



Experimental Aging Research

An International Journal Devoted to the Scientific Study of the Aging Process

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/uear20>

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To cite this article: Fatih Özden, Zeynep Yıldız Kızkın & Mehmet Özkeskin (2022): Psychometric Properties of the Turkish Version of the Fear of Falling Questionnaire-Revised (FFQ-R) in Nursing Home Residents with Mild Cognitive Decline, Experimental Aging Research, DOI: [10.1080/0361073X.2022.2106716](https://doi.org/10.1080/0361073X.2022.2106716)

To link to this article: <https://doi.org/10.1080/0361073X.2022.2106716>



Published online: 02 Aug 2022.



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Psychometric Properties of the Turkish Version of the Fear of Falling Questionnaire-Revised (FFQ-R) in Nursing Home Residents with Mild Cognitive Decline

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ABSTRACT

Background: The aim of the study was to investigate the validity and reliability of the Turkish version of the Fear of Falling Questionnaire-Revised (FFQ-R) in older adults with mild cognitive impairment (MCI) living in a nursing home.

Methods: The study was conducted with 107 (69 women) older adults. The participants were evaluated with the FFQ-R, the Falls Efficacy Scale (FES), the Mini-Mental State Examination (MMSE), the Barthel Index and Montgomery-Åsberg Depression Rating Scale (MADRS). FFQ-R was refilled one month later for retesting.

Results: Cronbach's alpha value of the FFQ-R was 0.971. The global internal consistency was excellent (>0.80). Intraclass correlation coefficient of the FFQ-R was 0.962 (95% CI: 0.92–0.98), indicating excellent test-retest reliability. The Standard Error of Measurement (SEM) and Minimal Detectable Change (MDC) values of the FFQ-R was 0.80 and 2.21, respectively. The correlation between the total score of FFQ-R and the FES was excellent ($r = 0.963$, $p < .001$). The relationship between FFQ-R and MMSE was excellent ($r = -0.821$, $p < .001$). Besides, there was a moderate correlation between the FFQ-R with Barthel Index ($r = -0.648$, $p < .001$) and FFR-Q with MADRS ($r = 0.568$, $p < .001$).

Conclusion: Turkish version of the FFQ-R is a valid and reliable tool to assess the fear of falling in nursing home residents.

ARTICLE HISTORY

Received 11 March 2022
Accepted 20 July 2022

Introduction

Falling in older person is a significant public health problem as a reason of morbidity and mortality (Al-Aama, 2011; Kannus et al., 1999; Soyuer, Cankurtaran, Akin, & Elmali, 2015). Falls are frequent in older individuals living in nursing homes. It affects 30% to 50% of the older population. It has been reported that 1.5 falls per year are encountered for each person in a nursing home (Vu, Weintraub, & Rubenstein, 2006). As a result of falling, the emergence of health problems in individuals increases the health costs of countries because it causes several disabilities (Rao, 2005).

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Falls in elderly individuals can occur in the home environment or nursing home. The incidence of first and recurrent falls within a year in older adults in nursing homes has been reported as 33.9%. If the elderly fell within the last six months, the risk of falling again increased approximately 3.7 times (Kaya et al., 2012). It has been demonstrated that age, female gender, education level, visual impairment, use of antihypertensive drugs, presence of physical disability, and any walking aid are associated with the risk of falling in elderly individuals. Along with sociodemographic characteristics, comorbidity, depression and fear of falling (FOF) have also been found to increase the risk of falling (Deandrea et al., 2010; Kumar, Carpenter, Morris, Iliffe, & Kendrick, 2014). Furthermore, mild cognitive impairment (MCI) has been documented to pose a risk for falling (Delbaere et al., 2012; Montero-Odasso, Verghese, Beauchet, & Hausdorff, 2012).

