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Cultural Adaption and Psychometric Properties of Chinese Version of 12 Item Expectations Regarding Aging Scale

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Abstract

Objective: This study evaluated the psychometric property of the Chinese version of the 12-item Expectations Regarding Aging Scale (C-ERA) in China. Method: The C-ERA was finalized after forward-translation, back translation, synthesis, pilot testing, and expert panel. A convenient sample of 458 community dwellers was used. The reliability and validity were investigated using content validity, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), Split-half Reliability, Item Analysis, Convergent Validity and discriminant validity. Results: The content validity index at item level was 0.831. The overall Cronbach's α coefficient of the scale is 0.953 and split-half reliability is 0.904 and 0.933 respectively. Three factors were extracted by EFA and the cumulative variance contribution rate is 84.24%, demonstrating an acceptable model fit confirmed by CFA. Convergent validity and discriminant validity were acceptable except physical health dimension. Conclusion: The psychometric properties of the C-ERA were confirmed and provided evidence for expectations regarding aging assessment.

Key words: elders; psychometric property; validity; reliability; expectations regarding aging

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簡版中文老化期望量表的跨文化調試和信效度檢驗

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摘要

目的：引進簡版老化期望量表（Expectations Regarding Aging Scale，ERA）並對其中文版進行心理學測量標準評價。方法：依據健康照護領域跨文化量表翻譯指南，原版老化期望量表經過前譯、後譯、合成、預實驗和專家諮詢法等形成最終中文簡版老化期望量表。依便利抽取中國唐山社區老人 458 名，運用探索性因子分析和驗證性因子分析方法檢驗簡版量表的信度與效度。 結果：中文簡版老化期望量表內容效度指數爲 0.831。量表的整體 Cronbach α 係數爲 0.953，分半信度分別爲 0.904 和 0.933。 驗證性因子分析中提取了三個因子，累積方差貢獻率爲 84.24%，該模型擬合良好。除身體健康維度外，收斂效度和區分效度均在可接受範圍內。結論：中文簡版老化期望量表信度與效度良好，可用於評估中國老年人老化期望情況。

關鍵詞：老年人；心理學測量；信度；效度；老化期望

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Introduction

The low levels of fertility rates and expanded life expectancy have made the global population inevitably age(Joshi et al., 2010). China, as a population giant, leads world regions both in the aging speed and the size of the older people which almost comprise a quarter of the world's elderly population, reaching 348.8 million older individuals in 2050(He et al., 2016). Burdened by increasingly aging-related physical and psychological disorders, the country, however, is not entirely prepared to address the difficulties of the health care system(Harper, 2014). Thus, more concern should be given to the aging research in rapidly aging China compared with Europe that is still struggling after spending more than 100 years preparing for the challenge of population aging(Harper, 2014). Therefore, it is highly critical to urge everyone in society to actively contribute to healthy aging rather than passively relying on one-size-fits-all answers of the government (Heshmati, 2018).

Healthy aging is about maximizing psychological resources rather than only maintaining physical or mental health. Because of the improved medical management of morbidity, the lifestyle-changing of older adults may enhance overall health and longevity, but not their quality of life(Bowling & Iliffe, 2011). Only the psychological approach to healthy aging is found to be an independent predictor of quality of life at a later time(Bowling & Iliffe, 2011). Expectations Regarding Aging (ERA), as one of the psychological approaches, can be described as a physical and mental function level that people expect themselves or others to achieve and maintain as aging, indicating healthy aging expectations(Catherine A Sarkisian, Hays, & Berry, 2002).

