Mirhosseini *et al. BMC Psychology* (2025) 13:222
https://doi.org/10.1186/s40359-025-02528-z

BMC Psychology

RESEARCH **Open Access**

Psychometric evaluation of the Persian version of the Family Caregiver-Specific Quality of Life Scale (FAMQOL) among family caregivers of patients with chronic psychiatric disorders

Seyedmohammad Mirhosseini[1], Fatemeh Moslemi[2], Hamid Sharif-Nia[3,4], Somaye Minaei-Moghadam[5], Mahboobeh Khajeh[1], Ali Abbasi[1*] and Hossein Ebrahimi[6]

Abstract

Background Family caregivers of psychiatric patients often experience various negative psychosocial consequences, with a decline in quality of life being the most prevalent. This study was conducted with the aim of evaluating the psychometric indices of the Persian version of the Family Caregiver-Specific Quality of Life Scale (FAMQOL).

Methods This cross-sectional study was conducted in 400 family caregivers of patients with chronic psychiatric diseases in Iran in 2024 using convenience sampling. Using a forward-backward translation procedure, the face and content validity of the FAMQOL were assessed through both qualitative and quantitative methods. After face and content validity, in order to determine construct validity, exploratory ($n = 200$) and confirmatory ($n = 200$) factor analysis was performed. To determine reliability, internal consistency (Cronbach's alpha coefficient and Macdonald's omega coefficient) and stability (intraclass correlation coefficient) were estimated.

Results A total of 400 participants were evaluated, comprising 184 males (46.0%) and 216 females (54.0%). In content validity, one item was removed and during exploratory factor analysis, the remaining 15 items were loaded on four factors including social, spiritual, physical and psychological, which described 61.74% of the total variance. Confirmatory factor analysis showed that the obtained model has a good fit. All obtained factors had convergent and discriminant validity. Cronbach's alpha (0.783 to 0.932), Macdonald's omega (0.817 to 0.934) and intraclass correlation coefficients (0.953 to 0.971) showed acceptable internal consistency and stability of the factors of the Persian version of FAMQOL.

Conclusion Findings from this study confirm that the Persian version of the FAMQOL is a valid and reliable instrument for evaluating the quality of life among family caregivers of patients with chronic psychiatric disorders. This

---

*Correspondence:
Ali Abbasi
abbasi_msn@yahoo.com

Full list of author information is available at the end of the article

scale holds significant potential for both research and clinical applications, facilitating the identification of caregivers' needs and guiding the creation of targeted interventions to enhance their quality of life.

Keywords Quality of life, Caregiver, Validity, Reliability, Psychometric

Background

Today, we are witnessing an alarming rise in the incidence of psychiatric disorders worldwide, driven by political turmoil, waves of violence, and frequent changes in the social fabric of countries [1]. Psychiatric disorders are a major public health concern and rank among the top ten leading causes of disease burden worldwide [2]. A meta-analysis of mental health surveys conducted in 59 countries between 1980 and 2013 estimated the pooled lifetime prevalence of common psychiatric disorders among adults aged 16–65 to be 29.2% [3]. In Iran, the prevalence of psychiatric disorders was found to be 31.03% in studies using screening tools and 25.42% in studies employing clinical interviews [4]. Chronic psychiatric conditions significantly affect not only the patients but also their family caregivers [5]. Moreover, family caregivers play a significant role in patient care and often experience a heavy burden that includes emotional, physical, financial, and psychosocial challenges. These challenges ultimately reduce their quality of life [6].

Quality of life is a crucial aspect of societies, but it is a deeply anthropocentric and complex concept that attempts to encompass human needs and activities [7]. It's important to remember that the interpretation of quality of life is highly subjective [8]. From both scientific and social perspectives, quality of life includes a variety of variables and factors that contribute to an overall sense of well-being [9]. It encompasses physical health, psychological parameters, and social interactions [10, 11]. The quality of life for family caregivers of patients with psychiatric illnesses is typically low [12]. Lower quality of life scores are related to lower socioeconomic status, lower education levels, and unemployment or financial problems among caregivers of individuals with mental and non-mental illnesses [13]. Caregivers of individuals with psychiatric illnesses are susceptible to social consequences, including reduced social support [14], stigma [15], and discrimination [16], which can lead to high levels of depression [17], stress [18], and anxiety [19]. This situation can ultimately hinder their ability to provide adequate informal care to their patients [20]. Assessing the quality of life of caregivers using questionnaires is a well-established and widely accepted approach [21]. Evaluating the quality of life of family caregivers of patients with chronic psychiatric disorders is especially important, as these individuals often encounter substantial physical, emotional, and social challenges that can adversely affect their well-being [22]. Gaining insight into their quality of life enables the identification of specific needs and supports the development of targeted interventions to enhance their overall health and caregiving experience [23].

Various tools have been validated to measure the quality of life of family caregivers of people with chronic diseases such as the Short Form-36 (SF-36) and WHOQOL BREF questionnaire. Researchers have either psychometrically tested these general tools for assessing the quality of life in caregivers of a wide range of conditions [24–27] or developed specific tools tailored to the caregivers of particular diseases such as Caregiver Quality of Life Index–Cancer (CQOLC), The Caregiver Oncology Quality of Life questionnaire (CarGOQoL), the Caregiver Quality of Life Cystic Fibrosis (CQOLCF), the Schizophrenia Caregiver Quality of Life questionnaire (S-CGQoL) [5, 28–33]. Given the critical importance of quality of life in evaluating, measuring, and identifying areas for improvement in care outcomes, it is essential to use diverse and comprehensive scales. In a 2007 study by Nauser et al., the Family Caregiver Quality of Life (FAMQOL) scale was introduced to assess the quality of life of family caregivers. This scale includes four factors: spiritual, physical, psychological, and social well-being, with higher scores indicating a better quality of life [31]. It's important to note that the FAMQOL scale contains general items for evaluating quality of life and has been translated and psychometrically tested in Turkish and Brazilian languages [34, 35]. This scale has a reasonable number of items compared to previously available tools, minimizing the risk of fatigue during completion and allowing caregivers to finish it in a shorter amount of time. Another strength of this scale lies in its straightforward scoring method and ease of interpretation, which motivated the authors to conduct its psychometric evaluation. Additionally, the inclusion of concepts such as spiritual, physical, psychological, and social well-being within the Iranian context further underscores its significance [36, 37].

Given the significant need to assess the quality of life of family caregivers of chronic psychiatric patients in Iran and the limitations of available measurement tools in this area, this study was conducted to validate the Persian version of the FAMQOL. The validation of this tool is expected to facilitate its use in future research for evaluating and identifying areas to improve the quality of life for family caregivers of patients with chronic psychiatric conditions.

