

RESEARCH ARTICLE

Measuring active aging: Development of a active aging measurement tool

Sara Marsillas^{1*}, Antonio Rial², and Jesús Varela²¹Matia Institute of Gerontology, Madrid, Spain²Department of Social Psychology, Basic Psychology and Methodology, Faculty of Psychology, University of Santiago de Compostela, Galicia, Spain**Abstract**

In recent years, various debates have emerged in the literature regarding the conceptualization of active aging. However, there is a lack of tools to assess active aging at the individual level. The aim of this paper is to develop a measurement tool and procedure for assessing active aging focused on an individual level, encompassing different elements of people's lives, and providing an individual quantitative result for each person. To achieve this aim, a representative sample of 404 community-dwelling older adults (aged ≥ 60 years) from Galicia, Spain, was interviewed using a structured survey guided by a questionnaire. The tool is based on an empirically validated model of active aging, which comprises two broad categories (health and participation) as well as a measurement tool. The results presented demonstrate how a region in Spain is actively aging. The discussion highlights the potential of this tool, which integrates different approximations of the concept and underscores its importance in people's lives.

Keywords: Active aging; Model; Index; Measurement; Individual level

***Corresponding author:**
Sara Marsillas
(sara.marsillas@matia.eus)

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1. Introduction**1.1. Origin of the concept of active aging**

The construct of active aging is framed as a concept belonging to the new paradigm of aging, which focuses more on a positive approach to studying older ages and aging (Foster & Walker, 2021). Successful aging theory is usually considered the origin of this new paradigm (Rowe & Kahn, 1987; 1997), whose roots can be traced to the sociogerontological literature of the fifties, such as the activity theory (Havighurst, 1953; 1963). The concept of successful aging has received criticism, but it has influenced the perspective in which older age has been conceived and researched in the past decades (Foster & Walker, 2021). Some other concepts have been defined afterward, focusing on positive aging as an alternative to expected dependence and passivity in older ages, such as productive aging or healthy aging (Foster & Walker, 2015). These share some commonalities, namely, the use of gerontological knowledge to build a positive conception of older age and aging and the challenge to negative stereotypes of advanced stages of life (Lassen & Moreira, 2014).

Compared to healthy aging or productive aging, which focused on one unique element, either health or social productivity, active aging was formulated to transmit

a broader concept (Foster & Walker, 2013; World Health Organization [WHO], 2002). Some references to active aging can be traced back to the late 1970s, whereas other authors consider the International Year of Older Persons (1999) as the launch of this concept when it was developed in an editorial written by Kalache (1999). Nonetheless, different elaborations about how activity is linked to the opportunities to be healthy in later life raised in articles before the 2000s. Later, the worldwide definition of “active aging” was presented in the document “Active Aging: A Political Framework” (WHO, 2002), elaborated as a result of the Madrid International Plan of Action on Aging and the Political Declaration adopted at the Second World Assembly on Aging of the United Nations held in 2002. This plan is the turning point in the focus of the WHO to address the challenge of building a society for all ages by integrating into the new political concept the scientific tradition developed in the past decades of the 20th century. While the need to create and maintain opportunities for older people to remain active is highlighted, other important factors in the aging process beyond health, such as activity and participation, are also recognized (Fernández-Ballesteros, 2005; Kalache & Kickbusch, 1997; WHO, 2002).

Active aging was defined as “the process of optimizing opportunities for health, participation, and security to enhance the quality of life as people age” (p. 12). Three basic pillars are identified to promote active aging: participation, health, and security, to which a fourth pillar was subsequently added, that is, lifelong learning (International Longevity Center Brazil, 2015). The aim is that people can develop their full potential for physical, social, and mental well-being throughout their lives and participate in society according to their needs, desires, and abilities while providing adequate protection, security, and care when they need assistance (WHO, 2002). Activity is, thereby, represented by continuous participation in diverse activities in terms of social, economic, cultural, physical, and routine activities. Active aging, therefore, unifies the ideas of activity and participation, health, independence, and good aging but provides participation with a main role (Van Malderen *et al.*, 2013).

Hence, active aging is a broader and more inclusive concept than the previous ones embedded in this paradigm (Bowling, 2008; Mendes, 2013; Van Malderen *et al.*, 2013; Stenner *et al.*, 2011). By definition, it gathers individual elements of productive and healthy aging from a multidimensional perspective (Foster & Walker, 2013; Kalache & Kickbusch, 1997; WHO, 2002; Van Malderen *et al.*, 2013). In addition, the importance of an active and proactive attitude from people in their own aging

process is added instead of focusing on results. Based on the conceptualization, it defends an active lifestyle while respecting the possibilities of each individual, including fragile people or people with disabilities, frequently excluded in other operationalizations (Sidorenko & Zaidi, 2013; WHO, 2002).