An increasing number of studies have shown that it may not always be completely successful in encouraging older people to participate in health-promoting behavior, which makes healthy aging possible if they have a low ERA(Kim, 2007; Levy & Myers, 2004; Wurm et al., 2010; Yao J. J., 2019). When older adults attribute health problems to an expected part of aging, they are less likely to seek health care help and receive a physical examination, which may lead to their health deterioration and the failure of healthy aging(Meisner & Baker, 2013; Catherine A. Sarkisian, Hays, & Mangione, 2002). Compared with high aging expectations, the low aging expectations older adults have been reported having fewer friends in their later life(Josephine A. Menkin et al., 2017), feeling less generative, being in lower levels of perceived social support, and having higher loneliness, all of which may worsen their mental health(Moieni et al., 2021). It has also revealed that aging expectations are highly associated with trait mindfulness, which will be beneficial for improving the expectation of older adults(Fiocco & Meisner, 2020), functional health status(Li et al., 2013), and how long they want to live(Bowen & Skirbekk, 2017). The research in the medical setting has reported that the aging expectation of clinicians is linked to the quality of health care service delivered to older adults(M. M. Davis et al., 2011). A longitudinal study shows that, compared with younger adults who had lower expectations, the mood and aging expectations of older adults seem to be constant. This finding supports the significance of understanding the aging expectation of older people to improve the quality of their life to realize truly healthy aging.

In order to investigate the different conditions when people have low expectations regarding aging resulting in the delay of health care, the association among health

behaviors, health service usage, and future health outcomes, a valid instrument is needed to measure aging expectations among older people(C A Sarkisian, Prohaska, et al., 2005; Catherine A Sarkisian, Hays, & Berry, 2002). A number of empirical researchers have developed a reliable tool such as the Attitudes Toward Own Aging Scale. It was, however, considered unidimensional though easy to practice(Diehl et al., 2015). Also, some scales only can be used for older adults who have experienced aging and do not suitable for the younger individuals, which group should be measured and intervened earlier to promote healthy aging(Faudzi et al., 2019), for example, the Attitudes to Aging Questionnaire(Laidlaw et al., 2007). Some preferred ageism scales may benefit from improving the content validity like the Kogan's Attitude towards elderly scale, Aging perceptions questionnaire(Ayalon et al., 2019). A systematic review of the existing ageism scales has shown that the expectations regarding aging were the only one that satisfies the minimum psychometric requirement after evaluating 11 ageism scales out of106 studies. However, the cross-cultural validity is still needed to make it clear understandable(Ayalon et al., 2019).

The Expectation Regarding Aging Scales(Catherine A Sarkisian, Hays, & Berry, 2002) is originally a 38-item survey that was developed by Sarkisian et al. to measure the aging expectations of older adults in the USA. It consists of 10 subscales including appearance, urinary incontinence, fatigue, sleep, pain, sexual function, functional independence, mental health, cognitive function, general health, confirmed sound content validity, structural validity, and internal consistency(C A Sarkisian, Steers, et al., 2005; Catherine A Sarkisian, Hays, & Berry, 2002). In order to reduce the response burden of the participants and allow the researchers have substantial time to evaluate other health priorities, the team explored a short 12 items version belonging to 3 subscales. Both of the long and short version are multidimensional and can be used in the whole range of ages. It has also been proved to meet the needs of psychometric standards in the USA as well as Korea, Singapore, and Turkey (Beser et al., 2012; Joshi et al., 2010; Park & Kweon, 2014; C A Sarkisian, Steers, et al., 2005).

Since aging expectations are deeply rooted in cultural background and affected by self-related experience with older people(Levy, 2003). Considering the vital culture characters in China where older people were highly respected and young people are educated to show obedience to the older individuals since childhood unlike other developed countries youngsters are trained independence and aging is treated as negative among people (Vauclair CM Hanke K, 2017). In addition, the ERA scores were examined different among different ethnic(J A Menkin et al., 2017; C A Sarkisian et al., 2006). It is, therefore, highly necessary to check the validity and reliability of the ERA-12 scale in China to make it adapt to local culture. This study was conducted to evaluate the psychometric properties of the Chinese version ERA-12 (C-ERA) Scale.

