

Applying the Concept of Successful Aging to Thailand

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Abstract

Objectives: This research aims to examine the components of Rowe and Kahn's model of successful aging as applied to the Thai population who are categorized as: young-old (60-69), old-old (70-79), and oldest-old (80 and over). **Method:** The study is based on the Survey of Older Persons in Thailand of the National Statistical Office, 2011 ($n = 24,433$). Confirmatory Factor Analysis is used to test whether Rowe and Kahn's model, which comprises three domains - avoiding disease and disability, maintaining physical and cognitive functioning, and continuing engagement with life, is confirmed by these data. Multiple group analysis is performed to determine factor loading differences among age groups. **Results:** Rowe and Kahn's model has a good statistical fit when applied to data of the current study. Factor loadings for three age groups is statistically different ($p < 0.001$). Of the three domains, continuing engagement with life is the domain most strongly associated with successful aging, particularly among the old-old and the oldest-old. **Implications:** Programs to support health and social engagement should be promoted and enhancing active engagement should be a priority since older Thai people have low levels of social participation.

Keywords

Successful aging; aging cohorts; confirmatory factor analysis; active engagement; health and social programs

Introduction

With the increase in aging population worldwide, living longer with good health and higher quality of life has become important. Thus, it is critical to have a good understanding of what is productive aging or "successful aging". Such an understanding will allow gerontologists to make international comparisons to identify helpful policies and interventions for older people. Researchers have developed numerous models to conceptualize successful aging (SA) (Baltes & Baltes, 1993; Bowling & Dieppe, 2005; Kim, 2008; Rowe & Kahn, 1998). One of the best known is Rowe and Kahn's model of SA (Bowling & Iliffe, 2006; Bülow & Söderqvist, 2014; Kim & Park, 2016; McLaughlin, Jette & Connell, 2012). This model has been validated using smaller samples in countries, such as China (Feng, Son & Zeng, 2015), Taiwan (Lee, Lan & Yen, 2011), and Thailand (Jaipiam, Kirdpitak & Malakul Na Ayudhaya, 2015; Watakakosol et al., 2013). It has not however, been tested using national probability samples across the globe. The present research therefore, applies Rowe and Kahn's model to a national probability sample of older adults in Thailand.

Successful aging refers to quality of life during old age. This concept was first proposed by Cicero in 44 B.C. (Anton, Woods & Ashizawa, 2015; Bowling, 1993). The concept was

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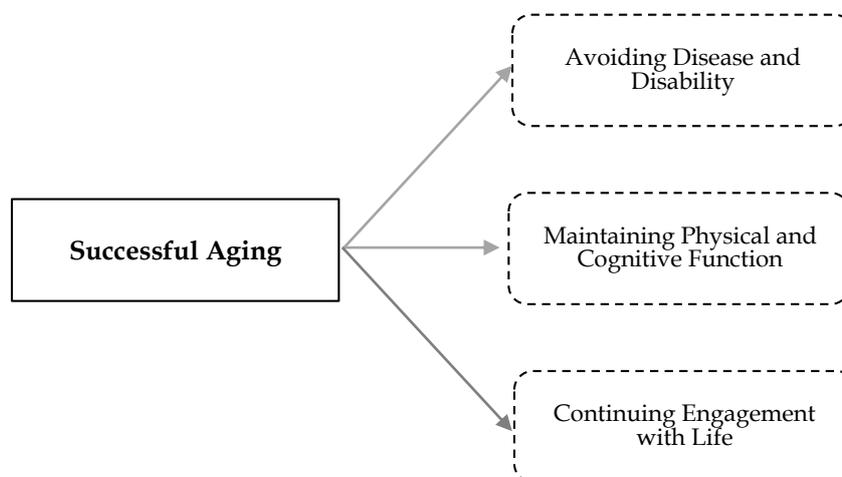
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popularized recently by John W. Rowe and Robert L. Kahn (Bülow & Söderqvist, 2014; McLaughlin et al., 2012). Rowe and Kahn contend that older people could potentially avoid their declining health by maintaining and improving their health through adoption of healthy behaviors (Rowe & Kahn, 1987). In addition, they believe people can age well without physical and mental impairments.

Rowe and Kahn's (1998) model includes three key behaviors or characteristics. The first characteristic, avoiding disease and disability, refers to minimizing risk factors for diseases and disability. Undergirding the model is the contention that, though older adults are vulnerable to diseases and disability that are not wholly under their control, they can reduce the risk of chronic diseases and disability by adopting healthy behaviors. The indicators of this domain include chronic diseases (e.g., hypertension, diabetes, heart disease, stroke, and cancer), and weakening of the organs. The second characteristic - maintaining physical and cognitive functioning - is the ability to be independent (e.g., able to live alone, take care of oneself) and maintain the basic activities of daily life (i.e., walking, eating, dressing and bathing) without help from others. This domain is measured by activities of daily living, mental ability, as well as verbal and spatial skills. The third characteristic, continuing engagement with life, includes the maintenance of close relationships with others and being involved in social activities. In this domain, Rowe and Kahn include giving and receiving instrumental support, participation in social activities, paid work, household chores, volunteering, and taking care of others (Rowe & Kahn, 1998). (Figure 1 describes the hypothesized domains of SA)

Figure 1: Rowe and Kahn's model of Successful Aging (Rowe & Kahn, 1998)



Rowe and Kahn's model has been criticized, however, for two reasons: first, the model was based on data that was specific to only one country's culture and history, namely the U.S.. It is important to note the definition of SA may differ from country to country depending on its cultural context (Hilton, Kopera-Frye & Krave, 2009; Motta et al., 2005; Ouwehand, de Ridder, & Bensing, 2007). One major difference between Westerners and Asians is the value they place on independence versus interdependence (Ingersoll-Dayton, Saengtienchai, Kespichayawattana & Aunguroch., 2001). Fiske, Kitayama, Markus and Nisbett (1998) argue that European-Americans are more likely to value independence in contrast to East Asians who value interdependence. Previous scholars noted the cognitive domain is the most important indicator of SA among the elderly in Western countries (Kahng, 2008; Pietrzak, Tsai, Kirwin & Southwick, 2014; Gutiérrez, Tomás & Calatayud, 2018). It may be that such cultural differences lead to different core constructs of SA. For example, researchers working in China

have concluded that life satisfaction should be added to Rowe and Kahn's SA model (Feng et al., 2015). Similarly, researchers in Taiwan have added leisure activities to the model (Lee et al., 2011).

