

WHEELCHAIR FUNCTIONAL OUTCOMES MEASURES & FUNCTIONING EVERYDAY WITH A WHEELCHAIR TOOLS

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Background and FEW Self-Report Tool

The trend of increasing consumer needs, demands for wheelchair seating and mobility services, technological improvements, and lack of sufficient funding and policies for many consumers has made it necessary for practitioners and researchers to provide evidence that wheeled mobility and seating interventions are effective. Outcomes data provides a means for consumers to measure the effectiveness of technology in meeting their needs, assist providers in justifying their assistive technology recommendations and efficacy of their service delivery program, and allow payers and insurers to ensure that effective services were purchased. Therefore, to provide the necessary data, valid and reliable outcomes measurement tools that specifically measure consumer-generated functional outcomes of seating-mobility interventions must be available.

Although a significant increase in assistive technology use and advancement exists, a scarcity of evidence remains on the quantitative benefit and efficacy of seating-mobility technology and service delivery. To address this issue, a team of clinical researchers at the University of Pittsburgh embarked on a project to systematically develop a set of outcome measurements known as the Functioning Everyday with a Wheelchair (FEW) tools. The first tool known as the FEW is a self-report questionnaire intended to measure user self-perceived satisfaction in performing functional activities with the use of a wheeled mobility and seating system. The 10 self report task items for the FEW were developed and validated based on structured interviews with wheelchair users and analysis of 1900 goals and items documented by consumers and clinicians in other sources including additional research studies related to wheeled mobility and seating as well as the review of health records related to the prescription of these devices. The FEW has demonstrated content validity and good test-retest reliability (1, 2). Specific items of the FEW address the following:

1. Stability, Durability, & Dependability
2. Comfort Needs
3. Health Needs
4. Operate
5. Reach
6. Transfers
7. Personal Care
8. Indoor Mobility
9. Outdoor Mobility
10. Transportation

The FEW self-report tool, instructional manual, and other resources related to the tool are available by going to http://www.iss.pitt.edu/FEW/ISS_FEW.html.

Performance-Based Outcome Measures

To address concerns associated with the accuracy of self-report tools, two observational versions of the FEW known as the FEW-Capacity and FEW-Performance have also been developed. Both tools were developed and modeled after the Performance Assessment of Self Care Skills (PASS) (5) and were designed to measure function based on the International Classification of Functioning, Disability and Health (6) (ICF) constructs of capacity (FEW-C) and performance (FEW-P). The FEW-C focuses on consumers' functional performance of activities in a controlled clinic or laboratory environment, and the FEW-P focuses on consumers' functional performance of activities in their actual home or community environments. The FEW-C and FEW-P consist of 10 items, which are identical to the 10 FEW items. There are a total of 34 subtasks with a range of 2-6 subtasks for each

item. In general, the length of time to administer the 10 FEW-C or FEW-P items is 45-60 minutes. The length of time will vary for several reasons, including the number or types of subtasks administered, environmental constraints, and any factors affecting how a consumer performs a task in a standardized environment or in their actual environment.

The validity, reliability, and sensitivity to the tools' ability to measure change in function are in the process of being disseminated (3, 4). However, the following is a very abridged overview of research performed on these tools to compliment the presentation. For specific details contact the authors.

Systematic Review of Performance-Based Tools

Prior to the development of the FEW-C and FEW-P tools, the development team felt it was necessary to systematically review the scientific literature rather than reinvent performance based measurable tasks. Therefore, a systematic review of the scientific literature from 1994 through July 2004 was conducted and revealed 20 studies that developed and/or utilized observable measures of functional outcome in the use of wheeled mobility and seating devices. The majority of study populations were manual wheelchair users with spinal cord injuries and the majority of studies cited measured the capacity qualifier of the activity domain of the ICF. Eighteen different outcome measures were cited in the 20 studies. There was minimal consistency in the methods used to score task performance and minimal overlap in specific task items which made it difficult to compare outcomes across measures. Not all studies reported or measured the clinometric properties of the tools. Content of the reported measures and subtasks were compared to the 10 items of the FEW and half of the consumer reported items were somewhat well represented and the other half were minimally represented. Thus, existing measures were not found to be fully representative of what wheelchair users identified as being important tasks to be able to perform in a wheeled mobility and seating device. The findings of this review were also consistent with findings of a previous and similar systematic review conducted by Kilkens, et al (7).

There are, however, advantages to having tools that are not necessarily all inclusive as specific tools developed to measure specific outcomes may be more sensitive in measuring change. For example, the use of a pressure mapping device may more accurately reflect improved magnitude of pressure redistribution than an observed ability to perform a weight shift. This review though justified the need for the development of a tool that quantifies functional activity at both the capacity and performance qualifier levels of the ICF activity domain. This tool should also operationalize the functions described in the FEW self report tool.

