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Development and validation of a Chinese version of the Falls Efficacy Scale International

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ABSTRACT

The FES-I is an instrument developed to assess concern about falls. The aim of this study was to develop a Chinese version of the 16-item Falls Efficacy Scale International (FES-I(Ch)) and evaluate its structure, measurement properties and convergent and predictive validity. The FES-I(Ch) was developed following the recommended 10-step protocol. The FES-I(Ch) was then administered to 399 community-dwelling Chinese older people (61–93 years) in conjunction with a range of other socio-demographic, physical, medical and functional measures. Falls were prospectively monitored over 12 months. Sub-samples were reassessed for determination of the FES-I(Ch)'s test–retest and inter-rater reliability. The overall structure and measurement properties of the FES-I(Ch), as evaluated with factor analysis and item-total correlations, was good. Internal consistency was excellent (Cronbach's $\alpha = 0.94$), as was test–retest and inter-rater reliability ($ICC_{3,1} = 0.89$ and $ICC_{2,1} = 0.95$ respectively). FES-I(Ch) scores were significantly higher in participants with poor physical performance, depression, medical conditions associated with falls and disability indicating acceptable congruent validity. FES-I(Ch) scores did not differ between those who did and did not fall in the 12-month follow-up period. We found that the FES-I(Ch) is a valid and reliable measure of concern about falls in Chinese older people. The relatively high level on concern (high FES-I(Ch) scores) as well as relatively few prospective falls may explain the lack of association between FES-I(Ch) scores and falls in this population. Future studies should explore the FES-I(Ch)'s responsiveness to change over time and during intervention studies.

1. Introduction

Fear of falling is a common consequence of falls (Tinetti, Richman, & Powell, 1990), and is also predictive of falls (Delbaere et al., 2010). Excessive fear of falling can result in self-imposed activity restriction (Howland et al., 1998), which can lead to physical de-conditioning and functional decline (Scheffer, Schuurmans, van Dijk, van der Hooft, & de Rooij, 2008). Fear of falling is also associated with depression and decreased quality of life (Arfken, Lach, Birge, & Miller, 1994).

The original Falls Efficacy Scale (FES) (Tinetti et al., 1990) was developed to assesses confidence in performing 10 basic activities of daily living without falling. The FES-I (Yardley et al., 2005) built on the FES to include social activities and higher demand physical activities outside home. FES-I can be self-administered or administered via interview (Hauer et al., 2010) and has been shown to have good psychometric properties and good convergent and predictive validity (Delbaere et al., 2010).

FES-I was designed to accommodate a variety of cultural contexts enabling cross-cultural comparisons (Kempen et al., 2007; Yardley et al., 2005). The scale had been translated to over 15 languages (Hauer et al., 2010), but as yet it has not been translated into Chinese or validated for use in a Chinese population.

There has been little research looking at concern about falls in Chinese older people (Chen, Dong, & Wang, 2010; Chu, Chi, & Chiu, 2005; Sze et al., 2008). Given the projected Chinese population demographic and the challenges associated with aging, including falls and fall related injury, the use of a validated tool which can be used for international comparison would be of potential benefit. The aims of this study were (1) to adapt and translate the 16-item FES-I for use in Chinese populations, (2) to evaluate the psychometric properties of the translated scale, for both the 16-item and the 7-item short version, and (3) to explore the convergent validity on a range of fall-related factors in Chinese older people.

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2. Subjects and methods

The FES-I assesses respondent's level of concern about falling when participating 16 of everyday life activities. The Short FES-I (Kempen et al., 2008) consists of seven of the 16 items of the full version (items 2, 4, 6, 7, 9, 15 and 16). Each item is scored on a four-point scale (1 = not at all concerned to 4 = very concerned) giving a summary score of 16–64 for the 16-item FES-I and 7–28 for the Short FES-I, of which a low score indicates low concern of falling.

2.1. Participants

Study participants were recruited from community centers, churches and local activity groups in two cities: Hong Kong, China ($n = 200$) and Sydney, Australia ($n = 199$). Those who were wheelchair/bed-bound, living in residential aged care, could not understand Cantonese or Mandarin or had a Mini Mental State Examination score <19 were excluded (Crum, Anthony, Bassett, & Folstein, 1993). Approval for the study was obtained from the ethics committees of the Hong Kong Polytechnic University and University of New South Wales. Informed consent was sought from participants prior to their participation in the study.

2.2. Procedure

2.2.1. Phase 1: translation and adaptation

The translation protocol outlined for development of the original FES-I (Yardley et al., 2005) was followed to develop the Chinese version of the FES-I. The English FES-I was independently translated into standard written Chinese by two native Chinese speakers who were familiar with the concept of falls efficacy. The initial agreed Chinese version derived through consensus was then administered to four older people to evaluate its comprehensibility and appropriateness. The translators met again to agree on necessary wording changes. A back translation from the revised Chinese version into English was then made by a professional translator whose native language was English. A final consensus meeting of the translators was held to review the backward translation which was compared to the original English version to ascertain whether semantic and conceptual equivalence was met.