Methods

Participants and the study setting

This methodological study was conducted using cross-sectional design with 400 family caregivers of patients with chronic psychiatric diseases at Ibn Sina Psychiatric Hospital in Mashhad, Iran, in 2024. To achieve the goals of this study and conduct both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), we aimed to include 5–10 family caregivers per item, as suggested by previous studies [38]. A sample size of at least 200 cases for psychometric studies is recommended [39]. A total of 400 family caregivers of patients with chronic psychiatric diseases were selected using a convenience sampling method and based on specific inclusion criteria. These criteria included a definite diagnosis by a psychiatrist according to the medical record, age 18 years or older, providing care for at least six months [40], literacy in reading and writing, and proficiency in the Persian language. Exclusion criteria included the presence of psychiatric disorders or the use of neuroleptic drugs by the caregiver.

Scale

The FAMQOL, developed by Nauser et al. in 2011, comprises 16 items divided into four subscales: physical, psychological, spiritual, and social well-being. Specifically, the subscales are as follows: physical well-being (items 1, 5, 8, and 9; e.g., Item 1: *'As a caregiver, I seem to get sick more often'*), psychological well-being (items 2, 3, 4, and 6; e.g., Item 2: *'As a caregiver, I am overwhelmed'*), spiritual well-being (items 13, 14, 15, and 16; e.g., Item 15: *'Caregiving gives me a sense of inner peace'*), and social well-being (items 7, 10, 11, and 12; e.g., Item 15: *'Because of caregiving, I am socially isolated'*). Items 1 to 7 are reverse-scored. Each item is rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The total score is obtained by summing the scores of all 16 items, resulting in a range from 16 to 80, with higher scores reflecting better quality of life. Construct validity was evaluated through EFA. During this process, leaving 16 items of scale explained 41% of the variance. Internal consistency and stability, were measured by Cronbach's alpha equal to 0.89, and the intra-cluster correlation coefficient equal to 0.91, respectively. Furthermore, the FAMQOL score demonstrated a correlation of 0.45 with the total score of the SF-36 quality of life scale and 0.59 with its psychological dimension [31].

Translation process

After obtaining written permission from the scale's creator, Professor Nauser, the FAMQOL was translated into Persian following Gudmundsson's translation protocol [41]. Two professional translators, one with expertise in the medical sciences field and the other in non-medical sciences fields, independently translated the scale into Persian. The authors carefully reviewed and merged these translations to produce the initial Persian version of the FAMQOL. Feedback was incorporated, and necessary revisions were made to refine the initial version. This revised Persian version was then back-translated into English by another two independent translators with similar qualifications to the previous translators. Finally, the research team reviewed and approved the final version of the scale.

Face validity

This stage included both qualitative and quantitative assessments of face validity. Initially, to evaluate the qualitative face validity, 10 family caregivers of patients with chronic psychiatric diseases were interviewed in person to gather their opinions on the appropriateness, difficulty, relevance, and clarity of the items. After analyzing and summarizing their feedback, modifications were made to the items to enhance their clarity and comprehension [42].

Additionally, to assess quantitative face validity, the importance of each item was evaluated using a 5-point Likert scale (very important = 5, important = 4, moderately important = 3, slightly important = 2, not important = 1) by the same group of ten family caregivers. The impact score for each item was calculated using the formula: Impact score = Frequency (%) × Importance. Frequency refers to the percentage of respondents who rated the item as 4 or 5, and Importance represents the average importance score based on the Likert scale. An item was considered suitable for further analysis and retained if its impact score was greater than 1.5, based on an average rating of 3 and a frequency of 50%. Items with an impact score of less than 1.5 were not removed but were reviewed and revised [43].

Content validity

Content validity was assessed both qualitatively and quantitatively. The qualitative evaluation involved 12 experts (five in mental health, five in nursing, and two in instrument design/psychometric evaluation). These experts reviewed the grammatical accuracy, appropriateness of terms, necessity of items, placement of items, and scoring of the items. The content validity ratio (CVR) and content validity index (CVI) were calculated to quantify the scale's content validity. The experts rated the necessity of each item using the criteria: not necessary (1), useful but not necessary (2), and necessary (3). The CVR was calculated using the formula: CVR = (ne– [N / 2]) / (N / 2). Where N is the total number of experts and ne is the number of experts who rated the item as "necessary." According to Lawshe's table, the minimum acceptable CVR for a panel of 12 experts is 0.56 [44]. The CVI, reflecting the relevance of the scale items to the overall concept, was also evaluated. Experts rated each item as "not relevant" (1), "somewhat relevant" (2), "relevant but needs revision" (3), or "completely relevant" (4). The CVI for each item was determined by dividing the number of experts who rated the item as 3 or 4 by the total number of experts. An item was considered acceptable if it had a CVI score greater than 0.79. Scores between 0.79 and 0.70 were deemed questionable and subject to revision, while items with scores below 0.70 were considered for removal. The scale-level content validity index (S-CVI) and scale-level content validity ratio (S-CVR) were calculated as the average values of CVI and CVR, respectively, with an S-CVI > 0.9 deemed acceptable [43].

Additionally, the modified Kappa statistic was calculated for each item to account for the chance agreement among experts. Items with a Kappa value of 0.74 or higher were considered excellent [45]. The Kappa (K) statistic was computed using the formula: K = (I-CVI - Pc) / (1 - Pc). Where I-CVI is the item-level content validity index and Pc is the probability of chance agreement.

Construct validity

The construct validity of the FAMQOL was assessed using Maximum Likelihood Exploratory Factor Analysis (MLEFA) with Promax rotation on the first set of 200 responses. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test were used to measure sampling adequacy. KMO values between 0.7 and 0.8 were considered good, and values between 0.8 and 0.9 were considered excellent. An item's presence in a latent factor was determined by a factor loading threshold of approximately 0.33, calculated using the formula: $CV = 5.152 / \sqrt{(n - 2)}$, where CV represents the critical value and n is the sample size. Items with communalities less than 0.3 were removed from the EFA [46]. Eigenvalues (λ) are calculated by adding up the squared factor loadings (SSL) for all items (k) within each factor. This number shows how much of the variance in each item can be explained by the analysis. To find out the percentage of total variance explained by a factor, the Eigenvalue is divided by the total number of items [47].

Following this, the CFA was conducted. The goal of CFA is to verify that the proposed model corresponds to the actual model in the study population by assessing the goodness of fit. In other words, CFA aims to confirm the factor structure identified through EFA. Various model fit indices were used to evaluate the model fit, including Comparative Fit Index (CFI), Normed Fit Index (NFI), Goodness of Fit Index (GFI), Relative Fit Index (RFI), and Incremental Fit Index (IFI) all above 0.9. The Root Mean Square Error of Approximation (RMSEA) was below 0.08, and the Minimum Discrepancy Function divided by degrees of freedom (CMIN/DF) was less than 3, indicating good model fit [48].

