# Psychometric Validation and Setting Cutoff Point for Persian Version of World Health Organization Quality of Life-Old Questionnaire

Leila Ghahremani, PhD[1], Mahin Nazari, PhD[1],
Farzane Bahadori, PhD Student[2], Mahsa Yarelahi, PhD Student[2],
Firoozeh Abbasi, Msc[1], and Masoud Karimi, PhD[1] (iD)

## Abstract

Health professionals assume the quality of life (QOL) as a main outcome of health care activities, especially in the elderly. Thus, they need valid tools for evaluating the effectiveness of their interventions. This study aimed to investigate the psychometric properties of the Persian version of the World Health Organization quality of life-old questionnaire (WHOQOL-OLD). The questionnaire was translated into Persian by standard translate/back-translate procedure. The Cronbach's alpha and intra-class correlation (ICC) coefficients were estimated to assess the internal validity and reliability. Confirmatory factor analyses (CFA) in a sample of 300 Persian-speaking elderly in Shiraz, Iran, were used for construct validity assessment. ROC curve analysis was used to determine the cutoff point for poor or good QOL. All the analyses were conducted using SPSS 24 and IBM AMOS 24. The internal consistency and reliability indices of the Persian version of WHOQOL-OLD were acceptable (Cronbach's alpha: 0.66–0.95; ICC: 0.71–0.91). CFA confirmed the WHOQOL-OLD six-domain structure (CMIN/$df$ = 3.12, $p$ < .001; CFI = 0.93; NFI = 0.89; RMSEA = 0.08). The ROC curve indicated 71.5 as the best cutoff point, with a sensitivity of 82.3% and specificity of 61.8%. The Persian version of the WHOQOL-OLD is valid and can be used for investigating the QOL in Persian-speaking elderly.

## Keywords

WHO-QOL, older adults, validity, Persian

**Manuscript received:** February 11, 2023; **final revision received:** June 13, 2023; **accepted:** June 15, 2023.

## Introduction

Improving living conditions and increasing life expectancy have led to the aging population as a demographic transition phenomenon in recent decades (United Nations, Department of Economic and Social Affairs, Population Division, 2015). The worldwide population of the elderly aged 65 and over in 2019 was 703 million, which is expected to increase to 1.5 billion by 2050 (United Nations, Department of Economic and Social Affairs, Population Division, 2019). According to the 2016 census, the elderly aged 65 and over comprised 9.3% of the total population in Iran; it is predicted that it will increase to more than16% in 2050 (Iran, 2019).

As life expectancy increases, health status, psychosocial satisfaction, and quality of life of the elderly will be of great importance (Seif, 2021). The importance of quality of life is such that health professionals have considered the focus of health care in the present century on improving the quality of life (Melo, 2018). World Health Organization defines quality of life as "an individual's perception of his/her position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns." Therefore, this concept is completely individual and is based on peoples' perceptions of different aspects of their lives (WHOQOL Group, 1995)

Given the importance of the quality of life in old age, in order to evaluate the impact of health promotion interventions on the quality of life of the elderly,

[1]Shiraz University of Medical Sciences, Shiraz, Iran
[2]University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

**Corresponding Author:**
Masoud Karimi, Research Center for Health Sciences, Institute of Health, Department of Health Promotion, School of Health, Shiraz University of Medical Sciences, Al-Zahra Street, Shiraz 14336 - 71348, Iran.
Email: karimeim@sums.ac.ir

it is necessary to develop valid and reliable tools for assessing quality of life as an outcome of health promotion interventions (Ashley, 2001; Kazemi, 2019; Pequeno, 2020).

So far, several tools have been designed to assess and measure the quality of life, some of the most widely used of which are SF-36, CASp-19, GHQ, EuroQol, WHO-QOL100, and WHO-QOL BREF (Ardian, 2014; Pequeno, 2020). However, one of the most important questions in the general assessment of the quality of life is whether the questionnaires used in the young and middle-aged population are equally valid and usable for the elderly population. Some studies found that commonly used tools such as SF-36 and EuroQol to assess the quality of life of the elderly had relatively satisfactory results but also posed challenges. The most important challenges are how to complete the questionnaire and how consistency in the answers can be provided, not paying attention to some important aspects in the quality of life of the elderly such as spirituality and environmental factors and the number of questions (Conrad et al., 2014; Brazier, 1996). One of the factors affecting the quality of studies are the number of questions in the questionnaire. Filling out long questionnaires is difficult for the elderly with sensory and physical problems. Also, due to the long time needed for answering the questions, it can cause fatigue and reduce the quality of answers. Thus, a brief tool which could be easily used in day care or in large population-based studies is needed (Fang, 2012).

Therefore, the World Health Organization Quality of Life Group designed and presented a special scale called the WHOQOL-OLD brief for the elderly with 24 questions that examine the six dimensions of sensory abilities; autonomy; past, present, and future activities; social participation; death and dying; and intimacy (Fang, 2012; Power, 2005). The WHO-QOL-OLD Questionnaire is a tool that measures quality of life exclusively in the elderly age group and, compared to other quality of life instruments, has two important components of fear about death and the ability to have intimate relationships with others, which are the strengths of this instrument (Fang, 2012).

