PROMIS Physical Function Scale Bookmarking and Validation

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INTRODUCTION

- Quick, valid and responsive outcome measure are critical for physical therapists

- The NIH's Patient Reported Outcomes Measurement Information System (PROMIS) is a universal, 124 item, computer adapted system (CAT) that evaluates various health domains including physical function without a ceiling or floor effect.

- PROMIS demonstrates good convergent validity with the Health Assessment Questionnaire Disability Index (HAQ-DI) and Short-form 36 (SF-36) physical function subscale[1] and also with 'gold standard' International Knee Documentation Committee (IKDC) scale. PROMIS score can also predict poor outcomes at various follow-up lengths ranging from 3-52 weeks[2].

- The modified physical performance test (mPPT) is a performance-based test containing several functional tasks and is used to assess physical frailty in older individuals[3].

- Patient reported outcomes (PRO) require less time and equipment compared to performance based measures.

- Purpose: To evaluate the relationship between scores on mPPT and PROMIS. Additionally, to map-out the scoring system of the PROMIS, to allow therapists to utilize it's T-score in clinical practice.

HYPOTHESES

- Scores on the mPPT and it's components such as the five-times sit-stand (5x STS), gait velocity and timed stair task will strongly correlate with PROMIS T-score.

- The PROMIS CAT will neither demonstrate a floor or ceiling effect and that scores from the mPPT will fall within one standard deviation of the mean PROMIS T-score (50).

METHODS

Participants
Elderly individuals were recruited from Newberg, OR, including senior centers, and the Friendsview retirement community. Table 1 one (below) displays participant demographics.

Inclusion criteria
- 60-95 yrs old, living independently in the community or in assisted living
- Mini mental status examination (MMSE) score ≥27.

Exclusion criteria
- Currently receiving treatment for an acute illness, stable chronic illness (e.g. Diabetes, osteoarthritis, heart disease)

Table 1

Total Participants	Age (Mean ± SD)	MMSE	mPPT	PROMIS
n = 46 (27 female)	77.1 ± 4.6	28.4 ± 1.5	29.1 ± 3.7	49.4 ± 5.1

Procedure
Participants completed the PROMIS and mPPT. The PROMIS includes 4-10 questions, generated using item-response theory to estimate scores on all 124 items based the participant responses and generates a T-score. mPPT contains 7 tasks: picking up a penny from the floor, lifting a book to a shelf, donning/doffing a coat, 5-times sit-stand (5xSTS) without use of hands, turning 360°, 50-foot walk, and climbing 1 flight of stairs. The task-order was randomized to reduce bias.

Analysis
Linear regression analysis was used to measure relationship between PROMIS T-scores and mPPT task scores. Scores on total mPPT, 5x STS, timed stair-task and gait velocity were plotted with PROMIS T-score to demonstrate the range of T-scores addressed by common functional tests. All 124 PROMIS items were divided into subcategories (walking, transfers, bathing, etc.) and each response for tasks in that category were plotted to demonstrate functional meaning of T-scores.