Convergent and discriminant validity

In order to assess convergent validity and discriminant validity, specific criteria were utilized. For convergent validity, the composite reliability (CR) should be higher than 0.7, and the average variance extracted (AVE) should be higher than 0.5 for each construct. Fornell and Larcker (1981) proposed that if the AVE is below 0.5 for a psychological construct, but the CR is above 0.7, the convergent validity can still be deemed acceptable [49]. The study used the Heterotrait-Monotrait Ratio (HTMT) correlation criterion to determine discriminant validity. According to this criterion, the HTMT ratio between all constructs should be less than 0.85 [50].

Reliability

To evaluate the internal consistency of the FAMQOL, Cronbach's alpha and McDonald's omega coefficients were calculated for all four extracted factors. A minimum value of 0.7 for both alpha and omega coefficients was considered acceptable, indicating good internal consistency. The CR was also assessed for each factor, with CR values greater than 0.7 indicating good reliability [51]. The stability of the FAMQOL was evaluated using the intraclass correlation coefficient (ICC), with an index above 0.8 considered to indicate satisfactory stability [52]. For this assessment, a sample of 30 family caregivers completed the scale twice with a two-week interval.

Normality, outliers and missing data

Univariate and multivariate outliers were assessed using distribution charts and Mahalanobis distance (with Mahalanobis distance $p < 0.001$). Univariate normality was evaluated considering skewness (values within ± 3) and kurtosis (values within ± 7), and multivariate normality was assessed using the Mardia coefficient (< 8) [53]. The data did not significantly deviate from a normal distribution. Listwise deletion was used to handle missing data for CFA, as it was preferred over imputation due to the association of non-response with incomplete questionnaires. Statistical analysis was conducted using SPSS and AMOS version 26.0.

Results

A total of 400 caregivers of patients with chronic psychiatric disorders participated in this study. Among them, 183 caregivers (45.8%) were the patients' children and provided direct care for an average of 7.05 (SD = 13.05) hours per day. Of the patients, 210 (52.5%) were diagnosed with bipolar disorder type I, with an average illness duration of 10.16 (SD = 10.12) years. The majority of caregivers were female (54.0%) and married (83.0%). Additionally, 224 caregivers (56.0%) had only a primary education, and 156 caregivers (39.0%) were housewives. Regarding the patients, approximately two-thirds (65.5%)

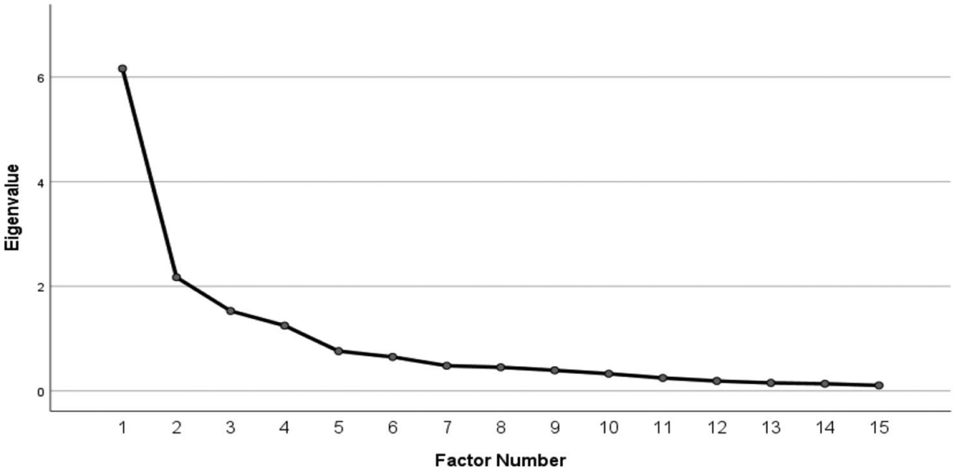

Fig. 1 Scree Plot for Exploratory Factor Analysis of the FAMQOL: Eigenvalues and Factor Retention

Table 1 Exploratory factors analysis of the Persian version of the FAMQOL (*N* = 200)

Facto	Indices						
	CR	AVE	MSV	MaxR (H)	α	Ω	ICC
Social	0.893	0.631	0.447	0.937	0.892	0.901	0.971
Spiritual	0.933	0.823	0.242	0.948	0.932	0.934	0.965
Psychological	0.820	0.535	0.447	0.834	0.816	0.817	0.953
Physical	0.808	0.603	0.216	0.894	0.783	0.861	0.953

Abbreviations: h^2: Item Communalities, λ: Eigenvalue

were male, and more than half (59.8%) were single. The majority of patients (64.3%) had primary school education as their highest level of schooling. The mean age of the caregivers was 48.29 (SD = 12.55) years, while the mean age of the patients was 38.33 (SD = 14.08) years.

Face and content validity

The results of face validity indicated that all items of the tool were deemed appropriate, clear, and important, with all scores exceeding 1.5. For qualitative content validity, some items were revised based on the suggestions of 12 experts. In terms of quantitative content validity, the CVR and CVI were calculated for each item. Item number 13, which had a CVR lower than the cut-off point of 0.56, was removed, reducing the number of scale items to 15. The S-CVI and S-CVR were obtained as 0.99 and 0.73, respectively.

Construct validity

In the MLEFA, the KMO value was 0.859, and Bartlett's test of sphericity yielded a value of Chi-square = 4027.694 ($P < 0.001$). Four factors were extracted based on eigenvalues greater than one and scree plot (Fig. 1). As shown in Table 1, these four factors collectively explained 61.74% of the total variance. None of the items were removed at this stage, as all had factor loadings greater than 0.3.

The CFA model (Fig. 2) findings confirmed all goodness-of-fit indices for the final model: χ^2 = 234.695; DF = 84, $P < 0.001$, CMIN/DF = 2.793, PCFI = 0.730, PNFI = 0.715, RMSEA = 0.068 (90% CI: 0.063, 0.075), IFI = 0.912, CFI = 0.912, GFI = 0.878, AGFI = 0.826, and PGFI = 0.615.

Convergent and discriminant validity

Since the AVE values for all factors were greater than 0.5, this indicates adequate convergent validity. Additionally, because the AVE values were higher than the MSV values, discriminant validity was confirmed for all subscales (Table 2). Also, the results of the Heterotrait-Monotrait (HTMT) ratio were below 0.85, indicating good discriminant validity for all factors.

Reliability

Cronbach's alpha, McDonald's omega, and the ICC for the four factors extracted from the FAMQOL were all evaluated at favorable levels (Table 2). The ICC for all items was calculated as 0.986. Additionally, CR values above 0.7 for all factors demonstrated appropriate reliability.

