ACRM
AMERICAN CONGRESS OF REHABILITATION MEDICINE

Archives of Physical Medicine and Rehabilitation

journal homepage: www.archives-pmr.org

Archives of Physical Medicine and Rehabilitation 2013;94:883-9

ORIGINAL ARTICLE

Falls Efficacy Scale-International: A Cross-Sectional Validation in People With Multiple Sclerosis

Rob van Vliet, BSc,[a,b] Phu Hoang, PhD,[a] Stephen Lord, PhD,[a] Simon Gandevia, PhD,[a] Kim Delbaere, PhD[a]

From [a]Neuroscience Research Australia and University of New South Wales, Sydney, Australia; and [b]Nijmegen Medical Centre, Radboud University, Nijmegen, The Netherlands.

Abstract

Objective: To evaluate psychometric properties of 16-item and 7-item Falls Efficacy Scale-International (FES-I) in people with multiple sclerosis (MS).

Design: Validation and prospective cohort study.

Setting: People with MS living in metropolitan areas.

Participants: Community-dwelling people with MS (N = 169; aged 21−73y) who were referred to Multiple Sclerosis Australia for physiotherapy assessment.

Interventions: Not applicable.

Main Outcome Measures: FES-I scores and a range of sociodemographic, physical, and neuropsychological measures.

Results: The mean score for the 16-item FES-I was 34.9±11.2, and the mean score for the 7-item FES-I was 14.7±4.7. FES-I total scores were normally distributed: skewness of .35 (SEM = .19) for the 16-item and .47 (SEM .19) for the 7-item FES-I, indicating the absence of floor and ceiling effects. Internal reliability was excellent, with Cronbach's alpha values of .94 (16-item) and .86 (7-item). Rasch analyses indicated that the structure and measurement properties were better for the 7-item FES-I than for the 16-item FES-I. Construct validity of both scales was supported by sensitivity to group differences relating to demographic characteristics and fall-risk factors.

Conclusions: The findings indicate that both 16-item and 7-item versions of the FES-I provide valuable information about the fear of falling in people with MS. However, the 7-item version of FES-I has better psychometric properties in people with MS.

Archives of Physical Medicine and Rehabilitation 2013;94:883-9

Multiple sclerosis (MS) is a chronic progressive neurologic disease of the central nervous system, characterized by inflammation, demyelination, gliossis (scarring), and neuronal loss. Onset of the disease is early to middle adulthood and is approximately 3 times more common in women than in men.[1] Characteristic lesions in MS can impair balance, coordination, muscle strength, and peripheral sensation, as well as cognitive function and mood.[1] This wide range of physiological, cognitive, and psychological problems places people with MS at a high risk of falls. Epidemiologic studies indicated that between 52% and 63% of people with MS report at least 1 fall over a period of 3 to 6 months.[2-4] Finlayson et al[2] reported that 52.2% of 1089 people with MS aged between 45 and 90 years reported a fall in the past 6 months. Similarly, Nilsagard et al[3] reported that 63% of 76 people with MS with an Expanded Disability Status Scale score between 3.5 and 6.0 registered a total of 270 falls over 3-month follow-up.

Falls often result in physical injuries and discomforts that can have a substantial impact on daily life and mental well-being.[5] Awareness of these potentially devastating consequences can lead to fear of falling and a loss of confidence in performing daily activities.[6] Fear of falling has been recognized as an important psychological factor associated with falls in older adults (eg, Boyd and Stevens[7]) as well as in people with MS aged between 45 and 90 years.[8] An appropriate level of awareness can be considered as a normal adaptive response to a real fall risk, but excessive fear of falling can lead to activity avoidance.[9,10] This, in turn, can lead to physical deconditioning, poor quality of life, social isolation, depression, and psychological distress.[9,11]

Supported by National Health and Medicine Research Council fellowships.

No commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit on the authors or on any organization with which the authors are associated.

0003-9993/13/$36 - see front matter © 2013 by the American Congress of Rehabilitation Medicine
http://dx.doi.org/10.1016/j.apmr.2012.10.034

While fear of falling has been recognized as an important psychological factor associated with falls in older adults,[9] it has not commonly been investigated in people with MS. One study, involving 1064 individuals with MS, reported very high prevalence of fear of falling (63.3%) and associated curtailment of activities (83.6%).[8] Other studies have shown that higher levels of fear of falling in people with MS are associated with fall incidence and resultant injuries.[2,12] However, previous studies have used only single-item questions to assess the fear of falling (eg, "Are you concerned about falling?").[2,3,8,12,13] There is a need for an assessment tool that is able to measure levels of fear of falling associated with different daily activities in people with MS.