The second criticism is that Rowe and Kahn's concept of SA is very difficult to achieve since having no impairments as an older person is highly improbable especially among the oldest-old (Motta et al., 2005). There are a few studies that compare the applicability of Rowe and Kahn's model of SA across age groups. Pruchno, Wilson-Genderson & Cartwright (2010) using a model of SA that includes functional abilities, pain, and health conditions for young-old and old-old groups find that physical health and physical functioning have a strong relationship with SA for both age groups. However, their study does not include the cognitive functioning and social engagement domains of Rowe and Kahn's model of SA. Previous researches show the age of the elderly is a variable that has a major influence on SA (Dahany et al., 2014; Feng et al., 2015; Pinguart & Sörensen, 2000). The definitions and model of SA may differ among old age groups. Therefore, in order to understand these differences, it is important to examine SA within sub-groups of older people.

Older people and SA in Thailand

The current study applies Rowe and Kahn's model of SA to Thailand. The proportion of older adults (60 years and above) in Thailand has rapidly increased over the past decade, from 10.7% in 2007 to 17.8% in 2018 and it is predicted to reach 28% in 2031 (Institute for Population and Social Research, 2018; Population Projection Working Group, 2013). This increase means potential health problems and a low rate of social participation among this age group (Foundation of Thai Gerontology Research and Development Institute, 2013; College of Population Studies, 2017). An important implication is that more services are needed to address these health problems while also supporting older adults to live independently with a high quality of life. For Thai policymakers, helping older adults to experience SA is critical. Previous studies on SA in Thailand can be categorized into 2 approaches: developing the conceptualization of SA, and exploring the prevalence of SA based on Rowe and Kahn's model. Several studies have attempted to define SA using different variables than those used in the Rowe and Kahn model. Nanthamongkolchai, Tuntichaivanit, Munsawaengsub and Charupoonphol (2011) for example use variables, such as self-esteem, family relationships, and happiness. Likewise, Charrurangsri, Un-Ob, Yodpet and Ratana-Ubon (2014) conceptualize SA among urban elderly by including spirituality as one of its component. Their findings suggest that cognitive and psychological skills, social interactions, and spiritual skills are important variables to measure SA. These studies however, do not apply Rowe and Kahn's model to study SA in Thailand. Nor do they consider how SA may differ based on age group.

Jaipiam et al. (2015) explore the prevalence of SA among those aged between 60 and 79 in Bangkok, Thailand using the components of Rowe and Kahn's model. Their results show this age group had high physical, mental, and social functioning. In another study using Rowe and Kahn's model, Watakakosol et al. (2013) examine SA of Thai older persons who live in Bangkok and its adjacent areas. Their findings show that among the three domains, social engagement has the strongest relationship with SA. However, this study focuses only on the Bangkok area and did not test the applicability of Rowe and Kahn's model to older Thai people living in other parts of Thailand. In addition, neither of these two studies use nationally representative data.

The present research builds upon an earlier research by the same authors that examines whether the SA model developed by Rowe and Kahn within the context of the United States is applicable for Thai older adults. The current study highlights the differential fit of the model

to three age groups: young-old (60 to 69), old-old (70 to 79), and oldest-old (80 or older). These age cohorts have been identified by Thai policy development officials for older people based on their ability to work, their physical impairment, and their dependency (Ministry of Social Development and Human Security, 2003). The present study seeks to answer the following questions: 1) Is Rowe and Kahn's model of SA applicable in the Thai context? 2) Is Rowe and Kahn model of SA applicable for three different age groups of older Thai people? 3) Are the domains of Rowe and Kahn's model more salient for some older age groups in Thailand than for the others?

Methods

Study design and respondents

This cross-sectional study is based on the Survey of Older Persons in Thailand 2011 (SOPT 2011) which is a nationally representative sample survey, conducted by the National Statistical Office (NSO) of Thailand. This sample survey uses a stratified two-stage sampling method. All provinces in Thailand are used as the first stratum and households are used as the second stage to produce a sample of 34,173 respondents aged 60 and above or their proxies. Data that come from the proxies (i.e., from members in the household and non-household members) are excluded from this study. When we compare the personal characteristics (e.g., age, gender, level of education, and living arrangements) of those in the study with those who are excluded, the researchers find the samples share similar personal characteristics. The final sample size of 24,433 eligible older individuals are analyzed. There are 13,484 people aged 60-69 years, 8,212 people aged 70-79 and 2,737 people aged 80 and over. More than half of the respondents (60.4%) are females. A little over three-fourths of them (75.7%) have elementary level education. Older persons aged 60-69, 70-79, and 80 and over are married (68.2, 56.0, and 39.0% respectively) and 40% of every age group report their incomes as insufficient. The vast majority (94.6%) are Buddhists.

Measurements

The concept of SA in the current study use is based on the following indicators: 1) avoiding disease and disability, 2) maintaining physical and cognitive functioning, and 3) continuing engagement with life (Rowe & Kahn, 1998).

Avoiding disease and disability: This domain asks questions related to chronic disease and weakening of the organs.