RESULTS
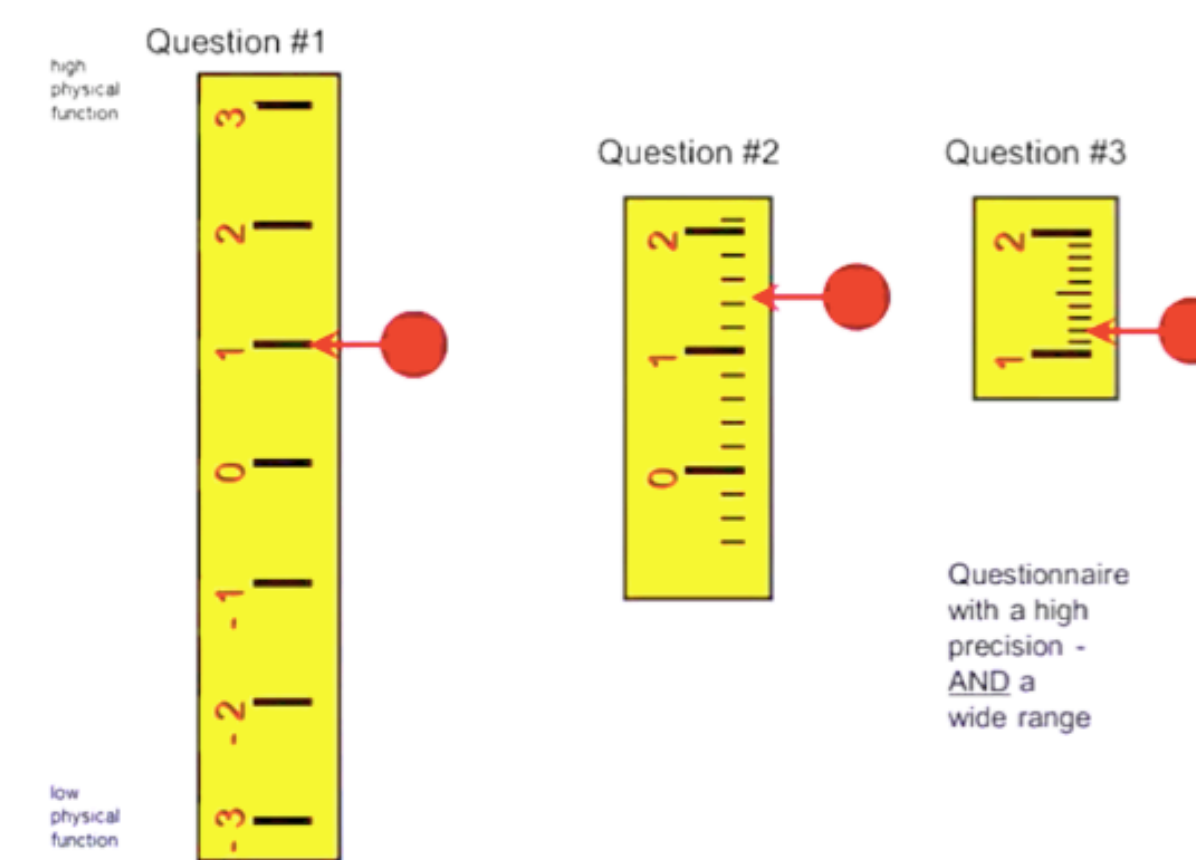
Figure 1. Computer Adaptive Testing

Figure 1. (left) demonstrates how the PROMIS CAT functions efficiently while remaining precise. The first question covers a wide range of physical function but is not precise. Based on the participant's response to the first question, the CAT calculates an estimated score and narrows the estimated range of physical function and uses the following questions to enhance precision. This process continues to shorten the range and increase the precision of items until a T-score is established.

