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Development and psychometric properties of a questionnaire to measure the active aging index for older people

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ABSTRACT

Background: The world's aging is a global phenomenon. The active aging framework responds to this phenomenon by emphasizing on the connections between good health, participation, and security in the lives of older people.

Objectives: This study developed a novel measurement of active aging for older people by integrating the international concept with specific features of Thailand.

Materials and methods: Active aging measurement components were generated through relevant literature reviews, with content validity examined by experts. Internal consistency and test-retest reliability were used for examining measurement reliability. Two hundred older people living in Chiang Mai Province participated in a pilot survey.

Results: The active aging measurement was composed of four components including health, social participation, security, and enabling an environment for active aging. Good internal consistency was represented overall by Cronbach's alpha=0.77, while the test-retest reliability value was 0.89.

Conclusion: The active aging measurement was developed for older people. It is a valid and reliable measure of an active aging index.

Introduction

The speed of growth in the aging population is a global phenomenon. Thus, the World Health Organization (WHO) introduced "the policy framework of active aging" to promote active aging. Its concept describes the maintenance of positive subjective well-being, good physical, social and mental health and continued involvement in the family, peer group and community throughout the aging process.[1,2] This framework focuses on independence, autonomy, and quality of life. It is not only a broad concept of being healthy, but also recognition of factors that affect individuals and older populations. Despite the importance of active aging as a global policy concept, research into it has been limited for providing understanding of insights and associated perspectives.[2,3]

The active aging concept has been incorporated into policies that manage aging population worldwide, in Thailand. In examining the response to the active aging policy, the National Committee for the Elderly (NCE) of Thailand

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highlighted a special theme, according to dimensions of active aging in income security, impact from natural disasters, living arrangements and health.[4-6] The Active Aging Index (AAI) can serve as a baseline assessment to identify the potential of older people and monitor their progress.[7,8] From 2006 to 2020, the index of older people in Thailand was moderate, which correlates with many studies.[9-12] Studies have concluded that there is a need to improve the active aging level of older people in Thailand. Zaidi and Um analyzed an overall Asian AAI at the global level for monitoring, implementing, and evaluating policies, in which older people in Thailand needed to be directed for continued active engagement with the help of suitable employment opportunities for their age and health.[13]

The active aging policy provides a broader perspective that can be applied to effective strategies for older people to maintain a healthy lifestyle and active engagement in life activities. It is important to have a policy approach level to communities, and older people, and their families. The AAI is analyzed in many countries by selecting data sources and variables of AAI indicators.[14] While in Thailand, assessment on active aging has been developed by using a national indicator for constructing AAI.[9,10,15] Moreover, self-assessment has been developed for measuring the multidimensional attributes of active aging in a Thai context since 2014.[11] In 2017, the National Statistical Office of Thailand refined the initial formulation (health, participation, and security) further with the addition a fourth component to enable an environment for active aging as the fourth component. Therefore, this study aimed to develop a new questionnaire to measure the AAI according to a paradigm shift for achieving assessment at the individual level.[15]

Materials and methods

The active aging measurement questionnaire was created as follows: 1) it was comprehensive according to the WHO concept of active aging, indicators studied from various reference sources and the Thai context, and 2) it needed to be clear, concise, easy to understand, and without ambiguous/implicit language.

The first step of constructing this tool was to develop a first draft of the active aging measurement questionnaire, based on the conceptual framework of the WHO. In order to design a measurement, it was crucial to track progress of the United Nations Economic Commission for Europe, as introduced to the AAI in 2012. Thus, time limits were set for searching the database from 2013 to 2020. The literature from both the international and Thai measurements were reviewed by focusing on components and scales, selected for the Thai context. The active aging aspects were determined by studying components of the AAI indicator. The researchers studied components of the active aging framework mentioned in different books and research studies.