Respondents are provided with a list of 15 chronic diseases, such as high blood pressure/high cholesterol, diabetes, and heart diseases, and asked to identify which diseases they have. They are asked the following question: "Do you have any of these chronic diseases?" Those who report they suffer from more than 5 diseases are collapsed into the following categories (0 = no disease, 1 = 1 chronic disease, ..., and 5 = 5 or more chronic diseases). Likewise, the items/questions measuring weakening of the organs are "Can you see clearly?" (0 = cannot see, 1 = not clear, 2 = clear with a visual aid, 3 = clear without a visual aid), "Can you hear clearly?" (0 = cannot hear, 1 = not clear, 2 = clear with hearing aid, and 3 = clear without hearing aid), "Can you control your urination?" (0 = not at all, 1 = sometimes, and 2 = always), and "Can you control your defecation?" (0 = not at all, 1 = sometimes, and 2 = always).

Maintaining physical and cognitive functioning: This domain relates to maintaining the ability to perform daily activities including walking, eating, dressing or bathing without help from others. In addition, this domain includes maintaining cognitive functioning. Participants are assessed for limitations in Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). ADLs include seven activities: eating, dressing, bathing, face washing and teeth brushing, toileting, grooming, and putting on shoes. They also include five activities: squatting, lifting things that weighed 5kg, walking, walking up to 2-3 flights of stairs, and taking a bus or boat on their own. ADLs and IADLs are measured with the following question: *"Can you perform...by yourself?"* (0 = no, 1 = yes with aid, 2 = yes, without aid). The summation scores of ADLs and IADLs range from 0-14 and 0-10 with higher scores indicating that participants face fewer difficulties. Cognitive functioning is measured using self-reported ability to count and use money and to take daily medication (Tappen & Hain, 2013) based on the following questions: *"Can you count and use money correctly by yourself?"*, and *"Can you take medicine correctly and completely by yourself?"* (0 = no, 1 = yes, with aid, 2 = yes, without aid).

Continuing engagement with life: This domain refers to maintaining close relationships with others and involvement in productive behaviors. Relationships with people are measured by giving and receiving instrumental support to/from others, and participation in social activities. The following questions are asked: *"During the 12 months before the interview, did you give/receive money from your children who live outside the household?"*, *"During the 12 months before the interview, did you receive food/clothes from your children who live outside the household?"* The answers range from 0 = never, 1 = yearly, 2 = monthly, 3 = weekly, and 4 = daily. Informational support and social participation are measured dichotomously (0 = no, 1 = yes) based on these items: *"During the last month before the interview, did you receive information relevant or useful for old age from others?"*, *"During the 12 months before the interview, did you participate in social activities (elderly club, funeral assistance association, occupation group, homemaker group, and cooperative groups)?"* Participation in religious activities is measured using an ordinal scale by asking: *"During the 12 months before the interview, how often did you attend religious activities?"* (0 = never, 1 = 1-3 times, 2 = 4-6 times, 3 = 7-11 times, and 4 = more than 11 times). Productive behavior is measured dichotomously (0 = no, 1 = yes) by three items: paid jobs, household chores, and taking care of others.

Ethics statement

Ethical approval for this study is obtained from the Institute for Population and Social Research Institutional Review Board (IPSR-IRB), Mahidol University, Nakhon Pathom, Thailand (COE. No. 2018/05-170).

Statistical analyses

The Statistical Package for the Social Sciences is used for descriptive statistical analysis. Structural Equation Model (SEM) is conducted using Mplus Base Program (Mplus) version 7. The SEM has the advantage of being able to incorporate the latent (unobserved) variables (i.e., SA and the three main constructs of SA) derived from observed measures (i.e., number of chronic diseases, ADL scores, and participation in social activities), and it provides a clear conceptualization of Rowe and Kahn's model of SA. Confirmatory factor analysis (CFA) is performed to test whether the three sets of observed variables described above, which relate to the three theoretical constructs of successful aging according to Rowe and Kahn's model, share common variance-covariance characteristics. Hence, CFA provides evidence of construct validity, in particular the convergent validity of Rowe and Kahn's constructs of SA

in the Thai context. Multicollinearity is assessed before data analysis. When multicollinearity occurs, this problem is remedied by adding residual correlations when specifying the model (Brown, 2014). Several fit indices are employed to assess the model fit: Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI). In order to constitute a good fit between the hypothesized model and the empirical data, the RMSEA must be equal to or below .07; the CFI must be .92 or higher; and the TLI should be .92 or higher (Hair, Anderson, Black & Babin, 2010). Although Chi-square is also a frequently used test when assessing the fit of a model, it is not used in the current study due to its sensitivity to large sample sizes. Multiple group analysis is performed to determine the equality of factor loadings among the three age groups. Finally, to identify which domains are the most salient by age group, the factor loadings of the domains of SA are compared across the three age groups.

Results

Descriptive findings

Table 1 contains statistics for all variables included in the model. Overall, mean distributions of the variables measuring the first two domains (i.e., avoiding disease and disability and maintaining physical and cognitive functioning) show the sample has high physical and cognitive functioning. However, the mean and percentage distributions for the third domain (i.e., continuing engagement with life) reveal that for some of the indicators, Thai older adults have relatively few supportive relationships with the others (i.e., giving and receiving financial support, participation in social activities). For other indicators (i.e., participation in household chores and taking care of others), they noted a high engagement.

