Research

CLINICAL INVESTIGATION

Successful aging in Turkey: Psychometric properties of the adapted Turkish successful aging scale

Abstract

Introduction: With better living conditions and medical advances globally, the longevity of people is increasing worldwide, demonstrating the importance of successful aging.

Aim: To investigate the psychometric properties of the Turkish Successful Aging Scale (SAS) among older adults 60 years and older in Turkey.

Methods: Cross-sectional data were collected from 206 older individuals registered with an Active Senior Center between April and May 2019. Inclusion criteria were literate in Turkish, aged ≥ 60 years, no dementia, newly registered with the Active Senior Center, and volunteered to participate in the study.

Results: A low mean (SD) sum-score for the SAS 16.18 (5.15) revealed, with no significant association with age, income, marital status, working, and chronical illness. Principal Component Analysis indicated two factors explaining 54,75% of the variance. Confirmative Factor Analysis disclosed a poor fit, indicating misspecification. A model including 6 items and two dimensions was the most parsimonious and best fitting solution: $\chi2=14.487$ (df=8), $\chi2/df=1.81$, p=0.0001, RMSEA=0.063, p-value for test of close fit=0.0295, CFI=0.99, TLI=0.97, and SRMR 0.033. Composite reliability for the two dimensions were good and acceptable, respectively.

Conclusion: The validity and reliability of the Turkish SAS two-dimensional measurement-model is acceptable. However, some items seemed redundant plausibly due to translation and cultural aspects. Possibly, the SAS content developed in a western context is highly culturally sensitive; working further on the Turkish wording and validation is recommended. Moreover, Turkish health authorities should acknowledge a health promotion perspective supporting positive life behaviors among elderlies both at a system-oriented and an individual level.

Keyword: Successful Aging Scale (SAS)• Older people • Confirmative factor analysis • Active Seniors in Turkey

Received: 29-March-2023, Manuscript No. fmci-23-93486; **Editor assigned:** 30- March-2023, PreQC No. fmci-23-93486 (PQ); **Reviewed:** 01-April-2023, QC No. fmci-23-93486 (Q); **Revised:** 06-April-2023, Manuscript No. fmci-23-93486 (R); **Published:** 15-April-2023; DOI: 10.37532/2041-6792.2023.13(4).417-426

Gorill Haugan[1,2*], Oznur Korukcu[3], Kamile kabukcuoglu[3], İsmail Tufan[4], Anne-Sofie Helvik1,[5]

[1]NTNU Norwegian University of Science and Technology, NTNU Department of Public Health and Nursing, Trondheim, Norway

[2]Nord University, Faculty of Nursing and Health Science, Levanger, Norway

[3]Akdeniz University, Faculty of Nursing, Department of Obstetrics and Gynecological Nursing, Antalya, Turkey

[4]Akdeniz University, Faculty of health Sciences, Department of Gerontology, Antalya, Turkey.

[5]Norwegian National Advisory Unit on Ageing and Health, Vestfold Hospital Trust, Tønsberg, Norway

*Author for correspondence: E-mail: gorill.haugan@ntnu.no

Introduction

Advances in public health and healthcare are keeping people alive longer; consequently, the proportion of older people in the global population is increasing rapidly. One of the most significant demographic phenomena in the twenty-first century is the aging population [1]. The progress in health, industry, economic, social, educational, and scientific development increase life expectancy worldwide [2, 3]. According to the Turkish Statistical Institute, the proportion of the Turkish older population will increase to 8.6 million (10.2% of the total population) in 2023, 19.5 million (20.8% of the total population) in 2050, and 24.7 million (27.7% of the total population) in 2075 [4]. Longer life is a valuable resource that provides the opportunity to reconsider not only what older age might be, but how our whole life might unfold [5]. However, with higher age the incidence of chronic diseases increases, cognitive and physical functions decrease, followed by reduced well-being [6]. Therefore, the World Health Organization (WHO) declared the 2020-2030 decade as the "healthy ageing decade" involving the importance of a healthy lifestyle at every stage during the life course [7]. As people succeed into advanced older age (i.e., >60 years), criteria to capture the multidimensional aspects defining successful aging in different cultures are necessary as a basis for health promotion strategies among older people worldwide. The WHO states that between 2015 and 2050, the world population aged 60 years and more will almost duplicate, and nearly 80% of people 60+ will be living

in middle-income countries (WHO, 2018). As already pointed out, the aging process brings about several changes concerning the individual's health, physical function, and social roles. The way of facing or handling these changes varies from culture to culture; knowledge about healthy and active aging in various cultures is highly warranted both internationally and interdisciplinary [8, 9]. Accordingly, the term 'successful aging' was developed to identify approaches and strategies to facilitate quality of life, life satisfaction, and well-being among older people; that is, health promoting strategies supporting successful aging [10].