Some principles have been outlined to preserve the ambition of the concept (Foster & Walker, 2021; Walker, 2002). Here, activity is considered a broad concept, including all significant activities that improve the well-being of individuals and families, the local community, and society. In addition, it argues that all older people should be included in the concept – not only young, independent, and healthy people but also fragile, dependent older people. Third, it is conceived as a preventive concept with a whole-life course perspective, whereas the fourth principle claims the enhancement of intergenerational solidarity and opportunities. The fifth point is that both rights and responsibilities are implied in terms of social protection and lifelong education and learning, insisting on the obligation to take advantage of these opportunities. Sixth, empowerment and participation are important effects of active aging, given that they promote citizens’ active attitudes in terms of bidirectional communication between society and policies. This approach is fostered to avoid imposition from high hierarchies and to prevent the conversion into a coercive strategy. The seventh principle suggests that active aging must respect national and cultural diversity regarding ways of participation without falling into valuing judgments about which activity is the best. The latter refers to the need to integrate flexibility into this approach. The individual perspective of active aging defends the existence of variation among individuals and their available sources to age well, which, in addition to the changes in limitations and preferences that occur during the life course, give rise to differences in the individual aging process.

From a political perspective, active aging refers to both individual and collective strategies to optimize economic, social, and cultural participation during the life course to manage current and future aging populations (Kalache & Kickbusch, 1997; Lassen & Moreira, 2014; WHO, 2002). However, this term has spread in society, and older people have their own conceptions of active aging. Some studies have researched how older adults define it, concluding that positive terms are used in the definition, referring to both health as a global concept (Bowling, 2008; 2009; Lucena *et al.*, 2010) and activity and participation (Clarke & Warren, 2007; Lucena *et al.*, 2010; Stenner *et al.*, 2011; Townsend *et al.*, 2006). Health includes multiple dimensions, such as maintaining good physical health

and body functioning, mental functioning and activity, and social relationships and contact (Bowling, 2008; 2009; Stenner *et al.*, 2011). References to activity or participation are also found in their own perspectives, in which physical, mental, and social activities are mixed, alluding to a general active lifestyle in which all these are included. In doing so, they highlight leisure, family care, volunteering, learning, traveling, or physical activity (e.g., Bowling, 2008; Hasmanová, 2011; Stenner *et al.*, 2011; Townsend *et al.*, 2006; Venn & Arber, 2011), whereas employment was not clearly included (Venn & Arber, 2011). A complete representation covering the main dimensions, highlighted by the different approaches and debates around active aging, is less frequently found in the research (Montero *et al.*, 2011; Paúl *et al.*, 2012; Perales *et al.*, 2014).

1.2. Literature on measurements of active aging

At present, there is still an absence of a gold standard for rating active aging. This concept has been partially assessed by considering some specific elements such as employment, social participation, and, less frequently, leisure time, and activities (Marsillas, 2016), whereas relatively few studies have measured it from a broad conception. In those cases, items or scales were used separately when measuring the components of the concept (Caprara *et al.*, 2013), or they were measured through the compliance of a list of criteria to create a dichotomous variable representing active aging (Bélanger *et al.*, 2017; Fernández-Ballesteros *et al.*, 2007). This measurement procedure is too strict because it generally delimits active aging to a specific group of people and is not sufficiently flexible to depict the evolution of people. Another approach was the summative measurement of dichotomous variables and the creation of a continuous variable for active aging (Perales *et al.*, 2014).

In the past few years, instruments have been developed to quantitatively measure active aging, with the Active Aging Index (Zaidi *et al.*, 2013) being the most acknowledged. It was developed based on the population perspective, with the collaboration of the European Commission's Employment, Social Affairs, and Inclusion Directorate General and the United Nations Economic Commission for Europe (UNECE). This toolkit is developed as an index targeted at policymakers and aimed at measuring the potential of active aging at a country level based on 22 indicators organized in four domains: (i) employment; (ii) participation in society; (iii) independent, healthy, and secure living; and (iv) capacity and enabling environment for active aging. The information for each indicator comes from secondary data sources for 28 European countries, such as the European Social Survey. The index sheds light on the effectiveness of existing strategies and points out the environmental elements that can be improved

to increase opportunities to age actively. The concept of the Active Aging Index (AAI) incorporates an economic dimension that involves the inclusion of older persons in the labor market and other productive activities. However, it cannot be used to measure active aging at an individual level since its indicators are macrolevel-oriented, such as healthy life expectancy, and the result provided is based on the aggregate number of older people that meet different indicators.