Reliability and Validity of the FEW-C

The FEW-C yielded excellent inter-rater reliability (ICC = 0.99 [95% CI = 0.98–0.99, $p < 0.001$]) when rated by a group of Occupational Therapists with experience in the provision of wheeled mobility and seating interventions. Potential reasons for high inter-rater reliability coefficients are that the raters were well trained in the application of the tool and scoring as well as having experience in this area. Future studies should investigate the inter-rater reliability of the tool amongst people from other health care disciplines and/or with less experience in the area of wheeled mobility and seating interventions.

The internal consistency of the total FEW-C tool was examined using Cronbach's coefficient alpha. Internal consistency of the total FEW-C tool, for all independence, safety and quality ratings achieved a standardized alpha of 0.97. Internal consistency for each scale was also good, with standardized alphas of 0.89 for independence, 0.81 for safety, and 0.74 for quality. One potential reason the FEW-C yielded good reliability and validity was that it was modeled after the PASS which is reliable and valid.

Sensitivity to Measure Change in Function over Time

To investigate the differences and magnitudes of change in function that can be detected by the FEW and FEW-C over time, a repeated measures cohort design study was undertaken. Twenty-five users of wheeled mobility and seating devices who met the inclusion criteria were recruited for the study. The FEW self-report as well as the FEW-C observational assessments were administered at Time 1 (in an old existing wheeled mobility and seating device) and again at Time 2 (2-8 weeks) after receiving their new wheeled mobility device. At Time 1 participants were typically using a standard manual wheelchair with no seat functions other than manual elevating leg rests. At Time 2 the same participants were typically using a power wheelchair with one or more seat functions such as tilt-in-space, recline, seat elevator, elevating leg rests, and passive standing.

Repeated measures analysis of variance (ANOVA) for the total tools indicated a significant interaction for the main effects of time and tools. When the interaction was followed, it indicated that participants improved significantly for function on both tools from Time 1 to Time 2, with the FEW differing significantly from the FEW-C. At Time 1 the FEW indicated a significantly lower self-reported level of function as compared to FEW-C observational tool. However, at Time 2, the FEW and FEW-C yielded similar scores. This is perhaps due to participants underestimating their functional abilities when they are seeking a new seating and mobility intervention.

Conclusion

A self-report functional outcomes measurement tool was developed and validated to address the lack of tools available. Given the concerns associated with the accuracy of self-report tools, two performance based companion tools were developed and validated following a systematic review of the literature that yielded limited availability of tools. Thus far, the FEW and FEW-C demonstrated the ability to measure change in function over time following the provision of a new wheeled mobility and seating intervention.

References

1. Mills, T., Holm, M. B., Schmeler, M., Trefler, E., Fitzgerald, S., Boninger, M., Buning, M. E., & Shapcott, N. (2002). The Functional Evaluation in a Wheelchair (FEW) instrument: Test-retest reliability and cross-validation with consumer goals. In R. Simpson (Ed.), *RESNA 25th Annual Conference Proceedings*, (pp. 245-247). Arlington, VA: RESNA Press.
2. Mills, T., Holm, M. B., Trefler, E., Schmeler, M., Fitzgerald, S., & Boninger, M. (2002). Development and consumer validation of the Functional Evaluation in a Wheelchair (FEW) instrument. *Disability & Rehabilitation*, 24, 38-43.
3. Mills, T., Holm, M. B., & Schmeler, M. R. (2003). *Test-retest reliability and cross-validation of the Functioning Everyday with a Wheelchair (FEW) instrument*. Unpublished Doctoral Dissertation, University of Pittsburgh, Pittsburgh, PA.
4. Schmeler, M.R. (2005). Development and Testing of a Clinical Outcome Measurement Tool to Assess Wheeled Mobility and Seating Interventions. Doctoral Dissertation. University of Pittsburgh. etd-11032005-153241.
5. Rogers, J. C., & Holm, M. B. (1994). *Performance Assessment of Self-Care Skills, version 3.1*. Unpublished instrument, University of Pittsburgh, Pittsburgh, PA.
6. World Health Organization. (2001). *The International Classification of Functioning, Disability and Health*. Geneva (Switzerland): World Health Organization.
7. Kilkens, O., Post, M., Dallmeijer, A., Seelen, H., & van der Woude, L. (2003). Wheelchair skills tests: A systematic review. *Clinical Rehabilitation*, 17(4), 418-430.

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Speaker Bio

Mark R. Schmeler, PhD, OTR/L, ATP is on the faculty of the Department of Rehabilitation Science Technology at the University of Pittsburgh. He has over 15 years of clinical experience managing and providing wheeled mobility and seating interventions. He teaches and conducts research in this area specifically in the areas of outcome measurement, evidence based practice, and service delivery models. He can be reached at Schmeler@pitt.edu.

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