Older adults with MCI were reported to have more FOF (Uemura et al., 2014). It has been documented that MCI gives an approximate opinion in determining the onset of FOF in older individuals who have had a fall. Moreover, it has been stated that elderly individuals with MCI pose a risk in terms of FOF along with the risk of falling (Uemura et al., 2015). FOF was determined to be noticed in 35% of the older adults living in nursing homes (Kaya et al., 2012). Different studies have revealed that the FOF develops in the older person due to falling again. Accordingly, the older person's self-confidence, mobility, independence in daily living activities, and quality of life are negatively affected (Kressig et al., 2001; Schepens, Sen, Painter, & Murphy, 2012; Suzuki, Ohyama, Yamada, & Kanamori, 2002).

Many instruments evaluate the FOF in older individuals. Although the "Survey of Activities of FOF in the Elderly" comprehensively evaluates the FOF and avoidance behaviors in older adults, it has been noted that its use in rehabilitation centers is not applicable (Jørstad, Hauer, Becker, Lamb, & Group, 2005). Different scales, "Falls Efficacy Scale (FES)" and "Falls Efficacy Scale-International (FES-I)," were found to be valid and reliable in geriatric rehabilitation patients (Hauer et al., 2010) and older individuals (Kempen et al., 2007) with or without cognitive impairment. It has been indicated that the FES and FES-I focus on physical performance rather than the psychological aspect of the FOF in older adults receiving rehabilitation after a subacute hip (or pelvic) fracture (Eckert et al., 2020).

The Fear of Falling Questionnaire (FFQ), which consists of 20 items, also evaluates the FOF from the cognitive and physical aspects (Dayhoff, Baird, Bennett, & Backer, 1994). Tardily, Bower et al. revised the FFQ, transformed it into six items, and named it "Fear of Falling Questionnaire revised (FFQ-R)" (Bower et al., 2015). Psychometric analysis of the English and German (Dautel et al., 2021) versions of the FFQ-R were performed. To our knowledge, the validity and reliability of the Turkish version of the FFQ-R have not been studied yet. The purpose of the present study is to investigate the validity and reliability of the Turkish version of the FFQ-R in Turkish older adults with MCI living in a nursing home.

Materials and Methods

Translation Procedures

The necessary permissions for this psychometric study were obtained from the developer of the "Fear of Falling Questionnaire-Revised (FFQ-R)." The global guidelines were considered for the translation of FFQ-R into Turkish (Beaton, Bombardier, Guillemin, & Ferraz, 2000; Guillemin, Bombardier, & Beaton, 1993). First, FFQ-R was translated by two

translators experienced in health and medical sciences. These translators' native language was Turkish. Different perspectives and cultural conceptions of Turkish were explored at this stage of forward translation. The translations were examined, and a Turkish version was acquired along with the counterparts that most accurately represented each item in the texts. In the second stage, these translations were synthesized. The translation committee's differing viewpoints were discussed until a consensus was obtained. In the third step, a native English bilingual translator translated the questionnaire from Turkish to English. Finally, the Turkish and English texts were assessed by two translators whose first language was English and a multidisciplinary team of physiotherapists, in order to identify inconsistencies in the texts and remove meaning discrepancies. As a result, it was discovered that these two tools were compatible with each other. Turkish FFQ-R was presented in Appendix 1.

Sample Size Estimation

Fayers et al. suggested a minimum number of 100 cases and at least five times the number of the questionnaire (Chavance, 2008). In addition, G*power software-based analysis was conducted for the test-retest reliability analysis. A total of 28 cases were calculated to be adequate (effect size: 0.5, error possibility: 0.05, power: 0.90) (Faul, Erdfelder, Lang, & Buchner, 2007). Re-test analysis was carried out with 30 older adults.

Study Design

"A prospective cross-sectional study" was carried out between September and December 2021 in *Murgul Nursing Home* and *Şavşat Naime İsmail Yılmaz Nursing Home* with the permission of the *Artvin* Provincial Directorate of Family and Social Services. The study protocol was approved by the ethics committee of *Artvin Çoruh University* (No: E.16520). The inclusion criteria of the study are given as follows; (a) Turkish-speaking adults aged between 65–90 years, (b) patients who had mild cognitive decline according to the Mini-Mental State Examination (MMSE), (c) volunteer to participate in the study. The exclusion criteria are; (a) individuals with fracture, trauma and admission to inpatient rehabilitation of 3 months, (b) who underwent a surgical operation within the last 6 months.