Methods

Participants

The community-dwelling elders were recruited from Diaoyutai District in Tangshan using a convenience sampling method. We chose elders from the activity center of retired elders which is located in the Diaoyutai North Building community. The elders who can come to the activity center tend to much more healthy and can do exercises without help. So they usually have no cognitive impairment. The inclusion criteria went

as follows: 1, voluntarily to participate in after getting knowledge of the whole research process. 2, aged more than 60 years old.3, walk to the activity center without help. The exclusion criteria went to those who were refused to participate in the study. A sample of 30 participants was recruited for the pilot study where the sample size requirement is ideally 10-40(Beaton et al., 2000). Then a total of 458 elders were invited to participate in the study and they were divided into two parts. 130 of the participants were chosen to investigate the factorial structure of the scale through exploratory factor analysis (EFA) where requires at least 10 times the number of the parameters(Sousa & Rojjanasrirat, 2011). The other 328 elders were selected to confirm the result from the EFA using confirmatory factor analysis (CFA) where the minimum sample size requirement is 300(Sousa & Rojjanasrirat, 2011).

Ethical considerations

The researcher made the investigating process understandable to all participants who were then asked to sing written contents.

Procedure

Based on Sausa and other experts' guidelines for cross-cultural scale translation adaption of health care research, the original English version of the scale was translated into Chinese following standardized steps.

Step 1: Forward translation

The ERA scale copyright was obtained from Sarkisian through Email, who is the lead author of the original scale. Then the scale was translated by 2 independent translators, both of whom are bilingual, one medical English professor and one general English professor in the university.

Step 2: Synthesis I

The two translated scales in the form of instruction, items, and responses, were initially compared by a third translator who is also bilingual and knowledgeable about geriatric terms in order to check the ambiguities of words and sentences. Then, a research team composed of the three translators mentioned before and the investigator was formed to discuss the translated instrument to achieve consensus.

Step 3: Blind backward translation

The preliminary initial version was translated back into English by two other independent qualified translators, both of whom had never seen the original English version.

Step 4: Synthesis II

The two back-translated versions were reviewed by a multidisciplinary committee include four translators, the investigator mentioned before, a gerontology professor to evaluate the content, format, grammatical structure of the instruction, items, and responses.

Step 5: Pilot study and expert panel

A sample of 30 elders was recruited from the target population who went to the retired workers' activity center regularly in the community to investigate the clarity of the instrument. The participants were asked to rate the scale instruction, items, and response. If any one of the items was unclear, they were invited to provide suggestions to revise the statements. A six members of expert panel was also formed to verify the equivalence of the concept and content of the Chinese version scale. The 6 clinical experienced experts are knowledgeable about gerontology.

Instrument

The questionnaire is composed of two sections. One section captures the demographics of the participants that contain data related to age, gender, living conditions, education, chronic illness, and lifestyle. The other is the Chinese version ERA-12 scale which can be evaluated by self and others. The scale contains 12 items that reflect the overall aging expectation including 3 sub-scales with 4 items separately that measure expectation regarding physical health (PH), mental health (MH), and cognitive function (CF). The scale is scored by a 4-point Likert scale ranging from Definitely True to Definitely False, which indicates 1 to 4 points. The total original score is transferred to a score between 0–100 using an algorithm method. The scores of the ERA are assessed "high" vs "low "rather than "positive" vs "negative", or "right" vs "wrong"(C A Sarkisian, Steers, et al., 2005; Catherine A Sarkisian, Hays, & Berry, 2002). Higher scores show higher physical and mental functional achievement and maintenance expectation for self and others as aging. The Cronbach's alpha of the original ERA-12 scale was 0.79, 0.73 and 0.81 for the PH, MH, CF subscale, and 0.89 for the overall ERA-12.

Statistical analysis

The data analysis was carried out by statistical packages SPSS 22.0 and AMOS 23.0.

(1) Demographic data was calculated using descriptive statistics.

(2) Cronbach's, Spearman-Brown formula, and Split-half Reliability were used to assess internal consistency reliability of the ERA-12 when the statistically acceptable coefficient should not be lower than 0.7(Polit et al., 2007).