Comprehensive measures assessing the fear of falling during specified activities have been developed for use in older adults. An example of such a measure is the Falls Efficacy Scale-International (FES-I), which is considered a criterion standard for assessing the fear of falls in older adults.[14-16] It has excellent psychometric properties and can be used to assess concern about falls during basic and more demanding activities, both physical and social. The FES-I has been validated in cross-cultural groups[15] and in people with other chronic illnesses such as people with cognitive impairment[17] and older persons at risk of falls.[18] The current study aimed to evaluate the psychometric properties of the FES-I in people with MS. Structure and measurement properties were evaluated with both confirmatory factor analyses and item-response theory. Construct validity of the scale was explored through its relation with falls and a range of sociodemographic, physical, and neuropsychological measures. We hypothesized that FES-I scores would be higher in mobile participants with more severe disease progression and higher fall risks.

Methods

Participants

A total of 169 community-dwelling people with MS aged 21 to 73 years were recruited from among people with MS who were referred to Multiple Sclerosis Australia in the Australian Capital Territory and states of New South Wales and Victoria for physiotherapy assessment. Participants were included if they were older than 18 years, had been diagnosed with MS (any type), and were able to stand unsupported for 30 seconds and walk 10 meters with or without an aid. This means that they were at disease steps 0 to 5 (appendix 1).[19] Exclusion criteria were inability to understand instructions relating to the physical assessment because of impaired cognitive function or language barriers. Data collection formed part of a larger prospective study that was approved by the Human Research Ethics Committee, University of New South Wales. Participation was voluntary, and informed consent was obtained from all participants prior to assessment.

Measures

The FES-I

The FES-I was used to assess the level of concern about falls during 16 activities of daily living, ranging from basic to more demanding activities including social activities that may contribute to quality of life. It was administered as a self-report questionnaire. The level of concern for each item was scored on a 4-point scale (1 = not at all, 2 = somewhat, 3 = quite a lot, 4 = very),[14] with the total score range being 16 to 64. The FES-I was originally developed to assess concern about falls in older people.[14,16] There are 2 versions of FES-I, the 16-item version and the shortened 7-item version.[15] In this study, we evaluated both versions.

List of abbreviations:

FES-I **Falls Efficacy Scale-International**
MS **multiple sclerosis**

MS severity

Severity of MS-related impairment was graded from 0 (functionally normal with no activity or lifestyle limitations) to 5 (requiring bilateral support to walk 7.5m),[19,20] as judged by physiotherapists. Participants were asked about duration of the disease (in years), mobility (use of a walking aid of any type), and use of medications.

Falls

A fall was defined as an unexpected event in which participants came to rest on the ground, floor, or lower level.[17] Participants were asked how often they had fallen over in the past year and whether they had suffered injuries as a result of any of these falls (such as bruises, lacerations, or fractures). Falls frequency during the 6-month follow-up was monitored with monthly falls diaries. Participants were also asked using a single-item question (on a 5-point scale) whether they were afraid of falling.

Physical fall-risk measures

Postural sway was measured by recording displacements of the body while standing still on the floor for 30 seconds and on a foam rubber mat with eyes open.[21] A rod with a pen on the end, fixed at the level of the pelvis, recorded sway on graph paper fixed on a table at a corresponding height. Maximal anterior to posterior deflection was multiplied by maximal medial to lateral deflection, resulting in an area of sway (mm^2).[21] Sway measured with this device has good agreement with force plate measures across multiple sensory conditions.[22] Maximal isometric quadriceps strength was measured in both legs while participants were seated on a high chair (so that feet did not touch the floor) with hip and knee flexed to 90°.[21] A strain gauge was fixed horizontally with straps on the lower shin. The participant was asked to perform 3 attempts (with a 2-min break between attempts to avoid motor fatigue) with each leg to push against the strap as forcefully as possible. The highest performance of quadriceps strength (kg) was used in the analysis.

Neuropsychological measures

Cognitive function was assessed using the Trail Making Test (Part B) as a measure of executive functioning. Participants were asked to draw lines connecting a number of circles alternating between letters and numbers (eg, 1-A-2-B).[23] Total time (s) to complete the test was recorded (capped at 300s). Fatigue, a prominent symptom in people with MS, was rated using the Fatigue Severity Scale.[24] Participants are asked to rate their level of agreement on 9 fatigue-related statements, ranging from 1 (strongly disagree) to 7 (strongly agree).

Statistical analyses

Internal reliability for both 16- and 7-item versions was established by calculating Cronbach's alpha for the whole scales, by checking whether every item increased the Cronbach's alpha coefficient, and by examining Pearson's correlations between