Table 1: Descriptive statistics of the variables included in the model based on age group

Variables	Measurement	Overall	60-69	70-79	80+
		\bar{x} (SD)	\bar{x} (SD)	\bar{x} (SD)	\bar{x} (SD)
Avoiding disease and disability					
Number of chronic diseases	Ordinal (0-5)	0.77(0.82)	0.69(0.79)	0.87(0.84)	0.83(0.84)
Ability to see	Ordinal (0-3)	2.36(0.75)	2.47(0.68)	2.27(0.79)	2.07(0.86)
Ability to hear	Ordinal (0-3)	2.77(0.62)	2.89(0.44)	2.70(0.70)	2.39(0.91)
Ability to control urination	Ordinal (0-2)	1.65(0.63)	1.73(0.56)	1.60(0.66)	1.42(0.75)
Ability to control defecation	Ordinal (0-2)	1.68(0.63)	1.75(.564)	1.63(.657)	1.48(.746)
Maintaining physical and cognitive functioning					
ADLs Scores	Ratio (0-14)	13.88(1.00)	13.94(0.73)	13.88(0.67)	13.63(1.70)
IADLs Scores	Ratio (0-10)	8.74(2.23)	9.37(1.57)	8.26(1.54)	6.77(3.03)
Using money correctly	Ordinal (0-2)	0.89(0.40)	0.96(0.25)	0.86(0.43)	0.63(0.68)
Taking medication correctly and completely	Ordinal (0-2)	0.91(0.35)	0.96(0.24)	0.89(0.37)	0.70(0.60)
Continuing engagement with life					
Giving financial support	Ordinal (0-4)	0.49(0.32)	0.61(0.48)	0.35(0.11)	0.25(0.12)
Receiving financial support	Ordinal (0-4)	1.56(0.98)	1.50(1.04)	1.63(0.90)	1.70(0.85)
Receiving food/clothes support	Ordinal (0-4)	1.30(0.96)	1.15(0.93)	1.44(0.97)	1.63(0.98)

Variables	Measurement	Overall	60-69	70-79	80+
		\bar{x} (SD)	\bar{x} (SD)	\bar{x} (SD)	\bar{x} (SD)
Receiving informational support	Nominal (0=no, 1=yes)	64%	64%	65%	61%
Participation in social activities	Ordinal (0-5)	1.51(1.32)	1.56(1.34)	1.51(1.30)	1.25(1.27)
Participation in religious activities	Ordinal (0-4)	2.77(1.39)	2.87(1.31)	2.77(1.41)	2.28(1.50)
Participation in employment	Nominal (0=no, 1=yes)	37%	51%	24%	9%
Participation in household chores	Nominal (0=no, 1=yes)	85%	77%	63%	80%
Taking care of others	Nominal (0=no, 1=yes)	64%	73%	57%	38%

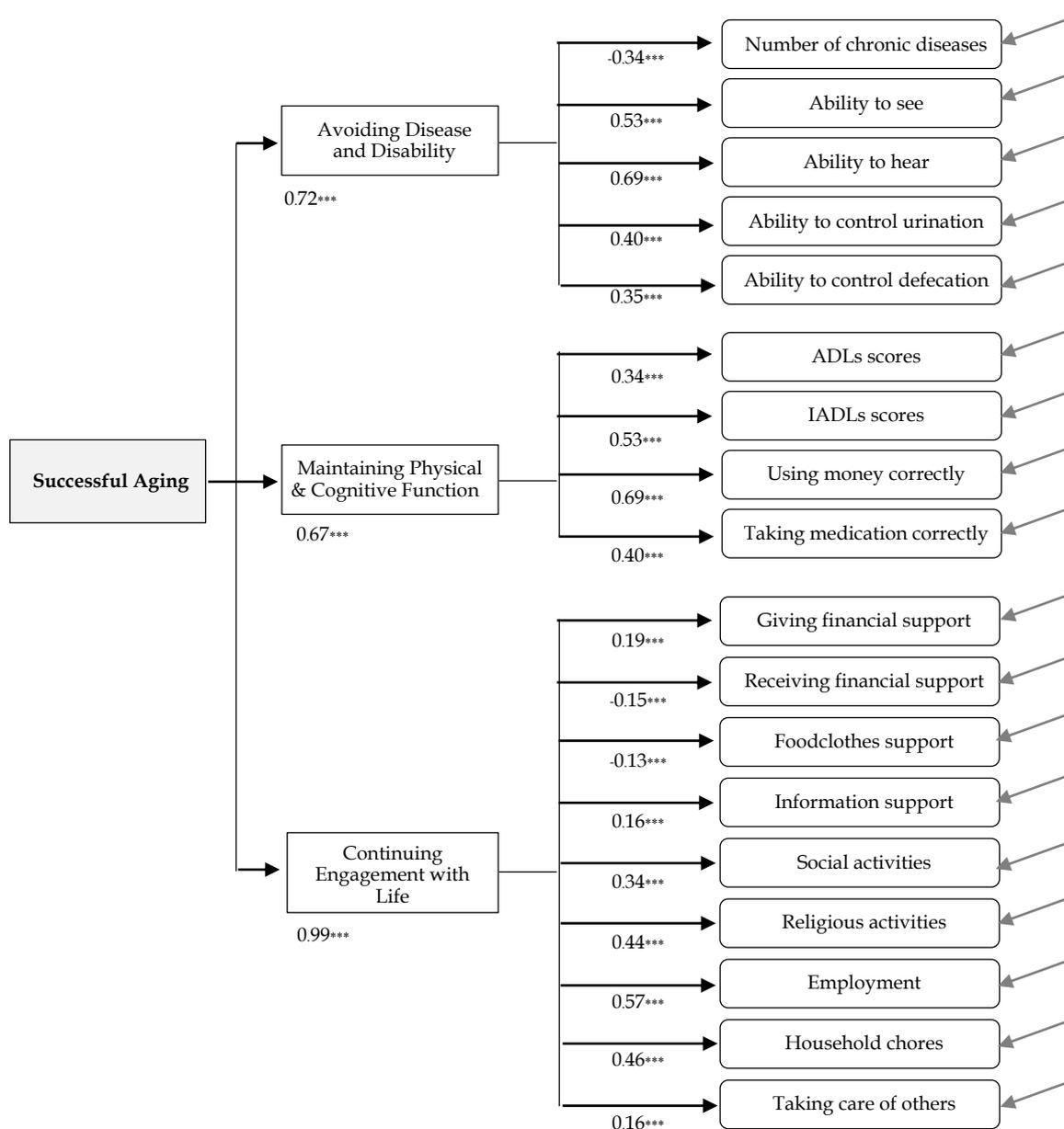
When considering variations in means among the different age groups, avoiding disease and disability has the highest means across all three domains of the SA model. The mean distributions also reveal that the items measuring the first two domains decrease with increasing age. Conversely, the items with particularly low mean distributions that measure the continuing engagement with life domain suggest that Thai older persons (in all age groups) have few relationships in which they give and/or receive support and low social activity, especially among those who are in the oldest-old group.

