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Psychometric evaluation of the shorter version of expectation regarding aging instrument (ERA-12-Persian) among older adults in Iran

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Abstract

Background Aging perceptions and expectations influence health behaviors and outcomes in older adults. The Expectations Regarding Aging (ERA-12) instrument has been validated in Western populations, but limited studies have examined its psychometric properties in Asian contexts. As Iran faces rapid demographic aging, there is a need for culturally appropriate tools to assess aging expectations. This study aims to evaluate the psychometric properties of the Persian version of the ERA-12 among older adults in Iran.

Methods Convenience sampling method was used to collect data of 302 older adults in Iran. Psychometric properties of the ERA-12 were evaluated. Validity and reliability tests using exploratory and confirmatory factor analysis were conducted. Cronbach's alpha (α), and McDonald's Omega (Ω) Coefficient as measures of internal consistency was used to evaluate the reliability of the Persian version of ERA-12.

Results Confirmatory factor analysis (CFA) confirmed the three-factor structure of the ERA-12-Persian scale, explaining 71.99% of the total variance. Model fit indices indicated a good fit (CFI = 0.930, RMSEA = 0.096, SRMR = 0.032). Internal consistency was strong, with Cronbach's alpha values ranging from 0.728 to 0.865. Additionally, convergent and discriminant validity were established, supporting the scale's construct validity.

Conclusions The validated ERA-12-Persian scale provides healthcare providers in Iran with a reliable tool to assess aging expectations across physical, mental, and cognitive domains. This instrument enables both the development of culturally-appropriate interventions and comparative studies of aging perceptions between Iranian older adults and other populations.

Keywords Psychometrics, Expectation regarding aging, Older people, Aging, Iran

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Introduction

The world's population is aging which is influencing how societies structure their healthcare, plan their economies, and support their older citizens. By 2050, the population aged 65 and older will reach 1.5 billion globally, with regions like Iran experiencing a rapidly aging population. Understanding how people perceive and anticipate aging has become increasingly important as societies adapt to longer life expectancies [1].

Aging has traditionally been associated with physical and functional decline. However, research shows that older adults experience aging in markedly different ways [2]. Healthcare professionals and researchers are increasingly focused on proactive factors that promote successful aging, reflecting a broader shift endorsed by the World Health Organization and their emphasis on prevention, especially in relation tomental health and well-being [3]. Given that aging perceptions and expectations significantly influence health behaviors and subsequently, physical and mentalhealth outcomes [1], such perceptions are crucial in the develoment ofe strategies to promote healthy aging [4].

Expectation regarding ageing (ERA) is a psychological measure focusing on beliefs about preserving strong physical and mental abilities later in life. Research indicates that ERA among older age groups aligns with stronger treatment adherence, more frequent engagement in preventive routines, and reduced healthcare expenses [5, 6].

The original ERA-38 instrument consists of 38 items and is divided into 11 subscales including: [7]. The shorter version of ERA has 12 items and comprises three factors: physical health, mental health and cognitive function [8]. The short version is expected to function in the same way as the 38-item ERA and is also used to measure the relationship between expectations of ageing, health behaviors and outcomes [6]. Although different versions of the ERA scale (i.e., ERA-38 and ERA-12) have been validated in Western cultures, particularly in the United States [6, 7, 9, 10], limited studies have examined ERA-12 in Asian populations. Among these, Sarkisian et al. (2005) conducted the first validation study of ERA-12 in the U.S., confirming its three-factor structure (physical health, mental health, and cognitive function) with high internal consistency (Cronbach's $\alpha > 0.70$ for all subscales) [11]. A subsequent validation study in Singapore tested ERA-12 among middle-aged adults (ages 45–65), demonstrating acceptable factor structure and internal reliability, though with slightly lower Cronbach's alpha values compared to Western samples [4]. Another study in Korea examined ERA among older adults but primarily focused on cultural differences in aging expectations rather than psychometric validation [4]. These findings demonstrated a need for additional cross-cultural validation, particularly in homogeneous Asian populations. Given Iran's distinct socio-cultural and demographic characteristics, validating ERA-12 in this context is important for ensuring the scale's applicability in an Iranian context.