In academic literature, some attempts to measure active aging at an individual level can also be found. In recent years, empirical models have been developed, but tools to measure this concept with a multidimensional and inclusive conception are scarce. Existing measurements are focused either on specific dimensions of active aging or have been developed through a closed list of criteria, which may exclude some people and do not represent older people's ways of engaging. Therefore, in contrast to the intentions when conceptualizing active aging as a broad concept, measurement in studies has been made through dichotomous and criteria variables created when all its elements were met (e.g., Fernández-Ballesteros *et al.*, 2007; Lucena *et al.*, 2010; Montero *et al.*, 2011). The inclusion criteria tend to be relatively high, and the compulsory fulfillment of them creates rigid ways of active aging (Perales *et al.*, 2014). This operationalization can also result in the exclusion of people with some disabilities, which contradicts the statements of WHO (2002). Conversely, engagement in life should be promoted even when constraints are present by adapting the forms to each person's situation (Boudiny, 2013), such as the assessment method developed to measure active aging (Rantanen *et al.*, 2019). In the case of the AAI, population- and macrolevel approaches focusing on productive participation and health variables do not cover the gap of a tool that contributes to quantifying active aging in older adults. For this reason, it is necessary to measure the concept of active aging, which represents inter- and intra-individual variability as a continuum (Bowling, 2008).

1.3. Aims of this study

The aims of this study were threefold. First, we developed a new measurement tool based on a tested model of active aging (Marsillas *et al.*, 2017), focusing on the individual level. This tool was developed considering the debates about active aging and by combining the most important dimensions found in the scientific literature regarding the elements enhanced by policy, research, and lay approaches. By including both health, conceived as a global concept, and participation, as a broad variety of alternative ways to actively age, it intends to represent more diverse population groups sometimes excluded by measurement procedures.

In doing so, a recurrent problem in the literature will be overcome, namely, the partial study of the concept of active aging. Second, it aims to construct a personal active aging index that allows quantification of this concept. The goal is to achieve a procedure that allows us to create a quantitative continuous variable, which can provide richer information than only establishing if somebody ages actively or not (Perales *et al.*, 2014). For instance, this could help evaluate the efficacy of initiatives related to active aging promotion. In doing so, an individual measuring tool will be provided that allows the quantification of the active aging of people, the value of the dimensions composing the index, and the identification of the improvement areas of each person. Thus, an efficacy assessment of the initiatives implemented to promote active aging was conducted and improved with the information provided. Third, the descriptive results for older adults living in Galicia (Spain) in terms of active aging are shared.

2. Methods

2.1. Study sample

The study methodology was based on a survey of a representative sample of community-dwelling residents aged 60 years and over in Galicia, Spain. In Galicia, 804,403 inhabitants are aged ≥ 60 years, representing 29.2% of the total population. Structured interviews were conducted by experienced psychologists using a questionnaire. The sample size was calculated based on the population size and a 95% confidence level with a 5% margin of error. The sampling selection was made through the county register, and a two-stage sampling was chosen: conglomerates for the selection of the first-level units (municipalities) and quotas according to the habitat (urban/semi-urban vs. rural/semi-rural), gender, and age group (60 – 74 years vs. 75 or older) for the selection of the second-level units (individuals). No personal data were requested, and anonymity and confidentiality were guaranteed. Ethical review and approval were waived for this study because the data collected in the study were anonymous and according to the Organic Law on Personal Data Protection and Guarantee of Digital Rights (Article 2.2. LOPD 3/2018). The participants were informed about the aim of the research and provided verbal consent. Participation in the study was voluntary.

Based on the population distribution, the final sample was composed of 404 individuals (176 men and 228 women; mean age = 72.6 years and range = 60 – 94 years), recruited directly by interviewers in different community facilities regarding those venues where people of different profiles usually attended. In this sense, we included social centers, which are oriented toward older people to meet

to have coffee, perform exercise, read newspapers, or arrange issues related to the municipality, as well as clinics, around hospitals, or markets. Regarding the habitat, 59.2% are residents of a rural/semi-rural area, whereas 40.8% are from an urban/semi-urban area. Thirty percent of the respondents did not complete primary studies, 32.9% completed primary education, 21.0% completed secondary education, and 16.1% completed tertiary education. In terms of marital status, 9.2% were single, 58.1% married, 3.0% divorced, and 29.7% widowed.