The psychometric properties of WHOQOL-Old Questionnaire have been approved in different languages such as in Brazil, Germany, and Portugal (Chachamovich, 2008; Conrad et al., 2014; Fleck, 2006). The Persian version of this questionnaire have previously been validated in two studies in Iran (Rasafiani, 2020; Rezaeipandari, 2020). However, these studies had some limitation such as recruiting only elder people with at least one diagnosed chronic disease in the study of Rezaeipandari et al. (2020) in Yazd, Iran or not reporting the health status of participants in the study of Rasafiani et al. (2020) in Tehran, Iran. On the other hand, none of these studies has estimated a cutoff point for quality of life in the elderly. In addition, Iran is a multi-cultural and multiethnic country and more studies should be conducted in other Iranian socio-cultural contexts. Therefore, this study aimed to investigate the psychometric properties and suggest cutoff points of the Persian version of WHOQOL OLD in the elderly in Shiraz, Fars province, Iran.

## Methods

This cross-sectional study was conducted in Shiraz, Iran (2021). Based on the suggestions of Tinsley and Kass (1979) who consider 5 to 10 participants for every item, as a suitable sample size for factor analysis (with a maximum of 300 participants), totally 300 elderly people were considered as the proper sample size for this study. The subjects were selected through multistage random sampling method; at first, 10 urban comprehensive health centers were randomly selected from a total of 30 centers; then, in each center 30 elderly who met the inclusion criteria were selected through systematic random sampling. Because of the importance of sex in the quality of life, especially in Iranian culture, the samples were stratified by sex, and equal proportion of males and females were recruited for the study.

The subjects who were over 60 years old men and women, had received primary health care services in Shiraz urban comprehensive health centers, had the ability to communicate verbally, spoke in the Persian language, were willing to participate in the study, and had no cognitive impairments (getting score 7 and higher in Abbreviated Mental Test) were included in the study; those who did not respond to all items of questionnaires were excluded.

Data were collected by four health care professional who had MSc degree in geriatric health, through face-to-face interview. Data collection tools consisted of a sociodemographic information form (age, sex, education level, marital status, having chronic diseases, and cigarette or hookah smoking), two questionnaires which assessed the quality of life in old age including CASP-19, and short version (24 items) of WHOQOL-Old.

The CASP-19 Quality of Life Questionnaire for the elderly consisted of 19 items, with four domains of control, autonomy, pleasure, and self-realization. This questionnaire was first developed by Hyde et al. (2003); the Persian version of the questionnaire has been validated by Heravi-Karimooi et al. (2016), with satisfactory internal consistency (Cronbach's a 0.70–0.88) for the subscales and external consistency (ICC with 2 weeks' interval 0.96, $p < .001$) (Heravi-Karimooi et al., 2016).

The WHOQOL-OLD is a 24-item self-report instrument, which has been developed by the WHOQOL Group (Fang, 2012; Power, 2005) and consisted of six domains including sensory abilities, autonomy, past-present-future activities, social participation, death and dying, and intimacy. Each domain included 4 items which were scored based on five different formats of 5-point Likert scale. The total score ranged from 24 to 120. This study aimed to develop and assess the psychometric properties of the Persian version of this questionnaire in Iranian population.

The following steps were taken to validate the Persian version of the questionnaire:

**Step 1:** For assessment of linguistic validity, at first the English version of the questionnaire was translated into Persian by a health promotion professional and revised by a gerontologist; then, it was back-translated to English by a bilingual general practitioner independent translator, who had no knowledge about the questionnaire. After that, by comparing the two Persian and English versions, some corrections were made to the Persian version. Finally, a panel of experts consisting of two health promotion professional, a psychologist and two geriatricians reviewed and confirmed the Persian version of the questionnaire.

**Step 2:** Assessment of the content validity of the questionnaire: The prepared Persian version was assessed by 10 health promotion experts, gerontologists and psychiatrists for content validity. All the items had a content validity ratio (CVR) above 0.7, and content validity index (CVI) above 0.80, so, based on the Lawshe's (1975) and Waltz and Bussel's (23) criteria; all the items remained in the questionnaire.

**Step3:** At this step, face validity of the questionnaire was confirmed qualitatively, using a convenience sample of 10 elders. They were asked to evaluate the items with respect to problems, ambiguity, proper terms and grammar, and understandability. The requested corrections were done based on the opinions of expert panel which was described in the previous step.

**Step 4:** The reliability of the Persian version of WHOQOL-OLD questionnaire was established by calculating Cronbach-α for each of six factors as an indicator of internal consistency, and intra-class correlation coefficient on a pilot population of 30 old individuals with two weak intervals as an indicator of external consistency.