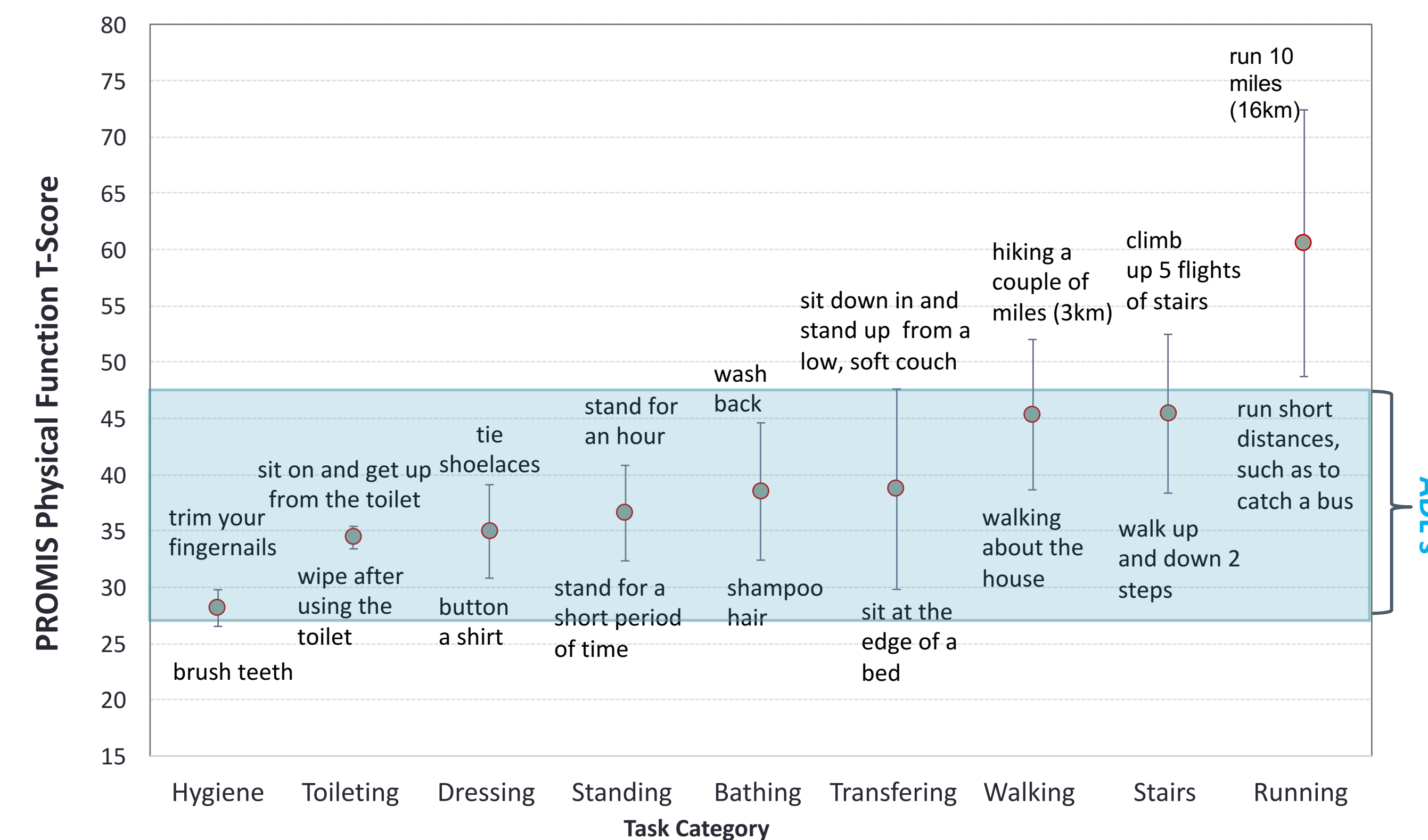### Figure 2. Functional Task Categories Plotted by Highest Cut Off

Figure 2. For each item in a task category the T-score cut-off **above** which the person is able to do the task 'without difficulty' was noted. The item with the lowest and highest T score for each item within a task category was graphed. The error bars for each task category represent the **range** of T scores associated with being able to perform