

## DEVELOPMENT AND PRELIMINARY VALIDATION OF THE SCALE OF FACTORS WHICH INFLUENCE DECISION-MAKING OF THE ELDERLY TO TAKE PART IN PHYSICAL EXERCISE PROGRAMS

Tatjana TOMAŽIČ<sup>1</sup>, Bojana FILEJ<sup>1</sup>, Nadja PLAZAR<sup>1</sup>

<sup>1</sup>Alma Mater Europaea – ECM, Department of Social Gerontology

*Corresponding author:*

Tatjana TOMAŽIČ

Department of Social Gerontology, Alma Mater Europaea – ECM,  
Slovenska ulica 17, 2000 Maribor, Slovenia  
e-mail: tatjana.tomazic.majstor@gmail.com

### ABSTRACT

*Regular physical activity and exercise are beneficial for both physical and mental health. However, in the elderly, the level of physical activity they partake in is consistently inadequate. Recognizing the need to enhance the participation of the elderly in organized physical exercise and understanding the factors which influence their decision-making becomes pivotal. The purpose of this study was to develop a measurement instrument, specifically a scale, to identify these factors and evaluate its psychometric properties. First, the statements were formulated, which was followed by content assessment by a panel of experts. In the process of scale validation, its internal consistency, stability, correlations between the variables, and factor structure were also evaluated. The scale was tested on a sample of 1777 participants engaged in guided physical exercise at the School of Health Association (društvo Šola zdravja), all aged 60 years or more. The exploratory factor analysis yielded a four-factor model with 27 statements which explained 42.9% of variability. The results indicated weak, but statistically significant correlations between the factors and an acceptable level of internal consistency and stability of the entire scale. This scale, developed to establish the factors that influence the decision-making of the elderly to take part in organized physical exercise, represents a valid and reliable measurement instrument, which can be beneficial in the planning and promotion of organized physical exercise programs for the elderly.*

**Keywords:** *physical exercise, quantitative methodology, elderly, social gerontology*

## RAZVOJ IN PRELIMINARNO PREVERJANJE LESTVICE DEJAVNIKOV PRI ODLOČANJU STAREJŠIH ZA VADBO

### IZVLEČEK

*Redna gibalna dejavnost in vadba koristita fizičnemu in duševnemu zdravju, vendar so starejši večinoma premalo gibalno dejavni. Za povečanje deleža starejših pri organiziranih gibalnih vadbah je ključno poznavanje dejavnikov, ki vplivajo na njihovo odločitev za vključitev v vadbo. Namen raziskave je bil razviti merski instrument – lestvico za ugotavljanje dejavnikov, ki vplivajo na odločitev starejših za vključitev v organizirano gibalno vadbo – in oceniti njegove psihometrične lastnosti. Najprej so bile oblikovane trditve, ki so jih vsebinsko ocenili strokovnjaki ekspertnega panela. V procesu validacije lestvice so se preverjale tudi notranja konsistentnost, stabilnost, povezanost spremenljivk in struktura dejavnikov. Lestvica je bila testirana pri 1777 udeležencih vadbe v društvu Šola zdravja, starih 60 let ali več. Eksploratorna analiza dejavnikov je podala model s štirimi dejavniki (27 trditvami), ki pojasnjujejo 42,9 % variabilnosti. Rezultati kažejo tudi šibke, toda statistično značilne povezanosti med dejavniki ter sprejemljivo notranjo konsistentnost in stabilnost celotne lestvice. Ustvarjena lestvica za ugotavljanje dejavnikov, ki vplivajo na odločitev starejših za vključitev v organizirano gibalno vadbo, je veljaven in zanesljiv merski instrument, ki je lahko koristen pri načrtovanju in promociji programov organiziranih gibalnih vadb za starejše.*

**Ključne besede:** gibalna vadba, kvantitativna metodologija, starejši, socialna gerontologija

## INTRODUCTION

The global population is aging and, in the coming decades, many countries including Slovenia will face serious challenges in the fields of public healthcare systems, pensions, and social security (Zubiashvil & Zubiashvil, 2021). In 2022, 21.1% of the population of Slovenia were aged 65 years or more, and according to data from the EUROPOP2023 population projections, this percentage is expected to increase to 30.2% by 2050 (Statistical Office of the Republic of Slovenia, 2023). This shifting age structure forces countries to conduct research on how to preserve and enhance the health and well-being of the elderly, ultimately prolonging their independence and reducing the costs associated with healthcare and social services (van Baal, Hoogendoorn & Fischer, 2016; Wang et al., 2019).