**Step 5:** Three methods were used to establish the construct validity of the questionnaire including the corrected item total correlations, and confirmatory factor analyses (CFA), the goodness of fit indices (*CMIN/df*, CFI, NFI, RMSEA, PNFI, and PCFI) were calculated. Convergent validity was assessed via correlations between total scores of WHOQOL-old and its six subscales with total score of CASP-19 Quality of Life Questionnaire and its four domains. Criterion validity was tested by comparing the participants' QOL between different subgroups including marital, job and educational status; existence of chronic diseases; and smoking.

**Step 6:** ROC curve analysis was used to determine the cutoff point of categorizing the respondents to poor or good quality of life based on WHOQOL-OLD, and its sensitivity and specificity. Contrasted

**Table 1.** Frequency Distribution of Respondents' Demographic Characteristics and their Status of Chronic Diseases.

| | Male | Female |
|---|---|---|
| Variable | N (%) | N (%) |
| **Marriage** | | |
| Married | 122 (82.4) | 98 (64.5) |
| Single | 7 (4.7) | 8 (5.3) |
| Widow | 17 (11.5) | 41 (27.0) |
| Divorced | 2 (1.4) | 5 (3.3) |
| **Education level** | | |
| Illiterate | 45 (30.4) | 80 (52.4) |
| Elementary | 53 (35.8) | 39 (25.7) |
| Middle school | 17 (11.5) | 13 (8.6) |
| High school and college | 33 (22.3) | 20 (13.2) |
| **Job status** | | |
| Employed | 20 (13.5) | 6 (3.9) |
| Retired | 117 (79.1) | 24 (15.8) |
| Unemployed/housewife | 11 (7.4) | 122 (80.3) |
| **Smoking** | | |
| Cigarette | 19 (12.8) | 6 (3.9) |
| Hookah | 14 (9.5) | 28 (18.4) |
| **Suffering from chronic diseases** | | |
| Hypertension | 67 (45.3) | 102 (67.1) |
| Heart diseases | 61 (41.2) | 66 (43.4) |
| Respiratory diseases | 22 (14.9) | 17 (11.2) |
| Diabetes mellitus | 36 (24.3) | 62 (40.8) |
| Liver diseases | 13 (8.8) | 9 (5.9) |
| Arthritis rheumatoid | 32 (21.6) | 65 (42.8) |
| Depression | 21 (14.2) | 31 (20.4) |
| Had at least one chronic disease | 109 (73.6) | 130 (85.5) |
| Had no chronic disease | 39 (26.4) | 22 (14.5) |

groups method was used to determine a standard for good and poor quality of life. All of the analyses were conducted using SPSS 24 and IBM AMOS 24 software.

## Results

Overall, 148 males (mean age $70.14 \pm 7.51$) and 152 females (mean age $66.95 \pm 6.15$) participated in the study. The mean age of the total participants was $68.5 \pm 7.02$. Table 1 describes the frequency distribution of the respondents' demographic characteristics and their status of suffering from chronic diseases.

Internal consistency of all of six factors of THE Persian version of WHOQOL-Old was confirmed using Cronbach α between 0.67 and 0.95. The external consistency of the factors was also confirmed by calculating intra-class correlation coefficient on 30 elders ($r > 0.70$, $p < .001$). Corrected item-total correlation was more than 0.3 for all items, which confirms the homogeneity of the questionnaire items (Lenz, 2010) (Table 2).

In Pearson's correlation coefficient test which was performed between the CASP-19 questionnaire of the

**Table 2.** Internal Reliability Characteristics and Corrected Item-Total Correlation Coefficients for the Persian Version of WHOOL-Old.

| Factor | Item $N$ | Mean | SD | Intra-class correlation coefficient (ICC, $p$) | Cronbach $\alpha$ | Corrected item total correlation |
|---|---|---|---|---|---|---|
| Sensory abilities | 1 | 3.15 | 1.03 | .75, <.001 | .664 | .480 |
| | 2 | 3.91 | 1.07 | | | .477 |
| | 10 | 3.81 | 1.10 | | | .414 |
| | 20 | 2.90 | 1.22 | | | .301 |
| Autonomy | 3 | 3.39 | 1.05 | .86, <.001 | .886 | .633 |
| | 4 | 3.27 | 1.01 | | | .613 |
| | 5 | 3.05 | 1.13 | | | .644 |
| | 11 | 3.01 | 1.01 | | | .597 |
| Past present and future activities | 12 | 2.19 | 1.01 | .71, <.001 | .897 | .758 |
| | 13 | 2.99 | 0.98 | | | .747 |
| | 15 | 3.26 | 0.95 | | | .798 |
| | 19 | 2.79 | 1.09 | | | .706 |
| Social participation | 14 | 3.14 | 0.99 | .79, <.001 | .867 | .671 |
| | 16 | 3.18 | 1.01 | | | .785 |
| | 17 | 3.18 | 1.01 | | | .777 |
| | 18 | 2.72 | 1.07 | | | .664 |
| Death and dying | 6 | 3.83 | 1.21 | .89, <.001 | .952 | .403 |
| | 7 | 3.92 | 1.16 | | | .476 |
| | 8 | 3.98 | 1.18 | | | .474 |
| | 9 | 3.67 | 1.43 | | | .520 |
| Intimacy | 21 | 3.51 | 1.04 | .91, <.001 | .907 | .603 |
| | 22 | 3.50 | 1.04 | | | .599 |
| | 23 | 3.44 | 1.03 | | | .568 |
| | 24 | 3.43 | 0.93 | | | .518 |

quality of life in old age and WHO-QOL Old scores, there was a statistically significant correlation between total WHO-QOL Old and CASP-19 QoL scores, and almost all the subcategories of these two questionnaires, confirming the conversion validity of the WHO-QOL Old (Table 3).