2.2. Variables and measures

The variables included in the questionnaire were chosen based on a literature review (Marsillas, 2016) and assessed the ten broad dimensions of: (i) health (objective and subjective health), (ii) functionality (basic and instrumental daily activities), (iii) cognitive state, (iv) affective state, (v) social state (social and family perceived support, frequency of outdoor social contact), (vi) Information and Communication Technologies (ICT) use, (vii) lifelong learning, (viii) employment, (ix) participation in society, and (x) leisure activities, as well as sociodemographic variables (age, gender, habitat, marital status, education, and income).

The dimensions of active aging were measured using different scales. Functionality was evaluated using the Barthel Index (Cronbach's $\alpha = 0.83$) (Mahoney & Barthel, 1965) and Lawton and Brody Scale (Cronbach's $\alpha = 0.92$) (Lawton & Brody, 1969); cognitive status was measured using the Mini-Examen Cognoscitivo, the Spanish version of the Mini-Mental State Examination (Cronbach's $\alpha = 0.73$) (Lobo *et al.*, 1999); affective status as part of mental health was measured using the positive affect scale of the Affective Balance Scale (Cronbach's $\alpha = 0.76$) (Godoy-Izquierdo *et al.*, 2008); different leisure activities were measured using items from Scarmeas *et al.* (2003) and by adding two more items; participation in society and employment were assessed with several items from the Active Aging Index (Zaidi *et al.*, 2013). Health was assessed using seven items created for this study, ICT use was measured using three items, including one from Zaidi *et al.* (2013), and social state was evaluated using a scale created for this study (Cronbach's $\alpha = 0.83$) by combining selected items from Zaidi *et al.* (2013), the Spanish version of the Duke-UNC-11 scale (Bellón *et al.*, 1996a), and modified items from the Spanish version of the Family APGAR (Bellón *et al.*, 1996b).

2.3. Statistical analysis

Based on the statistical model of active aging that has already been tested and published (Marsillas *et al.*, 2017), a composite index was constructed following the

methodology and steps proposed by the OECD (2008). Some of the original scales used to measure the dimensions of active aging had range scores starting at values different from 0. Therefore, after scoring each scale following the corresponding instructions, the individual scores were recoded to be added to the index. The minimum score in each item and scale was represented as 0, corresponding to the lack of presence of the dimension assessed, instead of having a minimum score of 5, which could correspond depending on the correction procedure, for instance. As leisure was scored based on frequency regarding a large number and variety of activities, it would be difficult to fulfill all the leisure activities at the highest level. For this reason, these variables were recoded before calculating the leisure dimension index (Table 1).

The values of each subdimension and subscale are detailed in Tables 2 and 3. The indexes for the subscales were first calculated by summing all the responses and then standardizing each subscale score using the minimum-maximum method (OECD, 2008) (Equation I). The result was a score for each dimension on a scale from 0 to 1, where 0 is the worst result, and 1 is the best result possible.

$$\text{Index} = \frac{\text{Real score} - \text{minimum score}}{\text{Maximum score} - \text{minimum score}} \quad (I)$$

To obtain a higher dimension, the mean of all indices composing the upper dimension was determined, providing the same weight to all subdimensions. As an example, to calculate the physical health subdimension, the subscales of objective health and subjective health were calculated following the steps indicated above for

standardization, and then, the arithmetic average of the indicators was calculated. Each index can be classified into three levels based on the criteria of the Program of the United Nations for Development (2006), where <0.5 means low level, between 0.5 and 0.79, moderate level, and >0.80, high level.

After the index was determined, a data analysis was conducted using SPSS 21.0 for Windows (IBM Corporation, New York, USA). A descriptive analysis was carried out, in which means and standard deviations were calculated. Moreover, the Pearson correlation coefficient was calculated to quantify the degree and direction of the relationships between the variables comprising the health and participation dimensions.

3. Results

After assessing the psychometrics, the index was constructed, and descriptive results were extracted. The mean and standard deviation were calculated for all dimensions and sub-dimensions comprising the active aging index (Table 4).

The level of active aging in this sample was moderate ($M = 0.66$). The dimension of global health ($M = 0.77$) had a higher value than the participation variables ($M = 0.45$). Health, functionality, and social state achieved the highest means ($M = 0.94$) and ($M = 0.91$), respectively, and goals and positive emotions achieved the lowest values ($M = 0.33$) and ($M = 0.43$), respectively. Regarding participation, leisure had the highest value ($M = 0.51$), followed by ICT and lifelong learning ($M = 0.42$). Employment had the lowest value ($M = 0.08$).