However, still a standard definition of the term 'successful aging' is missing as well as a general agreement on its content [9]. Successful aging has been defined as the avoidance of diseases and limitations, interaction with life, high physical and cognitive function, adequate nutrition, being productive, independent decision-making, living in a safe environment, and psychological well-being [11, 12]. According to this understanding, successful aging includes well-being not only in terms of physical health but also psychological and social well-being [13]. Longevity, productivity, and joy of life are common indicators of successful aging [13]. Consequently, successful aging involves health promoting strategies enhancing biological, mental, social, and psychological functions despite aging, along with ensuring a good economy in old age [14]. According to Rowe and Kahn (1987), successful aging contains no major chronic diseases or disability, high physical and cognitive functioning, and an active social life.

Successful aging relates to positive behavioral patterns and positive habits such as free decision-making, high motivation, social participation, and social interaction [15]. Third age universities and active senior centers are important institutions for promoting successful aging and positive behavioral patterns [16, 17]. These institutions, services such as leisure activities, participation in clubs and social environments, maintaining contact with nature and other people, physical activity, puzzle-like methods, and mental exercises are carried out to support successful aging and maintain health and functionality [18]. Research has shown that such institutions influence positively on older people's quality of life, physical, psychological, and social abilities, and facilitate socialization and connectedness [19].

Considering the growing older population globally, successful aging has become an important interdisciplinary field of interest to all countries in the world. Accordingly, the term successful aging is increasingly gaining awareness, followed by health promoting practices related to older populations [20]. Individuals differ also while growing old; some are more committed to life and have a positive attitude towards aging, while others have greater psychological difficulties and experience the consequences of aging more negatively [9]. With the effect of cultural and geographical diversity on lifestyle, the aging process differs from individual to individual and from society to society [8]. Conversely, Turkish elderlies largely prioritize to stay in their communities in which they feel "at home" and familiar, causing many of them to live in small villages far away from organized active aging activities. Consequently, several old individuals usually spend much time alone, stay far away from social and cultural activities, and therefor become dependent on care by family members [13].

Despite successful aging has been one of the core issues in the gerontology literature and research for the past half-century, studies on this issue in Turkey are still limited. A large part of the Turkish population considers elderly care as a family duty; currently, there is a need to increase the awareness towards successful aging in the Turkish culture. Considering the demographical development in Turkey, new knowledge about successful aging among Turkish elderlies is needed. To be able to develop such knowledge, a valid and reliable measurement tool for successful aging adapted to the Turkish culture is required. Therefore, this study addresses the psychometric properties of the Turkish version of the Successful Aging Scale (SAS).

Aims

This study aims to investigate the dimensionality, reliability, and construct validity of the SAS scale among elderlies 60+ in Turkey who participate in an Active Senior Center.

Materials and Methods

Participants and Setting

In this psychometric study, data were collected from 206 older individuals registered to an Active Senior Center between April and May 2019. The inclusion criteria were:

- literate in Turkish
- aged 60+
- no dementia
- newly registered to the Active Senior Center
- volunteered to participate in the study.

Out of the 224 individuals who fulfilled the inclusion criteria, 18 refused to participate giving a response rate of 92% and N=206.

The participants received information about the study and then responded to the questionnaire in a meeting room at the Active Senior Center, which was officially opened in 2017 by the actual municipality starting to serve in January 2018. Gerontologists, nurses, psychologists, physiotherapists, and cleaning staff wok in the center, providing drama activities, painting workshops, muscle strengthening exercises, balance exercises, choir studies, amigurumi knit doll making, wood painting, stone painting, artistic and cultural studies such as nature breezes, etc., educational and awareness studies, psychological counseling, physiotherapy services, nursing services, gerontological counseling, applied gerontological

counseling, etc. All services provided in the center are free of charge.

Instruments

The Personal Information Form assessed demographic variables of age, education, partner/ marital status, income, and chronic illness. The original Succesful Aging Scale (SAS) was developed by Reker (2009), containing 13 items and 3 dimensions

- Healthy lifestyle (4 items)
- Adaptive coping (4 items)
- Commitment to life (5 items)

On a seven-point scale, the sum score ranges between 10-70; higher scores indicate more successful aging. This original SAS scale was translated to Turkish by Hazer and zsungur(2017), who presented a Turkish version including 10 out of the original 13 items and 2 dimensions:

- Healthy Lifestyle and
- Coping with Problems (Cronbach Alpha was 0.85).

This adapted Turksih version was used in the present study to assess succesful aging among Turkish elderlies.

Data Analysis

The data were analyzed by descriptive statistics, Principal Component Analysis (PCA) using IBM SPSS version 27, and Confirmatory Factor Analysis (CFA) by means of Stata 17.1 [21]. This study aimed to test the psychometric properties of the Turkish adapted SAS scale among older people in Turkey. Consequently, investigating the underlying dimensionality of the data as well as the adequacy of each individual item is fundamental. In these requests, PCA and CFA can provide complementary evaluations, giving different pieces of information [22, 23]. Therefore, a broad perspective on the observed data using PCA followed by CFA was utilized; the implicit assumption underlying the use of PCA in the present study is the insecurity with respect to the psychometrics and thus the dimensionality of the Turkish SAS.

