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Loneliness inventory for older adults: Psychometric evaluation of the Turkish version

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ABSTRACT

This methodological study aimed to adapt the Loneliness Inventory for Older Adults (LIOA) into Turkish and to evaluate its validity and reliability. The sample consisted of 384 older adults who presented to a family health center in Turkey between May and December 2024. Data were collected using a Personal Information Form, the LIOA, and the UCLA Loneliness Scale Version 3. The Turkish version of the LIOA revealed a five-factor structure comprising 29 items, with factor loadings between 0.794 and 0.903. Goodness-of-fit indices indicated an excellent model fit (χ^2/df = 1.564, CFI = 0.978, GFI = 0.908, NFI = 0.943, IFI = 0.978, TLI = 0.976, RMSEA = 0.038, SRMR = 0.039). The Cronbach's alpha coefficient for the total scale was 0.951, and item-total score correlation coefficients ranged from 0.494 to 0.725. These findings demonstrate that the Turkish version of the LIOA is a valid and reliable instrument for assessing loneliness among older adults.

Introduction

Aging is a multifaceted process of change that begins in the intrauterine period and continues throughout the lifespan of all living beings. This process involves not only biological but also social, psychological, and cultural dimensions (McAuley, 2025). Today, a significant demographic transformation is underway globally, characterized by declining fertility rates, slowing population growth, and increasing average life expectancy. Consequently, the proportion of the elderly population is rising rapidly (Miremadi et al., 2020). It is estimated that over 700 million people worldwide are aged 65 and older, and this number is projected to double by 2050 (Kasai, 2021). According to the World Population Prospects report, individuals aged 65 and above accounted for 10% of the global population in 2022, and this proportion is expected to rise to 16% by 2050 (United Nations Department of Economic and Social Affairs, Population Division, 2022). Similarly, data from the Turkish Statistical Institute (TSI) indicate that this age group, which comprised 9.9% of the population in 2022, is projected to reach 12.9% by 2030, 16.3% by 2040, and 25.6% by 2080 (Turkish Statistical Institute, 2023). These demographic shifts suggest that, in the coming years, significant challenges will emerge in managing the care of older adults and addressing aging-related issues (McAuley, 2025; Turkish Statistical Institute, 2023).

The increasing elderly population gives rise to a range of challenges spanning biological, psychological, economic, social, and cultural dimensions (Kasai, 2021). Among these, changes in traditional family structures and living arrangements have notably intensified one of the most pressing issues faced by older adults: loneliness (Cacioppo & Cacioppo, 2018; O'Súilleabháin et al., 2019). Loneliness is defined as an unpleasant and subjective experience that arises when an individual's social relationships are perceived as insufficient in either quantity or quality (Yanguas et al., 2018). Although

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loneliness can affect individuals across all age groups, older adults are particularly vulnerable, making advanced age a significant risk factor (Bandari et al., 2019; Mund et al., 2020). Contributing factors include increased physical disabilities, chronic health problems, financial difficulties, shrinking social networks, and the loss of a spouse or peers – all of which exacerbate feelings of loneliness in later life (Quan et al., 2020; Sheftel et al., 2024). A meta-analysis reported that the prevalence of loneliness among older adults is 28.5%, increasing to 31.3% among those aged 75 and above (Chawla et al., 2021). Moreover, as global population aging accelerates, loneliness is expected to become an even more critical public health issue. Notably, the number of older adults living alone is projected to triple between 2020 and 2050 (Newmyer et al., 2022).

Loneliness is a critical public health concern that adversely impacts both the physical and mental health of older adults, ultimately increasing the risk of mortality (Sheftel et al., 2024; Zhou et al., 2023). It has been associated with various health problems, including cardiovascular diseases, stroke (Hakulinen et al., 2018), diabetes (Richard et al., 2017), cognitive decline (Cachón-Alonso et al., 2023), dementia (Li et al., 2023), depression (Martín-María et al., 2021), sleep disturbances (Qi et al., 2023), suicide (Niu et al., 2020), elder abuse (Acierno et al., 2010), and diminished quality of life (Vespa et al., 2023). Furthermore, loneliness has been shown to negatively affect treatment adherence (Lu et al., 2020) and impose additional burdens on geriatric care services and healthcare systems (Valtorta et al., 2018; Zhou et al., 2023). The COVID-19 pandemic has further intensified the detrimental effects of loneliness among older adults, amplifying global concerns surrounding this issue (Su et al., 2023).