In confirmatory factor analysis (CFA), which was used to assess how well the data fit the theoretical model, results confirmed the WHOQOL-OLD six domain structure with acceptable goodness of fit indices ($CMIN/df = 3.12$, $p < .001$; CFI = 0.93; NFI = 0.89; RMSEA = 0.08; PNFI = 0.75; PCFI = 0.77). Figure 1 shows the results of CFA of the six domains of WHOQOL-OLD.

Since there was no cutoff point to evaluate the quality of life as "poor" or "good," the contrasting groups method was used to rationalize the Receiver-Operating Characteristic (ROC) curve analysis by defining two groups at the extremes. Therefore, the mean score of the WHOQOL-OLD was compared between different demographic groups of respondents, their status of having chronic diseases, and their smoking status. The results revealed that the mean score of WHOQOL-OLD in respondents who were married, literate, and employed was significantly higher than other groups. Furthermore, as shown in Table 4, the mean score of WHOQOL-OLD was significantly different among the respondents who had different chronic diseases ($p < .001$); the Bonferroni

post hoc test revealed that this difference was attributable to the participants who had three and more chronic diseases. Also, the elders who smoked cigarette or hookah had significantly lower scores of WHOQOL-OLD in comparison with those who did not smoke ($p < .001$). These findings confirmed the criterion validity of the questionnaire.

Based on the results shown in Table 4, the respondents who had three or more simultaneous chronic diseases and were smoker concurrently were considered as participants who had poor quality of life, and the other participants were categorized as good quality of life group. Based on this assumption, analysis of the ROC curve indicated a critical value of 71.5 as the best cutoff point for evaluating the quality of life (Figure 1). The area under curve (AUC) was 0.78, with a sensitivity of 82.3% and specificity of 61.8% for the QoL cut-off point ≥71.5 in older adults in the good QOL group (Figure 2).

## Discussion

The present study aimed to validate and determine cut-off points for the WHOQOL-OLD questionnaire among the Iranian elderly. Based on the findings, the Persian version of the WHOQOL-OLD instrument had good psychometric properties for the evaluation of the quality of life in Iranian older adults. These findings were consistent with those of previous studies that

**Table 3.** Pearson's Correlation Coefficient among Domains of the WHOQOL-Old and the CASP-19 QoL Scale.

| | CASP-19 questionnaire of quality of life in old age | | | | |
|---|---|---|---|---|---|
| | Total | Control | Autonomy | Pleasure | Self-regulation |
| WHO-QOL Old | | | | | |
| Total | .802** | .366** | .548** | .867** | .573** |
| Sensory abilities | .611** | .289** | .465** | .658** | .379** |
| Autonomy | .715** | .371** | .508** | .799** | .424** |
| Past, present, and future activities | .801** | .364** | .518** | .913** | .507** |
| Social participation | .785** | .340** | .499** | .865** | .534** |
| Death and dying | .323** | .076 | .206** | .269** | .324** |
| Intimacy | .479** | .240** | .297** | .449** | .388** |

*Correlation is significant at the .05 level (two-tailed).
**Correlation is significant at the .01 level (two-tailed).

showed that the WHOQOL-OLD instrument had adequate psychometric properties in different languages and cultures, such as German (Conrad et al., 2014), French (Leplège et al., 2012), Taiwanese (Hsieh, 2015), Brazilian (Chachamovich, 2008), Norwegian (Halvorsrud, 2008), Chinese (Liu et al., 2013), Turkish (Eser et al., 2010), Mexican (González-Celis and Gómez-Benito, 2013), and Iranean (Rasafiani et al., 2020; Rezaeipandari, 2020) elderly.

As to construct validity, CFA supported the multidimensional structure of the Persian version of the WHOQOL-OLD instrument. In the present study, the six domains of the sensory abilities; autonomy; past present, and future activities; social participation; death and dying; and intimacy that can predict the overall QOL were verified by the satisfactory fit indices in CFA. Goodness-of-fit indices of the Persian version of WHOQOL-OLD instrument were found adequate according to the standard recommendations of Structural Equation Modeling literature (Hu, 1999). These findings were consistent with the original version of the questionnaire (Fang, 2012). Conrad et al. (2014) and Leplège et al. (2012) also showed that the six-domain instrument had good construct validity.