The second step, involved psychometric property testing, and content validity was investigated in the first draft by five experts, who had five years or more practical experience in the geriatric field. These experts consisted of two occupational therapists, one physician, one nurse and one social worker. After receiving feedback and recommendations from the experts, the Index of Item-Objective Congruence (IOC) was used in order to find content validity.[16] Then, the IOC index was analyzed and improved against the content of checklist items as a second draft, following advice from the experts. Due to it being a stable and easy-to-use tool for multidimensional insights, it realized the potential of older persons in the general situation. For preliminary psychometric testing, pilot testing was used to examine, based on the protocol of Ingersoll -Dayton, Kespichayawattana, and Saengtienchai.[17] The data were collected from one community by using convenience sampling. A default sample size of 30 participants was recommended for pre-testing.[18] Therefore, 35 participants were selected as subjects for this test by taking 15% of the member population (total number of members=232) at Community Club of Piyamal Center, Muang District, Chiang Mai Province. A think-aloud question was used to explore the perception of the participants. The researchers asked the older persons to consider each question one by one. Then, language in the second draft of measurement was improved according to recommendations from the older persons and used in the draft. The IOC was investigated in the final draft.

Then, internal consistency and test-retest reliability were used to examine measurement reliability. Participants: the inclusion criteria for the participants were as follows: 1) people aged 60 years and older, 2) member of the Community Club in of Nongpakrang Municipality, Mueng District, Chiang Mai Province, 3) ability to understand the questionnaire, and 4) voluntary participants with their informed consent to take part in this study and giving their informed consent to take part in this study. Data collection: the researchers contacted the community selected in the target area and collected the data. After that, the samples were selected using a proportional size (30 people) and convenience random sampling. Advertisements in the community invited its members to join this study. The participants were met to explain the details and purpose of this study to them, before describing the consent process. The data for time 1 and time 2 were collected. The researchers returned one week after the time 1. The participants were the same persons each time.

In the third step, a survey was performed with older people in Chiang Mai area, when the researchers contacted a selected community in the target area and collected the data. After that, samples were selected using a proportional size and systemaic random sampling. The sample used in this step was used following the protocol of Denscombe who recommended at least 200 subjects as an appropriate number in performing a survey.[19] Therefore, this test selected 200 participants. Older people living in Chiang Mai Province, Northern part of Thailand, were recruited in the study. In a data collection setting, District boundaries of Chiang Mai Province were classified into three categories: urban, suburban, and rural areas in order to represent the various characteristics of older people by using stratified sampling. One urban, one suburban and one rural area were selected from different districts of

Chiang Mai Province by using simple random sampling. In calculating each active aging dimension, (health, social participation, security and enabling an environment for active aging) a weighted score was used, and an index of each one was summed up by weighted score,[20] as shown in the formula below:

$$AAI = 1/4\ (HI) + 1/4\ (SPI) + 1/4\ (SI) + 1/4\ (EEI)$$

Then, the AAI was classified into three levels according to the Human Development Index (HDI), developed by the United Nations Development Programme.[20] It was constructed to measure the AAI level as follows:

Index score 0.000-0.499 is low level
Index score 0.500-0.799 is moderate level
Index score 0.800-1.000 is high level

Results

The components of active aging measurement between 2013-2020 from database (both the international and Thai) were found that WHO conceptual was primary used for building the index. The AAI was calculated on adjusting the flexible methodology on selection of appropriate data sources that the index preserved it core concept and structure. The AAI methodology uses several data sources (secondary data) from different sources depending on available statistical sources to capture various dimensions of active aging. For local purposes, the AAI was calculated by using the questionnaire. It is flexible tool that can apply the domains under concept of active aging to reflect the potential of older persons to the specific circumstances and purposes in their own contexts. There were some differences in details of indicators in each index component and grouping as summary in Table 1.

Table 1. Summary of some differences in details of components of active aging measurement.

Year	Authors	Country	Component	Indicators	Data collection for AAI
2013	Zaidi *et al.*[21]	EU Member States and some other European countries	Employment (national level)	Employment rate 55-59, employment rate 60-64, employment rate 65-69, employment rate 70-74	Review secondary data from different sources
			Participation in society	Voluntary activities, care to children/ grandchildren, care to older adults, political participation	
			Independent, healthy, and secure living	Physical exercise, access to health and dental care, independent living, relative median income, no poverty risk, no severe material deprivation, physical safety, lifelong learning	
			Capacity and enabling environment	Remaining life expectancy at age 55, share of healthy life expectancy at age 55, mental well-being, use of ICT, social connectedness, educational attainment	
2014	Thanakwang *et al.*[11]	Thailand	Being self-reliant	Living independent and being self-care in daily activities, having autonomy in decision making	Questionnaire : Validity = 0.91 Internal consistency reliability = 0.95 External reliability = 0.92
			Being actively engaged with society	Participating in social activities, connecting with friends, contributing to society	
			Developing spiritual wisdom	Making merits, being acceptance and calmness, trusting and practicing religious doctrines	
			Building up financial security	Preparing financially for later life and for funerary activities, having enough money for daily expenses	
			Maintaining a healthy lifestyle	Maintaining exercise, eating healthful food, managing stress, avoiding substance abuse	
			Engaging in active learning in active lifelong learning	Being physically and cognitively active, engaging in meaningful activities, engaging	
			Strengthening family ties to ensure care in later life	Strengthening family ties, teaching children about filial piety	