(3) Content validity index (CVI) was computed to evaluate content validity. The expert was asked to rate each item of the scale following content-related validity (relevance): 1 indicates that it is not relevant; 2 indicates that it is difficult to determine relevance; 3 indicates that it is relevant but need minor revision; 4 indicates that it is highly relevant and succinct. Item-CVI (I-CVI) and the Scale-level-CVI (S-CVI) were calculated to measure CVI. Lynn believes that the value of I-CVI should be no less than 0.78(Lynn, 1986). Taking into account the possibility of random selection by experts, the Kappa value should be calculated for random consistency correction which is calculated as K*. The evaluation standard of K* is:0.40-0.59 is fair, 0.60-0.74 is good, and greater than 0.74 is excellent(Taber, 2018). Universal Agreement (UA) among experts (S-CVI/UA) and the Average CVI (S-CVI/Ave) were computed to report S-CVI. Also, it is recommended that S-CVI/UA should not be less than 0.80(L. L. Davis, 1992),

while S-CVI/Ave should reach 0.90 (Zamanzadeh et al., 2015),indicating that the content validity of the scale is good.

(4) Critical ration method was used to make an Item Analysis. The total score of the scale was ranked ranging from low to high in order to choose the top 27% represents the low group and the last 27% represents the high group. The two groups were tested by an independent sample t-test to examine the discriminant of the scale. In order to check the problematic item of C-ERA scale, Pearson analysis was used to test the correlation between each item and the correlation between three subscales and overall scale , where the more absolute value of the correlation coefficient close to 1 indicates the stronger of the correlation(Schober et al., 2018).

(5) Exploratory factor analysis (EFA) was used to test the structure of C-ERA. Before conducting EFA, Bartlett's sphericity coefficient test was computed where $P<0.05$ is accepted and also Kaiser-Meyer-Olkin (KMO) test was done where the minimum acceptable value is 0.6(Sievers et al., 2014). Principal Component Analysis combing with promax rotation were used to analysis items of the scale where requires the factor loadings higher than 0.4, which needs to be combined with theoretical selection(Watkins, 2018).

(6) To evaluate the fit of the confirmatory factor analysis (CFA) on the same data, a CFA model was run using AMOS23.0. The model fit is sensitive to sample size when it tends to be a good fit if the sample is less than 200(Bentler, 1990), Nearly 30 years ago, Bollen and Long wrote: "the test statistics and fit indices are very beneficial, but they are no replacement for sound judgement and substantive expertise". while more than 300 elders were used in this study and also no golden rules for assessing the model fit, as a plethora of fit indices were output(Crowley & Fan, 1997).

This study chose to report some represent indices after reviewing several relative research(Boomsma, 2000; Hayduk et al., 2007; Hooper et al., n.d.; Markland, 2007). The requirements of the indicators of model fit as follows: $X2$ (Chi-square),which should be as high as 5(Wheaton et al., 1977), NFI(Hooper et al., n.d.), NFI (Normed Fit Index), which can be as low as 0.8, IFI (incremental fit index), CFI (comparative fit index), all of which should be higher than 0.9 PNFI (non-normed fit index), which should be higher than 0.5(West et al., 2012; Weston & Gore Jr, 2006) and RMSEA (root mean square error of approximation), which can be a good fit if it is lower than 0.08 or can be mediocre fit if it is between 0.08-0.1(MacCallum et al., 1996), all of which were computed to assess the model goodness-of-fit. The output indicators include average variance extracted (AVE) where requires a value higher than 0.5 and composite reliability (CR) values where requires a value higher than 0.7(Farrell & Rudd, n.d.), indicating the data convergent validity is better.

Also, according to Hair, when the AVE assessments of two values are bigger than their square of the correlation, discriminant validity is attested(Hair, 2009).

Results

Scale modification

Changes were not needed since it was easy to understand in the pilot study. Some

items were amended in the culture adaption phase due to inherent differences in the language structure of English and Chinese, as well as cultural differences. Item 3 "Having more ache and pains is an acceptable part of aging" was modified to "As aging, people will get more ache and pains". Item 7 "As people get older, they worry more" was modified to "As aging, people tend to worry a lot". The changes do not change the original meaning of the scale, instead of adapting to the custom of the Chinese language.

Sample characteristics

The demographic characteristics of the participants are provided in Table 1. Among the 458 elders, the mean age was 73 years; 63.5% of them were female; over 71% of the participants reported a monthly income between ¥ 1000 and ¥3000. The ERA score of the elderly in the community was compared according to their age, gender, educational level, income, marital status, living status, activity, sleep status, the number of chronic diseases, sleep status, and perceived health status. The results showed that there were statistically significant differences in the ERA total scores of different age groups, activity, educational level, marital status, living status, sleep status, number of chronic diseases, perceived health status expectations of aging ($p < 0.01$).