Individuals were evaluated in the nursing home. Socio-demographical, physical and clinical features of the patients (e.g., age, body mass index) will be collected. During the first visit, the participants were subjected to the "FFQ-R, FES, MMSE, Barthel Index, Montgomery-Åsberg Depression Rating Scale (MADRS)." The researcher was applied the FFQ-R one month later for retesting. During that time, it was considered that the clinical condition remained unchanged.

FFQ-R

FFQ-R was used to evaluate the FOF of the individuals (Dayhoff et al., 1994). FFQ consists of 15 items. FFQ-R is the short version, including only 6 items (Bower et al., 2015). The minimum and maximum scores of the FFQ-R was 6 and 24, respectively. High scores indicate high FOF levels (Bower et al., 2015; Dautel et al., 2021).

FES

FES is a tool to measure of “fear of falling” or “concerns about falling” with 10 items. A minimum and maximum score of the FES is 10 and 100, respectively. High scores indicate more FOF. A score higher than 70 predict a high FOF of the individuals (Tinetti, Richman, & Powell, 1990). Acar et al have been demonstrated the validation of the FES (Acar & Çankaya, 2019).

MMSE

The MMSE was preferred to assess the cognitive status of the cases (Folstein, Robins, & Helzer, 1983). MMSE is scored between 0–30. Higher scores point out better cognitive status. 18–23 points indicates a mild cognitive decline (Güngen, Ertan, Eker, Yaşar, & Engin, 2002).

Barthel Index

Barthel index is used to evaluate the functional status of individuals (F. I. Mahoney & Barthel, 1965). This battery evaluates several aspects of daily living. It is scored between 0–100, which higher scores indicates better function. The validity and reliability of the scale was conducted by Küçükdeveci et al. (Küçükdeveci et al., 2000).

MADRS

MADRS was used to assess depression of the older adults (Montgomery, Smeyatsky, De Ruiter, & Montgomery, 1985). It has 10 items and is rated over 60 points. Normal psychological state is predicted by 0–6 scores, mild depression by 7–9 points, moderate depression by 20–34 points, severe depression by >34 points. The validity and reliability of the MADRS scale was conducted by Özer et al. (Ozer, Demir, Tugal, Kabakcı, & Yazıcı, 2001).

Statistical Analysis

“SPSS for Windows v25.0” was used to conduct the data analysis. The mean (X) and standard deviation (SD) was be used to show descriptive data. Percentages was used to report frequency (%). “Kolmogorov-Smirnov” test was used to control the normality. The correlation coefficients was accepted with 95% confidence intervals.

“The intra-class correlation coefficient (ICC)” was calculated to consider “test-retest reliability.” ICC score higher than 0.80 indicated excellent reliability (Baumgartner & Chung, 2001). “Internal consistency” was interpreted with “Cronbach’s alpha coefficient.” Alpha scores greater than 0.80 was described as proper “internal consistency” (Digesu, Khullar, Cardozo, Robinson, & Salvatore, 2005). Besides, “standard error mean (SEM₉₅)” and “minimum detectable change (MDC₉₅)” were also estimated (Portney & Watkins, 2009). The Spearman correlational coefficient was analyzed and considered for construct validity (Pallant, 2011).

Results

A total of 107 geriatric individual with mild dementia (73.84 ± 7.74 years, 69 women) were enrolled. The characteristics of the cases are presented in Table 1. A vast majority of individuals (64.5%) were women. The absolute values of the FFQ-R, FES, MMSE, the Barthel Index and MADRS are presented in Table 2.