In addition, the convergent validity analysis showed that six domains of the WHOQOL-OLD instrument had a good correlation with subscales of the CASP-19 questionnaire. This is in the same line with Bowling's study findings (2009). In other studies, the convergent validity of the WHOQOL-OLD instrument was assessed by WHOQOL-BRIEF (Conrad et al., 2014; Eser, 2010) and SF-12 (Conrad et al., 2014) questionnaires. Results indicated an acceptable to good correlation between the quality of life based on WHOQOL-OLD questionnaire and these tools.

In addition, the Persian version of the WHOQOL-OLD introduced a cutoff point to discriminate the quality of life as "poor" or "good" for both healthy and unhealthy elders. In the present study, quality of life was significantly lower in the elderly with at least three chronic diseases, while Caballero et al. (2013) found

that the quality of life significantly differed between healthy individuals and those with at least one chronic condition. In this study, AUC was 0.78, with a sensitivity of 82.3% and specificity of 61.8% for the QoL cut-off point ≥71.5. which indicates moderate accuracy based on the Fischer et al.'s (2003) guide. Silva et al. (2014) reported the score of 60 as the optimal cut-off point for assessing perceived quality among Brazilian older adults with an AUC of 0.758, with a sensitivity of 76.8% and specificity of 63.8% (Silva et al., 2014).

The examination of the external consistency revealed moderate reliability for the past, present, and future activities domain; good reliability for sensory abilities; autonomy; social participation; death and dying domains; and excellent reliability for intimacy domain (Koo, 2016). Test-retest reliability was assessed in the study of Liu et al. (2013) and the intra-class correlation coefficients (ICC) for all domains were good (Liu et al., 2013). On the other hand, Cronbach's alpha coefficient was used as a measure of the internal consistency of the domains. The alpha value for death and dying and intimacy domains were excellent. Autonomy; past, present and future activities; and social participation domains were good. Also, for sensory abilities domain, the alpha value was acceptable. Cronbach's alpha reported in other studies also indicated a high reliability for the WHOQOL-OLD domains (Anum, 2021; Conrad et al., 2014; Eser et al., 2010; Liu et al., 2013).

Based on the results, the older adults who were literate, married, employed, healthy, and nonsmoker have higher quality of life than those who were illiterate, single, unemployed, unhealthy, and smoker. These findings are consistent with Eser et al. (2010), González-Celis et al. (2013), and Duzgun and Durmaz-Akyol (2021). Literature review suggests that the family plays an essential role in providing social support and meeting the emotional needs of the elderly. Older spouses also play an important role in meeting each other's care needs. As a result, single seniors report lower quality of life than the married seniors. Higher socioeconomic status also leads to better meeting the
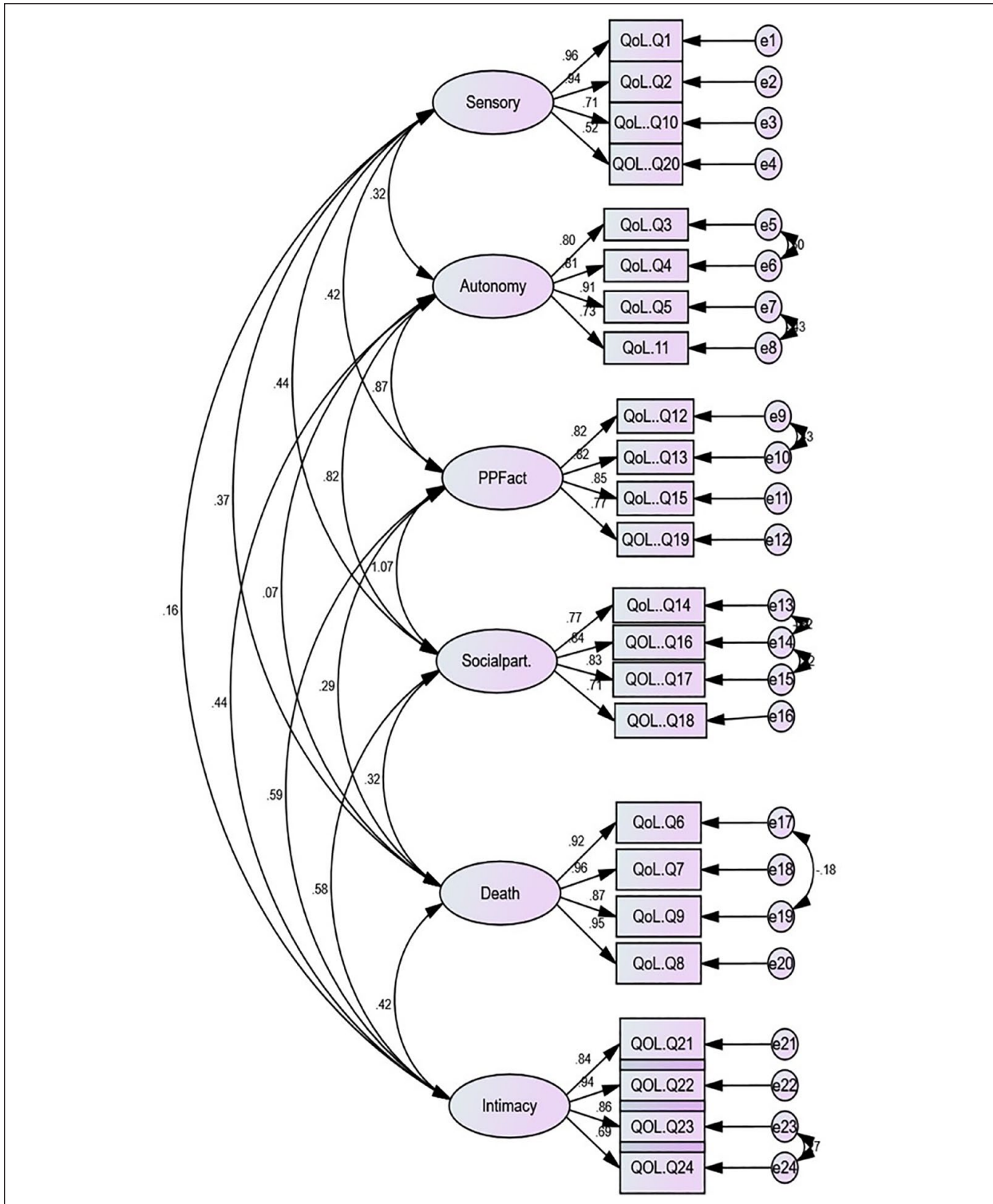
**Figure 1.** Path diagram for the confirmatory factor analysis of the six factors of WHOQOL-OLD questionnaire, 24 items.
*Note.* Sensory = Sensory abilities; PPF act = Past, present and future activities; Socialpart = Social participation; death = death and dying.

