

**DEVELOPMENT AND VALIDATION OF CHINESE-VERSION SUCCESSFUL  
AGING SCALE OF TAIWAN**

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**ABSTRACT**

Through four empirical studies, this research develops Chinese-version Successful Aging Scale, a theory-based measure of successful aging. In Study 1, we interviewed 40 elders aged more than 65 years old, and established Chinese-version Successful Aging Scale's item pool. In Study 2, with 220 elders aged more than 65 years old as the sample, we selected the optimal items to constitute formal Chinese-version Successful Aging Scale through repeated explorative factor analysis. Finally, in Study 3 and 4, the complete reliability and validity analysis was conducted on 400 elders aged more than 65 years old. It is found from Study 3 that the Chinese-version Successful Aging Scale has good reliability and factorial validity, convergent validity, and discriminant validity. Meanwhile, it proves that when we summed up the items' scores, it is appropriate and represents a meaningful and interpretable score. It is found that in Study 4, the Chinese-version Successful Aging Scale can effectively predict the positive affect as well as life satisfaction, indicating that it has proper criterion related validity. With four empirical studies, this research has developed the Chinese-version Successful Aging Scale with good reliability and validity, which is worthy of functioning as the tool to evaluate successful ageing among Chinese.

**Keywords:** Development, validation, Chinese-version, aging scale.

**INTRODUCTION**

With medical technology and social environment making progress, the elder population in the countries around the world occupies higher and higher proportion. Elongation of people's life has become the inevitable developing trend, and how to make the elder live long, live well, and live with dignity has become the issue concerned severely by people in a variety of fields (Jeste, Depp, Vahia, 2010). In recent years, so-called successful aging is an important research subject in the field of gerontology, which reflects the changing views on aging where a stigma associated with old age has led to elder people as a burden in the society. Consequently, in the past, most scientists have been focusing on negative aspects of aging (Rowe & Kahn, 1997). However, in this regard, research on successful aging also acknowledges the fact that there is a growing number of elder adults functioning at a high level and contributing to the society (Garfein & Herzog, 1995; Khaw, 1997).

Nevertheless, at present, there is no universally accepted definition of what the term 'successful aging' means (Pruchno, Wilson-Genderson, Rose, & Cartwright, 2010). Measurement criteria for successful aging vary greatly throughout the literature, typically reflecting the viewpoint of the investigator (Bowling, 2007). Depp and Jeste (2010) have identified 28 studies with sample size greater than 100, published in English-language journals, and involving adults over age 60. It is found astonishingly that there are 14 components in respect with successful aging. Since the definition of successful aging has not

been unified yet, it is difficult to reach the consensus, leading to the disturbance of practically applying to successful aging concept.

## LITERATURE REVIEW

The definition of successful aging is not unified, because different researchers expand the meaning of concept of successful aging arbitrarily, and there are dispute between objective successful aging measurement and subjective successful aging measurement. As far as the former is concerned, some researchers arbitrarily added the elements of successful aging, causing confusion of concept regarding successful aging. For example, Dillaway and Byrnes (2009) considered happiness and life satisfaction as successful aging, which has polluted the original implication of successful aging, and made successful aging relative to concept of emotional well-being. Willcox, Willcox and Ferrucci (2008) even regarded compression of morbidity as the element of successful aging, which has already brought successful aging towards the direction of psychopathology. Just as Strawbridge, Cohen, Shema, and Kaplan (1996) measured successful aging with activities of daily living and instrumental activities of daily living, they have narrowed the meaning of successful aging as longevity, no sickness, and no disability. In the meantime, they restricted successful aging to studies that are problem-focused or related to deficit models. In fact, so called successful should not be defined by the experts on the basis of objective measurement; rather, it should be interpreted by the elder subjectively.