Despite the growing body of research on aging in Iran, no study, to the authors' knowledge, has psychometrically evaluated the Expectations Regarding Aging (ERA-12) scale in Iran. Given Iran's rapidly aging population and the increasing need for effective interventions and policies, validating a culturally appropriate tool to assess aging expectations is essential. As such, the aim of this study is to test the psychometric properties of the ERA-12 scale in Iran. Specifically, this study aims to adapt and validate a Persian version of the ERA-12.

Materials and methods

Population and settings

The sample for this study consisted of 302 older adults aged 60 years or older living in Tehran and Qazvin, Iran. A convenience sampling method was used for data collection. One of the authors (A.Y) went to the public places (i.e. parks, mosques, et cetera) and described the aim of the study to potential participants. Data collection took place in 2018 between April and August. Eligible participants were adults aged 60 or older who were fully oriented to time and place and able to communicate and complete the questionnaire. Following the recommended guideline that a sample of at least 200 participants is sufficient for factor analysis [12], 325 older adults were invited to participate, with 304 consenting. After excluding two incomplete questionnaires due to missing data, the final sample comprised 302 participants, yielding a response rate of 99%.

Measures

Participants completed a questionnaire that included ERA-12 as well as demographic information. The demographic information contained participants' age, gender, educational and socioeconomic status, marital status, and main income sources. The shorter version of ERA was used for assessing expectation regarding aging. The ERA-12 is a 12-item, self-administered questionnaire, which was developed to measure three domains of expectations about ageing: physical health (four items), mental health (four items) and cognitive function (four items). It uses 4-point Likert scales for responses: [1] definitely true [2], somewhat true [3], somewhat false and [4] definitely false. Possible scores range from 0 to 100, with higher scores indicating that older people expect to maintain higher levels of physical health, mental health and cognitive function with age.

Written permission to use the ERA-12 was obtained from its developer, Dr. Sarkisian. The World Health Organization protocol was used to translate the ERA into

Persian [13]. We employed a forward-backward translation technique for translating the scale from English into Persian. Thus, two English-Persian translators were invited to independently translate the ERA. An expert panel, consisting of one of the authors in this current project as well as two translators, assessed and unified the two translations and constructed a single Persian translation of ERA. Thereafter, a Persian-English translator was asked to back-translate the Persian ERA into English. This English version (back-translated from Persian) of the ERA was sent to Dr. Sarkisian. Dr. Sarkisian confirmed the accuracy of the translations and their similarity to the original English version of the ERA.

Psychometric properties of the ERA-12-Persian scale

In order to assess the psychometric properties of the ERA-12 scale, validity and reliability tests were conducted.

Construct validity assessment

To examine the psychometric properties of the ERA, we performed (i) exploratory factor analysis (EFA), (ii) confirmatory factor analysis (CFA) and (iii) assessed reliability, convergent validity and discriminant validity [14]. EFA and CFA was analyzed using SPSS-22 and Analysis of Moment Structure (AMOS) software version 21, respectively. We applied EFA with Maximum Likelihood (ML) method and Promax rotational procedures. The Kaiser–Meyer–Olkin (KMO) and Bartlett's test of sphericity were used to check the appropriateness of the sample to conduct the factor analysis. Factor extraction was based on: (i) Eigenvalues > 1; (ii) communalities > 0.3, and; (iii) Scree plots [15–17]. The results obtained from EFA were confirmed by CFA and examination of the following output: Chi-square (χ^2) test, Chi-square/degree of freedom ratio (normalized chi-square CMIN/DF), Goodness-of-fit index (GFI) > 0.95, Comparative Fit Index (CFI) > 0.90, Incremental Fit Index (IFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Relative Fit Index (RFI), Root Mean Square Error of Approximation (RMSEA) 0.05 – 0.10 moderate, and Standardized Root Mean Square Residual (SRMR) < 0.09 [18].