Table 1. The socio-demographic characteristics of the geriatric individuals.

n:107	Total
Age (years, mean $\pm$ SD)	73.84 $\pm$ 7.74
BMI (kg/m ² , mean $\pm$ SD)	26.99 $\pm$ 7.14
Gender (n, %)	
Female	69 (64.5)
Male	38 (35.5)
Smoking (n, %)	
Yes	10 (9.3)
No	97 (90.7)
Alcohol use (n, %)	
Yes	3 (2.8)
No	104 (97.2)

"SD: standard deviation, n: number of patients"

Table 2. Absolute values of the clinical assessments.

n:107	Mean $\pm$ SD	Range
FFQ-R	16.74 $\pm$ 6.38	(6–24)
FES	63.50 $\pm$ 31.31	(10–114)
MMSE	20.70 $\pm$ 1.83	(18–23)
Barthel Index	83.55 $\pm$ 21.52	(0–100)
MADRS	12.58 $\pm$ 10.81	(0–47)

"SD: standard deviation, n: number of patients, FFQ-R: Fear of Falling Questionnaire-revised, FES: Falls Efficacy Scale, MMSE: Mini Mental State Examination, MADRS: Montgomery-Åsberg Depression Rating Scale"

Reliability

Cronbach's alpha value of FFQ-R was 0.971. The alpha value of the items of the FFQ-R was ranged from 0.963 to 0.971. The global internal consistency was excellent (>0.80). ICC of the FFQ-R was 0.962 (95% CI: 0.92–0.98). The ICC value of the items of the FFQ-R was ranged from 0.881 to 0.993. The SEM and MDC values of the FFQ-R was 0.80 and 2.21, respectively (Table 3).

Validity

The Spearman correlation results between the FFQ-R with FES, MMSE, Barthel Index and MADRS given in Table 4. The correlation between the total score of FFR-Q and the FES was excellent ($r = 0.963$, $p < .001$). In addition, the relationship between FFQ-R and MMSE was excellent ($r = -0.821$, $p < .001$). Besides, there was a moderate correlation between the Barthel Index and FFQ-R ($r = -0.648$, $p < .001$). According to the results of the correlation between FFQ-R with MADRS ($r = 0.568$, $p < .001$), there was a moderate correlation. The construct validity of the FFQ-R was highly acceptable ($r > 0.50$) (Figure 1).

Discussion

The present study was aimed to examine the psychometric properties of the Turkish version of FFQ-R. Falls in older individuals over the age of 65 should not only be attributed to physical parameters such as balance, coordination, muscle strength and flexibility. Fear of falling is

Table 3. The reliability of the FFQ-R.

n: 30	Test (Mean± SD)	Retest (Mean± SD)	ICC (95% CI)	α	SEM	MDC
Item 1	3.12 ± 0.83	3.03 ± 0.86	0.944 (0.88–0.97)	0.966	0.19	0.53
Item 2	2.87 ± 0.83	2.78 ± 0.90	0.947 (0.89–0.97)	0.965	0.15	0.41
Item 3	2.90 ± 0.81	2.75 ± 0.84	0.921 (0.83–0.96)	0.967	0.22	0.60
Item 4	3.12 ± 0.79	3.03 ± 0.86	0.944 (0.88–0.97)	0.963	0.18	0.49
Item 5	3.25 ± 0.56	3.15 ± 0.62	0.881 (0.75–0.94)	0.966	0.19	0.52
Item 6	2.78 ± 1.03	2.75 ± 1.04	0.993 (0.98–0.99)	0.968	0.06	0.15
FFQ-R	17.78 ± 4.11	17.50 ± 4.19	0.962 (0.92–0.98)	0.971	0.80	2.21

"n: number of patients, ICC: Intra-class correlation coefficient, CI: Confidence interval"

Table 4. Correlation between FES, MMSE, Barthel Index and MADRS with FFQ-R.

n: 107	FFQ-R	
	r	p
FES	0.963	< 0.001
MMSE	−0.821	< 0.001
Barthel Index	−0.648	< 0.001
MADRS	0.568	< 0.001