Actually, as long as we return to the theoretical foundation of successful aging, and remove the irrelevant factors of successful aging from the composite components, we can reduce the meaning of successful aging. In addition, we also have to treat successful aging with positive subjective experiences based on positive psychology of aging in order to make it become a kind of tasks enabling the potential of older adults (Ranzijn, 2002). To make measurement of successful aging become a kind of work, it requires our understanding that such proposal is to refute "disengagement theory of aging", which definitely points out that it is a wrong hypothesis that the people in elder stage are deemed to deteriorate, so we have to encourage the community to interpret the phenomena of aging population with positive observatory vision, regard the elder as a social asset and opportunity, so that in policy making along with practical work, we can endeavor to construct the fact of the elder's positive and active participation and production (Andrews, 2002; Dalziel, 2001) .

In accordance with the above-mentioned, to explore from the theoretical dimension, Rowe and Kahn(1997) considered that successful aging was characterized as involving three components: Physical dimension of low probability of diseases and diseases-related disability; mental dimension of high cognitive and physical functional capacity, and social dimension of active engagement of life. Concerning Rowe and Kahn's (1997) success in defining successful aging, the empirical research evidences show that it is a kind of aging status that can be measured objectively, and this definition has been quoted extensively. However, this definition ignores what Gergen and Gergen (2005) signified that the aging is a kind of constructed reality that must be interpreted by the elder's subjective perception. Namely, even if the objective body has illness or defection, as long as the elder perceive subjectively that the body functions well, this is successful aging, too.

Another prominent model of successful aging proposed around the same time period is that of Baltes , who described successful aging in terms of lifespan developmental trajectories with a focus on behavioral and psychological adaptation to losses. Baltes (1997) exerted variability

and plasticity concepts, and defined the success of aging as a good process of psychological adaptation. There are three elements in the success of aging, including selection, optimization, and compensation. In comparison with the concept of Rowe and Kahn (1997), the three elements have more extensive application and flexibility. It reflects Tate, Lah and Cuddy's (2003) viewpoint of the importance of the elder's subjective perception, emphasizing that through adjusting the goal and social comparison, the elder can still have life satisfaction and perspectives of positively treating themselves as young people can. It also indicated that Rowe and Kahn's successful aging model failed to address losses, gains, and balance in later life (Aldwin, Spiro, Park, 2005), so Crowther, Parker, Achenbaum, Larimore, and Koenig (2002) added the fourth element to Rowe and Kahn's theory, positive spirituality for inclusion of spirituality's positive influence on the elder's later life.

Given the above views, successful aging can be defined as a relatively high level of physical, psychological, social and spiritual well-being in adaptation. In addition, successful aging is a variable of subjective perception that differs from the concepts like the objective physical disability, poor economy, and bad environment, which cannot be mixed in order to prevent from confusion of concepts. According to those discussions, we developed the Successful Aging Scale with positive psychological orientation, including four measurement dimensions-- physical, mental, social and spiritual well-being. Through exploratory factor analysis, and confirmatory factor analysis, we proceeded reliability and validity analysis. Meanwhile, subject to the research results of Suri and Gross (2012), Gwee et al (2014), Cho, Martin, and Poon (2015), successful aging, positive affect, and life satisfaction have significant correlation. Therefore, with positive affect and life satisfaction as the outcome measures, we assessed criterion related validity of the Successful Aging Scale.

## **METHODOLOGY**

The present study has been divided into three stages, from developing item pool, setting up formal successful aging scale, to test the reliability and validity of the Successful Aging Scale.

### **STUDY1**

#### **Sample**

In the initial scale construction, by means of interviewing with 40 elders aged above 65 years old to generate the items in the Successful Aging Scale. We then convened the expert meeting for 5 experts' discussion on the interviewing results.

#### **Method**

With the sample of 40 Taiwan elders aged more than 65, and based on the four dimensions of physical, mental, social and spiritual well-being, we interviewed those elders individually on their views on the drafted measuring items to develop a diversity of possible measuring items. Then, 8 experts who investigated successful aging and have practical experiences were invited to discuss the applicable items. Finally, items with content validity were maintained through calculating the content validity index.