Average variance extracted (AVE), maximum shared squared variance (MSV) and average shared square variance (ASV) were estimated to assess the convergent and discriminant validity of the extracted ERA factors. To establish convergent validity (i) AVE should be greater than 0.5 and (ii) construct reliability should be greater than AVE. To meet the discriminant validity criteria, both MSV and ASV should be less than the value of AVE [19–21].

Reliability assessment

Cronbach's alpha (α), and McDonald's Omega (Ω) Coefficient as measures of internal consistency was used to evaluate the reliability of the Persian version of ERA-12. A value of 0.7 or greater implies satisfactory reliability [21]. n multi-factor instruments, internal consistency can be evaluated across multiple dimensions. Since alpha tends to decrease as multidimensionality increases [22], it may not always be the most reliable estimator. In cases of heterogeneity, McDonald's omega, derived from exploratory factor analysis, provides a more appropriate measure of internal consistency [23].

Construct reliability of the extracted factors was assessed using Hair et al.'s (2019) criteria, where a construct reliability (CR) value greater than 0.7 indicates good reliability [24].

Multivariate normality and outliers

Normality was assessed at both the univariate and multivariate levels. Univariate distributions were examined for outliers, skewness, and kurtosis. Multivariate normality was evaluated using Mardia's coefficient of multivariate kurtosis, with values exceeding 8 indicating a violation of normality assumptions [25]. Multivariate outliers were assessed using Mahalanobis distance ($p < .001$), with no significant outliers detected [26, 27].

Results

Sample characteristics

A total of 302 older adults participated in this study, with a mean age of 67.75 ± 6.59 years. Most participants were male (60.3%), and 85.4% were married. The participants had varying educational backgrounds, with 41.1% holding a diploma and 13.2% having college-level education. The main income source for most participants was from a pension (53.6%), while 21.2% relied on personal income. Table 1 presents a detailed summary of the demographic characteristics of the participants.

The results of psychometric assessment of the ERA-12-Persian Scale are reported in Table 2. The factor structure of the ERA-12-Persian Scale was assessed using EFA. The KMO was 0.809, and the Bartlett's test of sphericity was significant ($\chi^2 = 1669.17$, $p < .001$). Using eigenvalue greater than one and scree plot criteria (see Fig. 1), three factors were extracted which explained 71.99% of the total cumulative variance.

The results of test using maximum likelihood CFA confirmed the factor structure obtained from EFA. Goodness-of-fit index supported the appropriateness of the first-order model of ERA-12-Persian Scale, as shown in Table 3. Following the modification indices, to improve the model fit, the measurement errors of the 1st and 4th items, the 9th and 10th items, as well as the 11th and 12th items were allowed to covary. According to the final

Table 1 Demographic profiles of respondents

Variables	*N* (%) or Mean (SD)	Variables	*N* (%) or Mean (SD)
Sex		***Socio-economic Status***	
Male	182 (60.3%)	Low	30 (9.9%)
Female	120 (39.7%)	Average	254 (84.1%)
Age	67.75 (6.59)	High	18 (6%)
Marital Status		***Main Income source***	
Single	6 (2%)	Personal	64 (21.2%)
Married	258 (85.4%)	Family	76 (25.2%)
Divorced	5 (1.7%)	Pension	162 (53.6%)
Widowed	33 (10.9%)	***Relative Visiting***	
Education Completed		yes	269 (89.1%)
Low/limited literacy	14 (4.6%)	no	33 (10.9%)
Elementary	58 (19.2%)	***Social support (0–10)***	3.93 (2.22)
Junior	66 (21.9%)	***Religious belief (0–10)***	7.01 (2.85)
Diploma	124 (41.1%)		
Collegiate	40 (13.2%)		