Rowe and Kahn's Model of SA for Thai older adults

The first step in assessing the fit of Rowe and Kahn's model of SA for Thailand is testing the adequacy of the model by examining the model fit indices and this study meets all the criteria of SEM (CFI = .97, TLI = .97, and RMSEA = .07), suggesting that Rowe and Kahn's model of SA fits well with the national survey data from Thailand.

The link between the three domains defined by Rowe and Kahn and their measures are examined by inspecting the factor loadings of the observed variables on the three latent constructs. The factor loadings for avoiding disease and disability are high (>0.50) for the ability to hear and to see. The factor loadings for maintaining physical and cognitive functioning are also high for using money correctly as well as IADL scores. These high values indicate a strong positive link between maintaining physical and cognitive functioning and the observed variables. This means the observed variables are good indicators of maintaining physical and cognitive functioning. Similarly, the factor loading for continuing engagement with life is high for participation in employment. In contrast, the factor loadings for number of chronic diseases and material support (i.e., receiving financial and food/clothes support) have negative values. Therefore, findings point to an increase in the number of chronic diseases and material supports, a decrease in two domains: avoiding disease and disability as well as a decrease in continuing engagement with life (see Figure 2). Importantly, these factor loadings are statistically significant from zero but just only the number of chronic diseases had the expected sign according to Rowe and Kahn's model.

Figure 2: Empirical model of SA among Thai older adults (n = 24,433)



Note: The coefficients shown are standardized estimate, *** $p < 0.001$

Fit of Rowe and Kahn's Model of SA by age group

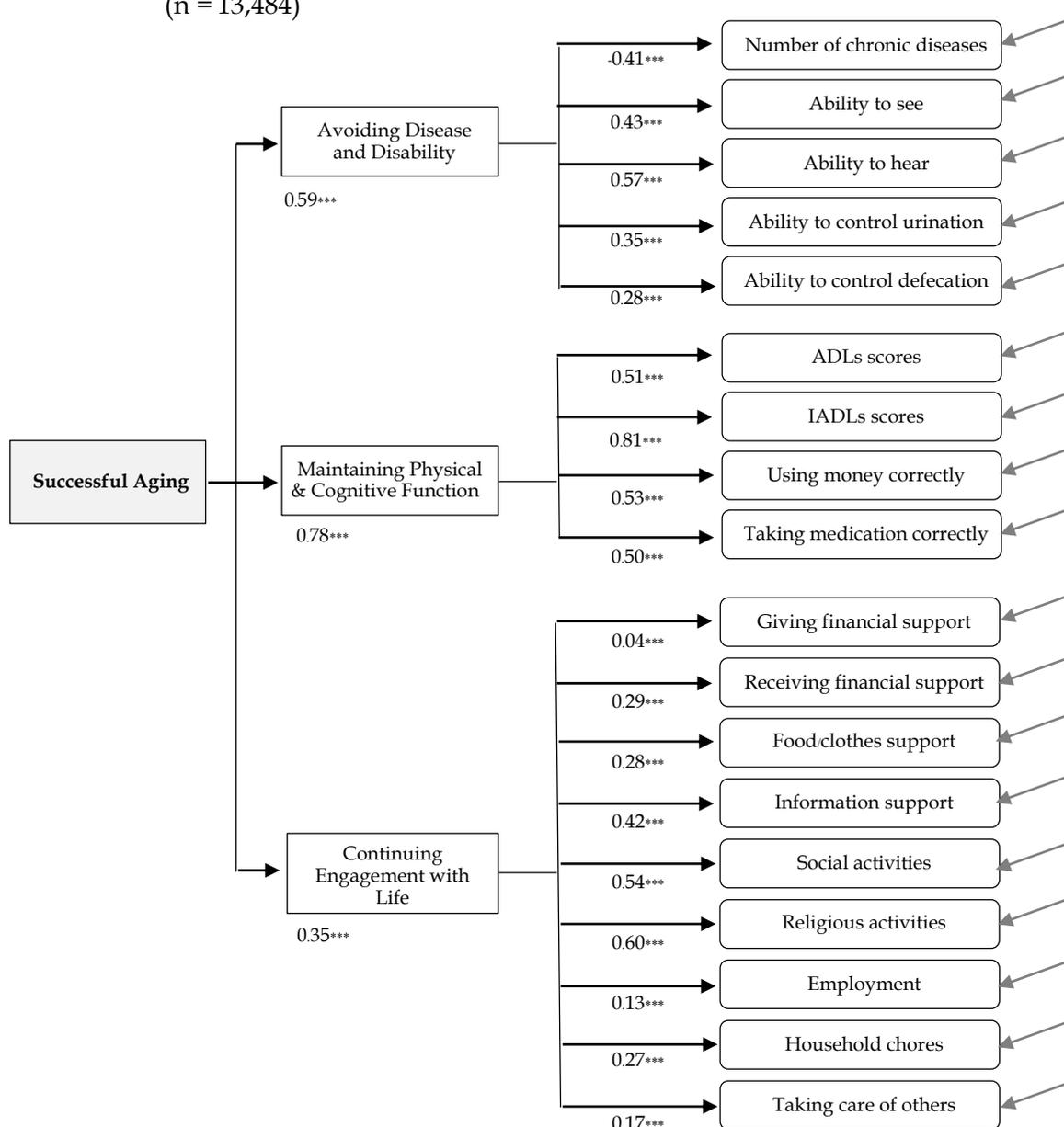
The applicability of the model to the three age groups is assessed by examining the model fit indices separately. All model fit indices for the three different age groups are satisfactory. The CFI and TLI for the young-old group are both .98, and, they are above the acceptable level of .92. The CFI and TLI among the old-old are .98, higher than the cut-off point. Both CFI and TLI among the oldest-old are also higher than .97. Finally, the RMSEA is below the conventional cut-off point of .07 (.06 in the young-old and old-old and .07 in the oldest-old).