To maintain health and prevent premature morbidity and mortality, regular physical activity and exercise are of particular importance (Langhammer, Bergland & Rydwik, 2018; Winett & Ogletree, 2019). Their benefits have been well-documented in the prevention and management of chronic diseases, such as cardiovascular diseases (Coats et al., 2017; Tonet et al., 2018; Singam, Fine & Fleg, 2020; Ciumărnean et al., 2022; Vilela de Sousa et al., 2023), type 2 diabetes (Colberg et al., 2016; Pan et al., 2018) and some cancers (Ahn et al., 2020; Sanchez-Bayona et al., 2021; Trinh et al., 2021). Additionally, regular physical activity and exercise have been associated with improvements in emotional, psychological, and social well-being, as well as mental health, and cognitive functions (Lee et al., 2015; Langhammer et al., 2018; Yamasaki, 2023).

Despite compelling evidence that regular physical activity and exercise significantly contribute to maintaining independence and improving quality of life in old age (Langhammer et al., 2018; Wang et al., 2019), there exists a notable shortfall in the percentage of elderly individuals who meet the recommended guidelines of at least 150 minutes of moderate physical activity per week (Vargas, 2020). Therefore, the promotion of physical activity among the elderly constitutes an important public health objective, which should receive greater attention (Nielsen et al., 2014; Langhammer et al., 2018).

In the pursuit of formulating effective measures to increase the level of physical activity among the elderly, an in-depth understanding of the factors influencing their decision-making to engage in physical activity is crucial (Nielsen et al., 2014; Chen, While & Hicks, 2015). Nevertheless, the results of studies conducted among the elderly across various cultures cannot be indiscriminately generalized. The factors influencing their decision-making to engage in physical activity within the context of a specific cultural and social community

necessitate focused investigation (Buman, Daphna Yasova & Giacobbi, 2010; Apaydin Kaya et al., 2013; Capalb, O'Halloran & Liamputtong, 2014; Dèdelè, Chebotarova & Miškinytė, 2022). Since there are no well-established tools in Slovenia to identify such factors, the primary objective of the article was to introduce a measurement instrument designed to assess the factors influencing elderly individuals' decisions to participate in organized physical exercise, and to validate its psychometric properties.

## METHODS

This study was part of a larger quantitative study of the factors which influenced the decision-making of elderly inhabitants of Slovenia to participate in regularly scheduled organized physical exercise throughout an entire year. The study's objective was in compliance with the recommendations of the World Health Organization, which suggest at least 150 minutes of moderate-intensity exercise a week for the elderly to maintain their health (World Health Organization, 2010). Several psychometric tests were employed to assess the instrument's validity and reliability.

### **Process for developing a measurement instrument**

Drawing upon an extensive review of prior research into the factors influencing the decision-making of the elderly to engage in physical activity (Stathi, McKenna & Fox, 2010; Lee & Hung, 2011; Sims-Gould, Miran-Khan, Haggis & Liu-Ambrose, 2012; Capalb et al., 2014; Nielsen et al., 2014; Chen et al., 2015; de Guzman, Jatulan & Jimenez, 2015; Yamakita, Kanamori, Kondo & Kondo, 2015) and a smaller qualitative study done among the members of the Ljubljana-Dravlje and Ljubljana-Vič groups of the School of Health Association, a set of 36 statements was created to establish the factors which influence the participation of the elderly in organized physical exercise. Assessment of these statements was based on a 5-point Likert scale, with responses ranging from 5 (I completely agree) to 1 (I completely disagree).

### *Evaluating the content validity of the scale*

To determine the suitability of the scale designed to identify the factors influencing the decision-making of elderly individuals to participate in organized physical exercise, a panel of experts from the field assessed the formulated statements. To assess content validity, members of the expert panel rated the statements on two dimensions: (1) relevance, using the following scale 4 – very relevant, 3 – somewhat relevant, 2 – revision is essential, and 1 – irrelevant; and (2) clarity, using the following scale 1 – not clear, 2 – needs some revision, and 3 – very clear.

When evaluating the content validity index, the number of experts who rated each statement as 3 (somewhat relevant) or 4 (very relevant) was divided by the total number of experts in the panel. This ratio, which was calculated for each individual statement, represents its content validity according to the method described by Polit and Beck (2006). The same two authors also stated that an individual statement is acceptable if its sum total is at least 0.83 for six to eight experts, reflecting good content validity.