Accounting for random measurement error, CFA is a sub-model of structural equation modeling which assesses the accuracy and psychometric properties of measurement models [24]. A high loading of an item on its respective latent construct indicates that there is much in common between the construct and the respective item [25]. Loadings below 0.32 are considered poor, ≥ 0.45 fair, ≥ 0.55 good, ≥ 0.63 very good, and above 0.71 are excellent [25].

The present study assessed model fit adequacy by $\chi 2$-statistics and various fit indices. In line with the 'rules of thumb' given as conventional cut-off criteria the following fit indices were used; $\chi 2$-statistics, the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean SquareSquare Residual (SRMS) with values ≤ 0.05 indicating good fit, whereas values smaller than 0.10 is interpreted as acceptable [26]. Furthermore, the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) with acceptable fit set at 0.90 were used [27]. Both skewness and kurtosis were significant, and the Robust Maximum Likelihood (RML) estimate procedure was applied. When analyzing continuous but no normal endogenous variables, the Satorra-Bentler corrected $\chi 2$ should be reported [28, 29].

Ethics

Before conducting the study, institutional approval was obtained from the director of the Active Senior Center. Research Ethics Committee approval was obtained from the Clinical Research Ethics Committee of XXXX University in Turkey, Faculty of Medicine (Approval No: xxxx). The research is conducted in line with the principles of the Declaration of Helsinki.

Results

Descriptive analysis

Among the 206 older participants, 116 were females and 90 were males, with a mean age of 66.4 years and 67.9 years, respectively. Moreover, 58 out of the 116 women and 47 of the men were married/living with a partner. Table 1 displays the characteristics of the study sample further.

Table 1: Characteristics of female and male senior students at Akdeniz university n=206.

		Female seniors		Male seniors		Comparison p-value
N		116	100	90	100	
Demographics						
AGE (year)	Mean (SD)	66.4	4.23	67.87	5.26	0.044[1]
Education						
Primary school or less	N (%)	15	12.9	6	6.7	0.134[2]
High school	N (%)	46	39.7	30	33.3	

Higher education	N (%)	55	47.4	54	-60	
Married/Partner	N (%)	58	50	47	52.2	0.752[3]
Working (Or Not) Generating business, Yes		68	58.6	57	58.3	0.903[4]
Income	Mean (SD)	3071.03	111	2996	947.09	
Health						
Chronic disease, Yes	N (%)	59	50.9	53	58.9	0.251[5]

Note: 1Mann-Whitney U= 4367.500; 2 Pearson Chi square test=4,017, df=2; 3 Pearson Chi square test =0.100, df=1: 4 Pearson Chi square test =0.015 def=1; 5 Pearson Chi square test =1.316, df=1;

The mean (SD) sum score for SAS was low with a mean of 16.18 (5.15) (Table 2). Furthermore, the mean (SD) sum score for successful aging did not differ significantly between female and male participants, i.e., for females 16.29 (5.13) and men 16.04 (5.20) (p-value >0.05). Age, income, marital status, working (or not), or chronical illness did not associate with the SAS sum score. Table 2 presents the distribution of the scale scores.

loading of .32 or higher associates to approximately 10% overlapping variance with the other items in the construct [30]. Accordingly, a "cross-loading" item loads at .32 or higher on two or more factors. We searched for the cleanest structure of the SAS concept and expected more than one dimension. Hence, an oblique rotation such as pro-max should theoretically render a more accurate solution [31]. PCA with pro-max rotation and Kaiser Normalization was used; two factors with eigen values 4.196 and 1.278 greater were extracted, explaining 41.96% and 12.79% of the varia-

Table 2: The distribution of the SAS-items and the sum-score, n=206.

Item SAS	Min	Max	Mean	SD
SAS1 When things don't go as well as they used to, I keep trying other ways until I achieve the same result	1	7	1.62	0.9
SAS2 In difficult times, I develop mental toughness in dealing with the situation	1	5	1.61	0.67
SAS3 I am actively engaged with life through productive activities	1	6	1.55	0.73
SAS4 I strive to remain independent for as long as possible	1	7	1.44	0.79
SAS5 I make attempts to remain relatively free of disease and disability	1	7	1.62	0. 93
SAS6 I try to maintain good physical and mental functioning as I age	1	7	1.56	0. 75
SAS7 I am actively engaged with life through regular social contacts	1	4	1.53	0.89
SAS8 I make every effort to achieve goals that are important to me	1	4	1.71	0.72
SAS9 I can deal with whatever comes my way	1	6	1.9	0.89
SAS10 I make attempts to engage in healthy lifestyle habits	1	7	1.64	0.93
Sum-score SAS1-10	10	47	16.18	5.15

Note: SAS = Successful Aging Scale

Principal Component Analysis (PCA) of SAS

To explain as much of the total variance as possible with as few factors as possible, the Turkish SAS scale was subjected to PCA. The Kaiser-Meyer-Olkin measure of sampling adequacy exceeded the recommended value of 0.60 (0.81) and Bartlett's test of sphericity showed statistical significance ($p<0.0001$), supporting the factorability of the correlation matrix. The literature suggests a minimum loading of .32 as a good rule of thumb a

