Fall Risk Classification in Community-Dwelling Older Adults: Validation of PROMIS-PF and Performance-Based Outcomes

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Background

1 in 4 adults 65+ fall each year

In 2015, the total medical costs for falls totaled more than 50 billion dollars

If rates continue to rise, CDC anticipates 7 deaths due to falls every hour by 2030

Fall risks can be reduced by community-based exercise programs that involve strength, balance, and endurance

PROMIS:
- Self-report outcome measure that is individualized using an Item Response Theory (IRT)
- Assesses physical, mental, and social health
- Includes a Computerized Adaptive Test (CAT)

STEADI Algorithm:
- CDC promoted fall risk screening tool for older adults
- Addresses modifiable risk factors for falling
- Classifies older adults into low, moderate, and high risk for falls

Falls Efficacy Scale - International:
- Self-reported outcome measure that assesses fear of falling based on the individual's confidence in his/her ability to complete various ADLs

What is Strong For Life?

Strong For Life is a community-based exercise program for adults aged 60+ designed to improve strength and flexibility for individuals of various activity levels.

Purpose

To validate the use of the PROMIS-PF in its ability to screen and classify fall risk in Strong For Life exercise participants consistent with STEADI and FES-I classification

Hypothesis

The PROMIS-PF will classify fall risk that is consistent with STEADI classifications

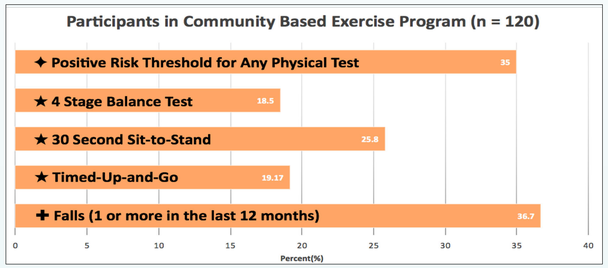
Methods

Subjects
- 120 community-dwelling older adults
- Average age 74.6 (range 53-96) with 72.5% female.
- All subjects recruited through the Strong For Life program.
- Average length of participation in Strong For Life was 38 months.

Performance-Based Outcome Measures
- Stopping Elderly Accidents, Deaths and Injuries (STEADI) measures including:
  1) Timed-Up-and-Go (TUG)
  2) 30 Second Sit to Stand (30 STS)
  3) 4 Stage Balance Test

Self-Report Outcome Measures
- Fall Efficacy Scale - International (FES-I)
- Patient Reported Outcome Information System Physical Function (PROMIS-PF)

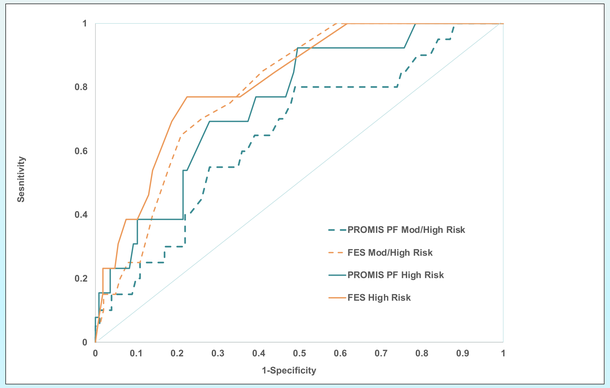
Results



Graph 1: Percent of participants who:
✦ Scored below the normative value on any one performance test
★ Performed below the normative value on a specific performance-based outcome
✚ Fell within the last 12 months

PROMIS PF vs. Positive Performance-Based Outcomes					
	AUC	Std. Error	P-Value	95% Confidence Interval	
Positive Tests				Lower Bound	Upper Bound
TUG <12 (n = 23)	0.81	0.07	<0.001	0.68	0.93
30 Second STS (n = 31)	0.80	0.05	<0.001	0.70	0.89
4 Stage Balance Test (n = 22)	0.73	0.06	0.001	0.63	0.84

Table 1: Results of Receiver Operating Characteristic (ROC) Curve analysis comparing the Area Under the Curve (AUC) of PROMIS-PF to performance-based outcome measures. AUC is clinically significant at >0.70.