Table 1. Characteristics of participants (n = 458).

characteristic	classification	n (%)	ERA score ($\bar{x} \pm s$)	Statistic value	P value
Age (years)	60–69	183 (40.1)	44.90 ± 28.94	55.1010**	.000
	70–79	131 (28.7)	31.04 ± 22.13		
	≥ 80	142 (31.1)	16.82 ± 17.71		
Gender	Male	167 (36.5)	36.16 ± 28.90	2.3592*	.019
	Female	291 (63.5)	30.06 ± 25.26		
Education Level	Illiterate	98	18.22 ± 18.70	25.0171**	.000

		(21.4)			
	Elementary	90 (19.7)	20.59 ± 18.56		
	Middle school	151 (33.0)	40.53 ± 28.20		
	High school	97 (21.2)	45.56 ± 27.72		
	University	22 (4.8)	27.15 ± 22.76		
Total Monthly Income(¥)	< 1000	24 (5.2)	38.08 ± 22.02	1.1730**	.320
	1000-3000	328 (71.3)	30.87 ± 27.56		
	3000-5000	69 (15.0)	35.91 ± 27.42		
	> 5000	37 (8.0)	34.31 ± 20.12		
Marital Status	Married	327 (71.4)	36.32 ± 27.34	5.2452*	.000
	Single or widowed	131 (28.6)	22.20 ± 22.45		
Living Status	With family	306 (66.8)	36.87 ± 27.21	14.5721**	.000
	With others	65 (14.2)	24.70 ± 24.23		

	Alone	87 (19.0)	21.80 ± 22.78		
Activity	Less	96 (21.0)	17.59 ± 19.99	64.051**	.000
	Sometimes	181 (39.5)	24.61 ± 20.07		
	Often	181 (39.5)	47.74 ± 28.16		
Sleep Status	Normal	167 (36.5)	48.27 ± 26.71	65.0661**	.000
	little insomnia	209 (45.6)	25.89 ± 21.77		
	Usually insomnia	28 (17.9)	16.02 ± 21.65		
Chronic illness	0	147 (32.1)	46.84 ± 27.96	26.7041**	.000
	1	217 (47.4)	27.41 ± 23.89		
	2	55 (12.0)	22.37 ± 19.08		
	≥ 3	39 (8.5)	18.44 ± 23.78		
Perceived health status	Very good	20 (4.4)	59.86 ± 22.30	64.0510**	.000

Good	148 (32.3)	48.99 ± 26.63
Moderate	235 (51.3)	24.62 ± 20.73
Poor	55 (12.0)	10.05 ± 17.20

Note. ERA = expectations regarding aging, **= F value, *=t value.

Descriptive statistics of the scale

The means and SD (standard deviation) of each item (N = 458) are shown in Table 2. The majority of the item mean scores are higher than 1.6. The item-total correlation was higher than 0.4 and statistically significant ($p < 0.01$), indicating that the majority of the items matched the total scale.

Table 2. Mean and Standard Deviation and Item-total correlation of ERA-12 items

Items	M	SD	Item-total correlation
Item1	1.62	.881	.702*
Item2	2.45	1.076	.811*
Item3	2.39	1.084	.786*
Item4	1.60	.902	.793*
Item5	1.78	.902	.812*
Item6	2.16	1.042	.835*
Item7	2.43	1.073	.811*
Item8	2.43	1.063	.806*
Item9	1.68	.956	.853*
Item10	1.69	.962	.861*
Item11	1.68	.955	0.842*

Item12	1.71	.951	0.849*

Note. M = mean, SD = standard deviation, C-ERA = Chinese version of 12 items expectations regarding aging.
* P < 0.01 (two-tailed)

Reliability

The Cronbach's α coefficients were 0.89 for the total scale, 0.79 for the PH, 0.73 for the MH, 0.81 for the CF, suggesting a high level of internal consistency reliability. The split-half reliability is 0.904 and 0.933. The Spearman- Brown coefficient is 0.918, indicating good reliability for the Chinese version ERA-12 scale.