needs of the elderly; as a result, employed or high-income seniors and literate seniors have higher levels of quality of life (Koo, 2016; Soósová, 2016). Other studies also confirm that smoking is an important determinant of the elderly's quality of life (Ferreira, 2018; Yang, 2020).

## Conclusion

The present study had several strengths such as recruiting both healthy elders and those with different chronic diseases and smokers in the study; and setting a cutoff point for quality of life of the elders in the study. However,

**Table 4.** Comparison of the Mean Score of WHOQOL-Old in the Study Participants According to their Demographic Characteristics and Health Status.

| Demographic factor | N | WHO-QoL old | | t/F | p |
| --- | --- | --- | --- | --- | --- |
| | | Mean | SD | | |
| Education status | | | | | |
| Literate | 175 | 83.90 | 15.61 | 3.921 | <.001* |
| Illiterate | 125 | 76.64 | 16.08 | | |
| Marital status | | | | | |
| Married | 220 | 83.13 | 14.79 | 4.084 | <.001* |
| Single | 80 | 74.71 | 18.24 | | |
| Job status | | | | | |
| Employed | 26 | 86.00 | 19.49 | 1.69 | .09* |
| Unemployed | 274 | 80.39 | 15.79 | | |
| Number of chronic diseases | | | | | |
| No diseases | 61 | 88.51 | 12.32 | 17.42 | <.001** |
| One disease | 63 | 86.73 | 12.16 | | |
| Two diseases | 74 | 82.97 | 13.18 | | |
| Three and more diseases | 102 | 72.39 | 18.78 | | |
| Smoking status | | | | | |
| No | 239 | 83.03 | 14.13 | 4.70 | <.001* |
| Yes | 61 | 72.47 | 20.59 | | |

*Independent *t* test.
**One-way ANOVA.
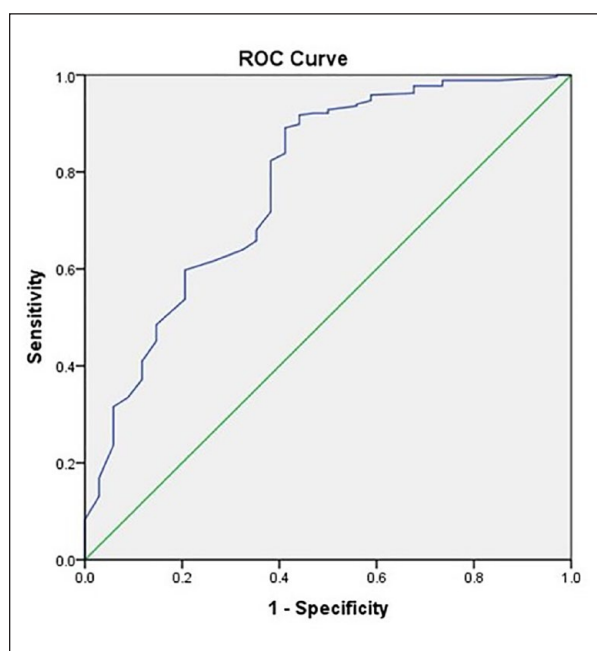


**Figure 2.** ROC curve showing sensitivity and specificity of the cutoff points to predict good quality of life.

it should be noted that it was performed on the urban community-dwelling elderly, and care should be taken in generalizing the results, especially to the elderly living in the nursing homes. The Persian version of the WHOQOL-OLD instrument is useful for investigating the quality of life in older adults. This study shows that the Persian version of the WHOQOL-OLD instrument (comprising 24 items spread across six domains) has good psychometric properties. It introduced a cutoff point for poor and good quality of life. Therefore, it can be used to assess the quality of life in different health conditions observed among the elderly; it is regarded as a reliable and valid tool for assessing the impact of service and care provision to the Iranian older adult population.