Despite its significant impact on health, the assessment of loneliness is not routinely incorporated into standard medical care in most healthcare systems (Howland & Stone, 2023; Perissinotto et al., 2019). Considering the rapid growth of the elderly population and the direct and indirect consequences of loneliness, there is an increasing need to address this phenomenon in a systematic and evidence-based manner (Chawla et al., 2021; Quan et al., 2020). Although several instruments have been developed to measure loneliness, widely used measures such as the UCLA Loneliness Scale primarily emphasize overall perceived loneliness, conceptualizing the construct largely at a global level. In contrast, loneliness in later life is a multifaceted experience, shaped not only by social relationships but also by age-related changes such as role loss, reduced social capacity, psychological suffering, and inefficient interpersonal interactions (Bandari et al., 2022; Wang et al., 2022). In Turkey, an adaptation study of a loneliness scale for older adults has been conducted (Akgül & Yeşilyaprak, 2015); however, this instrument mainly emphasizes the social dimension of loneliness and may not sufficiently capture the broader psychosocial and functional aspects experienced in older age. Given the unique physical, psychological, and social characteristics of older adults, there remains a critical need for a multidimensional and psychometrically robust assessment tool that can comprehensively evaluate loneliness in later life and support clinical decision-making, particularly in primary care and community settings (Bandari et al., 2022). In the Turkish context, strong family ties and intergenerational relations have traditionally played a central role in later-life social support, underscoring the importance of culturally appropriate and multidimensional assessment tools for evaluating loneliness in older adults (Akgül & Yeşilyaprak, 2015). Accordingly, the present study aimed to adapt the Loneliness Inventory for Older Adults (LIOA) into Turkish and to evaluate its psychometric properties, with particular attention to its capacity to capture the multiple dimensions of loneliness specific to older adulthood.

Method

Design

This study used a descriptive, cross-sectional, and methodological design. The methodological component included language adaptation, content validity, construct validity, known-groups validity, concurrent validity, and reliability analyses.

Setting and participants

The study population consisted of older adults aged 60 years and above who visited a family health center in Turkey between May and December 2024. Participants were recruited using a convenience sampling strategy with consecutive recruitment, whereby eligible older adults attending the center for routine primary care services during the study period were approached by the researcher.

The sample size was determined using the item-based sampling method, which is commonly employed in scale adaptation studies. According to the literature, the pilot implementation of a candidate scale should involve at least 30 participants (Kishore et al., 2021). Furthermore, for factor analysis, the recommended sample size is five to ten times the number of items or a minimum of 300 individuals (Boateng et al., 2018; Field, 2024). To assess test – retest reliability, it is emphasized that the final scale should be administered on two occasions, either consecutively or with an appropriate interval (Tavşancıl, 2019).

Accordingly, a pilot study was conducted with 30 older adults, and data from this group were excluded from the final analysis. The final sample size was determined based on a ratio of ten participants per item, targeting a minimum of 290 individuals. However, in order to improve sample representativeness and enhance the reliability of the findings, the study ultimately included 384 older adults. Of the individuals approached ($n = 412$), 28 declined to participate, yielding a refusal rate of approximately 6.8%. The primary reasons for nonparticipation were lack of time and unwillingness to complete the questionnaires.

For the test – retest reliability assessment, the LIOA was re-administered to a randomly selected subgroup of 52 participants after a two-week interval. Inclusion criteria were a Mini-Mental State Examination score of ≥24, age ≥60 years, basic literacy, and voluntary participation. Exclusion criteria included a history of neurocognitive disorders and/or intellectual disability, as well as severe visual or hearing impairments.

Measures

Data were collected using a Personal Information Form, the LIOA, and the UCLA Loneliness Scale Version 3.

Personal Information Form: This form was developed by the researchers based on relevant literature (Akgül & Yeşilyaprak, 2015; Bandari et al., 2022), contains 10 questions designed to assess the socio-demographic characteristics of older adults.