the items at the T score cut-off indicating 'no difficulty.' For example, a person who perceives no difficulty sitting on the edge of the bed will likely have a PROMIS T score of 30 or above. In contrast, a person that perceives no difficulty with "sitting in and getting up from a low couch" will have a PROMIS T score of 47 or above. The circle represents the midpoint of the range for each task.
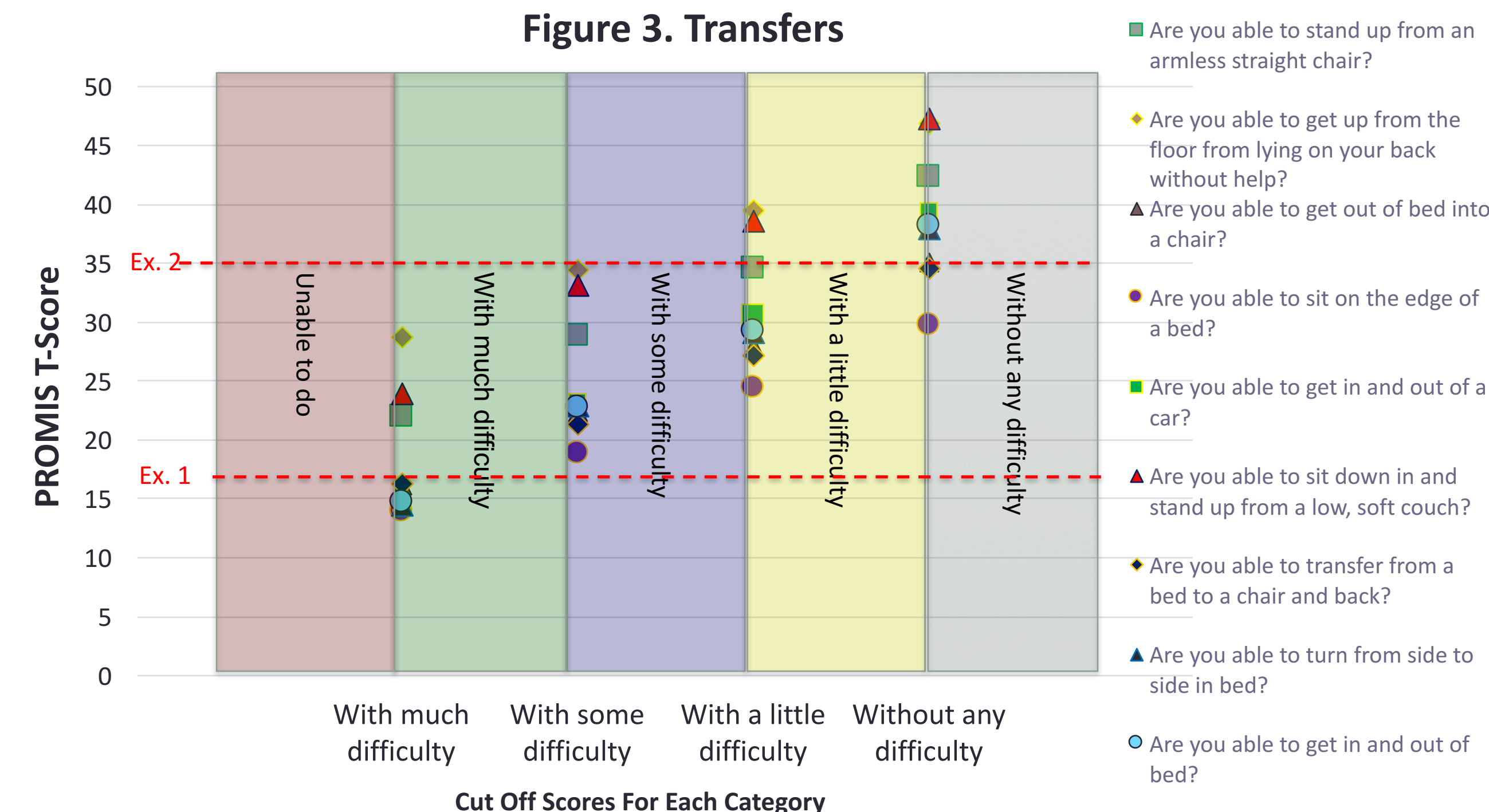
Figure 3. Transfers