## Author Contributions

All authors contributed to the study conception and design. Material preparation was performed by Mahin Nazari and Leila Ghahremani, data collection was performed by Mahsa Yarelahi, Firoozeh Abbasi, and Farzaneh Bahadori, data analysis were performed by Masoud Karimi and Leila Ghremani. The first draft of the manuscript was written by Masoud Karimi and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

## Ethics Approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Shiraz university of medical sciences, Shiraz, Iran (Code of Ethics: IR.SUMS.REC.1399.789)

## ORCID iD

Masoud Karimi 🆔 https://orcid.org/0000-0001-7931-4181

## Data Availability Statement

"The data generated during and/or analyzed during the current study are not publicly available due to [Data privacy/intellectual property issues preclude us from sharing data with the public] but are available from the corresponding author on reasonable request. Ethics approval, participant permissions, and all other relevant approvals were granted for this data sharing."

## References

Anum, A., Adjorlolo, S., Akotia, C. S., & de-Graft Aikins, A. (2021). Validation of the multidimensional WHOQOL-OLD in Ghana: A study among population-based healthy adults in three ethnically different districts. *Brain and Behavior*, *11*(8), e02193.

Ardian, N., Mahmoudabad, S. S. M., Ardian, M., & Karimi, M. (2014). General health of foreign-origin groups and native population. *Global Journal of Health Science*, *6*(5), 55.

Ashley, A., Lloyd, A., Lamb, S., & Bartlett, H. (2001). Is health-related quality of life a suitable outcome measure for evaluating health promotion programmes? *NT Research*, *6*(3), 671–678.

Bowling, A. (2009). The psychometric properties of the older people's quality of life questionnaire, compared with the CASP-19 and the WHOQOL-OLD. *Current Gerontology and Geriatrics Research*, *2009*, 298950.

Brazier, J., Walters, S., Nicholl, J., & Kohler, B. (1996). Using the SF-36 and Euroqol on an elderly population. *Quality of Life Research*, *5*(2), 195–204.

Caballero, F. F., Miret, M., Power, M., Chatterji, S., Tobiasz-Adamczyk, B., Koskinen, S., Leonardi, M., Olaya, B., Maria Haro, J., & Ayuso-Mateos, J. L. (2013). Validation of an instrument to evaluate quality of life in the aging population: WHOQOL-AGE. *Health and Quality of Life Outcomes*, *11*(1), 1–12.

Chachamovich, E., Fleck, M. P., Trentini, C., & Power, M. (2008). Brazilian WHOQOL-OLD Module version: A rasch analysis of a new instrument. *Revista de Saúde Pública*, *42*, 308–316.

Conrad, I., Matschinger, H., Riedel-Heller, S., von Gottberg, C., & Kilian, R. (2014). The psychometric properties of the German version of the WHOQOL-OLD in the German population aged 60 and older. *Health and Quality of Life Outcomes*, *12*(1), 1–15.

Duzgun, G., & Durmaz-Akyol, A. (2021). Evaluation of the Turkish version of the world health organization quality of life instrument-older adults' module (WHOQOL-OLD). *Journal of Patient Safety & Quality Improvement*, *9*(3), 189–197.

Eser, S., Saatlı, G., Eser, E., Baydur, H., & Fıdaner, C. (2010). The reliability and validity of the Turkish version of the world health organization quality of life instrument-older adults module (WHOQOL-Old). *Turkish Journal of Psychiatry*, *21*(1), 37–48.

Fang, J., Power, M., Lin, Y., Zhang, J., Hao, Y., & Chatterji, S. (2012). Development of short versions for the WHOQOL-OLD module. *The Gerontologist*, *52*(1), 66–78.

Ferreira, L. K., Meireles, J. F. F., & Ferreira, M. E. C. (2018). Evaluation of lifestyle and quality of life in the elderly: A literature review. *Revista Brasileira de Geriatria e Gerontologia*, *21*, 616–627.

Fischer, J. E., Bachmann, L. M., & Jaeschke, R. (2003). A readers' guide to the interpretation of diagnostic test properties: Clinical example of sepsis. *Intensive Care Medicine*, *29*(7), 1043–1051.

Fleck, M. P., Chachamovich, E., & Trentini, C. (2006). Development and validation of the Portuguese version of the WHOQOL-OLD module. *Revista de Saúde Pública*, *40*, 785–791.

González-Celis, A. L., & Gómez-Benito, J. (2013). Quality of life in the elderly: Psychometric properties of the WHOQOL-OLD module in Mexico. *Health*, *5*(12), 110.