Loneliness Inventory for Older Adults (LIOA): The inventory was developed by Bandari et al. (2022) to measure loneliness levels in older adults. It consists of 29 items, each rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The LIOA includes five subscales: decreased social capacity (items 1–7), disappointment and uselessness (items 8–14), psychological suffering (items 15–22), experiencing loneliness at certain times (items 23–26), and inefficient interactions (items 27–29). The total score on the LIOA ranges from 29 to 145, with higher scores indicating greater levels of loneliness. No items are reverse-coded. The Cronbach's alpha coefficient for the LIOA was reported as 0.94 (Bandari et al., 2022).

UCLA Loneliness Scale-V3: This scale was developed by Russell (1996) to assess individuals' levels of loneliness. It consists of 20 items rated on a four-point Likert scale (1: never, 2: rarely, 3: sometimes, 4: always). Of these items, 11 are negatively worded, while 9 are positively worded. In samples including university students, nurses, teachers, and older adults, the internal consistency ranged from 0.89 to 0.94. The total score on the scale varies from 20 to 80, with higher scores reflecting greater levels of loneliness (Russell, 1996). Durak and Şenol-Durak (2010) examined the scale's psychometric properties in Turkish culture and found a Cronbach's alpha reliability coefficient of 0.90 in a sample of older adults.

Data collection procedure

A presurvey and a cognitive function assessment were initially conducted by the researcher to identify individuals who met the inclusion and exclusion criteria. Older adults who met these criteria were provided with detailed information about the study, and written informed consent was obtained. The data collection instruments were administered to 384 older adults in a private interview room at the family health center. The forms were completed in approximately 30 minutes per participant. As part of the test – retest procedure, 52 older adults, randomly selected from the sample, were invited to the family health center two weeks later to complete the LIOA again. To ensure data matching, participants were asked to use pseudonyms. All invited participants completed the second assessment, and no attrition was observed.

Ethical considerations

This study received approval from the Health Sciences Non-Interventional Research Ethics Committee of Bandirma Onyedi Eylul University (IRB approval number: February 26, 2024/675). Institutional permission was granted by the X Provincial Health Directorate (decision date: April 24, 2024). Older adults were informed that their participation was voluntary and that they could withdraw from the study at any time without any consequences. The rights to anonymity and confidentiality were strictly maintained throughout the study.

Statistical analysis

Data analysis was performed by an independent biostatistician using the Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structures (AMOS) software. The normality of item distributions was assessed using skewness and kurtosis coefficients, which were within acceptable ranges (−1.5 to +1.5), supporting the use of maximum likelihood estimation (Tabachnick & Fidel, 2019). Socio-demographic characteristics of the older adults were summarized using frequency (n), percentage (%), and mean ± standard deviation (M ± SD).

Content validity was assessed by calculating the Item-Content Validity Index (I-CVI) and the Scale-Content Validity Index (S-CVI). Construct validity was evaluated through confirmatory factor analysis (CFA), using maximum likelihood estimation and the fit indices χ^2/df, CFI, GFI, NFI, IFI, TLI, RMSEA, and SRMR. Model fit indices were evaluated according to commonly accepted criteria (Field, 2024; Hu & Bentler, 1999). Known-groups validity was assessed by comparing the means of the top 27% and bottom 27% groups using an independent samples t-test. Concurrent validity was determined through Pearson correlation analysis.

Reliability of the LIOA was assessed using Cronbach's alpha coefficient, along with item analysis, and test – retest reliability was evaluated using a two-way random-effects model with absolute agreement (ICC[2,1]), with 95% confidence intervals calculated. Univariate outliers were examined using standardized z-scores, and no extreme values exceeding ±3 were detected. Missing data were minimal (<5%) and were handled using listwise deletion. A significance level of $p < .05$ was applied for all statistical analyses (Field, 2024; Tabachnick & Fidel, 2019).

Results

Older adults' characteristics

Among the participants, 50.3% were women, 40.6% were aged between 60 and 65 years, and 49.7% had basic literacy without formal educational attainment. Additionally, 72.1% were married, and 48.4% had between four and six children. Moreover, 46.9% of the older adults were retired, 83.3% perceived their economic status as moderate, and 82.0% evaluated their health status as moderate. Furthermore, 35.9% lived with their family, while 65.1% lived in their own home.

Translation and cultural adaptation

The scale adaptation process followed the COSMIN and ITC guidelines (Gagnier et al., 2021; Hernández et al., 2020). On August 2, 2023, initial contact was made with the corresponding author of the original scale, and written permission was granted via e-mail.