-nce (Table 3), showing factor loadings ranging between .35-.95. Figure 1 portrays the scree-test showing the number of factors to retain is two, explaining 54.75 % of the variance. Table 3 lists the loadings and variance for the PCA-suggested rotated 2-factor solution, revealing 3 substantial cross-loadings. Cronbach's alpha coefficients for the two factors were good ($\alpha1=0.73$; $\alpha2=0.80$). Originally, the SAS scale was developed to measure the construct 'successful aging' including 13 items and 3 dimensions [32]. However, the Turkish version of the SAS scale which was used in

this study included 10 items and two factors. Hence, apparently, the dimensionality seemed to include more than one factor; however, the structure indicating which item loaded on which factor differed substantially from the results of Hazer & Õzsungur (2017). Thus, the factorial structure seemed unclear, and we turned to Confirmatory Factor Analysis (CFA).

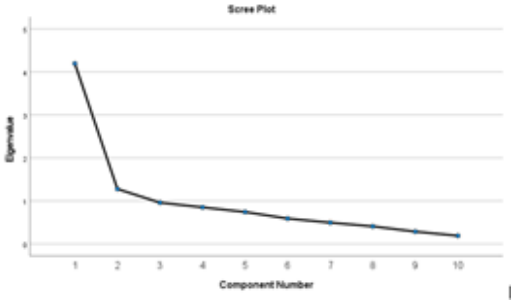

Figure 1: Scree-Plot of the SAS-scale based in the PCA using principal axis factoring.

Table 3: Principal component analysis of the successful aging scale based in eigenvalues ≥1 – Rotated Component Matrix. Estimates for factor loadings, extraction sums of squared loadings and Cronbach's alpha.

The PCA suggested 2-factor-solution, 10 items		
Eigen value in parentheses	Component	
	1 (4.196)	2 (1.278)
Factor 1:		
SAS4 I strive to remain independent for as long as possible	0.409	
SAS5 I make attempts to remain relatively free of disease and disability	0.949	
SAS6 I try to maintain good physical and mental functioning as I age	0.786	
SAS8 I make every effort to achieve goals that are important to me	0.42	
SAS9 I can deal with whatever comes my way	0.492	0.347
SAS10 I make attempts to engage in healthy lifestyle habits	0.947	
Factor 2:		
SAS1 When things don't go as well as they used to, I keep trying other ways until I achieve the same result	0.386	0.353
SAS2 In difficult times, I develop mental toughness in dealing with the		0.763
situation		
SAS3 I am actively engaged with life through productive activities		0.843
SAS7 I am actively engaged with life through regular social contacts	0.412	0.437
Cumulative % of total variance explained	41.963	54.748
Cronbach's Alpha (number of items) 0.84 (10)	0.73 (5)	0.80 (5)

Note: Extraction Method: Principal Component Analysis; Rotation Method: Oblimin with Kaiser Normalization; Rotation converged in 10 iterations. Original: Items 1-10.

Confirmatory Factor Analysis (CFA)

Firstly, we estimated the two-factor solution including ten items and two factors published by Hazer & Õzsungur (2017). This solution, termed Model 2-1 (the name indicates 2 factors, model 1) showed loadings between 0.46-0.89 followed by R2-values between 0.22-0.80. Composite reliability was good,0.88 and 0.77, respectively. Even so, Model 2-1 disclosed a bad fit to the present data: $\chi2$=137.471 (df=34), $\chi2$/df=4.04, p=0.0001, RMSEA 0.122, p-value for test of close fit=0. 0001,=0.8 , =0.82, SRMR=0.07 . ence, we estimated the -suggested two- factor model, revealing an even worse fit than Model 2-1 ($\chi2$=1. (df=33), $\chi2$/df=4.20, p=0.0001, RMSEA 0.13 , p- value for test of close fit=0.0001, =0.84, =0.78, SRMR=0.0 0). herefore, we turned bac to Model 2-1, scrutini ing the residuals, modification indices, and fit indices (Table 2). Model 2-1 revealed no significant residuals, but 8 Modification ndices (M) ≥ 10, indicating misspecification: the following pair of items revealed the highest MIs: SAS6-SAS9 (MI=16.532), SAS2