Graph 2: Receiver Operating Characteristic (ROC) Curve comparing PROMIS-PF and FES-I to the STEADI fall risk classification.

	AUC	95% Confidence Interval		Cut-Off Scores	
STEADI Mod/High (n = 20)		Lower Bound	Upper Bound	80% Sensitivity	80% Specificity
PROMIS PF	0.65	0.52	0.78	46.3	42.6
FES-I	0.79	0.70	0.88	19.5	22.5
STEADI High (n = 13)					
PROMIS PF	0.75	0.62	0.88	45.85	40.8
FES-I	0.82	0.71	0.92	20.5	23.5

Table 2: Results of ROC Curve analysis of FES-I and PROMIS-PF. Differentiating the classification of the FES-I vs. PROMIS-PF tests into mod/high and high risk. FES-I is approximately 10% more accurate than the PROMIS-PF based on the Area Under the Curve (AUC).

Discussion

Validation of the PROMIS-PF

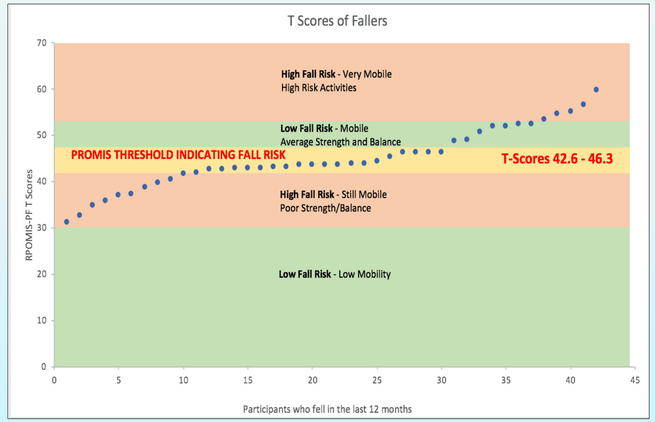
- PROMIS-PF is 80% accurate at identifying mobility and functional strength deficits in the TUG and 30 STS.
- PROMIS-PF is 75% accurate at identifying high fall risk classification based on the STEADI.

Despite subject participation in a tri-weekly community exercise program…

- **35%** under-performed on the physical performance tests
- **36.7%** had fallen in the past year
- **25.8%** demonstrated functional strength deficits
- Average PROMIS-PF T-Score was **46**, which is below the national average T-Score of 50

Recommendations

1. When resources for performance-based outcome measures are unavailable, using the PROMIS-PF and FES-I in combination could be an alternative for classifying fall risk.
2. Use of the PROMIS-PF may reduce the number of performance-based screening tests needed to classify fall risk.
3. Further research is warranted regarding the effect of combining self-efficacy and PROMIS-PF to improve accuracy in fall risk classification.



Graph 3: Participants who fell in the last 12 months were ordered by their PROMIS-PF T-Score and placed into fall risk categories using the ROC curve cut-off scores from Table 2.

Conclusion

PROMIS-PF is able to capture 75% of those classified by the STEADI as high fall risk.

References

1. Bergen G, Stevens MR, Burns ER. Falls and Fall Injuries Among Adults Aged ≥65 Years — United States, 2014. MMWR Morb Mortal Wkly Rep 2016;65:993–998.
2. Florence CS, Bergen G, Atherly A, Burns ER, Stevens JA, Drake C. Medical Costs of Fatal and Nonfatal Falls in Older Adults. Journal of the American Geriatrics Society, 2018 March.
3. Matchar, D. B., Eom, K., Duncan, P. W., Lee, M., Sim, R., Sivapragasam, N. R., Eng Hock Ong, M. (2018). A Cost-Effectiveness Analysis of a Randomized Control Trial of a Tailored, Multifactorial Program to Prevent Falls Among the Community-Dwelling Eldery. American Congress of Rehabilitation Medicine.