The translation-back translation method was applied to assess the psycholinguistic properties of the scale. In the first stage, two independent linguists, both native Turkish speakers with advanced English proficiency and familiarity with scientific terminology, translated the scale from the original language into Turkish. The translations were reviewed for semantic, conceptual, grammatical, and contextual accuracy by the researchers, the translation team, and a Turkish language expert. A consensus was reached for each item, resulting in the first draft of the Turkish version; for more than 95% of the items, the forward translations were deemed sufficiently similar and were reconciled without major modification through committee review. In the second stage, the Turkish scale was translated back into English by two independent linguists who were native English speakers with advanced Turkish skills and no prior exposure to the original scale. The translations were compared to create the English draft version. The original and back-translated scales were then evaluated for conceptual equivalence and cultural adaptation, confirming the achievement of language equivalence.

Validity analysis

The validity of the LIOA was assessed through content, face, construct, known-groups, and concurrent validity.

Content validity: The content validity of the scale was assessed based on expert evaluations ($n = 12$; 7 psychiatric nursing specialists and 5 geriatric specialists) via the Davis technique. Both the I-CVI and S-CVI values were 1.00, with the S-CVI calculated using the average method (S-CVI/AVE).

Face validity: After the expert panel, a pilot test was conducted with 30 older adults selected through purposive sampling to assess the clarity and comprehensibility of the Turkish LIOA. The participants found the items clear and understandable, so no changes were made, and the final version of the scale was established.

Construct validity: To evaluate the construct validity of the LIOA, a CFA was performed. A path diagram for the first-order CFA model was created (Figure 1), and regression coefficients were calculated using maximum likelihood estimation. The model's fit indices were examined, yielding $\chi^2/df = 1.564$, CFI = 0.978, GFI = 0.908, NFI = 0.943, IFI = 0.978, TLI = 0.976, RMSEA = 0.038, and SRMR = 0.039 (Table 1). The factor loadings for the LIOA items ranged from 0.794 to 0.903 (Table 2).

Known-groups validity: Known-groups validity was examined by comparing the loneliness scores of participants in the lowest and highest 27% groups, revealing a statistically significant difference ($p < .001$).

Concurrent validity: Concurrent validity was further supported by a strong positive correlation between the LIOA total score and the UCLA Loneliness Scale ($r = 0.659$, $p < .001$). In addition, all LIOA subscales demonstrated moderate and statistically significant correlations with the UCLA Loneliness Scale, including decreased social capacity ($r = 0.480$), disappointment and uselessness ($r = 0.497$), psychological suffering ($r = 0.548$), experiencing loneliness at certain times ($r = 0.424$), and inefficient interactions ($r = 0.429$) (all $p < .001$, Table 3).

Reliability analysis

The reliability of the LIOA was evaluated through two primary dimensions: internal consistency (measured using Cronbach's alpha and item analysis) and stability (assessed via test-retest reliability).

Internal consistency: The Cronbach's alpha coefficient for the LIOA was 0.951. Item-total score correlations ranged from 0.494 to 0.725 (Table 4).