-SAS3 (MI=14.359), SAS6-SAS7 (MI=13.613), SAS4-SAS9 (MI=13.457), SAS6-SAS8 (MI=11.730), SAS1-SAS4 (MI=11.423), SAS10-SAS9 (MI=11.222) and SAS5-SAS10 (MI=11.167). Based on the MIs, factor loadings, R2-values and theoretical nuances of the construct, the two-factor solution was adapted by removing one problematic item at a time. Firstly, item SAS2 (In difficult times, I develop mental toughness in dealing with the situation) was dismissed. This solution, termed Model 2-2 (indicating two factors, model 2), gave a better fit, but still a bad fit. Consequently, we checked the MIs again which pointed at item SAS4 (I strive to remain independent for as long as possible). Running CFA once more excluding item SAS4, Model 2-3 (8 items) revealed a better fit, but still not an acceptable fit (χ2=70.477 (df=19), χ2/df=3.71, p=0.0001, RMSEA 0.115, p-value for test of close fit=0.0001, CFI=0.9, TLI2=0.82, SRMR 0.062). Still, the composite reliability coefficients for the two dimensions were good with ρc=0.88 and 0.72, respectively. Next, item SAS7 (I am actively engaged with life through regular social contacts) was removed, termed Model 2-4 (7 items) showing an acceptable fit (χ2=35.896 (df=13), χ2/df=2.76, p=0.0001, RMSEA=0.093, p-value for test of close fit=0.026, CFI=0.96, TLI=0.93, SRMR 0.049). Still, composite reliability was good for factor 1 (items 5,6,10; ρc=0.88) while the estimate for factor 2 (items 1,3,8,9; ρc=0.67) was a bit low, yet acceptable; ρc ≥ 0.7 is wanted. Finally, Model 2-5 (6 items) excluding item SAS8 (I make every effort to achieve goals that are important to me) displayed a good fit (χ2=14.487 (df=8), χ2/df=1.81, p=0.0001, RMSEA=0.063, p-value for test of close fit=0.0295, CFI=0.99, TLI=0.97, SRMR 0.033). Forthis measurement model, composite reliability was 0.88 and 0.64, respectively.

Consequently, to achieve a good fit 4 of the original 10 items were dismissed. However, a parsimonious model is preferred. Hence, we checked the unidimensional solution termed Model 1-1 (indicating one factor, first model), including all ten items. The factor loadings were between .33-.83 followed by R2-values between .11-.69, with composite reliability ρc=0.84. However, the model-fit was bad (χ2=219.195 (df=35), χ2/df=6.26, p=0.0001, RMSEA=0.160, p-value for test of close fit=0.0001, CFI=0.75, TLI=0.68, SRMR 0.097). No significant residuals were revealed, but 12 significant MIs; the pair of items SAS5 (I make attempts to remain relatively free of disease and disability) and SAS10 (I make attempts to engage in healthy lifestyle habits) showed an extremely high MI=85.025. Both items (SAS5 and SAS10) were involved in 6 significant MIs signifying psychometrical problems of this measurement model, hinting to multidimensionality. Furthermore, the following pair of items presented high MIs and thus psychometric trouble: SAS2-SAS3 (MI=26.021), SAS5-SAS7(MI=18.014), SAS6-SAS9 (MI=17.27), SAS3-SAS10 (MI=15.68), SAS7-SAS8 (MI=14.80) and SAS1-SAS4 (MI=13.66). To achieve an acceptable fit, 5 items were removed one by one termed Model 1-2 (Table 4).

Table 4 shows the different estimated measurement models; the removed items are listed in parentheses for each model. Model 2-5 including 6 SAS-items was the most parsimonious and best fitting solution, demonstrating a good fit to the present data: χ2=14.487 (df=8), χ2/df=1.81, p=0.0001, RMSEA=0.063, p-value for test of close fit=0.0295, CFI=0.99, TLI=0.97, and SRMR 0.033. Model 1-5 including 5 SAS-items was the best fitting unidimensional model with an acceptable fit (χ2=14.805 (df=5), χ2/df=2.96, p=0.011, RMSEA=0.098, p-value for test of close fit=0.072, CFI=0.96, TLI=0.92, SRMR=0.069). Composite reliability was good for both models, except a bit low but still acceptable for the second factor in Model 2-5. Figure 2 portrays Model 2-5 with its factor loadings, R2-values, composite reliability, and fit indices.

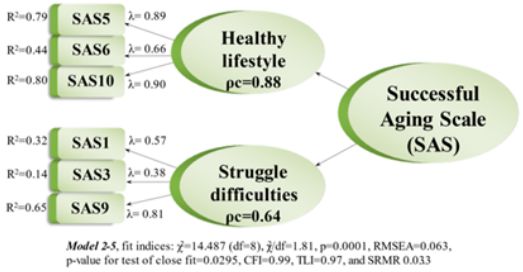

Figure 2: Best fitting measurement model of the SAS scale.

Table 4: Confirmatory Factor Analysis of the SAS scale. Goodness-of-fit indices.