Figure 3. The items included for transfers varied from ability to turn side to side in bed to sit/stand from a low, soft couch. The scores above represent where the cut-off for each category lies. For example, patients that score a 17 (Ex. 1) perceive being **unable to do** the following tasks: standing from armless chair, getting up off floor independently from lying on back, and sit-stand from a low, soft couch. They perceive having **much difficulty** with all other tasks. In contrast, scoring a 35 (Ex. 2) perceives the ability to complete the following: getting out of bed into a chair, transferring to/from a chair, and sitting on the edge of the bed **without difficulty**. They perceive **some difficulty** with sit-stand from a low, soft couch and getting up from the floor independently from lying on their back without help, and perceive a **little difficulty** with all other transfers.

Performance Tests Mapped To PROMIS T-score
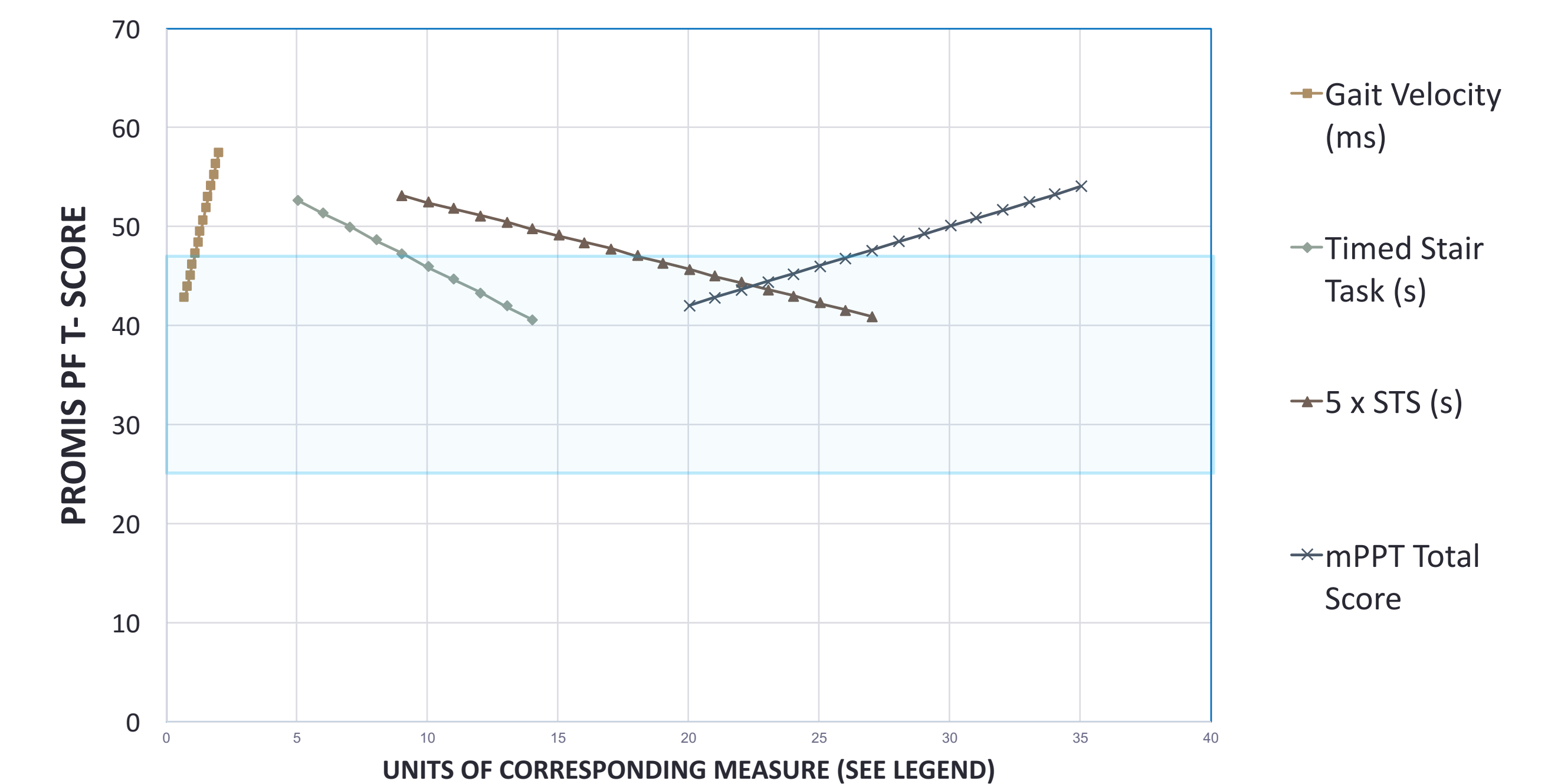
Performance Test	Lowest Score (Low Function)	Corresponding PROMIS T Score	Highest Score (High Function)	Corresponding PROMIS T Score	Linear Regression (R2)
Gait Velocity (m/s)	0.7	42.8	2	57.8	0.41
Timed Stair Task (s)	14	40.6	5	52.7	0.28
Five Times STS (s)	27	40.9	9	53.2	0.22
mPPT total	20	42	35	54.1	0.35

DISCUSSION

- Hypotheses of strong correlations between the mPPT and PROMIS T-score was not supported by our data. However, this research is valuable as it was the first project to plot PROMIS T-scores with measures of physical function.
- Understanding a patient's T-score (tables 1-2) may help clinicians predict ADLs or activities that are challenging to perform, helping plan relevant examinations and interventions.
- Our results indicate that scores on mPPT and it's components are associated with T-scores within one standard deviation of the mean PROMIS T-score (50). Therefore, common performance-based measures are redundant and limited in their ability to measure function across wide ranges.
- Limitations: Because the mPPT is a valid measure of physical frailty, our conclusions about the PROMIS and it's relation to other performance-based measures used on other populations (eg. Younger age, higher-functioning) should be interpreted cautiously until further research is conducted.
- Future research should investigate additions to item banks for measurement of very-high functioning individuals.

CONCLUSIONS

- Existing research shows PROMIS is efficient, reliable, flexible and precise[4], therefore we feel that clinicians should use this PRO more in the clinical setting in order to further analyze its utility with different participant demographics.
- With Medicare guidelines mandating completion of objective measures to monitor patient progress, PROMIS can easily be used in clinical practice to assess physical function at little cost and requires very-little time to complete.

REFERENCES

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