4. Discussion

This study was carried out to develop an individual measurement instrument that quantifies the degree of active aging of a person and summarizes it into one unique continuous score. This tool is based on an empirically supported model of active aging. This study contributes to the empirical literature in the field of active aging paradigm with a more comprehensive approach based on a multidimensional perspective and the development of a tested measurement instrument for active aging aimed at the individual level. For this, a tool was constructed based on an empirical model (Marsillas *et al.*, 2017), following the steps recommended by experts to construct composite indices (OECD, 2008; United Nations for Development, 2006). The instrument presented here facilitates the achievement of an individual continuous score not only in each of the dimensions or subdimensions comprising active aging but also in the concept as a whole. The scores provided show not only the performance in each

Table 1. Scores of leisure dimension

Subscale	Subscale range	Recoded values
Artistic	0 – 4	0: 0
		1 – 2: 0.5
		3 – 4: 1
Productive	0 – 4	0: 0
		1 – 2: 0.5
		3 – 4: 1
Recreative	0 – 4	0: 0
		1 – 2: 0.5
		3 – 4: 1
Social	0 – 6	0: 0
		1 – 2: 0.5
		3 – 4: 1
Solitary	0 – 4	0: 0
		1 – 2: 0.5
		3 – 4: 1
Outdoors	0 – 6	0: 0
		1 – 3: 0.5
		4 – 6: 1

Table 2. Subscale values to calculate the active aging index

Dimension	Subdimension	Subscale	No. of items	Items	Range of items	Range of subscale									
Health	Physical	Objective health	3	(i) Presence of symptoms in the past two weeks. Recoded 0/1 based on average. (ii) Absence/presence of chronic disease. (iii) Absence/presence of non-chronic disease or psychological stress in the past 3 months.	0 – 1	0 – 3									
		Subjective health	4	(i) Perceived limitations in daily activities. (ii) Perception of daily activity limited by cognitive state. (iii) Satisfaction with health. (iv) Perceived on health compared to peers.	0 – 4	0 – 16									
		Functionality	2	(i) Independence in Basic Life Activities. (ii) Independence in Instrumental Life Activities.	0 – 4	0 – 8									
	Cognitive	Cognitive	1	(i) Mini-examen cognoscitivo. Well-cognitive state versus possible cognitive decline.	0 – 1	0 – 1									
	Affective	Situation in life		4	(i) Feeling things are going well. (ii) Feeling glad for having people to count on. (iii) Feeling full of energy. (iv) Feeling confident about the future.	0 – 2	0 – 8								
					Emotions			3	(i) Joy. (ii) Cheer or happiness. (iii) Euphoric.	0 – 2	0 – 6				
									Goals			2	(i) Interest. (ii) Achievement.	0 – 2	0 – 4
													Friends		
	Social	Family		9	(i) Visits. (ii) Having people who care about oneself. (iii) Possibility to talk to someone about problems. (iv) Receiving invitations to entertain or going out. (v) Receiving help when being ill. (vi) Receiving love and affection. (vii) Satisfaction with help from family. (viii) Satisfaction with time spent with family. (ix) Feeling loved by family.	0 – 4	0 – 36								

dimension but also the improvement areas to enhance in the intervention, according to individual preferences. This approach solves one relevant gap in this field, namely, the absence of a personal measurement tool that unifies all the components in the same score and quantifies active aging as a continuous variable (Bowling, 2008; Fernández-Ballesteros, 2009).

Both concept and measurement tool development were aimed at the individual after reviewing different approaches to active aging to extract the main subdimensions linked to not only the theoretical definitions (e.g., WHO, 2002) but also according to the debates found in the literature (Marsillas *et al.*, 2017). Components included allude to personal conditions, such as physical, functional, cognitive, affective, and social dimensions, as well as participation in terms of social participation, employment, leisure, lifelong

learning, and use of ICT. Taking into consideration also the ambient and socioeconomic aspects would imply assessing another construct called quality of life (Fernández-Ballesteros, 2009), so they were proposed as external conditions of life influencing active aging (Boudiny, 2013; Fernández-Ballesteros, 2009). Here, this concept was addressed in terms of objective and subjective variables to capture the personal perspective (Stenner *et al.*, 2011). Both are necessary given that the subjective variables refer to older people's perceptions of their conditions, whereas the objective ones impede the consideration of a situation as a good one when it is not so (objective and subjective health). In some cases, self-assessments are better predictors of mortality than objective evaluation (Fernández-Ballesteros, 2009; Schoenfeld *et al.*, 1994), but by including objective variables, the "wellbeing paradox" is softer.