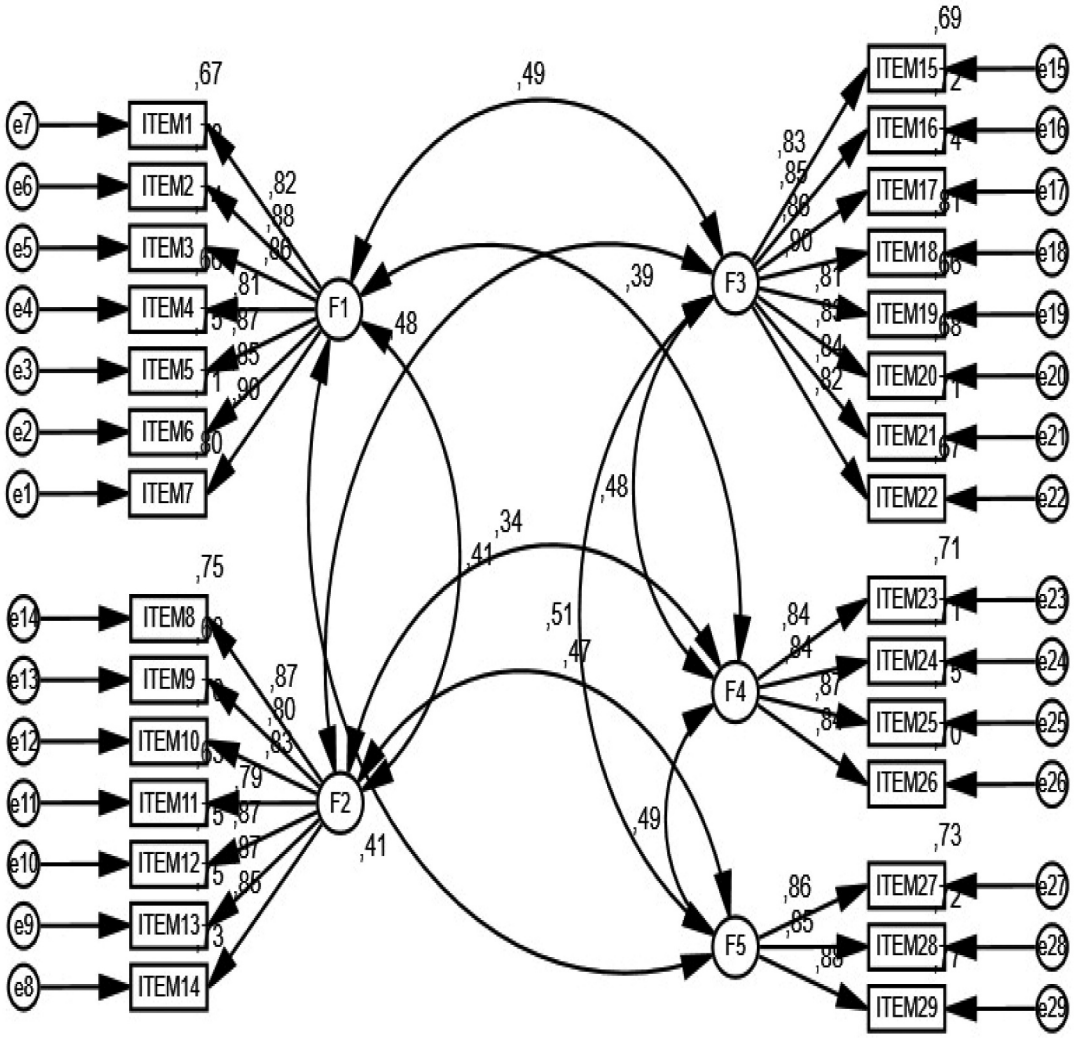

Figure 1. The first-order confirmatory factor analysis of the LIOA.

Table 1. Model goodness-of-fit indices of the Turkish version of the LIOA.

Indices	Good Fit	Acceptable fit	Results
χ2/df	0≤χ2/df < 3	3≤χ2/df ≤ 5	1.564
CFI	0.95≤CFI ≤1	0.90≤CFI < 0.95	0.978
GFI	0.95≤GFI ≤1	0.90≤GFI < 0.95	0.908
NFI	0.95≤NFI ≤1	0.90≤NFI < 0.95	0.943
IFI	0.95≤IFI ≤1	0.90≤IFI < 0.95	0.978
TLI	0.95≤TLI ≤1	0.90≤TLI < 0.95	0.976
RMSEA	0≤RMSEA ≤0.05	0.05 < RMSEA ≤0.08	0.038
SRMR	0≤SRMR ≤0.05	0.05 < SRMR ≤0.08	0.039

Test-retest reliability: Test – retest reliability of the LIOA was evaluated in a subsample of 52 older adults over a two-week interval. Intraclass correlation coefficients (ICCs) demonstrated excellent test – retest reliability for the LIOA total score (ICC = 0.973) and all subscales, with ICC values ranging from 0.956 to 0.971 (Table 5).

Table 2. Factor loadings and model fit indices.