"FFQ-R: Fear of Falling Questionnaire-revised, FES: Falls Efficacy Scale, MMSE: Mini Mental State Examination, MADRS: Montgomery-Åsberg Depression Rating Scale.

generally associated with physical variables, particularly in individuals in this age group, where psychological changes are common (Bower et al., 2015; Dautel et al., 2021; Dayhoff et al., 1994; Kumar et al., 2014; Ozcan, Donat, Gelecek, Ozdirenc, & Karadibak, 2005). Furthermore, cognitive decline also creates an additional catastrophizing for falls. The integration of somatosensory and motor reaction of individuals is also related to their cognitive status (J. R. Mahoney & Verghese, 2020). It has been observed that the frequency of falls is increased in conditions such as dementia and Alzheimer's disease (Borges, Radanovic, & Forlenza, 2015).

Considering that falls can lead to high morbidity and mortality risks such as hip fractures in older individuals, this situation severely burdens both patients, caregivers, and health services (Dautel et al., 2021). Therefore, the evaluation of falls together with the fear of falling has additional importance, especially in older individuals with cognitive problems. The FFQ-R is a short, comprehensive and practical assessment tool that focuses on falls' physical and psychological aspects. Its 6-item structure provides a more effortless and practice assessment, especially for older adults with cognitive disorders (Bower et al., 2015). Owing to its straightforward design, it also provides additional convenience to clinicians and caregivers.

The Turkish version of the FFQ-R had excellent internal consistency and test-retest reliability compatibility. On the other hand, the construct validity of the questionnaire was high regarding a high correlation with the gold standard tools in which both physical and psychological decline were evaluated. We also calculated the SEM and MDC values of the FFQ-R. These essential psychometric measures have been calculated for the first time for the FFQ-R. In this respect, our study provides additional originality compared to the FFQ-R development study (Bower et al., 2015) and the German version (Dautel et al., 2021). Another supplemental contribution of the Turkish version is that the questionnaire was validated for the first time in older individuals with cognitive impairment.