2.2.2. Phase 2: assessment of the psychometric properties of the FES-I(Ch)

The FES-I(Ch) was administered by face-to-face interview to eligible participants individually in Cantonese or Mandarin. Socio-demographic, physical, medical and functional measures were collected as well. Depression was measured with the short form of the Geriatric Depression Scale (GDS15) (Yesavage et al., 1982–1983). Lawton's Incidental Activities of Daily Living (IADL) (Lawton & Brody, 1969) scale was used to measure functional capacity. Items from the SF-12 (Gandek, Ware, & Aaronson, 1998) were used to measure quality of life. Gait and balance were measured with the timed up and go (TUG) (Podsiadlo & Richardson, 1991) and near tandem stand (NTS) (Butler, Menant, Tiedemann, & Lord, 2009) tests, respectively. Falls were prospectively monitored over 12 months with monthly telephone contact.

Sixty-three participants were re-assessed in a second face-to-face interview after two weeks. The FES-I(Ch) was re-administered to 31 participants by the same rater to determine the test–retest reliability, whereas the remaining ($n = 32$) were assessed by a different rater to determine the inter-rater reliability of the scale. Two week test–retest periods for both reliability evaluations were chosen to minimize content recall by participants from initial assessment or changes in events that could significantly impact on their concern about falls (Portney & Watkins, 2000). If participants fell during the 2-week inter-test period they were excluded from the reliability analyses.

2.3. Statistical analysis

Intra-class correlations (ICC's) – models 3,1 (two way mixed) and 2,1 (two way random) respectively, of the scores obtained – were used to assess test–retest reliability and inter-rater reliability. Internal consistency of the FES-I(Ch) and Short FES-I(Ch) was evaluated using Cronbach's alpha coefficients and item-total correlations. Spearman correlation between the full and shortened FES-I(Ch) was also computed.

The internal structure of the scale was examined by exploratory factor analysis as used in previous studies (Helbostad et al., 2010; Ulus et al., 2011; Yardley et al., 2005). First, principal component analysis with Varimax rotation was used to establish the number of factors in the scale, then with an oblique rotation (oblimin procedure) was used following the in the initial validation of the FESI (Yardley et al., 2005). This procedure allows the factors to be correlated and an assessment of their associations to be made. Finally a single-factor solution was specified to determine unity of the scale. Convergent validity of the FES-I(Ch) was assessed using independent *t*-tests to examine between group-differences in total scores according to age, gender, and factors previously shown to be associated with falls and fear of falling (Arfken et al., 1994; Howland et al., 1998; Yardley et al., 2005). All analyses were performed using SPSS version 18.0 software (SPSS Inc., Chicago, IL, USA).

3. Results

The mean age of participants was 74.9 ± 6.4 (SD) years, 283 (71.0%) were women, 337 (84.5%) completed the FES-I(Ch) in Cantonese, and 83 (20.8%) had less than one year of education. Two hundred twenty-seven (56.9%) undertook exercise more than five days per week, 31 (7.8%) reported having four or more medical conditions and 83 (20.8%) fell one or more times in the follow-up period.

The overall mean FES-I(Ch) score was 36.0 ± 12.4 (range 16–64). The full range of responses was used for every item with a skew towards low levels of concern evident for three items relating to indoor activities (Table 1). FES-I scores for Cantonese speakers (36.1 ± 12.6) and Mandarin speakers (35.4 ± 11.3) were similar ($p = 0.67$) as were FESI-I(Ch) scores for participants who lived in Hong Kong (35.7 ± 12.7) and Sydney (36.2 ± 12.2) ($p = 0.67$).

3.1. Phase 1: translation and adaptation

During the development phase (Yardley et al., 2005), two items were modified based on feedback provided by the four older people in the pilot study. These related to item 10 "going to answer the telephone before it stops ringing" where it was simplified to "rushing for the telephone" and item 16 where the word "social" was eliminated from "going to a social event", as it was considered categorizing religious service as social was inappropriate. The final version of the FES-I(Ch) is included in Appendix A.

3.2. Phase 2: assessment of the psychometric properties of the FES-I(Ch)

3.2.1. Test–retest reliability

Thirty-two subjects participated in the test–retest reliability study with a mean age of 75.6 years (±SD 7.1 years). The $ICC_{3,1}$ for the total scale score was 0.89 (95% confidence interval [CI] 0.79–0.95), indicating excellent reliability. The test–retest reliability of individual items ranged from 0.54 to 0.80 indicating moderate to excellent reliability (Table 2).