The measurement (i.e., observed) variables are examined in relation to the three domains: avoiding disease and disability, maintaining physical and cognitive functioning, and

continuing engagement with life. The factor loadings of the measurement variables for the overall sample and among the three different age groups reveal different contributions as detailed in Figures 3-5. In these figures, only the variables that are significantly correlated ($p < .05$) with their respective domains are displayed in the empirical models. For the overall sample, the findings show that the strongest indicator of avoiding disease and disability among Thai older adults was the ability to hear. One of the indicators of cognitive functioning (i.e., using money correctly) is the strongest indicator of maintaining physical and cognitive functioning. In addition, participation in employment is the strongest indicator of continuing engagement with life.

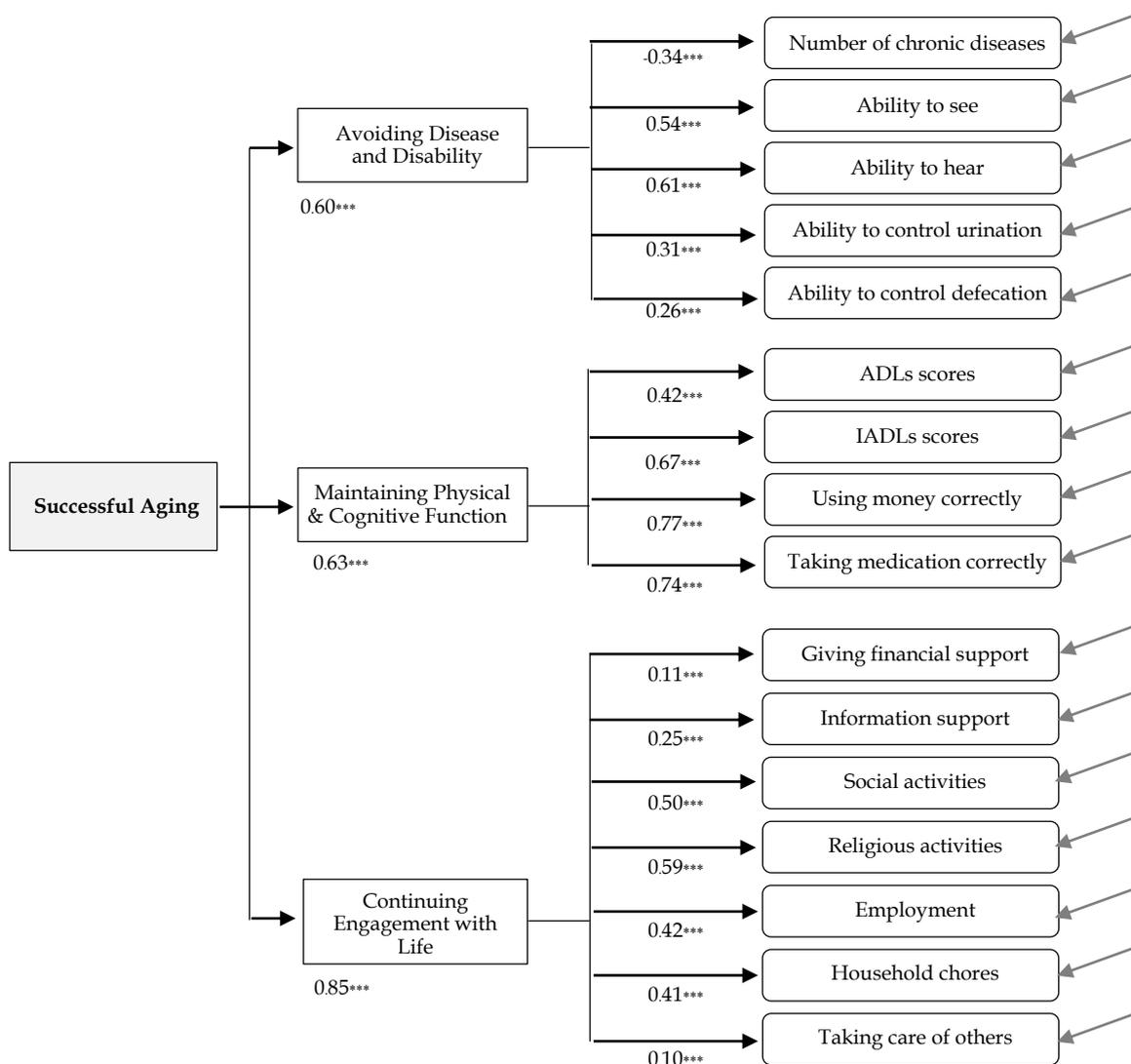
For the young-old, the variables that contribute most to each of the three domains of SA are the ability to hear, IADLs scores, and participation in religious activities. Interestingly, the variables that contribute most to the three SA domains are different for the oldest-old groups: the ability to see, cognitive functioning (i.e., taking medication correctly and completely), and participation in religious activities.