Discussion

Based on the results of this study the FAMQOL consists of four factors and 15 items. Consistent with these findings, the original version of the FAMQOL included 16 items and a four-factor structure comprising social, spiritual, physical, and psychological factors [31]. Additionally, the FAMQOL scale was validated in Turkey, where it revealed a three-factor structure (social, spiritual, and psychological) [34]. In Iran, a similar questionnaire designed to measure the quality of life for caregivers of patients with schizophrenia and affective disorders (SAC-QoL) included seven dimensions: emotional burden, managing patient symptoms, relationship with the therapeutic team, relationship with family, financial burden, relationship with extended family and friends, and latent worry [5]. Another scale introduced in Saudi Arabia to evaluate the quality of life and self-stigma in caregivers of patients with schizophrenia included 25 items and seven factors: psychological well-being, self-stigma, relationships with family and relatives, relationships with the psychiatric health team, physical health, psychological burden, and financial burden [33]. Additionally, the Schizophrenia Caregiver Quality of Life questionnaire (S-CGQoL), designed with 25 items and seven subscales, includes psychological and physical well-being, psychological burden and daily life, relationships with a spouse, relationships with the psychiatric team, relationships with friends, and material burden [32].

The first factor extracted in the Persian version of the FAMQOL was the Social factor, comprising five items. This factor primarily reflects the caregiving person's relationship with those around them and their involvement in various social activities, such as enjoyable, religious, and sports activities. It explained the highest percentage of caregivers' quality of life, highlighting its importance in shaping caregivers' overall quality of life. This factor corresponds to the social factor in the original version of

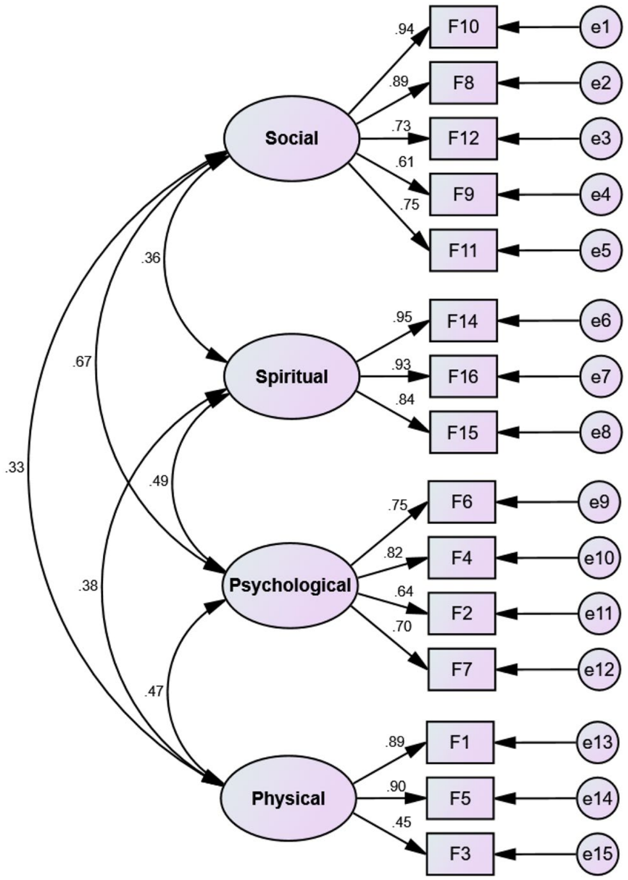

Fig. 2 The final model of the FAMQOL- Persian version ($N=200$). The mean of FAMQOL was 51.18 (SD = 11.69)

Table 2 Convergent and discriminant validity, and reliability of the FAMQOL-Persian version

Factors	Qn. Item	Factor loading	h^2	λ	%Variance
Social	**10.** Even though I am a caregiver, I can participate in enjoyable activities.	0.958	0.901	3.04	20.28
	8. Even though I am a caregiver, I can still exercise as much as I want.	0.833	0.791		
	12. Even though I am a caregiver, I can do religious activities if I want to.	0.804	0.575		
	9. Even though I am a caregiver, I can be check by doctors, dentists, and other health care providers.	0.631	0.395		
	11. Although I am a caregiver, I can maintain personal relationships with others.	0.621	0.584		
Spiritual	**14.** Providing care to my patient increases my sense of inner strength.	0.944	0.890	2.49	16.63
	16. Providing care to my patient gives meaning to my life.	0.928	0.885		
	15. Providing care to my patient gives me inner peace.	0.861	0.818		
Psychological	**6.** As a caregiver, I am emotionally strained.	0.797	0.582	2.00	13.35
	4. As a caregiver, I am tired.	0.768	0.687		
	2. As a caregiver, I feel overwhelmed.	0.689	0.438		
	7. As a caregiver, I am socially isolated.	0.550	0.523		
Physical	**1.** As a caregiver, I think I get sick more often.	0.886	0.822	1.72	11.48
	5. As a caregiver, my physical health has suffered.	0.848	0.789		
	3. As a caregiver, I feel selfish when I consider my own needs.	0.466	0.210		

Abbreviations: FAMQOL: Family Caregiver-Specific Quality of Life Scale; CR: Composite Reliability; AVE: Average Variance Extracted; MSV: Maximum Shared Squared Variance; α: Cronbach's alpha; Ω: McDonald's omega; ICC: Intraclass Correlation Coefficients the scale [31]. Similarly, the Turkish version of FAMQOL introduced a latent factor called social well-being, which aligns with the current factor [34]. A review of 30 quality of life scales indicates that the social dimension is a crucial component in measuring quality of life [54]. This factor underscores that families of patients with chronic psychiatric disorders benefit from support and interaction with others, which helps them manage their daily lives during caregiving. Thus, social health is a significant component of quality of life [55]. Previous research also identified two dimensions in the SAC-QoL: relationship with family and relationship with extended family and friends, consistent with the current study's findings [5]. Supporting these findings, a study by Richieri et al. (2011) in France developed a 25-item quality of life scale for caregivers of patients with schizophrenia, revealing seven factors. Four of these factors—Relationships with Spouse, Relationships with Psychiatric Team, Relationships with Family, and Relationships with Friends—are related to the social aspect of caregivers' lives [32]. Social health is a key predictor of quality of life for family caregivers of patients with chronic psychiatric disorders. It encompasses the strength and quality of social support networks, including emotional, practical, and informational support. Caregivers with robust social connections experience reduced feelings of isolation, improved emotional well-being, and greater resilience against stress and caregiving burdens [56, 57]. Access to support groups and community resources provides caregivers with essential knowledge and assistance, enhancing their ability to manage caregiving responsibilities. Consequently, strong social health not only alleviates the physical and emotional burdens of caregiving but also fosters a sense of belonging and purpose, leading to significant improvements in quality of life [58, 59].

The second factor extracted in the current version of the scale was the Spiritual factor, consisting of three items. This factor primarily focuses on enhancing the caregiver's sense of strength and inner peace, as well as imbuing their life with meaning through the act of caring for the patient. In the original version of this scale, a similar factor was identified, which corresponds to the Spiritual factor found in the Persian version [31]. Similarly, the current factor aligns with the Spiritual Well-Being factor in the Turkish version of FAMQOL [34]. A comparable scale developed for family caregivers of cancer patients in Taiwan also identified a factor equivalent to the one in this study, measuring the spiritual dimension as part of caregivers' overall quality of life [60]. It is important to recognize that, when classifying different types of health, spiritual health is considered a significant component of quality of life. Spiritual well-being is viewed as a crucial aspect of quality of life, distinct yet related to the traditional domains of physical, mental, and social health [61]. In healthcare settings or among patients with serious illnesses, spiritual well-being can provide a sense of hope and peace, even amidst severe health challenges [62, 63].