The items drafted in accordance with the interviewing results were filtered by the 8 experts, who stressed measuring subjective perceptions of successful aging, and suitability for the four measuring dimensions-- physical, mental, social and spiritual well-being. For example, items objectively judging physical illness and deflection had been deleted, and items

involving subjectively perceiving that one's physical function is operating well were maintained. The item regarding religious belief that is easy to arouse disputes had been deleted. Instead, the measuring point lied in exploring the meaning of the individual's life. To avoid overlapping the concepts, some items belonging to other concepts had also been deleted.

Lastly, we asked the experts to evaluate correlation between each item and its corresponding dimension. The score has four levels: 1= Irreverent, 2= Slightly reverent, 3= Strongly reverent, and 4= Extremely reverent for calculating item-level content validity index, along with scale-level content validity index. 40 items were drawn in the preliminary design, and each construct had 10 items. The scale was designed according to Likert five-point scale with 5 levels: "Extremely disagree", "Disagree", "Slightly agree", "Agree", and "Extremely agree" with score from 1 to 5 points.

## **STUDY 2**

### **Sample**

In accordance with the item pool set up in the first stage, we adopted 220 old people aged above 65 in Taiwan to receive measurement with 40 items. Through exploratory factor analysis and Cronbach's Alpha analysis of the measuring results, the items with loading less than .70 had been deleted in order to establish the items in the formal scale.

### **Method**

Principal factor analysis using Promax rotation was conducted on the 40 items. To make concise and accurate items, each dimension selected 5 optimal items. The optimal 5 items from each dimension were selected according to multiple criteria, including the following: skewness below 1; kurtosis below 2; loadings  $>.70$  with the largest value. Using this procedure, the optimal 20 items were chosen to constitute the formal successful aging sample items.

## **RESULTS**

Principal factor analysis using Promax rotation was conducted on the exploratory sample ( $N=220$ ). After 9 analysis, loadings  $>.70$  and items with the largest value were selected in each construct. Those methods suggested a four-factor solution explaining 78.67% of the total variance as the best empirically and theoretically supportive solution. And the total Alpha is .93. The analytical results are listed in Table 1. With items in Table 1 as those in the formal scale, the subsequent analysis was conducted.

Table 1: The exploratory factor analysis of successful aging scale

Dimension	Item	Loading	Cronbach's Total Alpha	Total Variance	Total Alpha
Physical Well-being	X1.I can take care of my own daily life.	.87	.89	78.67%	.93
	X2. I can maintain normal daily routine.	.91			
	X3.I can process matters outsides.	.85			
	X4.I can prevent physical illness.	.87			
	X5.I can make good use of my physical functions.	.77			
Mental Well-being	X6. I am satisfied with the current living quality.	.93	.91		
	X7. I feel happy about what I do every day.	.88			
	X8. I hold optimistic thoughts towards things.	.92			
	X9. I am hopeful for the future.	.80			
	X10. I am proud of myself.	.72			
Social Well-being	X11. I have trustable family or friends.	.90	.93		
	X12 I have good human relationship..	.91			
	X13. I have a lot of friends to confide to.	.90			
	X14.I have my own supportive network.	.93			
	X15. I have the habit of actively caring for or helping others.	.90			
Spiritual Well-being	X16. I can quickly recovers from pains.	.91	.91		
	X17. I can accept the unpredictability in life.	.85			
	X18. I can find the value of my own existence.	.94			
	X19. I can find the serenity in my mind.	.93			
	X20. I can control my own fate.	.85			

Note:N=220.

### STUDY 3

#### Sample

Next, another 400 elders aged more than 65 were adopted as the sample in the research for carrying out the test of the 20 items in the formal Successful Aging Scale, data collection, analyzing the measuring model of successful aging through confirmatory factor analysis, and estimating the reliability and validity.