Items		Factors	S.E.	C.R.	p	Factor loading
Item 1	<—	Decreased social capacity	0.043	0.817	<0.001	0.817
Item 2	<—		0.037	0.882	<0.001	0.882
Item 3	<—		0.038	0.858	<0.001	0.858
Item 4	<—		0.036	0.814	<0.001	0.814
Item 5	<—		0.040	0.867	<0.001	0.867
Item 6	<—		0.039	0.845	<0.001	0.845
Item 7	<—			0.896		0.896
Item 8	<—	Disappointment and uselessness	0.048	0.868	<0.001	0.868
Item 9	<—		0.044	0.796	<0.001	0.796
Item 10	<—		0.050	0.834	<0.001	0.834
Item 11	<—		0.045	0.794	<0.001	0.794
Item 12	<—		0.049	0.865	<0.001	0.865
Item 13	<—		0.049	0.865	<0.001	0.865
Item 14	<—			0.852		0.852
Item 15	<—	Psychological suffering		0.832		0.832
Item 16	<—		0.048	0.851	<0.001	0.851
Item 17	<—		0.054	0.862	<0.001	0.862
Item 18	<—		0.062	0.903	<0.001	0.903
Item 19	<—		0.049	0.810	<0.001	0.810
Item 20	<—		0.050	0.826	<0.001	0.826
Item 21	<—		0.049	0.840	<0.001	0.840
Item 22	<—		0.049	0.817	<0.001	0.817
Item 23	<—	Experiencing loneliness at certain times		0.842		0.842
Item 24	<—		0.040	0.840	<0.001	0.840
Item 25	<—		0.042	0.865	<0.001	0.865
Item 26	<—		0.039	0.838	<0.001	0.838
Item 27	<—	Inefficient interactions		0.856		0.856
Item 28	<—		0.047	0.847	<0.001	0.847
Item 29	<—		0.052	0.876	<0.001	0.876

SE: Standard Error; CR: Critical Ratio.

Table 3. Correlation between the LIOA and the UCLA loneliness scale.

Loneliness inventory for older adults		UCLA loneliness scale
LIOA total	r	0.659**
	p	0.000
Decreased social capacity	r	0.480**
	p	0.000
Disappointment and uselessness	r	0.497**
	p	0.000
Psychological suffering	r	0.548**
	p	0.000
Experiencing loneliness at certain times	r	0.424**
	p	0.000
Inefficient interactions	r	0.429**
	p	0.000

** <0.001; Pearson correlation analysis.

Discussion

The growing elderly population, together with the fact that advanced age is a significant risk factor for loneliness, underscores the need for comprehensive measurement tools that address the specific needs of older adults and capture the multidimensional nature of loneliness (Bandari et al., 2022; Wang et al., 2022). In this context, the present study aimed to adapt the LIOA into Turkish and to evaluate its psychometric properties within a primary-care setting.

Table 4. Reliability analysis of the Turkish version of the LIOA.

Items	Item-total correlation	α if item deleted	Alpha coefficient
F1: Decreased social capacity			0.949
Item 1	0.721	0.948	
Item 2	0.643	0.949	
Item 3	0.598	0.949	
Item 4	0.564	0.949	
Item 5	0.627	0.949	
Item 6	0.605	0.949	
Item 7	0.639	0.949	
F2: Disappointment and uselessness			0.943
Item 8	0.595	0.949	
Item 9	0.560	0.950	
Item 10	0.723	0.948	
Item 11	0.551	0.950	
Item 12	0.569	0.949	
Item 13	0.643	0.949	
Item 14	0.578	0.949	
F3: Psychological suffering			0.950
Item 15	0.675	0.948	
Item 16	0.694	0.948	
Item 17	0.691	0.948	
Item 18	0.725	0.948	
Item 19	0.669	0.949	
Item 20	0.661	0.949	
Item 21	0.668	0.949	
Item 22	0.656	0.949	
F4: Experiencing loneliness at certain times			0.906
Item 23	0.592	0.949	
Item 24	0.494	0.950	
Item 25	0.504	0.950	
Item 26	0.526	0.950	
F5: Inefficient interactions			0.894
Item 27	0.527	0.950	
Item 28	0.592	0.949	
Item 29	0.581	0.949	

Table 5. Test-retest reliability.

Scale	ICC	p-value
Loneliness Inventory for Older Adults	0.973	<0.001
Decreased social capacity	0.964	<0.001
Disappointment and uselessness	0.971	<0.001
Psychological suffering	0.956	<0.001
Experiencing loneliness at certain times	0.963	<0.001
Inefficient interactions	0.966	<0.001

ICC: Intraclass Correlation Coefficient.