Table 1. Summary of some differences in details of components of active aging measurement. (continued)

Year	Authors	Country	Component	Indicators	Data collection for AAI
2014	Zasimova and Sheluntcova.[22]	Russia	Health	Chronic conditions, physical ability, pain and discomfort, mental health, physical health condition	Not available
			Participation in social activities	Work participation, community participation, family and friends participation	
			Security	Financial stability, living conditions, living security	
2015	Saengprachak-sakula.[20]	Thailand	Health	Physical, mental, visual ability, hearing ability, limitation in active in daily living: ADL, functional limitation	Review secondary data from different sources
			Participation	Member in social group, participating in social group	
			Security	Income adequacy, home ownership, living together in family	
2015	International Longevity Centre Brazil (ILC-Brazil).[7]	Brazil	Health	Physical and mental health, reducing health inequalities	Not available
			Lifelong learning	Equips to stay healthy, remain relevant and engaged in society, and assure personal security	
			Participation	Engagement in work (paid and voluntary) and any social, civic, recreational, cultural, intellectual, or spiritual pursuit that brings a sense of meaning, fulfillment and belonging	
			Security	the effects of climate change, natural disasters, disease epidemics, organized crime, human trafficking, criminal victimization and interpersonal violence and abuse, sudden and/or prolonged economic and financial downturns, risks can be disease, poverty and hunger, deaths in the family, periods of unemployment, and moving away from homeland	
2016	Lim and Thompson.[23]	Singapore	Health	Self-assessed health status, psychological well-being, disabilities, activity of daily living (ADL) limitations, functional limitations, exercise behavior	Review secondary data from different sources
			Participation	Participation in workforce, interaction with family members, participation in clubs/groups	
			Security	Sufficiency of income, source of income, house ownership, living arrangement, safety facilities	
2017	National Statistical Office Thailand.[15]	Thailand	Health	Self-reported health status, Self-reported happiness, engaging activity independently, visual ability, hearing ability, exercise	Review secondary data from different sources
			Participation	Employment, club/group participation, village/community participation, care to members in family	
			Security	Sufficiency of income, house ownership, living arrangement, safety facilities	
			Capacity and enabling of active aging	use of ICT, literacy	

Table 1. Summary of some differences in details of components of active aging measurement. (continued)

Year	Authors	Country	Component	Indicators	Data collection for AAI
2018	Guntupalli and Chakraborty.[24]	India	Employment	Employment rate 55-59, employment rate 60-64, employment rate 65-69, employment rate 70-74	Review secondary data from different sources
			Participation in society	Voluntary activities, care to children/ grandchildren, care to older adults, political participation	
			Independent, healthy, and secure living	Physical exercise, access to health and dental care, independent living, relative median income, no poverty risk, no material deprivation	
			Capacity and enabling environment	Remaining life expectancy at age 55, mental well-being, social connectedness, educational attainment	
2019	Nyqvist, Nygård and Snellman.[25]	Finland	Employment	Employment rate 55-59, employment rate 60-64, employment rate 65-69, employment rate 70-74	Questionnaire : not available psychometric property
			Participation in society	Voluntary activities, informal caregiving, political participation	
			Independent, healthy, and secure living	Physical exercise, financial security, physical safety, lifelong learning	
			Capacity and enabling environment for active aging	Self-rated health, mental well-being, use of ICT, social connectedness	
2019	Hus ***et al***.[26]	Taiwan	Employment (national level)	Employment rate 55-59, employment rate 60-64, employment rate 65-69, employment rate 70-74	Review secondary data: national, city, community, household, individual
			Participation in society	Voluntary activities, caring for children/ grandchildren, care to older adults/disabled relatives, political participation, other social group participation,	
			Independent, healthy, and secure living	Physical activity, access to health and dental care, independent living arrangement, relative median income, no poverty risk for older persons, no severe material deprivation for older persons, physical safety (from violence), lifelong learning, physical function independence, no severe cognitive impairment, no depressive symptoms, primary prevention care utilization, physical safety (from accidents or injuries), owning assets	
			Capacity and enabling environment	Remaining life expectancy achievement of 50 years at age 55, share of healthy life years in the remaining life expectancy at age 55, mental well-being, use of ICT (internet), social connectedness, educational attainment of older persons, transportation accessibility, transportation convenience, barrier-free space , social integration and social respect	