Figure 3: Empirical model of Successful Aging among Thai older adults aged 60-69 (n = 13,484)



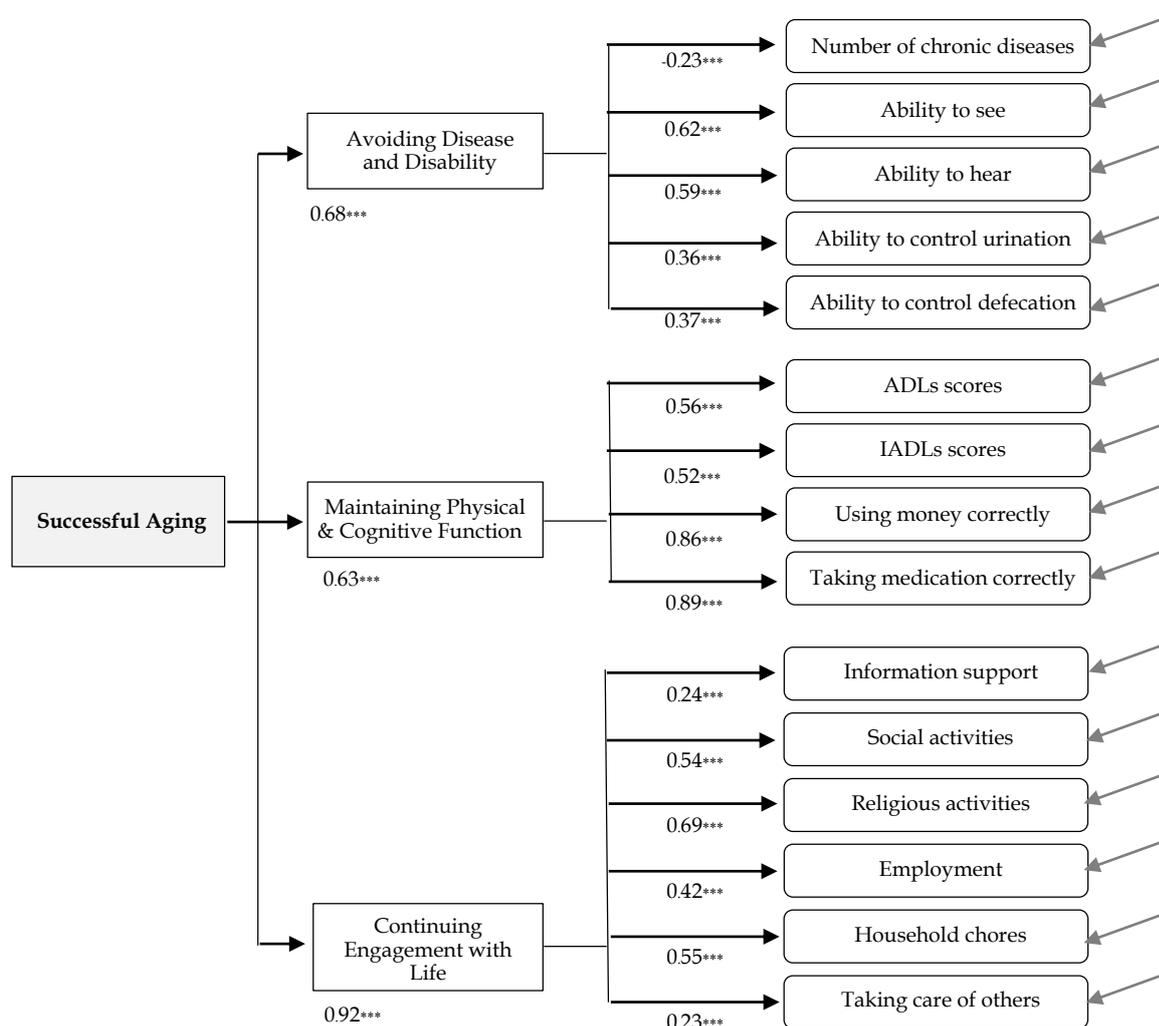
Note: The coefficients shown are standardized estimate, *** $p < 0.001$

Figure 4: Empirical model of Successful Aging among Thai older adults aged 70-79 (n = 8,212)



Note: The coefficients shown are standardized estimate, *** $p < 0.001$

Figure 5: Empirical model of Successful Aging among Thai older adults aged 80+ (n = 2,737)



Note: The coefficients shown are standardized estimate, *** $p < 0.001$

Several other patterns emerge when examining the contributions of the measurement variables to the SA domains. First, for all age groups, the number of chronic diseases has a negative contribution to avoiding disease and disability. Again, these factor loadings are statistically significant from zero. Further, the results reveal that the measures of receiving financial or food/clothes support do not significantly contribute to continuing engagement with life among the old-old and oldest-old group (Figure 4-5). Providing financial support also does not significantly contribute to continuing engagement with life among the oldest-old (Figure 5). This result suggests that receiving material support from children who live outside the household is not an indicator of continued engagement with life among the old-old and oldest-old group in Thailand.

Saliency of SA domains by age group

In order to identify salient domains among Thai older adults, the links between all three domains and SA are examined. The completely standardized solution or coefficients of the

three domains of SA are displayed in Figures 3-5. For the overall population, the factor loading of continuing engagement with life is significant and positive as expected. The factor loadings for avoiding disease and disability as well as maintaining physical and cognitive functioning are also statistically significant and positive as hypothesized, while their size is smaller than that of continuing engagement with life. These differences in the factor loadings indicate that continuing engagement with life has the highest correlation with SA.

The difference between the chi-squares of the unconstrained and unconstrained multiple group SEM model and the difference in degrees of freedom indicate the variation in factor loadings for the three age groups (60-69, 70-79, and 80+ years old) is highly significant (p -value < 0.001). The findings among the three age groups reveal different contributions of SA based on its three domains (see Figures 3-5). For the young-old, maintaining physical and cognitive functioning represents the strongest domain in relation to SA. In contrast, continuing engagement with life explains a significant portion of the variance in SA among the old-old and oldest-old. It is worth noting that, with age, the correlation between SA increases for continued engagement with life but not for the other two domains.

Discussion

There is a growing interest in the concept of SA; however, there is little understanding of whether the domains of SA are consistent across countries. Further, to date, few studies have examined differences in the construct of SA by age group. The current study attempts to address these gaps, and the applicability of Rowe and Kahn's model of SA for Thai older adults, and describe differences in age groups: the young-, old-, and oldest-old. The strengths and limitations of this study are discussed as well and the findings offer directions for policy and research.