The third factor identified was Psychological Health, comprising four items. This factor generally addresses aspects such as emotional burden, confusion, social isolation, and psychological stress. It corresponds to the Psychological factor in the original version of FAMQOL [31]. Similarly, in a study evaluating the psychometrics of the Turkish version of FAMQOL, the second factor identified was termed Psychological Well-Being [34]. However, consistent with the current findings, a dimension titled Psychological Well-Being was included in a quality of life scale for caregivers of patients with schizophrenia in Saudi Arabia [33]. Additionally, Psychological Health is one of the subscales of the 26-question WHOQOL-BREF instrument [64]. Psychological Health is a crucial component in determining the quality of life for caregivers. The World Health Organization defines quality of life as a multidimensional construct encompassing mental, physical, and social health areas [65]. Traditionally, psychological well-being has been considered as the absence of psychiatric illness. However, subjective quality of life encompasses a broader construct, reflecting general and self-perceived satisfaction with significant life domains such as work, friendships, leisure, creativity, and opportunities for learning [66].

Finally, the last factor identified by MLEFA is called Physical, comprising three items. This factor highlights aspects such as illness, physical health deterioration, and the caregiver's personal physical needs amid patient care. Like the previously identified factors, this one corresponds to the Physical Well-Being factor in the original version of FAMQOL [31]. Similar factors have been observed in scales measuring the quality of life of caregivers for patients with schizophrenia in previous studies [32, 33]. Consistent with these findings, physical health was identified as one of the factors in the Quality of Life Inventory-Disability, a tool designed to measure the quality of life of primary caregivers of children with intellectual disabilities [67]. Additionally, the dimension of physical health appears in the 26-question World Health Organization Quality of Life Tool (WHOQOL-BREF) [64]. Family caregivers often face a higher risk of depression and anxiety, which can lead to physical health issues due to the demands of caregiving. Consequently, the quality of life from their perspective typically encompasses both physical and mental dimensions [68]. Various factors influence the physical dimension of caregivers' quality of life, including chronic physical complications, psychological distress, and educational status [69].

Based on the results of the current study, all fit indices in the CFA were within the acceptable range, indicating a good fit of the model with the data. This finding aligns with results from a previous study, which showed that the three-factor model obtained in the Turkish version of FAMQOL also had an acceptable fit [34]. The original FAMQOL scale and its Brazilian version were not evaluated through CFA [31, 35]. Furthermore, CFA was not used in earlier studies focused on the development or validation of tools measuring the quality of life of caregivers of patients with schizophrenia [5, 21, 32], highlighting the strength of the present study. In a similar study in the field of cancer, the validation of the Caregiver Quality of Life Index-Cancer (CQOLC) in caregivers of cancer patients in China also indicated a good fit of the model through CFA [70]. Similarly, another study by Cheung et al. (2019) found that their instrument model fit well with five factors (physical well-being, mental well-being, experience & meaning, impact on daily living, and financial well-being) [71].

According to the results of the present study, the FAMQOL items in the final model demonstrated good convergent and discriminant validity. The original version of FAMQOL was also assessed in this regard. Specifically, the total score and the scores of each subscale of the original FAMQOL were analyzed separately in a regression model. Similarly, the mean score of the physical well-being subscale showed a significant inverse relationship with depression symptoms and caregiving task difficulty. The psychological well-being subscale exhibited a negative and significant relationship with caregiving task difficulty, threat appraisal, and depression symptoms. Additionally, a significant inverse relationship was observed between the social well-being subscale scores and social support, uncertainty, and caregiving task difficulty. Finally, the scores of the spiritual well-being subscale had a significant and inverse relationship with threat appraisal. These findings indicate the presence of discriminant validity in the psychological, spiritual, and physical health subscales, and both convergent and discriminant validity in the social well-being factor [31]. Furthermore, the score of the Turkish version of FAMQOL showed a significant and direct relationship with the general health and mental health subscales of the SF-36. Similarly, the psychological and social well-being subscales also had a positive and significant correlation with the general health and mental health subscales of the SF-36, aligning with the current findings [34]. Additionally, the QLSSoSPC and SAC-QoL indices were significantly correlated with all dimensions of the WHOQoL-BREF [5, 33]. While these results are consistent with the current study, none of the previous studies employed the Fornell and Larcker approach, which was used to determine the psychometrics of the Persian version of FAMQOL. The Brazilian version of FAMQOL was also not evaluated in terms of convergent or discriminant validity [35].

In the current study, Cronbach's alpha and McDonald's omega coefficients for all factors were above 0.7, indicating desirable internal consistency for the Persian version of FAMQOL. Additionally, CFA revealed that the composite reliability (CR) was above 0.7 for all factors, demonstrating good reliability. A key advantage of CR is that it is not influenced by the number of scale items or sample size [72]. Consistent with these findings, the original version of FAMQOL also exhibited acceptable reliability, with Cronbach's alpha coefficients for its subscales ranging from 0.80 to 0.91 [31]. Similarly, the internal consistency of the Turkish version of FAMQOL was reported as favorable (above 0.7) through Cronbach's alpha, aligning with the current study's results [34]. Comparable subscales for measuring the quality of life of caregivers in the context of schizophrenia also demonstrated acceptable reliability [5, 21, 32, 33]. While previous studies primarily reported Cronbach's alpha coefficients, this study's inclusion of McDonald's Omega and CR coefficients, in addition to Cronbach's alpha, represents a notable strength of the present research.

The results indicated that the Persian version of the FAMQOL exhibits acceptable stability based on the ICC. The stability of the original FAMQOL version was reported as ranging from 0.70 to 0.76 for all subscales and 0.83 for the entire scale, which aligns with the current study's findings [31]. Similarly, the stability of the Turkish version of FAMQOL was reported as between 0.86 and 0.93 for the subscales and 0.91 for the overall scale, reflecting an acceptable level of stability [34]. Additionally, the results of other studies showed that similar tools also demonstrated acceptable coefficients for measurement stability [73–75].

Following the removal of the 13th item from the Persian version of the FAMQOL, the scale now comprises 15 items. The total score ranges from 15 to 75, with higher scores reflecting better quality of life for caregivers. The Persian version of the FAMQOL is structured into four factors: social (5 items; score range: 5–25), spiritual (3 items; score range: 3–15), psychological (4 items; score range: 4–20), and physical (3 items; score range: 3–15).

The current study has some limitations. As caregivers completed the scale via self-report, there is a potential for response bias. Additionally, since the validation of FAMQOL was conducted within the Iranian context and culture, its findings may not be generalizable to other settings. Future studies are encouraged to conduct psychometric validations of this scale in other languages.