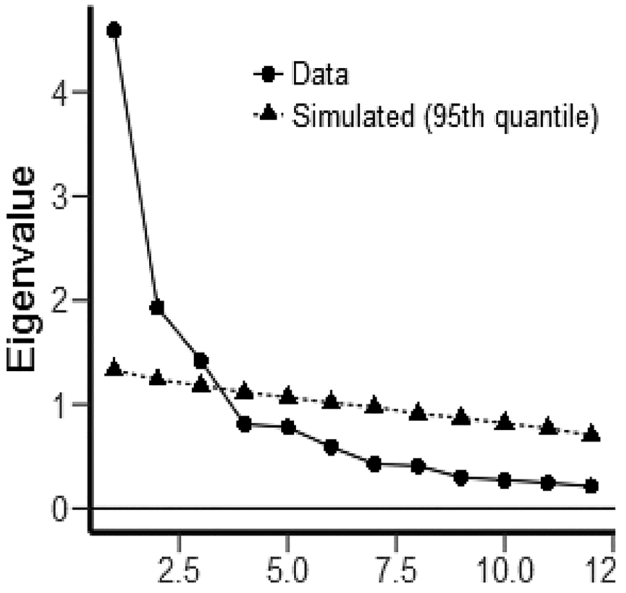

Fig. 1 Scree plot of conducting EFA

model of ERA-12 items, there is a link between measurement errors of items 1st and 4th (e4, e3), 11th and 12th (e5, e7), and 9th and 10th (e6, e8). Correlated measurement error arises from the situation when variables have not been recognized clearly or not measured openly [28]. Self-reported measurement method may cause measurement errors. Conversely, measurement errors can be the consequence of using similar words and expressions in both positive and negative statements [29]. Correlated measurement error can be used as a scale reduction technique to finalize and then confirm final structural scale [22].

The model fit indices suggested a good fit evidenced by several model fit indexes [$\chi^2(38) = 143.64$, $p < .001$, $\chi^2/df = 3.780$, comparative fit index (CFI) = 0.930, incremental fit index (IFI) = 0.931, Tucker–Lewis Index (TLI) = 0.899, normed fit index (NFI) = 0.909, relative fit index (RFI) = 0.868, standardized root mean square

Table 2 The results of psychometric assessment of the ERA-12-Persian scale

Factor	Items	Factor Loading	h^2	λ	Variance
Physical Health	3. Having more aches and pains is an accepted part of ageing.	0.909	0.794	3.26	27.16%
	2. The human body is like a car: when it gets old, it gets worn out	0.836	0.732		
	4. Every year that people live, their energy levels go down a little more	0.811	0.644		
	1. When people get older, they need to lower their expectations of how healthy they can be.	0.565	0.405		
Cognitive Function	11. Forgetfulness is just a natural occurrence just from growing old	0.925	0.807	3.00	25.00%
	10. It's an expected part of ageing to have trouble remembering names	0.740	0.547		
	12. It is impossible to escape the mental slowness that happens with ageing.	0.621	0.412		
	9. I expect that as I get older I will become more forgetful	0.528	0.511		
Mental Health	8. It is normal to be depressed when people get old.	0.653	0.633	2.38	19.83%
	5. I expect that as I get older I will spend less time with friends and family	0.596	0.317		
	6. Being lonely is just something that happens when people gets old.	0.555	0.390		
	7. As people get older, they worry more.	0.508	0.461		

h^2: Communalities, λ: Eigenvalue

Table 3 Goodness of fit index of CFA of ERA-12-Persian scale

Goodness of fit Index of CFA*	χ^2	df	*P*-value	CMIN/DF	RMSEA	PCFI	PNFI	AGFI	IFI	CFI
After modification indices	143.64	38	< 0.001	3.78	0.096	0.643	0.628	0.862	0.931	0.930

*: Acceptable index rate PNFI, PCFI, AGFI (> 0.5), CFI, IFI (> 0.9), RMSEA (> 0.08), CMIN/DF (good > 3, acceptable > 5)

CMIN/DF: Minimum Discrepancy Function by Degrees of Freedom divided/ RMSEA: Root Mean Square Error of Approximation/ PCFI: Parsimonious Comparative Fit Index/ PNFI: Parsimonious Normed Fit Index/ AGFI: Adjusted Goodness of Fit Index/ IFI: incremental fit index/ CFI: Comparative of Fit Index

residual (SRMR) = 0.032, Adjusted Goodness of Fit Index (AGFI) = 0.862, and root mean square error of approximation (RMSEA) = 0.096]. Figure 2 shows the final model. These results show good model fit.