Table 3. Subscale values to calculate the active aging index

Dimension	Subdimension	Subscale	No. of items	Items	Range of items	Range of subscale
Participation	Employment	Employment	1	Paid work.	0–1	0–1
	Participation in society	Participation in society	3	(i) Caring for children and grandchildren.	0–1	0–3
				(ii) Political participation.		
				(iii) Volunteering.		
	Use of ICT	Use of ICT	3	(i) Use of mobile phone.	0–4	0–12
				(ii) Use of computer.		
				(iii) Use of the Internet.		
	Lifelong learning	Lifelong learning	2	(i) Attendance to lectures.	0–1	0–1
				(ii) Attendance to courses within/outside the regular education system.		
				(iii) Reading.		
Leisure	Artistic	2	(i) Singing/playing instruments.	0–2	0–1	
			(ii) Drawing or crafts.			
	Physical	2	(i) Walking.	0–2	0–1	
			(ii) Sports, exercise, or dancing.			
	Productive	2	(i) Gardening.	0–2	0–1	
			(ii) Cooking.			
	Recreative	2	(i) TV watching.	0–2	0–1	
			(ii) Games: Crosswords, Sudoku, etc.			
Social	2	(i) Playing cards/other games with people.	0–2	0–1		
(ii) Visiting friends/relatives/neighbors.						
Solitary	2	(i) Time for oneself.	0–2	0–1		
		(ii) Collect things.				
Outdoors	3	(i) Cinema/Theater.	0–2	0–1		
		(ii) Traveling.				
		(iii) Associations or clubs.				

Abbreviation: ICT: Information and communication technologies.

Results corroborated that active aging can be measured at an individual level. Active aging has been proposed as a higher-order construct composed of two broad categories of variables: (i) Health and (ii) participation. The first group includes elements related to health as a multidimensional concept, considering physical, mental, and social variables. These findings are consistent with those of authors who study active aging, such as Bowling (2008), Montero *et al.* (2011), and Perales *et al.* (2014). However, some academics have rejected the inclusion of health in active aging (Boudiny, 2013). This omission may be due to the frequent restriction of physical components and the absence of diseases, as well as becoming the center of the concept and neglecting other important elements, such as participation. Moreover, the common consideration of active aging as a criteria list where an absence of chronic diseases and disability is included contributes to restricting this concept to specific groups (Strawbridge *et al.*, 2002). However, physical health cannot be the only axis of the concept, as it is neither sufficient nor indispensable to actively age (Clark & Warren, 2007; Stenner *et al.*, 2011). Social variables represent the most important variables

within this dimension. Older people highlight the value of social relationships, and a trend is detected in which older people prefer emotionally close relationships, in which the quality of social contacts prevails over quantity (Berg, 2008). Although the affective state represents a less contributing component compared, for instance, to social variables or cognitive state, the results can be comparable to those of Bowling *et al.* (2008), in which psychological functioning represents a response less provided when referring to active aging.

Participation variables represent different types of activities, including both productive and leisure activities, following the preferences and perceptions of older adults (Boudiny, 2013; Clarke & Warren, 2007; Stenner *et al.*, 2011). In doing so, a more inclusive approach to active aging is addressed, which unifies the policy, scientific, and lay perspectives. It supports the mainstream ideas about productive activities as defended by policymakers in terms of employment, social participation, and leisure activities, mainly defended by researchers (Boudiny, 2013; Foster & Walker, 2013; Hasmanová, 2011) and older people's definitions (Bowling, 2008; Stenner *et al.*, 2011). Without

Table 4. Descriptive results of active aging and dimensions

Indices	Median	S.D.	Minimum	Maximum
Physical health index	0.65	0.20	0.03	0.97
Objective physical health index	0.60	0.32	0	1
Subjective physical health index	0.70	0.16	0.06	0.94
Functionality index	0.94	0.15	0	1
Cognitive index	0.86	0.35	0	1
Affective index	0.47	0.23	0	1
Affective index: Goals	0.33	0.35	0	1
Affective index: Emotions	0.43	0.30	0	1
Affective index: Situation in life	0.65	0.26	0	1
Social index	0.91	0.14	0	1
Social index: Family	0.91	0.16	0	1
Social index: Friends	0.92	0.16	0	1
Employment index	0.08	0.28	0	1
Participation in society index	0.38	0.49	0	1
Use of ICT index	0.42	0.35	0	1
Lifelong learning index	0.42	0.28	0	1
Leisure index	0.51	0.17	0.07	0.93
Global health index	0.77	0.13	0.27	0.99
Global participation index	0.45	0.25	0.02	1.00
Global active aging index	0.66	0.15	0.18	1.00

Abbreviations: ICT: Information and communication technologies; S.D.: Standard deviation.

