| *SE = T-score standard error                                                |         |     |

Use this table if "N/A" is *not* selected for item engage\_ec2.

**TABLE B.**

| <b>PROMIS Early Childhood Parent-Report Scale v1.0 – Engagement – Curiosity 6a</b> |                |            |
|------------------------------------------------------------------------------------|----------------|------------|
| <b>Raw Summed Score to T-Score Conversion Table</b>                                |                |            |
| <b>Raw Summed Score</b>                                                            | <b>T-Score</b> | <b>SE*</b> |
| 5                                                                                  | 16.7           | 3.3        |
| 6                                                                                  | 19.6           | 3.2        |
| 7                                                                                  | 21.7           | 3.0        |
| 8                                                                                  | 23.6           | 2.9        |
| 9                                                                                  | 25.4           | 2.9        |
| 10                                                                                 | 27.1           | 2.9        |
| 11                                                                                 | 28.8           | 3.0        |
| 12                                                                                 | 30.6           | 3.0        |
| 13                                                                                 | 32.4           | 3.1        |
| 14                                                                                 | 34.3           | 3.1        |
| 15                                                                                 | 36.2           | 3.1        |
| 16                                                                                 | 38.3           | 3.1        |
| 17                                                                                 | 40.5           | 3.1        |
| 18                                                                                 | 42.8           | 3.1        |
| 19                                                                                 | 45.1           | 3.1        |
| 20                                                                                 | 47.3           | 3.1        |
| 21                                                                                 | 49.6           | 3.1        |
| 22                                                                                 | 52.1           | 3.2        |
| 23                                                                                 | 54.8           | 3.5        |
| 24                                                                                 | 58.3           | 4.0        |
| 25                                                                                 | 64.1           | 5.6        |
| <b>*SE = T-score standard error</b>                                                |                |            |

Use this table if "N/A" is selected for item engage\_ec2.

## PROMIS Early Childhood Parent-Report Scale v1.0 – Engagement – Persistence 6a

| PROMIS Early Childhood Parent-Report Scale v1.0 - Engagement - Persistence 6a |         |      |
|-------------------------------------------------------------------------------|---------|------|
| Raw Summed Score to T Score Conversion Table                                  |         |      |
| Raw Summed Score                                                              | T score | SE*  |
| 6                                                                             | 15.07   | 3.25 |
| 7                                                                             | 17.15   | 3.54 |
| 8                                                                             | 19.29   | 3.63 |
| 9                                                                             | 21.39   | 3.61 |
| 10                                                                            | 23.39   | 3.57 |
| 11                                                                            | 25.32   | 3.54 |
| 12                                                                            | 27.2    | 3.53 |
| 13                                                                            | 29.07   | 3.53 |
| 14                                                                            | 30.94   | 3.55 |
| 15                                                                            | 32.86   | 3.58 |
| 16                                                                            | 34.83   | 3.61 |
| 17                                                                            | 36.85   | 3.64 |
| 18                                                                            | 38.93   | 3.65 |
| 19                                                                            | 41.06   | 3.65 |
| 20                                                                            | 43.25   | 3.64 |
| 21                                                                            | 45.52   | 3.63 |
| 22                                                                            | 47.83   | 3.61 |
| 23                                                                            | 50.15   | 3.61 |
| 24                                                                            | 52.49   | 3.61 |
| 25                                                                            | 54.87   | 3.62 |
| 26                                                                            | 57.34   | 3.65 |
| 27                                                                            | 59.98   | 3.71 |
| 28                                                                            | 62.86   | 3.86 |
| 29                                                                            | 66.19   | 4.19 |
| 30                                                                            | 70.82   | 5.07 |
| *SE = T-score standard error                                                  |         |      |