#### Method

With 400 elders, we analyzed measuring model of successful aging through confirmatory factor analysis. Several models were computed to compare different conceptualizations of the factor structure, including the following:

1. A one-factor model tests whether the successful aging scale is measuring one overall factor.
2. An uncorrelated factors model tests the idea that the four successful aging factors are independent.
3. A hierarchical model tests the idea that a second-order factor can account for

relations between the four successful aging factors.

By employing Structured Equation Modeling technology, under the premise of the absolute value of the skewness' observed variables' coefficient not larger than 3, and the absolute value of Coefficient of kurtosis not larger than 10, we exerted the LISREL software and Method of Maximum Likelihood for analysis. In accordance with Fit indices, the optimal mode was selected to further estimate the composite reliability, average variance extracted, and discriminant validity.

## RESULTS

Confirmatory factor analysis of successful aging scale's fit indices are shown in Table 2.

Table 2: Fit indices of confirmatory factor analysis

Models	$\chi^2$	df	$\chi^2/df$	RMSEA	GFI	NNFI	CFI
One factor	1801.82	170	10.59	.18	.62	.90	.91
Uncorrelated factors	974.84	170	5.73	.13	.75	.94	.94
Hierarchical	298.59	166	1.79	.05	.91	.99	.99
Criteria			<3	<.05	>.90	>.90	>.90

Note. RMSEA= Root Mean Square Error of Approximation. GFI= Goodness of Fit Index. NNFI= Non-Normed Fit Index. CFI = comparative fit index.  $N=400$ .

On the basis of Table 2, and according to Table 2, as Bagozzi and Yi's (1988) and Browne and Cudeck's (1993) structural equation model fit indices criteria, hierarchical model was the model with the best fit. Therefore, we chose the complete hierarchical model as the final solutions. This model shows that physical, mental, social and spiritual well-being are relative to the higher order factor (successful aging). Factor loadings, composite reliability, and average variance extracted for confirmatory factor analysis, as shown in Table 3. According to Table 3, each composite reliability is higher than 0.6, each average variance extracted (AVE) is higher than 0.5, meeting what Fornell and Larcker's (1981) suggested range, and presenting that the Successful Aging Scale developed by this research has good reliability and convergent validity, and explains that summing up the score of items in the whole scale is appropriate and represents a meaningful and interpretable score.

Table 3: Factor loadings, composite reliability, and average variance extracted

Factors	Observed Variables	Standardized Factor Loading	$R^2$	Composite Reliability	AVE
Physical Well-being	X1	0.79	0.62	.86	.55
	X2	0.73	0.53		
	X3	0.71	0.50		
	X4	0.72	0.52		
	X5	0.78	0.61		
Mental Well-being	X6	0.81	0.66	.89	.62
	X7	0.74	0.55		
	X8	0.81	0.66		
	X9	0.81	0.66		
	X10	0.79	0.62		
Social Well-being	X11	0.78	0.61	.88	.61
	X12	0.77	0.59		

	X13	0.81	0.66		
	X14	0.77	0.59		
	X15	0.78	0.61		
Spiritual Well-being	X16	0.81	0.66		
	X17	0.78	0.61		
	X18	0.79	0.62	.88	.61
	X19	0.75	0.56		
	X20	0.79	0.62		
Successful Aging	Physical Well-being	0.84	0.71		
	Mental Well-being	0.82	0.67		
	Social Well-being	0.81	0.66	.89	.68
	Spiritual Well-being	0.83	0.69		
Criteria		>0.7	>0.2	>0.6	>0.5

Note. AVE= average variance extracted.  $N=400$ .