Fit Measure	Model 2-1 2-factors N=206 10 items	Model 2-4 2 factors N=206 7 items (2,4,7)	Model 2-5 2 factors N=206 6 items (2,4,7,8)	**Model 2-6 PCA 2 factors N=206 10 items**	**Model 1-5 1 factor N=206 5 items (2,3,4,9,10)**
χ^2 Satorra Bentler	137.471	35.896	14.487	155.696	14.805
p-value	0.0001	0.0001	0.0001	0.0001	0.011
$\frac{x^2}{df}$ *Satorra Bentler*	4.04 (Df=34)	2.76 (Df=13)	1.81 (Df=8)	4.20 (Df=33)	2.96 (Df=5)
RMSEA	0.122 (CI: 0.101-0.143)	0.093 (CI: 0.57-0.129)	0.063 (CI: 0.00-0.114)	0.135 (CI:0.114-0.156)	0.098 (CI: 0.042-0.157)
p-value (close fit test)	0.0001	0.026	0.295	0.0001	0.072
SRMR	0.076	0.049	0.033	0.090	0.043
CFI	0.86	0.96	0.99	0.84	0.96
TLI	0.82	0.93	0.97	0.78	0.92
$\rho c = \frac{\left(\sum \lambda\right)^2}{\left[\left(\sum \lambda\right)^2 + \sum(\theta)\right]}$	1: 0.88 2: 0.77	1: 0.88 2: 0.67	1: 0.88 2: 0.64	1: 0.72 2: 0.81	0.76

Note. SAS=Successful Aging Scale measurement model. Removed items in parentheses. Listwise N=206.
RMSEA=Root Mean Square Error of Approximation. SRMS=Standardized Root Mean Square Residual, CFI=Comparative Fit Index,
TLI=Tucker-Lewis Index, 1Df=Degrees of freedom, ρc=Composite reliability, Raykov's factor reliability coefficient.
Model 2-1: 10 items 2-factor solution FACTOR 1 (SAS-items 5,6,10), FACTOR 2 (SAS-items 1,2,3,4,7,8,9). Model 2-4: FACTOR 1 (SAS items 5,6,10), FACTOR 2 (SAS-items 1,3,8,9). Model 2-5: FACTOR 1(SAS-items 5,6,10), FACTOR 2 (SAS-items 1,3,9). Model 1-6 PCA: the PCA-suggested 2-factor solution. Model 1-5: unidimensional version including SAS-items 1,5,6,7,8.

Discussion

People are growing older worldwide, also in Turkey. Consequently, knowledge about successful aging is required. Therefore, this study provides new knowledge about the psychometric properties of the Turkish version of the SAS scale among older people in Turkey. When evaluating a measurement scale, two key issues should be addressed:

- The underlying dimensionality of the data
- The suitability of the items included.

This study assessed how well the Turkish adaptation of the original SAS fit to the present data concerning dimensionality, reliability, and construct validity among Turkish adults 60 years and older.

Dimensionality

The PCA based on Eigenvalues ≥1 suggested two factors with acceptable loadings, though several cross-loadings. Hence, like the Turkish adaptation of the SAS, the PCA supported a two-factor-structure. However, looking at the loading structure, the present data differed largely compared to the results by Hazer & Õzsungur (2017); yet both studies were conducted among Turkish older people. Based on the PCA results, the dimensionality seemed unclear. This was also the case based on the CFA results; the measurement model based in Hazer & Õzsungur (2017) solution presented a very bad fit to our data. Several pairs of items seemed troublesome, indicating misspecification. Regardless of estimating a one- or two-factor solution, to achieve an acceptable fit, several items had to be removed.

Reliability

Reliability and construct validity address the adequacy of the items included in the scale. Reliability relates to the factor loadings and square multiple correlations (R2). Good and thus reliable indicators of successful aging load at 0.71 or higher. The square of a standardized factor loading (R2), which is also termed the variance extracted by the item, represents how much variation in an item is explained by the latent construct. Looking at Model 2-1 (Turkish version by Hazer & Õzsungur, 2017) including all ten items and two factors, the reliability was low for some items; only three of the ten loadings were excellent (≥ 0.71), two were very good (≥ 0.63) while the rest was good-fair (≥ 0.55, ≥ 0.45). Hence, no loadings were poor, and both composite reliability and Cronbach's' alpha displayed good values supporting the reliability and internal consistency of the SAS construct.

Construct validity

This aspect of a measurement model concerns the accuracy of the measurement. Model 2-1 exposed no significant residuals, but several high modification indices pointing at psychometric troubles. Firstly, item SAS2 (In difficult times, I develop mental toughness in dealing with the situation) revealed a high MI with item SAS3 (I am actively engaged with life through productive activities). Item SAS2 seemed to be closely worded to both item SAS3 and SAS9; it is rational that dealing with the life situation (SAS2) is closely related with being active and engaged with life (SAS3). Similarly, it is plausible that the development of mental toughness (SAS2) correlates highly with the idea that "I can deal with whatever comes my way" (SAS9). Therefore, removing item SAS2 gave a better fit, but still a bad fit. Next, we looked at item SAS4 (I strive to remain independent for as long as possible). This item shared much variance with items SAS9 (I can deal with whatever comes my way) and SAS1 (When things don't go as well as they used to, I keep trying other ways until I achieve the same result). Accordingly, these older adults living in the Turkish culture may perceive independency as an aspect of keeping trying when things do not go as wanted and the ability to deal with whatever comes in life. In the Turkish culture, the family is commonly large, representing a substantial personal network and the main resource of support in peoples' life, especially when growing old or in difficulty. Moreover, in Turkey the family is the main 'institution' – the state represents minor support. Thus, the family as a group ranks higher than individual freedom. As independency and individuality are not emphasized values the way these are regarded in western societies, the term "to stay independent" may not communicate well to older people in Turkey. Therefore, item SAS4 was dismissed (Model 2-3), which improved the fit. At this point, two items (SAS2 and SAS4) were removed.