Furthermore, the Fleiss Kappa ( $\kappa$ ) coefficient was calculated, which determines the level of agreement above random chance. Values of the Fleiss Kappa coefficient above 0.74 are considered excellent, those between 0.60 and 0.74 are good, and those between 0.40 and 0.59 are fair (Tang, Hu, Zhang, Wu & He, 2015).

### *Evaluation of the construct validity of the scale*

Construct validity was evaluated using exploratory factor analysis which enables the condensation of extensive data into a more manageable and comprehensible datasets (Tavakol & Wetzel, 2020). Exploratory factor analysis is used to collate interdependent variables into descriptive categories and to classify profiles into types with similar properties. In addition, factor analysis can be used to simplify the complexity of correlations between the variables and to predict correlations (Field, 2009). The suitability of data for factor analysis was evaluated using the Kaiser-Meyer-Olkin (KMO) index and Bartlett's test of sphericity. Data is deemed suitable if the KMO index is at least 0.5. If Bartlett's test of sphericity does not show statistical significance ( $p \geq 0.05$ ), this means that the correlation matrix does not show a satisfactory correlation between the variables measuring an individual construct (Field, 2009). In the data analysis,

only variables with an eigenvalue of communalities (percentage of total variance in the variable) greater than 0.4 were considered relevant.

### *Evaluation of reliability of the scale*

The reliability of the scale was assessed by analyzing its internal consistency and stability. Internal consistency was assessed using the Cronbach's alpha coefficient ( $\alpha$ ), whereby 0.60 was used as the threshold value. While this value is considered suboptimal, it remains acceptable (Morgan, Cleave-Hogg, DeSousa & Tarshis, 2004; Kachooei et al., 2015). The threshold value of 0.60 was also applied when evaluating reliability with the split-half method for analyzing the stability of the variables using Guttman's coefficient and Spearman-Brown's coefficient.

## **Sample description**

The expert panel tasked with evaluating the content validity of the scale's statements consisted of six experts, five women and one man between the ages of 40 and 75, and having a master's degree or doctorate of science. The panel's diverse expertise included social gerontology, sociology and extensive experience in healthcare education. Their collective experience provided a comprehensive understanding of the various aspects of social activities relevant to the focus of the scale.

Evaluation of validity and reliability based on the expert ratings was performed on a sample of participants retrieved from the physical exercise program organized by the School of Health Association of Slovenia. This program comprises 30 minutes of morning exercise done in accordance with the "1000 movements" method (Grishin, 2012). It is led by trained volunteers who are members of the association and is available free of charge every day (except Sundays and holidays) in open air public areas. The research data were obtained on a sample of 1777 respondents between 60 and 92 years of age. The average age of the respondents was 69.5 years ( $SD = 6.2$ ). In terms of gender structure, women prevailed in the sample (88.7%), while based on their residence the respondents were mostly from urban areas (65.1%). The respondents came from all statistical regions of Slovenia, except the Pomurje and Zasavje regions. The levels of education ranged from unfinished primary school to doctorate of science, and most of them had a secondary school level of education (39.4%). In

terms of household income, most respondents stated that they were just getting by with their income (50.3%), 8.4% of the respondents found it difficult or extremely difficult to survive on their income, and the rest of them stated that they were able to live comfortably on their income.

### **Data collection and processing**

Data collection was done in line with the Helsinki Declaration and took place from June to October 2017. Formal approval from the ethics committee was not sought as the research method did not involve any interventions or sensitive personal data. The participants were thoroughly informed about the study and their voluntary participation. In addition, the study was conducted in accordance with general ethical principles, including anonymity and confidentiality, as well as respect for the autonomy and dignity of all participants.

The first author joined several training groups and upon completing the exercises she invited the participants to join the study, guaranteeing anonymity and protection of the collected data. Since it was not possible to visit all of the groups, some of the participants were recruited by the group leaders using the same approach described above. The participants were given the questionnaires and asked to fill them out at home and return them back to the group leader. All of the leaders then forwarded the collected questionnaires to the first author by mail using envelopes equipped with stamps and properly addressed.

Data were analyzed using the IBM SPSS software, Version 29.0 (SPSS Inc., Chicago, IL, US). To determine the psychometric properties of the scale to establish the factors influencing the decision-making of the elderly to take part in organized physical exercise, the following statistical analyses were done: descriptive statistics (frequency distribution, the lowest and highest data values, the mean and standard deviations), Cronbach's alpha coefficient to establish internal consistency, Guttman's and Spearman-Brown's coefficients for analyzing the stability of the variables, exploratory factor analysis for evaluating the factor structure and Pearson's correlation coefficient to determine the correlation between the variables.