Item Analysis

The critical result shows that the differences between the two groups were statistically significant (t = -42.275 - 14.339, p < 0.001), indicating each item has a high degree of discrimination. Pearson correlation analysis provides information that the three subscales and overall scale correlation coefficient were 0.924, 0.918, 0.880, and p < 0.01.

Content validity

Expert consultation results show that the I-CVI of items 3 and 7 is 0.83, the Kappa value is 0.81 respectively while the I-CVI of the remaining items is 1, the Kappa value is 1. The S-CVI/UA is 0.83, and S-CVI/Ave is 0.97, indicating the content of the scale is valid.

Exploratory factor analysis

Since only 13 Asians were recruited in the field test of the original research, as well as no mother language was used, which may lead to information errors, the EFA was used first to explore the dimensional classification of the scale in China since culture gap. KMO was calculated as 0.872, which is eminently suitable for factor analysis. The Bartlett sphere test X^2 = 1858.11, p < 0.001, which was highly statistically significant, indicates principal component analysis was suitable for the data. The results of the principal component analysis showed that the cumulative contribution rate of the three factors reaches 83.76%. The eigenvalue of the first two principal components is > 1, and the third one is 0.855. The factor loading of each item was extracted by the standard that is higher than 0.4, combing the theoretical consideration. Most of the item communalities are higher than 0.8, meaning information loss is small. The comprehensive analysis results of each item loading on the three factors show in Table 3.

Table 3. Factor Analysis

N O.	Item	ERA—12 Instrument*	Commun ality

		Factor1	Factor2	Factor 3	
1	When people get older, they need to lower their expectations of how healthy they can be.	.553	.414	.813	.688
2	The human body is like a car: When it gets old, it gets worn out.				
3	Having more aches and pains is an accepted part of aging.	.512	.923	.437	.893
4	Every year that people age, their energy levels go down a little more.	.481	.918	.456	.865
5	I expect that as I get older I will spend less time with friends and family.	.759	.507	.661	.656
6	Being lonely is just something that happens when people get old.	.598	.496	.878	.790
7	As people get older they worry more.	.513	.760	.849	.822
8	It’s normal to be depressed when you are old.	.406	.879	.713	.844
9	I expect that as I get older I will become more forgetful.	.409	.862	.696	.806
10	It’s an accepted part of aging to have trouble remembering names.	.964	.494	.564	.930
11	Forgetfulness is a natural occurrence just from growing old.	.969	.491	.598	.942
12	It is impossible to escape the mental	.975	.507	.568	.951

slowness that happens with aging.				
Eigen Value	.926	.483	.594	.865
Explained variance（%）	7.461	1.735	0.855	
Accumulative Variance（%）	62.174	14.456	7.128	

Note. C-ERA = Chinese version of 12 items expectations regarding aging. Kaiser-Meyer-Olkin (KMO) = .919; Bartlett's test of sphericity: x2 = 6629.416, p < .001* Factor 1 = Cognitive function, Factor 2 = Physical health, Factor 3 = Mental health

Confirmatory factor analysis (CFA)

The output indicators AVE is 0.636–0.914 and CR values is 0.871–0.977 which reveal that the data convergent validity is good. The AVE of the MH and CF dimensions were greater than the square of the correlation between the two factors and self except PH, indicating an acceptable discriminant validity. The square root of the AVE for PH is 0.797 which is less than the absolute value of the correlations with another factor 0.833, meaning the discriminant validity is not perfect See Table4.