Conclusions

The results of this study indicate that the FAMQOL scale for family caregivers of patients with chronic psychiatric disorders comprises 15 items grouped into four factors, accounting for more than half of the variance in caregivers' quality of life. The scale exhibits robust validity, reliability, and stability, establishing it as an effective tool for evaluating and improving the quality of life in this population.

Clinical implications

The Persian version of FAMQOL serves as a valid tool for evaluating the quality of life among family caregivers of individuals with chronic psychiatric disorders. By addressing its four dimensions (social, spiritual, psychological, and physical well-being) the scale identifies critical areas for intervention. Healthcare professionals can leverage this tool to assess caregivers' needs and develop targeted support programs, including counseling, social support networks, and health promotion strategies, aimed at easing caregiving burdens.

Abbreviations

CVR	Content validity ratio
CVI	Content validity index
EFA	Exploratory factor analysis
CFA	Confirmatory factor analysis
MLEFA	Maximum Likelihood Exploratory Factor Analysis
KMO	Kaiser-Meyer-Olkin; RMSEA: Root Mean Square of Error of Approximation
CFI	Comparative Fit Index
GFI	Goodness of Fit Index
AGFI	Adjusted Goodness of Fit Index
RFI	Relative Fit Index
PNFI	Parsimonious Normed Fit Index
IFI	Incremental Fit Index
ICC	Intra-class correlation coefficient
PCFI	Parsimony Comparative Fit Index
AVE	Average Extracted Variance
MSV	Maximum Shared Squared Variance
CR	Composite Reliability
NFI	Normed Fit Index
COPE	Committee on Publication Ethics
S-CVI	Scale Content Validity Index
S-CVR	Scale Content Validity Ratio
FAMQOL	Family Caregiver-Specific Quality of Life Scale
Pc	Probability of chance agreement
SAC-QoL	Quality of life for caregivers of patients with schizophrenia and affective disorders
S-CGQoL	Schizophrenia Caregiver Quality of Life questionnaire
CQOLC	Caregiver Quality of Life Index-Cancer
QLSSoSPC	Quality of Life and Self-Stigma of Schizophrenia Patient's Caregiver

Acknowledgements

This study has been approved and registered with the code 14020049 at Shahroud University of Medical Sciences. The authors would like to express their gratitude to all the caregivers and their patients who participated in this research.

Author contributions

Study design: S. M., H. S., M. K., A. A.; Data collection: S. M., F. M., S. MM., Data analysis: S. M., H. S., Study supervision: S. M., A. A.; Manuscript writing: All authors (S. M., F. M., H. S., S. MM., M. K., A. A., H. E.). All authors have read and approved the final manuscript.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data availability

The dataset(s) supporting the conclusions of this article is(are) included within the article (and its additional file(s)).

Declarations

Ethical approval and consent to participate

The Ethics Council in Biomedical Research at Shahroud University of Medical Sciences approved this study (IR.SHMU.REC.1402.135). Participants were thoroughly briefed on the study's objectives and their participation conditions at the outset of the research. The authors followed the guidelines established by the Committee on Publication Ethics (COPE) when sharing their findings. Written informed consent was obtained from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Department of Nursing, School of Nursing and Midwifery, Shahroud University of Medical Sciences, Shahroud, Iran
[2]Student Research Committee, School of Nursing and Midwifery, Shahroud University of Medical Sciences, Shahroud, Iran
[3]Psychosomatic Research Center, Mazandaran University of Medical Sciences, Sari, Iran
[4]Department of Nursing, Amol Faculty of Nursing and Midwifery, Mazandaran University of Medical Sciences, Sari, Iran
[5]Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
[6]Center for Health Related Social and Behavioral Sciences Research, Shahroud University of Medical Sciences, Shahroud, Iran

Received: 8 August 2024 / Accepted: 21 February 2025

References

1. Solmi M, Radua J, Olivola M, Croce E, Soardo L, Salazar de Pablo G, et al. Age at onset of mental disorders worldwide: large-scale meta-analysis of 192 epidemiological studies. Mol Psychiatry. 2022;27(1):281–95.
2. Collaborators GMD. Global, regional, and National burden of 12 mental disorders in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. Lancet Psychiatry. 2022;9(2):137–50.
3. Steel Z, Marnane C, Iranpour C, Chey T, Jackson JW, Patel V, Silove D. The global prevalence of common mental disorders: a systematic review and meta-analysis 1980–2013. Int J Epidemiol. 2014;43(2):476–93.
4. Mirghaed MT, Gorji HA, Panahi S. Prevalence of psychiatric disorders in Iran: a systematic review and meta-analysis. Int J Prev Med. 2020;11(1):21.
5. Soltaninejad A, von Kardorff E, Kamali M, Shahrbabaki ME. Development and validation of a questionnaire to measure quality of life in caregivers of patients with schizophrenia and affective disorders (SAC-QoL). Iran J Psychiatry Behav Sci. 2017;11(2).
6. Ntsayagae EI, Myburgh C, Poggenpoel M. Experiences of family caregivers of persons living with mental illness: A meta-synthesis. Curationis. 2019;42(1):1–9.
7. Hosseini SH. The well-living paradigm: reimagining quality of life in our turbulent world. Discover Global Soc. 2023;1(1):19.
8. Allirani H, Dumka A, Verma A. A framework for assessment of pedestrianization impacts on quality of life: combining subjective and objective measures. Cities. 2024;145:104688.
9. Owen R, Berry K, Brown LJ. Enhancing older adults' well-being and quality of life through purposeful activity: A systematic review of intervention studies. Gerontologist. 2022;62(6):e317–27.
10. Gkinton E, Telonis G, Halkiopoulos C, Boutsinas B, editors. Quality of life and health tourism: A conceptual roadmap of enhancing cognition and well-being. International Conference of the International Association of Cultural and Digital Tourism; 2022: Springer.