Internal consistency and composite reliability greater than 0.7 indicated good internal consistency and construct reliability, respectively. Moreover, AVE was greater than 0.5 and both MSV and ASV were less than their respective AVE that established convergent and discriminant validity, respectively (Table 4).

Discussion

The present study aimed to test the psychometric properties of the Persian version of the Expectation Regarding Aging (ERA-12) in older adults living in Iran. Previous studies have examined the scale in Singapore and in Korea, though the latter did not focus on psychometric validation [11]. The findings of the present validation study confirm that the ERA-12-Persian scale demonstrates strong psychometric properties for older adults in Iran

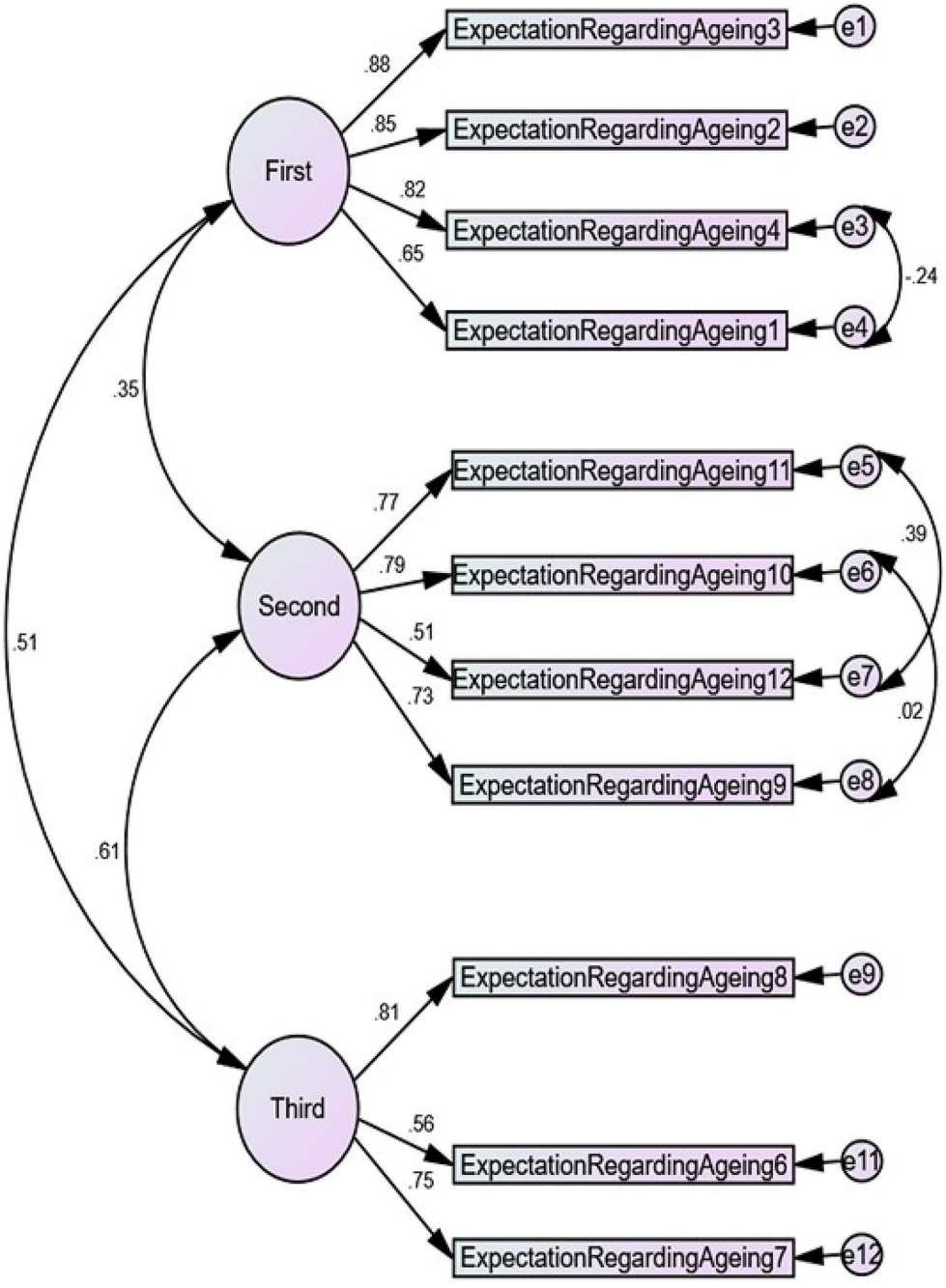

Fig. 2 The results of conducting CFA

Table 4 Convergent and divergent Validity, internal Consistency, and construct reliability of ERA-12-Persian scale

Index Factor	α (CI95)	Ω	CR	AVE	MSV	ASV
Physical Health	0.865 (0.838;0.888)	0.871	0.878	0.645	0.263	0.192
Cognitive Function	0.797 (0.772-0.842)	0.810	0.797	0.501	0.367	0.244
Mental Health	0.728 (0.674;0.775)	0.745	0.752	0.508	0.367	0.315

α: Cronbach's alpha coefficients, Ω: McDonald's Omega Coefficient, CR: Construct Reliability, AVE: Average Variance Extracted, MSV: Maximum Shared Squared Variance

The results of this study produced three 4-item factors, as found in the original scale [9]. The factors explained 71.99% of the variance in the ERA-12 total score. The items loaded on the subscales are consistent with those in the original study, except that Factor 2 (cognitive function) in this study corresponds to Factor 3 in the original ERA-12. This factor accounted for 25% of the total variance and may reflect cultural beliefs in Asian populations, particularly the expectation that cognitive functioning declines with age [30]. This is notable, as a fatalistic outlook can shape one's perspective on life and, in this case, influence expectations about ageing.