So far as discriminant validity is concerned, plus and minus the correlation coefficient with standard error of 1.96, if the confidence interval does not include 1, it indicates that there is discriminant validity in latent variables. The correlation and the relative 95% confidence interval among the constructs have been organized in Table 4, presenting that none of the pairing include 1. In addition, the restrictive model which sets up the correlation as 1 proceeded the Chi-square difference test for the nonrestrictive model and the restrictive model, and, as shown in Table 4, there is difference in the restrictive model with pairing correlation set up as 1 and nonrestrictive model. Namely, correlation among the four latent variables is discriminant. It means that there is indeed discriminant validity among physical wellbeing, psychological wellbeing, social wellbeing, and spiritual wellbeing.

Table 4: Correlation and 95% confidence interval among the four constructs in successful aging.

	Physical Well-being	Mental Well-being	Social Well-being
Mental Well-being	.54a (.45; .63)b [43.05*] c		
Social Well-being	.55 (.48; .63) [41.58*]	.61 (.51; .72) [64.98*]	
Spiritual Well-being	.49 (.42; .57) [44.89*]	.64 (.55; .73) [66.19*]	.58 (.49; .67) [58.34*]

Note. a is correlation coefficient, b is confidence interval, c is Chi-square difference.

\* $p < .05$ .

#### STUDY 4

##### Sample

Finally, with the abovementioned 400 elders aged above 65 as the sample, we tested the Successful Aging Scale's criterion related validity. Adopting structured equation modeling

technology, when the absolute value of the coefficient of skewness of the observed variables' score did not exceed 3, and the absolute value of the Coefficient of kurtosis did not exceed 10, we conducted analysis with LISREL software and the Method of Maximum Likelihood.

## Method

In addition to Successful Aging Scale, the 400 elders received measurement with Watson, Clark, and Tellegen's (1988) Chinese-version Positive and Negative Affectivity Schedule PA scale as well as Diener, Emmons, Larsen and Griffin's (1985) Chinese-version Satisfaction with Life Scale. In regard of the Chinese-version PANAS Scales, the design exerted declarative sentences to replace the emotional adjectives like active, alert, attentive, and determined. Participants responded on a 4-point Likert scale to 12 items, including "I feel happy" and "I feel sad". 6 items belong to the positive emotion scale to measure the positive emotions, while the other 6 items belong to the negative emotion scale to measure the negative emotions. According to the explorative factor analysis results, two dominant factors emerged, together accounting for 77.76% of the common variance. On the other hand, PA scale's alpha reliability was .93, and NA scale's alpha reliability was .89. Moreover, the Chinese-version Satisfaction with Life Scale includes five items, such as "In most ways my life is close to my idea", "The conditions of my life are excellent", "I am satisfied with my life, So far I have gotten the important things I want in life, If I could live my life over, I would change almost nothing. Participants responded on a 5-point Likert scale to 5 items. As to the explorative factor analysis results, one factor explaining 87.05% of the total variance and alpha reliability was .93.

## RESULTS

With the composite score of physical, mental, social and spiritual well-being as the observed variables (X1, X2, X3, and X4) in Successful Aging Scale, the composite score of the first and last three items in the Chinese-version PA Scale as the observed variables (Y1 and Y2) of positive affect, and the composite score of the first and last three items in the Satisfaction with Life Scale as the observed variables (Y3 and Y4) in life satisfaction, we proceeded structured equation modeling analysis, which path diagram is presented in Fig. 1, and the model's fit indices are listed below: RMSEA=.05, GFI=.97, CFI=.97, NNFI=.98, and  $\chi^2/df=39.17/18=2.17$ , showing that the whole model's quality has been accepted. According to Fig. 1, the path coefficient of successful aging for positive affect was 0.59 ( $t=9.85$ ,  $p < .05$ ), the path coefficient of successful aging for life satisfaction was 0.62 ( $t=9.59$ ,  $p < .05$ ), and criterion related validity was acceptable as well.