## RESULTS

A total of 2579 questionnaires were distributed and 1966 of those were returned, which means that the response rate was 76.2%. Questionnaires of the participants younger than 60 years of age and of those who did not provide the year of birth were excluded from further analysis. The statistical analysis thus comprised 1777 or 68.9% of all distributed questionnaires.

### *Content validity of the scale*

The expert panel members assessed all 36 formulated statements of the scale as relevant and clear. Therefore, no statement was excluded on the basis of content validity analysis. The content validity indices for the statements were satisfactory and rated between 0.83 and 1.00 for relevance, and between 0.83 and 1.00 for clarity. To reduce the possibility of random agreement between the expert panel's members, the level of their agreement was calculated using the Fleiss Kappa coefficient. The value of this coefficient showed a good agreement between expert assessments ( $\kappa = 0.71$ ; 95% confidence interval from 2.98 to 4.08;  $p < 0.001$ ). The results for the Fleiss Kappa coefficient for individual statements of the scale ranged between 0.67 and 1.00.

### *Construct validity of the scale*

The evaluation of the scale's validity to establish the factors that affect the decision-making of the elderly to take part in organized physical exercise was done on the basis of an exploratory factor analysis. The suitability of data for factor analysis was first verified using the KMO index and Bartlett's test of sphericity. Analysis of the interdependence between the variables showed that the use of factor analysis was reasonable, which was confirmed by the KMO index and Bartlett's test of sphericity (KMO = 0.702; Bartlett's test of sphericity  $\chi^2 = 5165.895$ ,  $df = 496$ ,  $p < 0.001$ ). It follows from the obtained results that the correlation matrix demonstrated satisfactory correlations between the variables measuring individual constructs. In the data analysis, we used those variables which had an eigenvalue of communality higher than 0.4. For this reason, 9 statements were excluded from further analysis because they did not meet the inclusion criteria. The final scale for determining the factors that influence



the decision-making of the elderly to participate in organized physical exercise thus consisted of 27 statements.

Table 1 shows these 27 statements and the respective factor loadings which range from 0.402 to 0.791. Factor 1, Exercise Characteristics, was comprised of 8 statements with factor loadings ranging from 0.498 to 0.647. Factor 2, Social Aspect, was comprised of 4 statements with factor loadings ranging from 0.603 to 0.788. Factor 3, Health Problems, was comprised of 7 statements with factor loadings ranging from 0.483 to 0.785, and Factor 4, Improvement in Psychophysical Well-Being, was comprised of 8 statements with factor loadings ranging from 0.402 to 0.791. Using this four-factor model, 42.9% of variability can be explained. Factor 1 had the highest eigenvalue of variability of 14.3 %, followed by Factor 2 with 10.7%, Factor 3 with 9.6%, and Factor 4 with 8.3%.

Table 1 also shows the content validity index of individual statements from the viewpoint of relevance. Regarding clarity, all expert panel members assessed all of the 27 statements of the final scale to establish the factors that influence the decision-making of the elderly to participate in organized physical exercise as very clear (1.00).

A quartile-based scoring system was also determined. Using the scale, the respondents were able to achieve between 27 and 135 points. Considering the factors that influence the participation of the elderly in organized physical exercise, scoring was done as follows: low influence (from 27 to 53 points), moderately low influence (from 54 to 81 points), moderately high influence (from 82 to 108 points), and high influence (from 109 to 135 points). The sum of all results leading to the final score on the scale was quite low among the respondents and indicated a moderately low influence of the factors on the decision-making of the elderly to participate in organized physical exercise ( $\bar{x} = 65.00$ ;  $SD = 12.189$ ; 95% confidence interval [64.43; 65.57];  $p < 0.001$ ) (Table 2).

As part of validating the measurement model, the correlation coefficients between the factors were also stated. The results showed that the correlations between the factors were low/weak, as they ranged from 0.216 to 0.300. All correlations were statistically significant at  $p < 0.001$  (Table 3).