the combination of these elements, active aging would be restricted to health, and even from a multidimensional perspective, it would omit active and involved lifestyles (Boudiny, 2013). Leisure activities contributed the most to the participation variables. This result is in agreement with the authors, who argue that leisure activities indirectly increase life satisfaction (Boudiny & Mortelmans, 2011; Bowling, 2008; Clarke & Warren, 2007). Different types of leisure activities were included, even those traditionally excluded from being considered rather passive, such as watching TV, solving crosswords, or gardening, since they are important to the oldest (Avramov & Moskova, 2003; Clarke & Warren, 2007; Pettigrew & Roberts, 2008; Townsend *et al.*, 2006). Home-based and solitary leisure activities were also considered part of the index. The rationale for including them was to count the diversity of activities that embrace the changing preferences and selection of activities derived from constraints in health and physical abilities, which tends to lead to more home-based leisure (Gauthier & Smeeding, 2003; Venn & Arber,

2011; Verbrugge *et al.*, 1996). The importance of ICT use is shown as a participation variable and part of the concept of active aging, which agrees with Boudiny & Mortelmans (2011). Subsequently, as stated by previous authors who referred to ICT's benefits (Boudiny & Mortelmans, 2011; Small *et al.*, 2009), these results are in line with the current encouragement of their use to promote older people's inclusion, and they provide empirical support for their inclusion as constituents of the concept of active aging. We found lifelong learning to be another important dimension that influences older people's well-being (Walker, 2002). Productive activity, both in terms of employment and social participation, contributed relatively little to the active aging construct. The reasons behind this may be related to the fact that the proportion of older people in working age was small in relation to the total age range, both for the current unemployment trend, the retirement schemes, and the lower labor opportunities at older ages (Avramov & Maskova, 2003; Boudiny, 2013; Hirsch, Macpherson, & Hardy, 2000; Walker, 2006; WHO, 2002). A relatively low level of social participation was found, for instance, in the case of volunteering, due to the frequent existence of upper age limits (Foster & Walker, 2013; Gauthier & Smeeding, 2003). Another factor that could explain this result is the share of people living in suburban environments, where the attendance at volunteer organizations or the distance to relatives make participation difficult (Monreal, 2008). Moreover, sometimes tension exists among work, care responsibilities, volunteering, and leisure; thus, certain patterns of leisure can impede social participation (Dury *et al.*, 2015).

Despite these findings, this study also has some inherent limitations. First, the cross-sectional nature of the research does not permit the verification of the causal relationship among variables. On this topic, each component of active aging could act as a predictor as well (Hasmanová, 2011). However, the proposed tool had a good representation of the different components of active aging presented in the literature according to different approaches. Second, there is a lack of a gold standard for measuring and rating active aging (Rantanen *et al.*, 2019), which makes the complete validation process difficult. Although this study was developed in an attempt to provide a new index based on an empirically supported model that covers a wide range of indicators, a future validation study should include alternatives for testing the criterion-based validity as well to prove if the new index is more inclusive as intended. Third, although one of the aims was to determine the influence of active aging on the cognitive and subjective components of well-being and life satisfaction, it could also be interesting to add quality of life as an outcome variable (WHO, 2002). Fourth, most of the variables are assessed by self-

reporting; thus, subjective perception may influence the results. Nevertheless, in future research, validity could be tested by comparing it to objectively measured equivalent variables, such as the specification of social networks in the case of perceived social support. Finally, by including more antecedents or predictor variables with long-term effects and covering a multilevel model (Fernández-Ballesteros, 2008), more complete information can be provided. Future research could take these considerations into account. This study, however, was performed to develop an empirically supported individual measurement instrument for active aging based on a broad and inclusive individual concept and the theory of active aging, which integrates the different approaches addressing this concept. The final aim was to complement the population perspective of active aging by focusing on individual variables that are likely to be modified by individual-level interventions.

Based on the results hereby presented, the next steps to promote active aging in our region could be done simultaneously from a double perspective, both at the micro level, focused on older people, and at the meso- and macrolevels, related to neighborhoods and communities, public policies, and institutional environments (Sidorenko & Zaidi, 2013). A focus on enhancing health and participation should be expanded, always according to older adults' preferences, and adapting to the environment and contextual elements while maximizing individual conditions. For this, the coordination of health and social measures, education, employment, economy, social security, living arrangements, transport, and urban and rural development is crucial (Lassen & Moreira, 2014; Walker & Maltby, 2012; WHO, 2002). In addition, the benefits of the active aging process need to be more disseminated, enhancing the active participation of older people in society and in decisions that have an impact on their lives. More programs promoting active aging components should be built and assessed to prove their efficacy on active aging during the course of life (Boudiny, 2013; Fernández-Ballesteros *et al.*, 2004). However, it is necessary to prevent this discourse from transmitting a compulsory strategy as well as unique self-responsibility to individuals. In these cases, negative consequences would be produced, such as personal discomfort, blaming, and the oppression of older people, stepping back to narrower concepts such as successful aging or productive aging (Boudiny, 2013; Hasmanová, 2011; Ranzijn, 2010).