11. Jeyagurunathan A, Sagayadevan V, Abdin E, Zhang Y, Chang S, Shafie S, et al. Psychological status and quality of life among primary caregivers of individuals with mental illness: a hospital based study. Health Qual Life Outcomes. 2017;15:1–14.
12. Ndikuno C, Namutebi M, Kuteesa J, Mukunya D, Olwit C. Quality of life of caregivers of patients diagnosed with severe mental illness at the National referral hospitals in Uganda. BMC Psychiatry. 2016;16:1–9.
13. Ribé JM, Salamero M, Pérez-Testor C, Mercadal J, Aguilera C, Cleris M. Quality of life in family caregivers of schizophrenia patients in Spain: caregiver characteristics, caregiving burden, family functioning, and social and professional support. Int J Psychiatry Clin Pract. 2018;22(1):25–33.
14. Karaçar Y, Bademli K. Relationship between perceived social support and self stigma in caregivers of patients with schizophrenia. Int J Soc Psychiatry. 2022;68(3):670–80.
15. EghbalManesh A, Dalvandi A, Zoladl M. The experience of stigma in family caregivers of people with schizophrenia spectrum disorders: A meta-synthesis study. Heliyon. 2023;9(3).
16. Serrao R, Mathias T, Shivakumara J. Stigma and discrimination of family care giver's (FCG)-A barrier in mental illness: scoping review. Asian J Nurs Educ Res. 2023;13(4):312–6.
17. Prasad F, Hahn MK, Chintoh AF, Remington G, Foussias G, Rotenberg M, Agarwal SM. Depression in caregivers of patients with schizophrenia: a scoping review. Soc Psychiatry Psychiatr Epidemiol. 2024;59(1):1–23.
18. Mohamed RS, Mahmoud NZ, Mahmoud DAM, Eissa MF, Zohdy YW, Hafez YSR. Coping strategies and burden stress in caregivers of patients with schizophrenia and patients with bipolar disorder. Middle East Curr Psychiatry. 2023;30(1):102.
19. Bademli K, Lök N, Çinkılıç D. The effect of a psychoeducational intervention on mental health and anxiety in family caregivers of inpatient patients with schizophrenia: A randomized controlled trial. Curr Psychol. 2023;42(31):26989–95.
20. Guan Z, Wang Y, Lam L, Cross W, Wiley JA, Huang C, et al. Severity of illness and distress in caregivers of patients with schizophrenia: do internalized stigma and caregiving burden mediate the relationship? J Adv Nurs. 2021;77(3):1258–70.
21. Caqueo-Urízar A, Urzúa A, Mena-Chamorro P, Boucekine M, Richieri R, Auquier P, et al. Cross-cultural adaptation and validation of the quality of life questionnaire for caregivers of patients with schizophrenia (S-CGQoL) in Latin America. L'encephale. 2021;47(4):291–8.
22. Estrada-Fernández ME, Gil-Lacruz M, Gil-Lacruz AI, Viñas-López A. The impact of community care: burden and quality of life of the informal caregivers of patients with severe mental disorder. J Community Psychol. 2022;50(1):487–501.
23. Di Lorito C, Bosco A, Godfrey M, Dunlop M, Lock J, Pollock K, et al. Mixed-methods study on caregiver strain, quality of life, and perceived health. J Alzheimers Dis. 2021;80(2):799–811.
24. Reed M, Reaume SV, Ferro MA. Psychometric properties of the short Form-36 (SF-36) in parents of children with mental illness. Psych. 2022;4(2):247–57.
25. McLeese RH, Spinou A, Alfahl Z, Tsagris M, Elborn JS, Chalmers JD et al. Psychometrics of health-related quality of life questionnaires in bronchiectasis: a systematic review and meta-analysis. Eur Respir J. 2021;58(5).
26. Kumar V, Malhotra V, Sinha V. Evaluation of individual quality of life (QOL) among patients with tracheostomy using WHO-QOL BREF questionnaire. Indian J Otolaryngol Head Neck Surg. 2022;74(Suppl 3):5207–16.
27. Pucciarelli G, Årestedt K, Simeone S, Bolgeo T, Alvaro R, Vellone E. Psychometric characteristics of the WHOQOL-SRPB scale in a population of stroke survivors and caregivers. Qual Life Res. 2020;29:1973–85.
28. Weitzner MA, Jacobsen P, Wagner H, Friedland J, Cox C. The caregiver quality of life Index–Cancer (CQOLC) scale: development and validation of an instrument to measure quality of life of the family caregiver of patients with cancer. Qual Life Res. 1999;8:55–63.
29. Minaya P, Baumstarck K, Berbis J, Goncalves A, Barlesi F, Michel G, et al. The caregiver oncology quality of life questionnaire (CarGOQoL): development and validation of an instrument to measure the quality of life of the caregivers of patients with cancer. Eur J Cancer. 2012;48(6):904–11.
30. Boling W, Macrina DM, Clancy JP. The caregiver quality of life cystic fibrosis (CQOLCF) scale: modification and validation of an instrument to measure quality of life in cystic fibrosis family caregivers. Qual Life Res. 2003;12:1119–26.
31. Nauser JA, Bakas T, Welch JL. A new instrument to measure quality of life of heart failure family caregivers. J Cardiovasc Nurs. 2011;26(1):53–64.
32. Richieri R, Boyer L, Reine G, Loundou A, Auquier P, Lancon C, Simeoni M. The schizophrenia caregiver quality of life questionnaire (S-CGQoL): development and validation of an instrument to measure quality of life of caregivers of individuals with schizophrenia. Schizophr Res. 2011;126(1–3):192–201.
33. Albikawi Z, Abuadas M. Quality of life and self-stigma of schizophrenia patient's caregiver tool: development and validation using classical test theory and Rasch analysis. South Afr J Psychiatry. 2021;27.
34. Dülgeroğlu C, Gürkan A. Reliability and validity of family caregiver quality of life scale in heart failure. Turkish J Thorac Cardiovasc Surg. 2018;26(1):73.
35. Vieira GCA, Cavalcanti ACD, da Silva SA, Guimarães TCF, Rosa MLG, da Silva VA. Brazilian transcultural adaptation of the family caregiver-specific quality of life scale: a methodological study. Online Brazilian J Nurs. 2014;13(1):53–61.
36. Mirhosseini S, Hosseini Nezhad FS, Haji Mohammad Rahim A, Basirinezhad MH, Bakhshiarab A, Saeedi M, Ebrahimi H. Care burden and the predictive role of spiritual well-being and religious coping: A cross sectional study among Iranian family caregivers of patients with stroke. Health Sci Rep. 2024;7(6):e2155.
37. Akbari M, Alavi M, Irajpour A, Maghsoudi J. Challenges of family caregivers of patients with mental disorders in Iran: A narrative review. Iran J Nurs Midwifery Res. 2018;23(5):329–37.
38. Watkins MW. Exploratory factor analysis: A guide to best practice. J Black Psychol. 2018;44(3):219–46.
39. MacCallum RC, Widaman KF, Zhang S, Hong S. Sample size in factor analysis. Psychol Methods. 1999;4(1):84–99.
40. Mirhosseini S, Parsa FI, Gharehbaghi M, Minaei-Moghadam S, Basirinezhad MH, Ebrahimi H. Care burden and associated factors among caregivers of patients with bipolar type I disorder. BMC Prim Care. 2024;25(1):321.
41. Gudmundsson E. Guidelines for translating and adapting psychological instruments. Nordic Psychol. 2009;61(2):29–45.
42. Rust J, Golombok S. Modern psychometrics: the science of psychological assessment. Routledge; 2014.
43. Rahmatpour P, Peyrovi H, Sharif Nia H. Development and psychometric evaluation of postgraduate nursing student academic satisfaction scale. Nurs Open. 2021;8(3):1145–56.
44. Ayre C, Scally AJ. Critical values for Lawshe's content validity ratio: revisiting the original methods of calculation. Meas Evaluation Couns Dev. 2014;47(1):79–86.
45. Sharif Nia H, Sivarajan Froelicher E, Hosseini L, Ashghali Farahani M, Hejazi S. Development and validation of the care challenge scale in family caregivers of people with Alzheimer's disease. Front Public Health. 2022;10:921858.
46. Bahrami N, Yaghoobzadeh A, Sharif Nia H, Soliemani M, Haghdoost A. Psychometric properties of the Persian version of Larson's sexual satisfaction questionnaire in a sample of Iranian infertile couples. 2016.
47. Sharif-Nia H, She L, Osborne J, Gorgulu O, Fomani FK, Goudarzian AH. Statistical concerns, invalid construct validity, and future recommendations. Nurs Pract Today. 2024;11(1):16–21.
48. Hosseini L, Sharif Nia H, Ashghali Farahani M. Development and psychometric evaluation of family caregivers' hardiness scale: a sequential-exploratory mixed-method study. Front Psychol. 2022;13:807049.
49. She L, Pahlevan Sharif S, Sharif Nia HS. Psychometric evaluation of the Chinese version of the modified online compulsive buying scale among Chinese young consumers. J Asia-Pac Bus. 2021;22(2):121–33.
50. Henseler J, Ringle C, Sarstedt M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. J Acad Mark Sci. 2015;43:115–35.
51. Sharif Nia H, Haghdoost AA, Ebadi A, Soleimani MA, Yaghoobzadeh A, Abbaszadeh A, et al. Psychometric properties of the King spiritual intelligence questionnaire (KSIQ) in physical veterans of Iran-Iraq warfare. J Military Med. 2015;17(3):145–53.
52. Sharif Nia H, Pahlevan Sharif S, Boyle C, Yaghoobzadeh A, Tahmasbi B, Rassool GH, et al. The factor structure of the spiritual well-being scale in veterans experienced chemical weapon exposure. J Relig Health. 2018;57:596–608.
53. Sharif Nia H, Pahlevan Sharif S, Koocher GP, Yaghoobzadeh A, Haghdoost AA, Mar Win MT, Soleimani MA. Psychometric properties of the death anxiety scale-extended among patients with end-stage renal disease. OMEGA-Journal Death Dying. 2020;80(3):380–96.
54. Palamenghi L, Carlucci MM, Graffigna G. Measuring the quality of life in diabetic patients: a scoping review. J Diabetes Res. 2020;2020(1):5419298.
55. Akranavičiūtė D, Ruževičius J. Quality of life and its components' measurement. Eng Econ. 2007;52(2).
56. Zhang B, Conner KO, Meng H, Tu N, Liu D, Chen Y. Social support and quality of life among rural family caregivers of persons with severe mental illness in