Validity analysis

Various forms of validity – including content, face, construct, known-groups, and concurrent validity – are essential for evaluating the quality and adequacy of a measurement tool (Alpar, 2022; Mohajan, 2017). Content validity is a critical component in determining whether a measurement tool adequately represents the construct it is intended to assess (Erdoğan et al., 2020; Yusoff, 2019). According to established criteria, I-CVI values ≥0.78 and S-CVI values ≥0.90 indicate excellent content validity (Polit & Beck, 2006; Yusoff, 2019). In the present study, the perfect I-CVI and S-CVI values obtained using the Davis technique provide strong evidence for the adequacy, clarity, and cultural relevance of the Turkish version of the LIOA. This high level of expert agreement supports the appropriateness of the translation and adaptation process and indicates that the scale items accurately reflect the intended construct. Furthermore, these findings are consistent with those

reported in the original Iranian version and the Chinese adaptation of the LIOA, suggesting that the conceptual structure of the scale has been preserved across different cultural contexts (Bandari et al., 2022; Wang et al., 2022). In addition, face validity was supported through a pilot study in which older adults reported that the items were clear, understandable, and culturally appropriate.

Construct validity was evaluated using confirmatory factor analysis (CFA), which is recommended in scale adaptation studies when a predefined theoretical model exists (Erdoğan et al., 2020; Seçer, 2018). To establish construct validity, specific criteria for model fit must be met: a χ^2/df ratio between 0 and 3, SRMR between 0 and 0.08, and RMSEA between 0 and 0.05 indicate a good fit. Additionally, values between 0.95 and 1.00 for GFI, NFI, CFI, IFI, and TLI also indicate a well-fitting model (Field, 2024; Hu & Bentler, 1999; Tabachnick & Fidel, 2019). The CFA results demonstrated excellent model fit for most indices (χ^2/df = 1.564; CFI = 0.978; IFI = 0.978; TLI = 0.976; RMSEA = 0.038; SRMR = 0.039) and acceptable fit for GFI (0.908) and NFI (0.943). These findings confirm the validity of the Turkish LIOA's five-factor, 29-item structure. Notably, the fit indices obtained in this study were higher than those reported in the Chinese version, which may reflect cultural or linguistic influences on item interpretation (Wang et al., 2022). Moreover, item factor loadings ranged from 0.794 to 0.903, exceeding the commonly accepted threshold of 0.70 for excellent loadings (Alpar, 2022) and surpassing those reported in the Iranian and Chinese versions (Bandari et al., 2022; Wang et al., 2022). These results further support the robustness of the factor structure in the Turkish context. In addition, the scale's ability to distinguish effectively between individuals with low and high levels of loneliness provides further evidence of its strong psychometric properties and sensitivity (Tavşancıl, 2019).

In Turkish society, strong family ties, intergenerational solidarity, and culturally defined social roles play an important role in shaping older adults' experiences and perceptions of loneliness (Akgül & Yeşilyaprak, 2015; Arun & Holdsworth, 2018). Although co-residence with family members is relatively common, changes in family structure, urbanization, and the migration of younger generations may reduce emotional support and contribute to feelings of loneliness in later life. Additionally, role loss following retirement and decreased social participation may further intensify loneliness as a multidimensional experience that extends beyond social isolation (Arun & Holdsworth, 2018). These cultural and social characteristics were taken into account during the translation and adaptation process by prioritizing conceptual and cultural equivalence over literal translation, thereby ensuring that the scale items adequately reflect the lived experiences of older adults in the Turkish context.

Concurrent validity was examined by assessing the relationship between the Turkish LIOA and the UCLA Loneliness Scale. Based on a priori expectations, moderate to strong correlations were anticipated between the LIOA dimensions and the UCLA Loneliness Scale, reflecting related but non-identical constructs. A strong positive correlation was observed between the LIOA total score and the UCLA Loneliness Scale, consistent with findings from the Iranian and Chinese versions (Bandari et al., 2022; Wang et al., 2022). This result supports the criterion validity of the Turkish version of the LIOA and its applicability across different cultural contexts. In contrast, correlations between the LIOA subscales and the UCLA Loneliness Scale were of moderate magnitude, supporting convergent validity while also indicating that the LIOA captures related yet distinct dimensions of loneliness beyond a single global loneliness score.