Furthermore, SAS7 (I am actively engaged with life through regular social contacts) was blurred with item SAS6 (I try to maintain good physical and mental functioning as I age). Probably, the present participants perceived that maintaining mental functioning is equal to staying actively engaged in social contacts; the latter is an obvious, indisputable, and central feature of the Turkish culture. Consequently, most likely these older adults perceived "staying engaged in social contact" as something taken for granted and highly related with maintaining mental functioning. Dismissing item SAS7 Model 2-4 displayed an improved fit.

Finally, excluding item SAS8 (I make every effort to achieve goals that are important to me) disclosed the best fitting Model 2-5 (6 items). Item SAS8 was clouded with item SAS6 (I try to maintain good physical and mental functioning as I age). Reasonably, these older adults recognized maintaining good physical and mental functioning to be an important goal when heading old age, and therefore confuse item SAS6 and SAS8. Based on this scrutinizing of the loadings, R2-values along with the modification indices, Model 2-5 including six out of the ten items and two factors was the most parsimonious best fitting solution.

When dismissing items, the reliability decreases. For Model 2-5 with two dimensions involving three items each, the composite reliability was good for the latent variable Healthy Lifestyle (ρc=0.88), while a bit low, but still acceptable, for the second latent construct "Struggle with difficulties" (ρc=0.64). The items SAS 5,6 and 10 were highly valid indicators for the Healthy Lifestyle factor. Concerning the second factor, item SAS3 (I am actively engaged with life through productive activities) revealed a loading of 0.38, explaining only 14% of the variation of the latent construct. Consequently, this item did not stand out to be a reliable indicator for "struggling with difficulties". This may point to a possible third factor as originally presented by Reker (2009).

Furthermore, we checked the possibility of a unidimensional solution of the Turkish SAS scale. The CFA analyses Table 4, showed a good fit for the model (Model 1-2) including only five of the ten items. The adapted Turkish version of the SAS scale presented a two-factor solution, while the original SAS scale comprising 13 items showed a three-factor measurement model. Consequently, we assume that the most parsimonious model with six items (Model 2-5) should be retained. Hence, Model 2-5 is portrayed in Figure 2.

Successful aging among Turkish adults 60+

This study shows a low mean score of successful aging among the Turkish elderlies attending an Active Aging Center. Moreover, the mean score did not relate significantly to age, gender, marital status, income, and working or not. This corresponds well with recently published findings, displaying poor correlations of SAS with education, working, and marital status among Turkish older adults. Moreover, several items in the SAS scale demonstrated low reliability and validity in our study. Possibly, the older adults participating in this study were unfamiliar with the the concept of successful aging; four out of the ten items seemed redundant. The construct 'succesful aging' as well as the SAS scale was developed in the Western culture. Consequently, the present findings might be explained by cultural aspects along with translation issues: the notion of successful aging may still be overlooked in the Turkish society. The present participants represented a group of resourceful elderlie, attending an Active Aging Center; still, they seemed unfamiliar with the items in the SAS scale. This Active Aging Center represents the first Turkish third age university, also termed a "Refreshment University". This Center opened in 2017, later than in other countries [18].

In the years to come, health promoting strategies facilitating successful aging will be ever more important. Thus, there is a need to focus on a healthy lifestyle, involving activities which promote physical and mental strengths which are useful in coping with difficulties resulting from aging.

Turkey is gradually facing the situation of the growing aging population. Currently, the increasing rate of older Turkish people is recognized, followed by an increased understanding of 'successful aging' and its importance. Even though the number of institutions and organizations promoting a healthy lifestyle and active aging is gradually increasing, still the consept 'successful aging' seems unfamiliar. To achieve successful aging countrywide, it is necessary to work holistically focusing on both system-oriented issues of economic, social, and political character along with strategies at the individual level [33].

Conclusion

Considering the psychometric properties of the Turkish adapted SAS scale, the validity and reliability of the SAS measurement model is acceptable. However, some items seemed redundant plausibly due to translation and cultural aspects. Consequently, in the Turkish language some items seemed to cover much of the same content. Therefore, this study suggests working further on the wording of the Turkish items considering the nuances and the breadth of the SAS construct. Possibly, the content of the term 'successful aging' is culturally sensitive, not only in a Turkish context but in other non-western countries as well. Therefore, more validating studies are recommended. Nonetheless, health promoting efforts supporting older individuals to maintain healthy functioning are less costly than the management of diseases. The present study advocates that the Turkish health authorities acknowledge the health-promoting perspective supporting positive life behaviors among elderlies both at a system-oriented and an individual level.