The active aging measurement was finalized into 4 components: health, social participation, security and enabling an environment for active aging. The first draft of measurement for active aging consisted of 28 items in the four performance components, including health (14 items), social participation (4 items), security (7 items), and enabling an environment for active aging (3 items). The result of IOC from the experts was between 0.6 and 1.00. To ensure that the participants could understand the questions clearly, they were asked to express their own perception. Then, the characteristics of questions were clarified, and examples provided for easy understanding. After these improvements, the IOC was investigated. A number of items in health (2) and enabling an environment for active aging (1) was decreased to leave a total of 25 from 28 in the final version, due to those three making a similar point. The IOC of the final version was between 0.9-1.0 (Table 2).

Cronbach's alpha coefficient of measurement with four domains of 0.77 was interpreted as acceptable,[27,28] as shown in Table 3.

The final version evaluated stability. The Pearson correlation coefficient was 0.89, which interpreted as good,[29] as shown in Table 4.

Two hundred participants were evaluated in the AAI by using the new active aging measurement. The characteristics of the study population are described in Table 5.

Table 2. Measurement components of active aging and IOC between the first draft and final version.

Components	Indicators	First draft		Final version	
		Number of items	IOC	Number of items	IOC
1. Health	H1. Chronic condition	2	0.5-1.0	1	1.00
	H2. Pain & discomfort	2	0.5-1.0	1	1.00
	H3. Physical ability	5	0.8-1.0	5	0.9-1.0
	H4. Mental health	2	0.8-1.0	2	1.0
	H5. Physical health condition	3	1.0	3	1.0
2.Social participation	SP1. Religion	1	1.0	1	1.0
	SP2. Community	2	0.8-1	2	1.0
	SP3. Family & friends	1	1.0	1	1.0
3. Security	S1. Financial stability	2	0.8-1	2	1.0
	S2. Living conditions & security	5	0.8-1.0	5	0.9-1.0
4. Enabling an environment for active aging	E1. Use of ICT	1	1.0	1	1.00
	E2. Literacy	2	0.5-1.0	1	1.00
Total		28	0.6-1.0	25	0.9-1.0

Table 3. Internal consistency reliability of the active aging measurement.

Components	Number of items	Cronbach's Alpha	Interpretation
1. Health	12	0.77	Acceptable
2. Social participation	4	0.72	Acceptable
3. Security	7	0.79	Acceptable
4. Enabling an environment for active aging	2	0.76	Acceptable
Total	25	0.77	Acceptable

Table 4. Reliability test of the active aging measurement.

Components	Number of items	Pearson's Coefficient	Interpretation
1. Health	12	0.91	Excellent
2. Social participation	4	0.90	Excellent
3. Security	7	0.96	Excellent
4. Enabling an environment for active aging	2	0.51	Poor
Total	25	0.89	Good

Table 5. Socio-demographic characteristics of the participants.

Variables	Frequency (n=200)	Percent (%)
Gender		
Male	39	19.50
Female	161	80.50
Age (yrs.)		
60-70	147	73.50
71-80	46	23.00
81 over	7	3.50
Religion		
Buddhism	200	100.00
Marital status		
Single	15	7.50
Married	109	54.50
Divorce	32	16.00
Widowed	44	22.00
Educational level		
Uneducated	6	3.00
Less than high school	113	56.50
High school graduate	44	22.00
College	17	8.50
Graduate and higher	20	17.00

The attributions of active aging among the Thai older persons in the community are shown in Table 6. Mean score among the AAI was at the moderate level.

Table 6. Frequency and percentage of the older persons, classified by the active aging level.

