PSYCHOMETRIC PROPERTIES OF SELF-REPORT OUTCOME MEASURES FOR PROSTHETIC APPLICATIONS

Hafner, B.J.[1], Morgan, S.J.[1], Askew, R.L.[2], Salem, R.[1]

1. University of Washington, 2. Northwestern University

INTRODUCTION

Self-report outcome measures are well suited to measurement of prosthetic outcomes and are advocated for use in clinical practice and research. However, specific information about each measure's psychometric performance is needed to help clinicians and researchers select appropriate instruments and interpret the information they provide.

Test-retest reliability, for example, is a key factor in distinguishing measures recommended for individual-level applications (e.g., monitoring a patient's change over time) from group-level applications (e.g., comparing groups in a clinical trial). It is generally accepted that measures should demonstrate reliability of 0.7 or greater for comparisons between groups of people (Reeve, 2013) and 0.9 or greater for applications that involve decisions about individuals (Fitzpatrick, 1998). *Mode of administration (MOA) equivalence* is needed to demonstrate that scores obtained from different methods of administration (e.g., paper or electronic) are directly comparable (Coons, 2009). Evidence of equivalence would allow administrators to choose the format most appropriate for the respondent. *Standard error of measurement (SEM)* and *minimal detectable change (MDC)* are properties that help users interpret scores and score changes. SEM and MDC describe expected variations in a score and minimum differences that can be considered "true" change, respectively.

Although psychometric properties such as these can improve instruments' usability and interpretability, they have not been established for many measures used in prosthetics. Therefore, the purpose of this study was to assess reliability, MOA equivalence, SEM, and MDC of five self-report measures that have been advocated for use in prosthetics.

METHOD

Subjects: Participants (n=201) with unilateral lower limb loss, mean age of 60 years, most reported either traumatic (60%) or dysvascular (23%) etiologies.

Apparatus: A standardized, self-report survey included the Prosthetic Limb Users Survey of Mobility 12-item short form (PLUS-M), the Prosthesis Evaluation Questionnaire Mobility Subscale (PEQ-MS), the Activities Specific Balance Confidence Scale (ABC), the Socket Comfort Score (SCS), and the Quality of Life in Neurological Conditions Applied Cognition/General Concerns (NQ-ACGC).

Procedures: Test and retest surveys were administered to all participants via paper and/or electronic methods over a 48-72 hour period. Participants were randomly assigned to one of three study arms (i.e., electronic-only, paper-only, or mixed) based on modes of administration.

Data Analysis: Reliability of each instrument was quantified using the intraclass correlation coefficient (ICC 3,1). ICCs were compared across study arms to evaluate MOA equivalence. Reliability ICCs were used to calculate SEM and MDC(90).

RESULTS

Retest surveys were taken, on average, 2 (SD=0.2) days after the test survey. Time to complete the test and retest surveys was 12 (SD=7) and 10 (SD=6) minutes, respectively. Reliability ICCs, determination of MOA equivalence, and estimates of SEM and MDC were determined from participant scores (Table 1).

Table 1- Psychometric properties of outcome measures.

MEASURE	ICC	MOA =	SEM	MDC
PLUS-M (T-score)	0.96	yes	1.93	4.50
PEQ-MS (0-4)	0.92	yes	0.24	0.55
ABC (0-4)	0.95	yes	0.21	0.49
SCS (0-10)	0.74	no	1.18	2.73
NQ-ACGC (T-score)	0.88	yes	2.87	6.67

DISCUSSION

Tested measures all have moderate-to-high (>0.7) test-retest reliability, indicating that they are suitable for group-level comparisons, like quality improvement programs. Select measures (PLUS-M, PEQ-MS, and ABC) have high reliability (>0.9) and are suitable for individual-level applications, like monitoring patients over time. Comparisons of ICCs indicate measurement equivalence across paper and electronic MOAs for all measures, except the SCS. Further research is needed to assess the use of the SCS for individual-level applications. SEM and MDC estimates derived in this study can be used to interpret scores obtained from each instrument.

CONCLUSION

Estimates of test-retest reliability, MOA equivalence, SEM, and MDC derived in this study can be used to inform instrument selection and facilitate interpretation of resultant scores.

CLINICAL APPLICATIONS

Clinicians can use information from self-report outcome measures to monitor patients and assess the effectiveness of prosthetic interventions. Measurement properties, including test-retest reliability, MOA equivalence, SEM, and MDC, can aid them in selecting measures and interpreting scores.

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