In addition, it is necessary to be aware that some critiques about active aging point out that the activities and values promoted by policy and research are mainly associated with first stage of old age (the young-old) or functionally independent old people (Boudiny &

Mortelmans, 2011; Van Dyk, 2014), whereas activities not linked to middle-aged people usually result in stigmatization (Venn & Arber, 2011). Another source of critical thinking is that the lifestyle promoted in the current discourse of active aging is easy to follow by people who can afford it, who have the physical or mental ability to do so, and who can participate in the institutions where it is promoted (Biggs, 2001; Bowling, 2005; Hasmanová, 2011). It means that this rhetoric may become coercive, as the social images promoted are being interiorized by older people (Foster & Walker, 2015; Katz, 2000; Townsend *et al.*, 2006), with high expectations placed on them (Boudiny, 2013). Those expectations can be assumed as a challenge or a threat depending on personal circumstances in terms of health, educational level, or income (Pavlova & Silbereisen, 2012). In addition, this paradigm is not fully prepared to incorporate the notion of decline (Foster & Walker, 2015; Moulaert & Paris, 2013), and it ignores the barriers of certain social groups to meet the ideals of older ages (Hasmanová, 2011). Thus, active aging may be presented as unattainable for a large group of people who are old or who live with a disability and cannot join active aging as it is being promoted (Holstein & Minkler, 2003). This situation results in subtle or overt social discrimination or exclusion of old-old people, as well as vulnerable, fragile, and dependent people who do not meet the criteria in terms of health, independence, productivity, and activity (Boudiny, 2013; Ranzijn, 2010; Van Dyk, 2014). For those reasons, policies and programs should increase the opportunities to remain active, adapting them when necessary, such as in the case of dependent people (Boudiny, 2013; WHO, 2002). This issue is also related to how active aging has been presented in practice, narrower than the theoretical conceptualization (Boudiny, 2013; Foster & Walker, 2015). Unless changes are made to include new alternative ways to age actively, it will result in a new categorization of older ages as being narrow, oppressive, excluding, and normative, with an excessive idealization of older ages (Foster & Walker, 2015; Holstein & Minkler, 2007). Thus, the same mistakes from active theory (Boudiny, 2013) and successful aging (Pruchno *et al.*, 2010; Strawbridge *et al.*, 2002) could be made. Future research on this concept may evolve toward meaningful (active) aging, focusing more on what is meaningful for aging people and linking this paradigm of activity to what is relevant and generates subjective well-being for older adults.

5. Conclusion

In this study, a tool that can assess active aging in an integral, quantitative, and continuous way is tested and shared. Due to its operationalization, people who otherwise could not

meet the exigent criteria of active aging were included, taking into account the various dimensions, abilities, and activities present in their lives. It provides some progress toward a broader version of active aging. Moreover, this tool is aimed at an individual level and could contribute to meeting the need to provide empirical evidence regarding the effectiveness of intervention programs (Bowling & Iliffe, 2006). In doing so, the recommendations about incorporating the heterogeneity of older people as a continuum are incorporated (Fernández-Ballesteros, 2009). Its importance is reflected in the manifest concern about the transformation of this paradigm into an excessively idealized one, which may result in a negative impact on older people's well-being by presenting an extremely positive image of active aging and neglecting the reality faced by older adults (Hasmanová, 2011; Holstein & Minkler, 2007). The results obtained support the hypothesis of including two big types of variables as components of active aging: Those referring to global health and those alluding to different ways of participation. All these variables are proposed from a multidimensional perspective by matching different spheres of people's lives. Thus, the triangle created by the three approximations found in the literature (political, scientific, and social) is reconciled in a certain manner.

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Conflict of interest

The authors declare that they have no competing interests.

Author contributions

Conceptualization: Sara Marsillas, Jesús Varela

Formal analysis: Sara Marsillas, Antonio Rial

Investigation: Sara Marsillas, Antonio Rial

Methodology: All authors

Writing – original draft: Sara Marsillas

Writing – review & editing: All authors

Ethics approval and consent to participate

The acquisition of ethical approval is not necessary, as participants have given their verbal consent.

Consent for publication

Informed consent was provided verbally.

Availability of data

The data used in this work are available from the corresponding author on reasonable request.

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