Active aging level	Frequency (n=200)	Percent (%)	Active aging index		
			Min	Max	±SD
High	32	16.00	0.80	1.00	0.82±0.04
Moderate	168	84.00	0.68	0.77	0.77±0.03
Low	0	0	0	0	0
Total	200	100	0.68	1.00	0.77±0.03

Discussion

The aim of this study was to develop a measurement for identifying the AAI at the individual level. The new measurement attempted development within the Thai context so that older people would find it simple to use and easy to understand. This measurement could be assumed as appropriate for use by older persons because its contents of items were improved by using their perspective in the Thai context. Moreover, the new measurement was intended to apply in the community context. The United Nations Economic Commission for Europe (UNECE) suggested that the AAI can be adjusted in various contexts for local purposes.[14]

The four components (health, social participation, security and enabling an environment for active aging) of measurement were identified within the concept of active aging (WHO)[1,7,8] at the national level and in Thai contexts, [2-5,10,11,15] in order to measure the reviewing stage of at the source of data. In Thailand, the concept of active aging in the Thai context of older persons was reported at the national level in 2017[5] and National Statistical Office report,[15] which led to Thai older persons actively. Thus, this measurement was developed in the Thai context for further study in promoting active aging in the community. The development of new assessments, in accordance with the context has been increased according to the purpose of use. [8,27]

This study demonstrated that the psychometric properties of the active aging measurement questionnaire showed desirable validity and reliability. The quality of content validity of in this measurement was based on the IOC and findings from the five experts in this field. The items were revised and three removed. Three items were deleted due to vague and duplication. The question in this measurement was congruent with exploring the perception of older people. The final version of measurement had the IOC of 0.9-1.0, thus reaching a high level of value.[16] Internal consistency of the active aging measurement was 0.77, based on Cronbach's alpha coefficient, indicating good internal consistency reliability as health is a main pillar of active aging.[28] To ensure the consistency of results over time, the coefficient of a person was 0.89 in total, indicating good stability. Moreover, the measure of internal consistency reliability of each component domain, indicated poor to excellent stability and reliability, ranging from 0.51-0.96.[29] On the other hand of this study, the Cronbach´s Alpha value (0.95) and Person correlation coefficient reliability (0.92) were lower than Thanakwang *et al*.[11] However, the active aging measurement is a valid and reliable questionnaire.

Based on the component factors, AAI (ranges from 0 to 1) has been calculated. In this study found that mean AAI of the total was 0.77, active aging level had at moderate level, same as the previous studied.[9,14,29] The AAI can be used as a tool to monitor the change for implementation based on the component factors for individual life balance, being an individual checklist of possible social and economic activities and capabilities. The concept of active aging has been already recognized as particularly profiles that for more favorable age actively.[12, 30, 31] AAI is one factor to achieve Sustainable Development Goals (SDGs) in Thailand as a relatively new philosophy to improve human well-being as a development goal.[32,33] Therefore, the many factors; physical, mental, social, enabling factors to pay attention and emphasize to be a great relevant for active aging. In this way, the new active aging measurement can assess active aging levels, and their determinants can use to enabling the design and implementation of clinical and public health interventions to optimize and promote healthy aging.

Conclusion

We developed a new measurement to assess AAI

to adopt and implement at individual level at community. The active aging measurement comprised 25 items of four components and has satisfactory validity and reliability for assessing active aging levels to promote active aging. We believe that the development of this scale will make it possible to move forward the service to induce, enable the design and implementation of interventions to rise aging society of communities in Thailand.

Limitations and suggestions

The researchers intend to mention some limitations, this study was not conducted in a nationally representative sample covering all geographic regions of Thailand. It was a study of the elderly living in Chiang Mai or Northern Thailand. Moreover, it has been applied for questionnaire development only older people in community who were social-bound elders. The sample size used in the study to validate the AAI was relatively small, it was not nationally representative of the other areas of Thailand. Therefore, further studies should expand to validate with larger and representative samples the other contexts. For future developmental steps of the measure these differences (bed-bound and home-bound elders) will be further examined. Another limitation is that this measure of active aging levels has been applied only to Thai elders in community context. This measure should be used in cross-cultural research conducted in other Asian and non-Asian countries.

Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethic approval

This study was approved by the Ethics Committee of the Faculty of Associate Medical Sciences, Chiang Mai University (number: AMSEC63EX040).

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