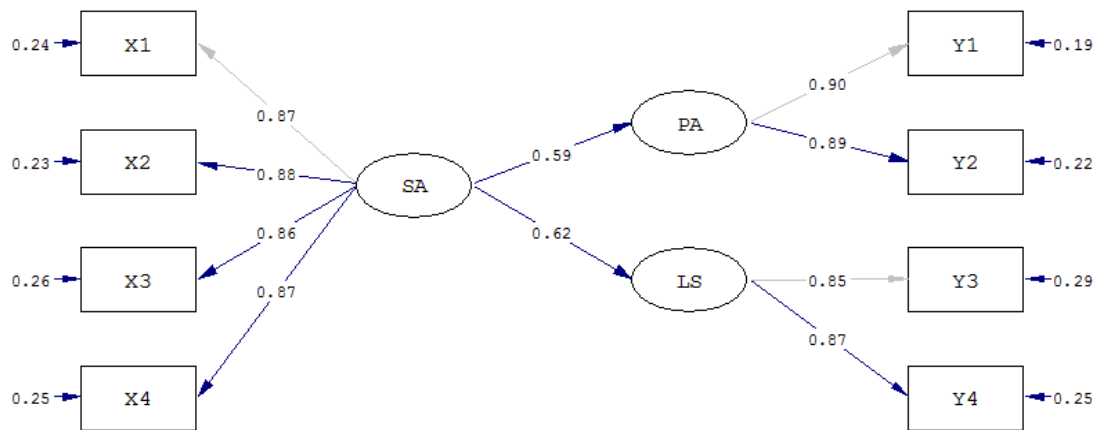


Fig. 1 The Route Diagram

Note. SA= successful aging PA=positive affect LS= life satisfaction

## DISCUSSION

In accordance with Rowe and Kahn's (1997) and Crowther, Parker, Achenbaum, Larimore, and Koenig's (2002) discourse on successful aging, to begin with positive psychology of ageing and Gergen and Gergen's (2005) constructed reality angle to respect the elder's subjectivity and emphasize the elder's positive subjective experiences, we have developed the Chinese-version Successful Aging Scale in Taiwan with four measurement dimensions--physical, mental, social and spiritual well-being.

The formal scale consists of five items in each dimension, and there is totally 20 items. The results indicate that the Successful Aging Scale has favorable psychometric properties. In Taiwan, the Chinese-version Successful Aging Scale has good content validity, factorial validity, convergent validity, discriminant validity, and criterion related validity, and such finding corresponds to Tate et al's(2003) perspective on constructionism, showing that successful aging is a kind of subjective perceptions instead of objective measurement. It demonstrates that the individual's subjective interpretation is indispensable for successful aging, and further extends to the viewpoint that everyone should take aging from the positive angle. Anyhow, the objective age and physical changes are uncontrollable, but we can interpret our body, mind, and spirit from the positive angle. What influences the development of the elder in their later life is often not an objective phenomena; rather, it is the elder's subjective perception and interpretation for those objective facts. On the other hand, in the past, most studies stress the successful aging measurement in physical, psychological, and social dimensions. In this research, it is found that successful aging includes dimension of spirit, which make up what Crowther, Parker, Achenbaum, Larimore, and Koenig's (2002) so-called forgotten factor, and completely presents that successful aging consists of physical, psychological, social, and spiritual wellbeing, and explains that successful aging involves the elder's positive perception for their physical health and functions physiologically; the positive perception for the individual's psychological adaption and ability of making happiness psychologically; the positive perception for the individual's owning good human relationship and ability of taking part in social activities in regard of social interaction; and finally, the positive perception for the individual's life meaning and self-transcendence spiritually. The addition of dimension of spirituality emphasizes that successful aging cannot ignore the elder's self and environment transcendence from restriction to implement self healing and pursue value of life when they encounter such negative situations.

Anyhow, through strict statistic analysis, this research ascertains the measuring model of the physical, psychological, social, and spiritual wellbeing in successful aging. The Successful Aging Scale developed in this research has fit reliability and validity, which is suitable for evaluating the elder's positive development to serve as the beneficial evaluative tools to promote successful aging.

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