

A Multifactorial Crosswalk Between the SMFA and 5 PROMIS Item Banks: Results from a Longitudinal Cohort Study

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Purpose: As part of the National Institutes of Health (NIH) Roadmap initiative, PROMIS (Patient-Reported Outcomes Measurement Information System) has developed item banks, short forms, and computer-adaptive tests (CATs) to standardize measurement for many health-related quality of life domains. Increasingly, the PROMIS Physical Function (PF) domain is taking over the role of the Short Musculoskeletal Functional Assessment (SMFA) as the primary patient-reported outcome for many orthopaedic trauma studies. However, in prior research, we reported on a PF to SMFA conversion ("crosswalk"), which showed that 56% of PF-predicted SMFA scores fell 7 or more points away from their actual SMFA score. We hypothesized that a multifactorial crosswalk drawing from multiple PROMIS domains would provide improved performance.

Methods: The study, conducted at 43 Level I trauma centers, enrolled 1000 patients participating in longitudinal trials, and collected 733 SMFA and PROMIS assessments (PF, Anxiety, Depression, Pain Interference, and Participation) at either 6 or 12 months post-injury. Linking functions between SMFA domains and PROMIS scores were developed following equipercntile matching methodology. A minimal clinically important difference (MCID) for the SMFA of 7 was used based on prior literature.

Results: Similar to previous work developing a single domain crosswalk, the accuracy of the observed versus PF-predicted SMFA scores was poor. Only 50.7% and 38.4% of the predicted SMFA dysfunction and mobility scores, respectively, were within 1 MCID of the observed scores. When a multifactorial crosswalk was developed that added Anxiety, Depression, Pain Interference, and Participation, there was a statistically significant improvement in accuracy ($P < 0.001$) for dysfunction but not mobility ($P = 0.075$). However, only 59.9% and 43.0% of the predicted SMFA dysfunction and mobility scores, respectively, were within 1 MCID of the observed scores with the multifactorial crosswalk.

Conclusion: SMFA versus PROMIS linking functions would be very useful to clinicians to compare across studies and normative sets. However, the accuracy of the crosswalks suggests that the PROMIS instruments, even with multiple domains used in combination, are still not a good match for any of the SMFA domains, and that the predicted values should be used with significant caution. This work suggests there is still great uncertainty regarding the best approach for functional outcome measurement in orthopaedic trauma trials.