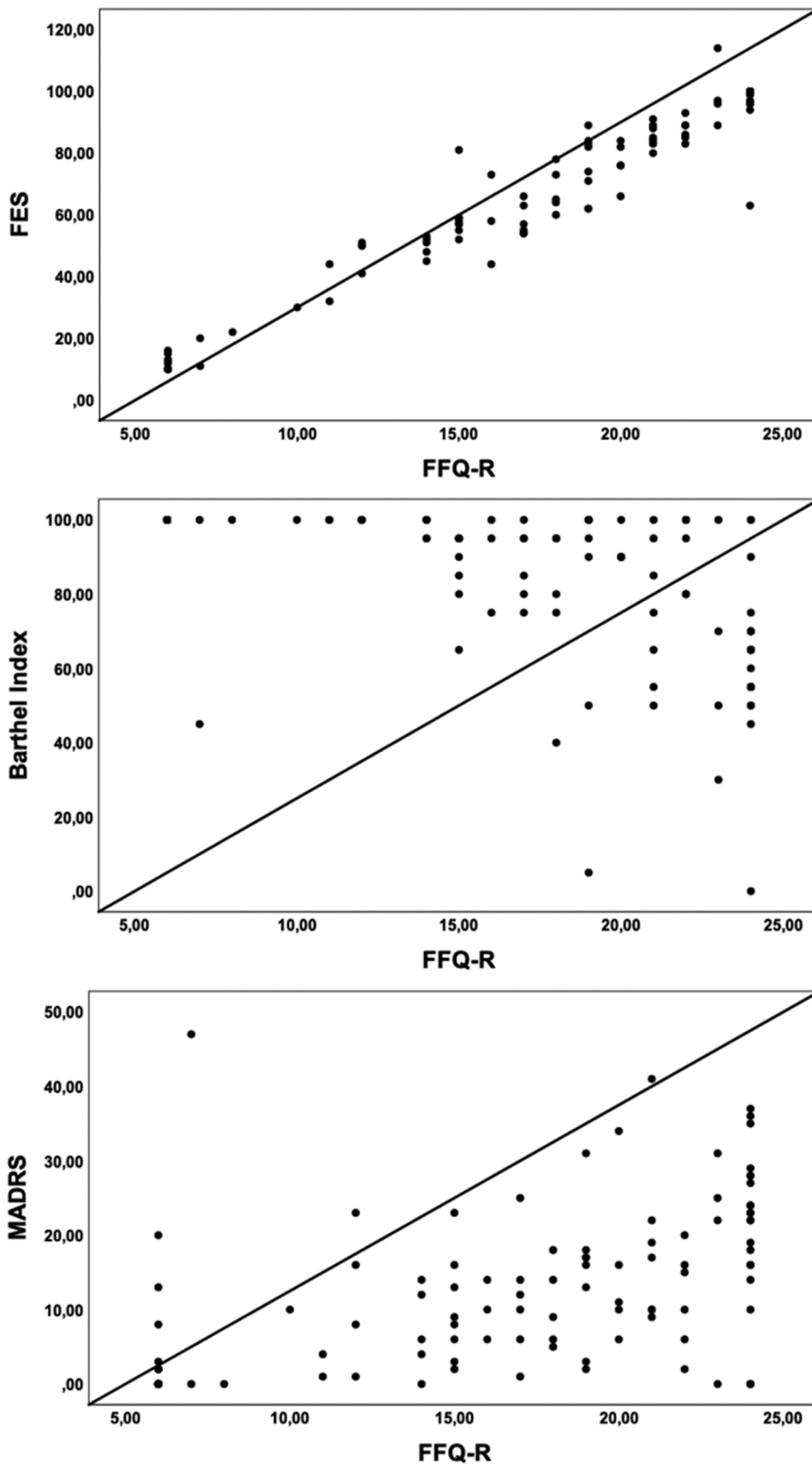


Figure 1. Scatter plot of the correlational analysis for the construct validity.

First, the mean age of the older individuals included in our study was approximately 73 years. The development and German version studies had a mean population of 78 and 84 years, respectively (Bower et al., 2015; Dautel et al., 2021). Regarding age, it should be stated that the FFQ-R was conducted in a relatively young group in our study. Notably, we could be concluded that our study was conducted on individuals whose fear of falling was less due to physical reasons and more to cognitive-psychological reasons. In this respect, our study provided a unique design. It is essential to compare and contrast the mean values of the FFQ-R in these three different populations. The mean values of the FFQ-R in the Turkish version, the development study, and the German version were 16.7, 16.1, and 16.9, respectively (Bower et al., 2015; Dautel et al., 2021). These results might bring to mind the conclusion that there is a similar fear of falling even in the possible differences of physical or cognitive-psychological reasons.

Second, we interpreted our reliability results. Due to the brief structure of the FFQ-R, the high ICC value of the test-retest reliability was the expected result. Because the reevaluation of long-structured questionnaires generally gives inefficient results in terms of ICC (Özkeskin, Özden, Bakırhan, & Yüceyar, 2021). For this reason, survey developers focus on precise surveys that can make both a short and comprehensive evaluation. The ICC value calculated over 0.80 for the total and item scores of the FFQ-R proves that the questionnaire can clearly reflect the same clinical situation in different measurements. Our other reliability parameter was Cronbach's alpha coefficient. The results of this essential psychometric analysis parameter were performed in order to determine that the items of the questionnaire holistically focused on the assessment of fear of falling. The alpha score for the total score and items was higher than 0.90, similar to the ICC score. These results revealed that the questionnaire had sufficient internal consistency. In the development study, the ICC value was 0.82 (Bower et al., 2015). Even with a slight cognitive decline, relatively higher test-retest reliability coefficients were found in our study due to the relatively young population. However, it may not be appropriate to attribute this situation only to cognitive status and age. Because even asking more questions to patients with a more significant number of questionnaires in the development study may have led to various cognitive biases in terms of individuals' retest scores.