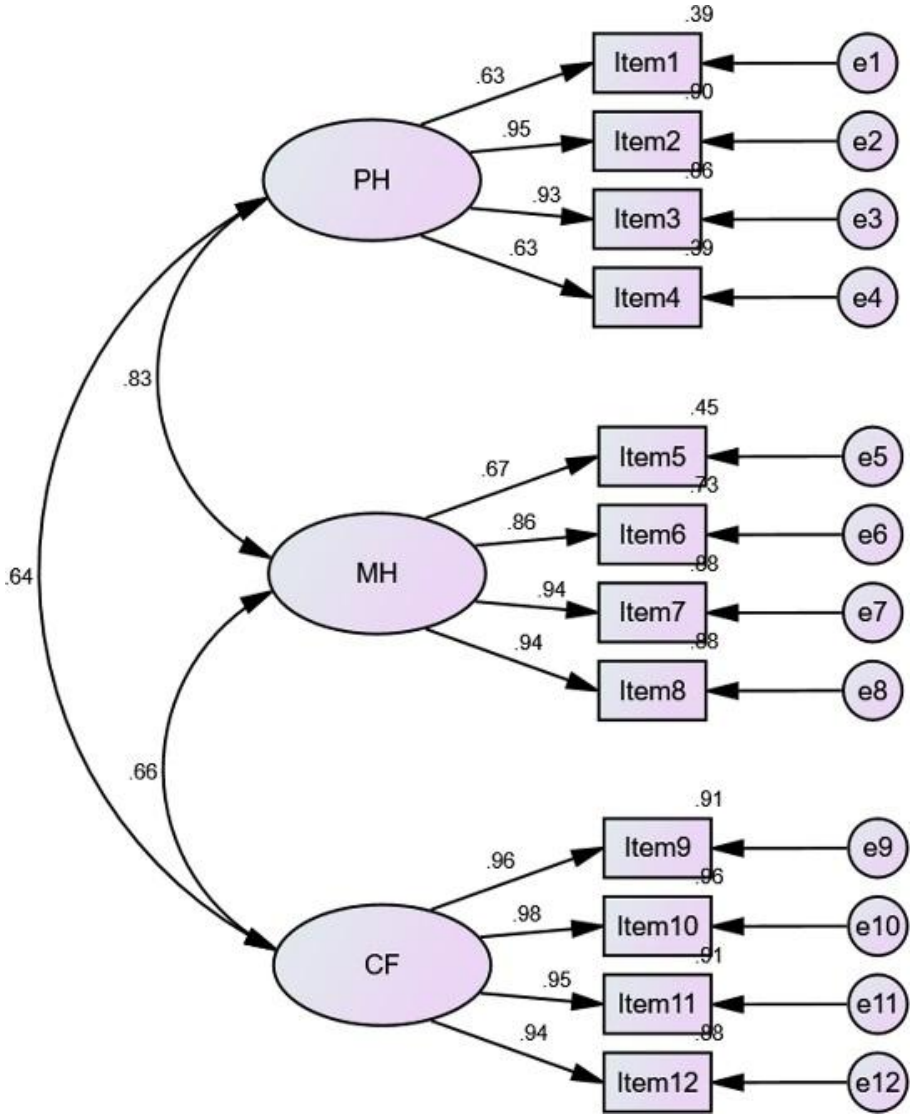
Table 4. The convergent validity and discriminant validity of C-ERA

Dimension	CR	AVE	MH	PH	CF
MH	.917	.737	.859		
PH	.871	.636	.833	.797	
CF	.977	.914	.661	.642	.956

Note. CR = composite reliability, AVE = average variance extracted, PH = physical health, MH = mental health, CF = cognitive function.

The model fit was analyzed by CFA (Figure 1). The indicators of the model fit are reported as follows: the chi-square value of the model is 519.985 which is statistical significant (p = 0.000), RMSEA = 0.168, NFI = 0.894, IFI = 0.903, CFI = 0.903, all of which should be higher than 0.9, PNFI = 0.691, which should be greater than 0.5. The factor loading of the items are all higher than the standard requirement 0.4, even higher than the ideally value 0.7, except item1, item4, item5.

Figure 1: Confirmatory Factor Analysis of C-ERA



Discussion

The Chinese version ERA-12 scale is a survey that can be used to investigate aging expectations of community- residing elders. The scale demonstrated adequate reliability, acceptable content and construct validity. The instrument took about 5 minutes to administer. The item-level missing data rates were minimal. Our findings show that scale could be beneficial to researchers who want to evaluate aging expectations in further investigations.