Halvorsrud, L., Kalfoss, M., & Diseth, Å. (2008). Reliability and validity of the Norwegian WHOQOL-OLD module. *Scandinavian Journal of Caring Sciences*, *22*(2), 292–305.

Heravi-Karimooi, M., Rejeh, N., Garshasbi, E., Nikkhah, M., & Montazeri, A. (2016). A validation study of the Persian version of older people's quality of life questionnaire (CASP-19). *Payesh (Health Monitor)*, *15*(4), 432–442.

Hsieh, P., & Yao, G. (2015). Measurement invariance of the Whoqol-Old module across different demographic groups in Taiwan's elderly people. *Value in Health*, *18*(7), A717–A718.

Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55.

Hyde, M., Wiggins, R. D., Higgs, P., & Blane, D. B. (2003). A measure of quality of life in early old age: The theory, development and properties of a needs satisfaction model (CASP-19). *Aging & Mental Health*, *7*(3), 186–194.

Iran, S. C. O. (2019). *Selected findings of the 2016 national population and housing census*. Vice Presidency Plan and Budget Organization.

Kazemi, N., Sajjadi, H., & Bahrami, G. (2019). Quality of life in Iranian elderly. *Journal of Ageing*, *13*(5), 518–533.

Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine*, *15*(2), 155–163.

Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology*, *28*(4), 563–575.

Lenz, E. R. (2010). *Measurement in nursing and health research*. Springer Publishing Company.

Leplège, A., Perret-Guillaume, C., Ecosse, E., Hervy, M., Ankri, J., & von Steinbüchel, N. (2012). A new instrument to measure quality of life in older people: The French version of the WHOQOL-OLD. *La Revue de Medecine Interne*, *34*(2), 78–84.

Liu, R., Wu, S., Hao, Y., Gu, J., Fang, J., Cai, N., & Zhang, J. (2013). The Chinese version of the world health organization quality of life instrument-older adults module

(WHOQOL-OLD): Psychometric evaluation. *Health and Quality of Life Outcomes*, *11*(1), 1–8.

Melo, R. L. P. d., Silva Júnior, E. G. d., Souto, R. Q., Leão, Í. S., & Eulálio, M. d. C. (2018). Psychometric properties of the complete version of the World health organization quality of life assessment (WHOQOL-OLD): Reduced response scale. *Psicologia: Reflexão e Crítica*, *31*, 4.

Pequeno, N. P. F., Cabral, N. L. d. A., Marchioni, D. M., Lima, S. C. V. C., & Lyra, C. d. O. (2020). Quality of life assessment instruments for adults: A systematic review of population-based studies. *Health and Quality of Life Outcomes*, *18*(1), 1–13.

Power, M., Quinn, K., & Schmidt, S. (2005). Development of the WHOQOL-old module. *Quality of Life Research*, *14*(10), 2197–2214.

Rasafiani, M., Sahaf, R., Shams, A., Vameghi, R., Zareian, H., & Akrami, R. (2020). Validity and reliability of the persian version of the world health organization quality of life questionnaire–the older adults edition. *Iranian Journal of Ageing*, *15*(1), 28–41.

Rezaeipandari, H., Morowatisharifabad, M. A., Mohammadpoorasl, A., & Shaghaghi, A. (2020). Cross-cultural adaptation and psychometric validation of the world health organization quality of life-old module (WHOQOL-OLD) for Persian-speaking populations. *Health and Quality of Life Outcomes*, *18*(1), 1–7.

Seif, M., Asadollahi, A., Yarelahi, M., & Rezaian, E. (2021). Item response analysis to explore psychometric proper-ties of the Persian version of Troutman successful aging inventory: Rasch partial credit model. *Journal of Health Psychology*, *26*(14), 2711–2718.

Silva, P. A. B., Soares, S. M., Santos, J. F. G., & Silva, L. B. (2014). Cut-off point for WHOQOL-bref as a measure of quality of life of older adults. *Revista de saude publica*, *48*, 390–397.

Soósová, M. S. (2016). Determinants of quality of life in the elderly. *Central European Journal of Nursing and Midwifery*, *7*(3), 484–493.

Tinsley, H. E., & Kass, R. A. (1979). The latent structure of the need satisfying properties of leisure activities. *Journal of Leisure Research*, *11*(4), 278–291.

United Nations, Department of Economic and Social Affairs, Population Division. (2015). *World population prospects: The 2015 revision*. United Nations.

United Nations, Department of Economic and Social Affairs, Population Division. (2019). *World population prospects 2019*. United Nations.

WHOQOL Group. (1995). The world health organization quality of life assessment (WHOQOL): Position paper from the world health organization. *Social Science & Medicine*, *41*(10), 1403–1409.

Yang, Y., Wang, S., Chen, L., Luo, M., Xue, L., Cui, D., & Mao, Z. (2020). Socioeconomic status, social capital, health risk behaviors, and health-related quality of life among Chinese older adults. *Health and Quality of Life Outcomes*, *18*(1), 1–8.