The findings validate the fit of Rowe and Kahn's model of SA to Thai older adults. Their three hypothesized domains of SA (i.e., avoiding diseases and disability, high physical and cognitive functioning, and active social engagement) are relevant to older Thai people as well. Thai older individuals can be described as aging successfully when they have fewer chronic diseases or disabilities, better physical and cognitive functioning, and are more actively engaged in life. Furthermore, consistent with previous literature (Kahng, 2008; Rowe & Kahn, 1998; 2015), the findings reveal that many measures significantly contribute to SA suggesting they are good indicators of their respective domains. However, some observed variables do not have a strong relationship with their respective domains (i.e., giving and receiving support) suggesting that they are poorly measured indicators of continuing engagement with life among Thai older people. The negative association of receiving financial and food/clothes support on SA reflects the expectation among older persons. Regardless of the amount of money or socioeconomic status, Thai older persons expect to receive support (filial piety) from their adult children because it is their social norm (Rittirong, Prasartkul & Rindfuss, 2014).

This study also highlights the importance of differences across countries when considering the applicability of Rowe and Kahn's model to a global perspective. The results show the domain that has the strongest link to SA is continuing engagement with life. The findings are consistent with those of two other studies conducted in Thailand. Ingersoll-Dayton et al. (2001) suggest a major aspect of psychological well-being among Thai elders is the quality of their social interactions (i.e., harmony and interdependence). Thanakwang (2009) points to social relationships having a significant positive association with good health among Thai elders. The findings of these studies and the current one differ, however, from those conducted in

other countries. For example, in the U.S., the cognitive domain is the most salient aspect of SA (Kahng, 2008; Pietrzak et al., 2014). Similarly, in a study among the elderly in Spain, Gutiérrez et al. (2018) discover that the cognitive domain has the strongest link to SA. A possible reason for the differences between the research conducted in Thailand and these other countries is the high value Asians traditionally place on interdependence between the generations (Ingersoll-Dayton et al., 2001).

The current study also contributes to the small body of literature that examines differences in SA by age group. First, consistent with a study conducted in Taiwan (Lee et al., 2011), the current study findings reveal for the young-old, maintaining physical and cognitive functioning was the domain that contributes most strongly to SA. This is in contrast to the old-old and especially the oldest-old participants in our study for whom continuing engagement in life is the most salient aspect of SA. These differences in the relative importance of SA domains by age group are likely related to the varying ways in which aging Thais use their time. According to the Foundation of Thai Gerontology Research and Development Institute (2018), more than half of the young-old are working, but this proportion is significantly reduced for the older age groups. It is likely the employment of the young-old results in the need to be capable both physically and cognitively, and thus, this domain is most salient to SA. Second, for the oldest-old, participation in religious activities has the strongest contribution to their continuing engagement with life. The strength of this link is likely related to the context of Thailand which, as a Buddhist country, has many opportunities for older adults to make merit for themselves and their family while participating in Buddhist temple activities (Kramanon & Gray, 2015; Winzer & Gray, 2018). Finally, for both the old-old and the oldest-old, the current study indicates that receiving material support does not contribute to continuing engagement with life. This finding is likely an artifact of the measurement used in the national survey which focuses on receiving material support only from children who live outside of the home rather than from children who live both within and outside of the home.

There are, however, a few limitations associated with this study that have implications for the conduct of future research on this topic. First, when measuring cognitive functioning we use proxy measures (i.e., using money and taking medications correctly) because our study is based on the questions asked in the national survey. Future research should use a standardized instrument to assess cognitive functioning, such as Mini-Mental State Examination (MMSE) (Tombaugh & McIntyre, 1992). Second, when measuring support from family and friends, only item that assess material support (i.e., money, food, and clothes) from children who lived outside the household are available. We suggest that future research include items that capture other sources of support (e.g., children who live in the same household, relatives, neighbors, and friends), as well as types of support (i.e., emotional as well as material support). Third, participation in volunteering, as suggested by Rowe and Kahn (1998), is not included because this question is not included in the questionnaire. Future research should consider volunteer work when evaluating the productive behavior of the elderly. Finally, Rowe and Kahn's constructs of successful aging in the Thai context and other types of validity, in particular content validity, are not examined and should be factored into future research.

Implications for Research, Practice, and Policy

Based on a nationally representative sample of older Thai adults, this study provides important insights into the extent to which Rowe and Kahn's model of SA fits the context of Thai people. The research divides the sample into three different age groups to analyze

developmental differences; these findings are important to expand our understanding of Rowe and Kahn's model of SA among Thai older population by age, specifically for young-old, old-old, or oldest-old group.

Findings from this study have important practice and policy implications for Thailand. The 2nd National Plan for Older Individuals (2002-2021) support older Thai adults using concepts such as good health and social participation that are similar to SA. The current study points to relatively low levels of social participation and productive behaviors and therefore, policies should be targeted to enhance social participation among this group. This is consistent with those of similar studies; for example, the College of Population Studies (2017) reports that only 15% of older Thai people participate in social activities during the previous three months. The oldest-old are the least likely to participate in social activities (Foundation of Thai Gerontology Research and Development Institute, 2018). Thus, social activities including elderly clubs and religious activities, should be promoted. The current findings also point to the importance of maintaining physical and cognitive functioning among the elderly. For example, healthy behaviors (i.e., exercise, eating a balanced diet, no smoking) are related to physical and cognitive functioning (Marquez, Bustamante, Blissmer & Prohaska., 2009). Thus, developing policies and interventions that promote all domains of SA will build upon existing efforts to improve the quality of life of older people in Thailand.

In sum, the current findings show that Rowe and Kahn's conceptualization of SA results in a good model fit when applied to a national probability sample of older Thai people. Despite the strong indicators of statistical fit based on this study, it is important to acknowledge there are many conceptualizations of SA that may be applicable to the Thai setting. Future studies should work toward identifying frameworks and models that are cross-culturally relevant.

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