Internal consistency reliability (Cronbach's alpha) for whole scales and subscales exceeded 0.70, which are all higher than original scale. The Pearson correlation coefficient of each dimension and the total scale is higher than 0.8 ($P<0.01$), meaning the dimensions reflect aging expectations. Item analysis implies that the difference

between the scores of the low group and the high group is statistically significant, providing further evidence for the item discrimination. Half-split reliability is higher than 0.9, meaning good internal consistency.

High content validity for the overall scale and each item suggest that the Chinese version ERA-12 has a good equivalence of translation, cultural adaption, and connection between specific item and subscale. The Chinese version ERA-12 scale has three dimensions, named physical health, mental health, and cognitive function, including four items each of them.

CFA is a statistical technique for determining whether the items are effectively represented in subscales, whether the defined subscales adequately describe the scale's original construct, and whether the relationships between the items and the factor are adequate(Brown & Moore, 2012). What is more, it can also be used to verify the validity of measurement in different cultural background (Kyriazos, 2018). The results of the CFA show that the physical health, mental health, and the cognitive function subscale loading are higher than the requirement, although the item1, 4, 5 are not ideally which are lower than 0.7. The other relative indices are in the accepted range, indicating good fit except RMSEA which is 0.168, meaning the mediocre level. Therefore, the 3-factor structure of the ERA-12 was confirmed by CFA, which was consistent with the validation studies in Turkey and Iran version (Beser et al., 2012). The CFA findings revealed that the AVE values for the three subscales exceeded 0.50, and the CR values for them exceeded 0.70, which supports the convergent validity for each subscale. For the discriminant validity, however, the PH did not have good demonstration as well as the other two dimensions. This study chose to keep the dimension as the original author said: "physical function was the most frequently addressed domain of expectations regarding aging in the focus group."

The greatest limitation of this study is must be the sample frame when the participants came from a specific geographic region of the country city, all of whom are speaking Chinese, and had higher average earnings since most of them retired from the state-owned steel entrepreneur. The sample was biased toward older people who exercised regularly, socialized, or prioritized activities. In order to assess the psychometric performance in a larger, more representative sample, future population-based research should be done. Also, although the response rate was outstanding, response bias may have influenced the findings; those who participated in the survey were likely to be healthier and less depressed than those who did not. It is worth noting that this study did not check test-retest reliability, which should be done in future studies before the measure is utilized to assess longitudinal change over time. It is also should be noted that the study was limited to the Han minority, other minorities should be tested before carrying out research. Furthermore, the studies that pertain to aging expectations until now were cross-sectional studies, and more longitudinal studies are needed to observe the change of expectation regarding aging.

The physical health dimension is retained by this study despite the slightly lower eigenvalue. The eigenvalue of the dimension physical health value is 0.855, lower than criteria 1 which was the standard to choose factors statistically. But theory must be considered when choosing proper factors. So we chose to keep this factor based on the strong content ability, reliability, and the CFA, combing the theoretical consideration. In this study, the item1, item4 and item5 are not ideally factor loading on the subscale，

though it can be acceptable to measure related aging expectations. Some changes are expected to perfect the scale because the item 1 and item 4 are much more like general health rather than physical health specifically, and item 5 looks like social function rather than mental health. Also, there are no cut points to differentiate the high and low aging expectations making it difficult to assess which one is low and make a proper intervention. Ayalon's study(Ayalon et al., 2019) shows that only the stereotype dimension of ageism was evaluated in this scale, the other two dimensions as prejudice and discrimination should be included in the future research. Overall, the CERA scale is not totally perfect and need improvement to enhance the ability to capture aging expectations in the future.

Despite the limitations of the study, it is the first study to examine the psychometric properties of the ERA-12 scale in China. It provides a foundation for further study to evaluate aging expectations of elders and impact on health- outcomes. It absolutely riches the aging-related research in gerontology domain in China where more aging theory and empirical research should be explored to promote healthy aging.

Conclusion

In conclusion, the Chinese ERA-12 scale with acceptable reliability and validity to evaluate expectations regarding aging. This survey can be used by researchers who have interests in exploring various associations between aging expectations and other health behaviors among elders.

Declarations of Competing Interest

None.

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