The item loadings in this study were consistent with those reported by Sarkisian et al. (2005), with similar correlational coefficients between each item and its corresponding factor. An exception was the item *"Forgetfulness is just a natural occurrence from growing old,"* which had a higher factor loading in this study (0.925) compared to Sarkisian et al. (2005) (0.74) [14]. The Cronbach's alpha for this factor was 0.79 in the present study, slightly lower than the 0.81 reported by Sarkisian et al. (2005) but higher than the 0.68 found in a middle-aged Singaporean sample [9].

The variance explained in this study was lower than the 0.88 reported by Sarkisian et al. (2005) but exceeded that observed in Joshi et al. (2010) in a sample of middle-aged Singaporeans. The first extracted factor, labeled Physical Health (PH), aligns with the structure identified by Sarkisian et al. (2015). The item *"When people get older, they need to lower their expectations of how healthy they can be"* had the same factor loading (0.56) as reported by Sarkisian et al. (2005). The remaining three items in this factor exhibited higher loadings in this study compared to those reported by Sarkisian et al. (2005). This factor accounted for 27.16% of the total variance. The Cronbach's alpha for this factor was 0.865, exceeding the 0.79 reported by Sarkisian et al. and the 0.62 found in Joshi et al. (2010) for middle-aged Singaporeans.

Factor 3, labeled Mental Health (MH), accounted for 19.83% of the total variance and retained the same item structure as Factor 2 in the original ERA-12 scale [14]. The factor loadings were similar across studies. The Cronbach's alpha for this subscale was 0.728 in the present study, compared to 0.75 in the original ERA-12 study and 0.61 in the Singaporean middle-aged sample.

In addition to factor structure and reliability, the ERA-12-Persian scale was assessed for convergent and discriminant validity. Convergent validity was supported by an average variance extracted (AVE) greater than 0.5 across all factors, indicating that each factor effectively represents its intended construct. Construct reliability (CR) exceeded AVE, further confirming the internal consistency of the scale. Discriminant validity was established, as both maximum shared variance (MSV) and average shared variance (ASV) were lower than their respective AVE values, demonstrating that the factors are distinct and not excessively correlated. These findings strengthen the evidence that the ERA-12-Persian scale is a reliable and valid measure of expectations regarding aging in Iranian older adults.