*Table 1: Assessment scale to establish the factors which influence the participation of the elderly in organized physical exercise*

	<b>Statements</b>	<b>Factor loadings</b>	<b>Mean score (SD)</b>	<b>I-CVI (R)</b>
<b>Factor 1</b>	I chose to exercise at the School of Health Association because it is done in a standing position.	0.647	2.16 (1.592)	0.83
	I chose to exercise at the School of Health Association because it lasts only 30 minutes.	0.627	2.31 (1.689)	1.00
	I chose to exercise at the School of Health Association because it takes place in the mornings.	0.625	3.43 (1.646)	1.00
	I chose to exercise at the School of Health Association because it is available several times a week.	0.582	2.85 (1.812)	1.00
	I chose to exercise at the School of Health Association because it is performed in a group.	0.534	2.93 (1.899)	1.00
	I chose to exercise at the School of Health Association because it takes place in the open air.	0.508	3.92 (1.496)	0.83
	I chose to exercise at the School of Health Association because it is close to my home.	0.499	3.74 (1.549)	0.83
	I chose to exercise at the School of Health Association because it does not require any special sports equipment.	0.498	2.39 (1.655)	0.83
<b>Factor 2</b>	I chose to attend the exercising activities at the School of Health Association because I miss the company of other people.	0.788	1.72 (1.438)	0.83
	I chose to exercise at the School of Health Association to feel less lonely.	0.764	1.82 (1.552)	0.83
	I chose to exercise at the School of Health Association because I am depressed.	0.617	1.35 (0.753)	1.00
	I chose to exercise at the School of Health Association to feel less sad.	0.603	1.25 (0.907)	0.83

Statements	Factor loadings	Mean score (SD)	I-CVI (R)
Factor 3	0.785	2.33 (1.734)	1.00
	0.759	1.39 (1.118)	1.00
	0.678	1.59 (1.186)	0.83
	0.512	1.98 (1.532)	0.83
	0.506	1.69 (1.292)	0.83
	0.497	1.19 (0.738)	1.00
	0.483	1.80 (1.390)	0.83
	0.791	4.27 (1.508)	1.00
	0.620	4.44 (0.649)	1.00
	0.473	3.88 (1.463)	0.83
Factor 4	0.461	2.44 (1.882)	1.00
	0.458	2.46 (1.888)	0.83
	0.443	1.37 (1.110)	1.00
	0.405	1.32 (1.044)	0.83
0.402	3.35 (1.893)	1.00	

Legend: Factor 1 – Exercise Characteristics; Factor 2 – Social Aspect; Factor 3 – Health Problems; Factor 4 – Improvement in Psychophysical Well-Being; SD – standard deviation; Scores based on level of agreement: From 5 – Completely agree to 1 – Completely disagree; I-CVI (R) – Statements Content Validity Index (Relevance)

*Table 2: Scores on the scale to establish the factors which influence the participation of the elderly in organized physical exercise*

Factors	$\bar{x}$	SD	95% confidence interval		p value
			Lower limit	Upper limit	
Exercise Characteristics	21.89	6.788	21.58	22.21	< 0.001
Social Aspect	6.14	3.025	6.00	6.28	< 0.001
Health Problems	11.98	4.016	11.79	12.16	< 0.001
Improvement in Psychophysical Well-Being	23.18	4.844	22.96	23.41	< 0.001
Assessment scale to establish the factors which influence the decision-making of the elderly to participate in organized physical exercise	65.00	12.189	64.43	65.57	< 0.001

Legend:  $\bar{x}$  – mean value; SD – standard deviation

*Table 3: Correlation matrix for factors of the scale – Pearson's correlation coefficient*

Factors	1	2	3	4
Exercise Characteristics	-	0.216**	0.266**	0.300**
Social Aspect	0.216**	-	0.256**	0.243**
Health Problems	0.266**	0.256**	-	0.288**
Improvement in Psychophysical Well-Being	0.300**	0.243**	0.288**	-

Legend: \*\* Correlation is statistically significant at 0.01

*Evaluation of reliability of the scale*

The reliability evaluation to establish the factors that influence the decision-making of the elderly to enroll in organized physical exercise was done using reliability and stability testing. Cronbach's alpha coefficient, Guttman's split-half coefficient, and Spearman-Brown's coefficient were calculated for the scale as a whole (Table 4). The results showed reliability and stability along the entire scale ( $> 0.600$ ).

*Table 4: Reliability evaluation of the scale to establish the factors which influence the participation of the elderly in organized physical exercise*

Construct	n	Cronbach's $\alpha$ coefficient	Guttman's split-half coefficient	Spearman-Brown's coefficient
Assessment scale to establish the factors which influence the participation of the elderly in organized physical exercise	27	0.642	0.670	0.649

Legend: n – total number of statements within the scale

## DISCUSSION

The purpose of the study was to develop a scale comprising of factors that influence the decision-making of the elderly to enroll in organized physical exercise lasting 30 minutes per session five or six days a week, and to perform its psychometric validation.