Reliability analysis

Reliability refers to a measurement tool's ability to produce consistent and stable results. In this study, reliability was evaluated through internal consistency and invariance. Internal consistency assesses whether all items in a scale measure the same construct (Erdoğan et al., 2020; Mohajan, 2017). In this study, both Cronbach's alpha and item-total correlation methods were used to evaluate the internal consistency of the LIOA. Based on established criteria, a Cronbach's alpha between 0.00–0.40 is considered unreliable, 0.40–0.60 indicates low reliability, 0.60–0.80 suggests adequate reliability, and 0.80–1.00 is classified as high reliability (Alpar, 2022; Tavşancıl, 2019). The Cronbach's alpha for the LIOA in this study was 0.951, indicating high reliability. This result is consistent with the original

Iranian version (0.94) and the Chinese version (0.89), both of which also demonstrate high reliability (Bandari et al., 2022; Wang et al., 2022).

Item-total correlation reliability measures the consistency between individual items and the overall scale structure. A coefficient of ≥0.40 indicates adequate correlation and strong internal consistency (Erdoğan et al., 2020; Field, 2024). In this study, item-total correlations ranged from 0.494 to 0.725. Similarly, the original Iranian version and the Chinese adaptation also reported item-total correlations above 0.40 (Bandari et al., 2022; Wang et al., 2022). These results confirm that the LIOA is a reliable tool across diverse cultural and linguistic contexts.

Temporal stability, defined as a tool's ability to provide consistent results over time, was assessed using a test-retest reliability analysis. This method evaluates the consistency of scores from the same participants at two different time points (Hajjar, 2018; Mohajan, 2017). The recommended time gap between measurements is two to four weeks, with at least 30 data pairs (Tavşancıl, 2019). In this study, the LIOA was administered to 52 older adults with a two-week interval, yielding an ICC of 0.973. The Iranian (Bandari et al., 2022) and Chinese (Wang et al., 2022) versions also reported ICC values ≥0.80, supporting the tool's stability and consistency over time.

Limitations

This study was conducted with older adults attending a single family health center in southern Turkey, which may limit the generalizability of the findings to the broader older population in Turkey. In addition, participation was voluntary and data were collected anonymously; however, social desirability bias may have influenced participants' responses, as some individuals may have tended to provide answers consistent with perceived social expectations. Although maximum likelihood estimation was considered appropriate based on distributional assumptions, further research may also employ robust or ordinal estimators (e.g., WLSMV or robust ML with polychoric correlations) to assess the stability of the factor structure. Furthermore, while known-groups validity provided supportive evidence in the present study, future research may evaluate discriminant validity in the factor-analytic sense using indices such as HTMT ratios or AVE-based criteria. Additionally, ethnicity, language, and religious affiliation were not assessed in the current study, which should be considered a limitation. Accordingly, future research with larger and more heterogeneous samples may examine potential group differences and test measurement invariance across diverse subgroups within the Turkish population.

Conclusion

The Turkish version of the LIOA, comprising five dimensions and 29 items, was found to be a valid and reliable measurement tool for assessing loneliness among older adults. In the context of primary care, LIOA scores should be interpreted as indicative rather than diagnostic; higher total and subscale scores signal increased levels of loneliness and may indicate the need for further psychosocial assessment. In clinical practice, the LIOA may serve as a screening and monitoring tool, guiding healthcare professionals in identifying older adults at risk of loneliness and informing appropriate supportive interventions or referrals. To enhance the generalizability and applicability of the findings, future research is recommended to include older adult populations from diverse age groups and living environments, such as nursing homes, home care settings, and other healthcare facilities. Overall, the LIOA has the potential to serve as a valuable reference instrument in both research and clinical settings, supporting the development and evaluation of intervention programs aimed at reducing loneliness among older adults.

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Data availability statement

Data are available upon reasonable request, by sending an e-mail to the corresponding author.

Ethical statement

This study received approval from the Health Sciences Non-Interventional Research Ethics Committee of Bandirma Onyedi Eylul University (IRB approval number: February 26, 2024/675). Institutional permission was granted by the Hatay Provincial Health Directorate (decision date: April 24, 2024).

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