Sarkisian et al. (2005) proposed that the ERA-12 instrument measures expectations regarding age-related changes across various health domains, rather than categorizing attitudes toward ageing as simply positive or negative [11]. For instance, the item *"Forgetfulness is just a natural occurrence from growing old"* had a high loading (0.925) on Factor 2 (Cognitive Functioning), highlighting the need for further investigation into the interplay between attitudes and expectations. Specifically, research should examine whether expectations regarding ageing function as independent, mediating, or outcome variables in relation to attitudes and health behaviours among older adults. Understanding expectations about ageing may offer critical insights into the mechanisms through which attitudes toward ageing influence health outcomes [31], and conversely, how attitudes shape expectations, ultimately affecting a range of factors including physical health and subjective wellbeing.

Limitations

This study has some limitations. It did not include additional variables that could have been used to assess the scale's nomological validity, as done in Joshi et al. (2010) [4] and the original ERA-12 validation study [9]. Moreover, the use of convenience sampling limits the generalisability of the findings to the broader Iranian population, despite data being collected from two major cities, including the capital, Tehran.

Future directions

Future research should include cross-cultural studies to compare expectations of ageing and their associations with health outcomes. Longitudinal studies can track changes in these expectations over time, providing insights that inform the development and evaluation of interventions aimed at fostering more positive views on ageing. Further exploration of the mechanisms linking expectations, attitudes, and health is essential, requiring multidisciplinary collaboration to deepen understanding and enhance evidence-based approaches.

Implications

Researchers can use the ERA-12 Persian to study aging expectations among Persian-speaking older adults and investigate the relationship between expectations, attitudes, and health behaviors. Policymakers can utilize the findings to develop targeted interventions and programs addressing the specific expectations and needs of older adults in different cultural contexts, particularly Iran. Healthcare professionals can employ the ERA-12-Persian scale to assess patients' aging expectations, informing personalized care plans and interventions. Taken together, considering cultural and social factors in understanding aging expectations can lead to more effective strategies for promoting healthy aging in older adults.

Conclusions

The ERA-12-Persian scale demonstrates good psychometric properties and is a valid measure of aging expectations among older adults living in Iran. The scale reflects the influence of age-related cultural beliefs on expectations of ageing, with cognitive decline emerging as a prominent expectation among Asian populations. Investigating the relationship between ageing expectations, attitudes, and health behaviours will be an important future undertaking for understanding how these factors shape various outcomes for older adults.

Abbreviations

ERA	Expectation Regarding Aging
WHO	World Health Organization
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
AMOS	Analysis of Moment Structure
ML	Maximum Likelihood
KMO	Kaiser–Meyer–Olkin
GFI	Goodness-of-fit index
CFI	Comparative Fit Index
IFI	Incremental Fit Index
NFI	Normed Fit Index
TLI	Tucker-Lewis Index
RFI	Relative Fit Index
RMSEA	Root Mean Square Error of Approximation
SRMR	Standardized Root Mean Square Residual
AVE	Average variance extracted
MSV	Maximum shared squared variance
ASV	Average shared square variance (ASV)

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Author contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Motahareh Bagheri, Morteza Shamsizadeh and Ameneh Yaghoobzadeh. The first draft of the manuscript was written by Ameneh Yaghoobzadeh and Kelly-Ann Allen and all authors critically reviewed all versions of the manuscript. All authors read and approved the final manuscript.

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Data availability

Available data are presented in the manuscript.

Declarations

Ethics approval and consent to participate

The study was approved by Hamedan University's Medical Sciences Ethics Committee (IR.UMSHA.REC.1400.894). In accordance with the Declaration of Helsinki, participants were informed about the study aims and procedures (e.g., that participation was voluntary and wouldn't affect medical care) before signing an informed consent document. All personal data were de-identified by assigning codes to the participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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