References

1. Kıssal A, Tezel A. Aging and health promotion. *Turk Klin. Publ Health Nurs Spec Top*. 5(1):44-9(2019).
2. Friedman SM, Mulhausen P, Cleveland ML, et al. Healthy aging: American geriatrics society white paper executive summary. *J Am Geriatr Soc*. 67(1):17-20(2019).
3. Baloglu A, Unlu EZ. Data Mining Analysis on Healthy Aging in Turkey. *Int J Health Med Sci*. 6(1):12-6(2020).
4. Haber Bülteni Sayı: 30699. *İstatistiklerle Yaşlılar*. (2018).
5. Beard JR, Officer A, Sadana R, et al. The world report on ageing and health: a policy framework for healthy ageing. *Lancet*. 387(10033):2145-54(2016).
6. Franse CB, van GA, Alhambra BT, et al. The effectiveness of a coordinated preventive care approach for healthy ageing (UHCE) among older persons in five European cities: a pre-post controlled trial. *Int j nurs stud*. 88:153-162(2018).
7. World Health Organization Geneva. (1998).
8. Özsungur F. A research on the effects of successful aging on the acceptance and use of technology of the elderly. *Assist Technol*. 34(1):1-14(2019).
9. Kunuroglu F, Yuzbasi DV. Factors Promoting Successful Aging in Turkish Older Adults: Self Compassion, Psychological Resilience, and Attitudes towards Aging. *J Happiness Stud*. 8:1-16(2021).
10. Estebsari F, Dastoorpoor M, Khalifehkandi ZR, et al. The concept of successful aging: A review article. *Curr aging sci*. 13(1):4-10(2020).
11. Wilkie R, Tajar A, McBeth J. The onset of widespread musculoskeletal pain is associated with a decrease in healthy ageing in older people: a population-based prospective study. *PLoS One*. 8(3):e59858(2013).
12. Özsungur F. Successful Aging of Men with Various Chronic Health Conditions Residing in Nursing Homes. *Ageing Int*. 46:95-107(2021).
13. Korukcu O, Kabukcuoğlu K. Health Promotion Among Home-Dwelling Elderly Individuals in Turkey. *Health Promot Health Care–Vital Theor Res*. 313(2021).
14. Öztürk ME. Ve KD. Sağlıklı Yaslanma. *Bilim Armonisi*. 1(1):51-3(2018).
15. Hill R. D. A positive aging framework for guiding geropsychology interventions. *Behav ther*. 42(1):66-77(2011).
16. Tufan İ. (2016). Yaşlanan toplumun riskleri, problemleri, ihtiyaçları. Ceylan H. *Yaşlılık Sosyolojisi*. 99-117(2016).
17. Stankov G. Overcoming ageism through education for the third age. *Int conf "Equal learn oppor elderly"*. 32-42(2017)
18. Oglak S, Canatan A. Yaşam Boyu Öğrenme ve Aktif Yaşlanma Bakış Açısından Üçüncü Yaş Üniversiteleri: İyi Uygulama Örnekleri. *Yaşlı Sorunları Araştırma Dergisi*. 13(2):131-41(2020).
19. Adamo CE, Esper MT, Bastos GCFC, et al. University of the Third Age: the impact of continuing education on the quality of life of the elderly. *Rev bras geriatr gerontol*. 20(4):545-55(2017).
20. Nari F, Jang BN, Kim S, et al. Association between successful aging transitions and depressive symptoms among older Korean adults: findings from the Korean longitudinal study of aging (2006–2018). *BMC Geriatr*. 21(1):1-11(2021).
21. StataCorp. (2017).
22. Hurley AM, Scandura TA, Seers A, et al. (1997). Exploratory and confirmatory factor analysis: guidelines, issues, and alternative. *J Organ Behav*. 18(6):667-83(1997).
23. Netemeyer R, Bearden W, Sharma S. Scaling procedures, Issues and Applications. *SAGE Publ*. (2003).
24. Brown T. Confirmatory factor analysis for applied

research. *Guilford Press*. (2006)

25. Sharma S. Applied Multivariate Techniques. *N Y: Wiley*. (1996)
26. Mehmetoglu M, Jakobsen TG. Applied Statistics using STATA. *guide soc sci*. (2017).
27. Acock AC. Discovering structural equation modeling using Stata. *STATA Press*. (2013).
28. Satorra A, Bentler P. Corrections to Test Statistics and Standard Errors in Covariance Structure Analysis. *Latent var anal: Appl dev res*. 399-419(1994).
29. Kline R. Principles and Practice of Structural Equation Modeling. *Guilford Press*. (2011).
30. Tabachnick BG, Fidell LS. Using Multivariate Statistics. (2013).
31. Osborne JW, Costello AB. Best Practices in Exploratory Factor Analysis: Four Recommendations for Getting the Most From Your Analysis. *Pract Assess Res Eval*. 10:1-9(2005). [Google Scholar] [Crossref]
32. Rowe JW, Kahn RS. Human aging: Usual and successful. *Science*. 237:143-9(1987).
33. Lezwijn J, Vaandrager L, Naaldenberg J, et al. Healthy ageing in a salutogenic way: building the HP 2.0 framework. *Health Soc Care Community*. 19(1):43-51(2011).