Third, we calculated the SEM and MDC values of FFQ-R for the first time in this study. Especially the MDC value can make an outstanding contribution to clinicians during the patient follow-up process. A patient score changes of 2.21 according to the baseline value shows the patient's lowest significant detectable score change value in terms of fear of falling. It should be declared that this value is affected by the standard deviation value. Therefore, the SEM and MDC values for different populations should be recalculated, and the sample should be as homogeneous as possible. In our study, the standard deviation of the mean value was approximately 4. This value was approximately 3 and 4 in the development study and the German version, respectively. Based on the similarity of these standard deviation data, it can be interpreted that a homogeneous sample could be formed in all three studies. Therefore, the MDC value we obtained could be used for elderly individuals from different populations to a large extent.

Fourth, we interpreted our construct validity questions. The FFQ-R was highly correlated with all compared questionnaires (FES, MMSE, Barthel Index, MADRS). The highest correlation of FFQ-R was with FES ($r = 0.963$). This correlation can be strong evidence of

how compatible the FFQ-R is with the fear of falling due to physical conditions. A correlation coefficient above 0.90 indicated a high degree of construct validity in convergent validity. The high correlation (>0.80) with the MMSE revealed that the relationship of FFQ with cognitive status was essential. Especially in this group with mild cognitive impairment, the increase in cognitive losses indicates an increase in fear of falling, a critical study output. Moderate correlation (>0.50) with Barthel index and MADRS showed the potential of FFQ-R to represent both psychological and fear of falling in activities during activities of daily living. In the development study, FFQ-R correlated 0.31 with MADRS and 0.68 with short FES-I. Observation of relatively higher correlations in our study suggested positive possibilities for the suitability of FFQ-R for individuals residing in a nursing home with cognitive impairment. The German version presents the correlation between FFQ-R and short FES-I as 0.51. Considering that the case group in this study was after hip or pelvic fracture, it was assumed that the fear of falling might be more in more mobile older individuals.

Limitations

Finally, some limitations of the study should be mentioned. First, we had to conduct the retest at a one-month interval. This duration was related to the consultation programs of individuals in nursing homes. Retest intervals have commonly accepted the duration of 21 days (Werner, Petersen, & Bischoff, 2013). However, some recommendations state that it may be appropriate to evaluate the cases after one month for the retest analysis (Schatz & Ferris, 2013). Collecting data on physical performance tests, frequency of falls, and assistive device use alongside questionnaires would have been more valuable in presenting the details of a clinical trial. However, it was difficult to carry out physical performance tests and collect accurate statements about fall history healthily, considering individuals with cognitive loss and the conditions of the pandemic period.

Conclusion

The Turkish version of the FFQ-R is a valid and reliable tool for fear of falling in nursing home residents. In our study, the Turkish version of the FFQ-R had excellent internal consistency and test-retest reliability. Its 6-item structure provides an easier evaluation process, especially for older adults with cognitive decline.

Ethical Approval

The permission for the translation for the Turkish version of the Fear of Falling Questionnaire-Revised (FFQ-R) was acquired from the developer of the original questionnaire. The study was carried out in accordance with the ethical principles and the Helsinki Declaration. Informed consent of the patients was obtained. The study protocol was approved by the ethics committee of Artvin Çoruh University (No: E.16520).

Disclosure Statement

No potential conflict of interest was reported by the author(s).

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Appendix

Düşme Korkusu Anketi-Revize (DKA-R).

	Kesinlikle katılmıyorum	Katılmıyorum	Katılıyorum	Kesinlikle katılıyorum
1. Düşersen, yaralanma ihtimalim var.				
2. Tekrar düşmekten korkuyorum.				
3. Düşersen hayatım büyük ölçüde değişir.				
4. Düşme düşüncesi beni gerçekten korkutuyor.				
5. Başım dönerse veya takılırsam muhtemelen düşerim.				
6. Düşmek en büyük korkularımdan biridir.				