Sichuan Province, China: mediating roles of care burden and loneliness. Qual Life Res. 2021;30:1881–90.

57. Wang R, Liu Q, Zhang W. Coping, social support, and family quality of life for caregivers of individuals with autism: Meta-analytic structural equation modeling. Pers Indiv Differ. 2022;186:111351.
58. Bernabéu-Álvarez C, Lima-Rodríguez JS, Lima-Serrano M. Effect of support groups on caregiver's quality of life. Fam Process. 2022;61(2):643–58.
59. Hsiao C-Y, Lu H-L, Tsai Y-F. Caregiver burden and health-related quality of life among primary family caregivers of individuals with schizophrenia: a cross-sectional study. Qual Life Res. 2020;29(10):2745–57.
60. Tang W-R, Tang S-T, Kao C-Y. Psychometric testing of the caregiver quality of life Index-Cancer on a Taiwanese family caregiver sample. Cancer Nurs. 2009;32(3):220–9.
61. Bredle JM, Salsman JM, Debb SM, Arnold BJ, Cella D. Spiritual well-being as a component of health-related quality of life: the functional assessment of chronic illness therapy—spiritual well-being scale (FACIT-Sp). Religions. 2011;2(1):77–94.
62. Fitchett G, Canada AL. The role of religion/spirituality in coping with cancer: Evidence, assessment, and intervention. Psycho-oncology, 2nd edition edn Edited by JC Holland WSB, PB Jacobson, MS Lederberg, MJ Loscalzo, & R McCorkle New York: Oxford University Press. 2010:440– 46.
63. Yilmaz M, Cengiz HÖ. The relationship between spiritual well-being and quality of life in cancer survivors. Palliat Support Care. 2020;18(1):55–62.
64. Group W. Development of the world health organization WHOQOL-BREF quality of life assessment. Psychol Med. 1998;28(3):551–8.
65. Group W. The world health organization quality of life assessment (WHOQOL): position paper from the world health organization. Soc Sci Med. 1995;41(10):1403–9.
66. Katschnig H. Quality of life in mental disorders: challenges for research and clinical practice. World Psychiatry. 2006;5(3):139.
67. Downs J, Jacoby P, Leonard H, Epstein A, Murphy N, Davis E, et al. Psychometric properties of the quality of life Inventory-Disability (QI-Disability) measure. Qual Life Res. 2019;28:783–94.
68. Schulz R, Martire LM. Family caregiving of persons with dementia: prevalence, health effects, and support strategies. Am J Geriatric Psychiatry. 2004;12(3):240–9.
69. Sambasivam R, Liu J, Vaingankar JA, Ong HL, Tan ME, Fauziana R, et al. The hidden patient: chronic physical morbidity, psychological distress, and quality of life in caregivers of older adults. Psychogeriatrics. 2019;19(1):65–72.
70. Duan J, Fu J, Gao H, Chen C, Fu J, Shi X, Liu X. Factor analysis of the caregiver quality of life Index-Cancer (CQOLC) scale for Chinese cancer caregivers: a preliminary reliability and validity study of the CQOLC-Chinese version. PLoS ONE. 2015;10(2):e0116438.
71. Cheung YB, Neo SH, Teo I, Yang GM, Lee GL, Thumboo J, et al. Development and evaluation of a quality of life measurement scale in english and Chinese for family caregivers of patients with advanced cancers. Health Qual Life Outcomes. 2019;17:1–12.
72. Vinzi VE, Chin WW, Henseler J, Wang H. Handbook of partial least squares: Springer; 2010.
73. Parpa E, Katsantonis N, Tsilika E, Galanos A, Sassari M, Mystakidou K. Psychometric properties of the family quality of life scale in Greek families with intellectual disabilities. J Dev Phys Disabil. 2016;28:393–405.
74. Fereidouni A, Ebadi A, Rassouli M, Hosseini SM, Mollahadi M, Khorshidvand A, et al. Psychometric properties of the quality of life in life-threatening illness—family carer version(QOLLTI-F) in Persian-speaking carers of COVID-19 patients. Front Psychol. 2022;13:838074.
75. Mei Y, Lin B, Li Y, Ding C, Zhang Z. Validity and reliability of Chinese version of adult carer quality of life questionnaire (AC-QoL) in family caregivers of stroke survivors. PLoS ONE. 2017;12(11):e0186680.

Publisher's note