The retention of all 36 initial statements after expert validation emphasizes their relevance and appropriateness in capturing the different aspects of decision-making in this population. This comprehensive inclusion, which meets the content validity criteria of Polit and Beck (2006), emphasizes the depth and breadth of the factors considered in our study.

The exploratory factor analysis, which was crucial for refining the scale, revealed interesting findings. The exclusion of 9 statements due to their insufficient variability suggests that certain anticipated factors may not play as significant a

role in the decision-making process as originally assumed. This refinement resulted in a more focused four-factor model that reveals the complexity and multidimensionality of the decision-making process in the elderly in relation to physical exercise. The weak but statistically significant correlations between these factors suggest a nuanced interplay rather than strong, direct relationships. This subtlety in the relationships between the different factors provides a more complex understanding of how the elderly weigh up different considerations when deciding to participate in organized physical exercise programs.

The scale to establish the factors that influence the decision-making of the elderly to enroll in organized physical exercise clearly identified four main factors that are crucial for planning organized physical exercise for the elderly in Slovenia. The first factor refers to the Exercise Characteristics and is related to the way the exercises are done, the duration of exercise, the timing of exercise, the frequency of exercise, the form of exercise, the place of exercise, and the need to use sports equipment. Other authors have also reported that the characteristics of organized physical exercise, such as access to the exercise area, the time and place of exercise, the intensity and form of exercise, and the prices of exercise programs, are important for the elderly when deciding to participate in a physical exercise program (Bethancourt, Rosenberg, Beatty & Arterburn, 2014; de Guzman et al., 2015; Lévasseur et al., 2015; Shaikh & Dandekar, 2019).

The second factor, i.e. Social Aspect, is related to the enrolment of the elderly in organized physical exercise programs as a means to counteract feelings of loneliness, depression, and sadness. Aging encompasses not only biological changes, but also important psychological and social shifts (Cannon, 2015). These are often associated with alterations in socio-economic status, loss of employment, spouse or friends, and an increasing dependence on the assistance of others. Moreover, cognitive and mental capacities tend to decline with age (Johnson, Barrera & Yochim, 2018; June & Marty, 2018; Woodhead, 2018). Given these multifaceted challenges, it becomes advantageous for the elderly to have access to and participate in organized group physical exercise programs. The results of studies have shown that the elderly do not take part in such programs solely to maintain or improve their physical health, but also to socialize with other people of similar age (Devereux-Fitzgerald, Powell, Dewhurst & French, 2016; Pels & Kleinert, 2016; Franke, Sims-Gould, Nettlefold, Ottoni & McKay, 2021). There is also an increasing amount of evidence in support of the mental and cognitive benefits for the elderly derived from participating in programs involving regular physical exercise (Windle, 2014; Lee et al., 2015; Yamasaki, 2023).

The third factor, i.e. Health Problems, comprises statements on various health problems reported by the respondents. This factor is particularly complex as there are different views in the literature on how health perceptions influence physical activity in the elderly. On the one hand, some studies have found that poor health can actually motivate the elderly to increase the level of their physical activity (Stathi et al., 2010; Patel, Schofield, Kolt & Keogh, 2013; Midlöv, Leijon, Sundquist, Sundquist & Johansson, 2014). These authors suggest that health problems may serve as a wake-up call that prompts the elderly to exercise more in order to manage or alleviate their health problems. On the other hand, a number of studies argue that negative self-rated health tends to be associated with lower levels of physical activity in the elderly (Moschny, Platen, Klaaßen-Mielke, Trampisch & Hinrichs, 2011; Chen et al., 2015; Yamakita et al., 2015; Aro, Agbo & Omole, 2018). This perspective implies that the elderly who perceive their health to be poor are less likely to engage in physical activity, possibly out of concern about exacerbating their health problems or a general sense of incapacity. When designing exercise programs, it is advisable to consider the health problems and diseases of the elderly. Awareness of these conditions is crucial as the etiology of such health problems may necessitate adaptations in the exercise program.

The last factor of the scale to establish the factors that influence the decision-making of the elderly to participate in organized physical exercise combines statements that refer to improvement in psychophysical well-being. This is demonstrated by improvements in mobility, overall well-being, fitness levels, balance, pain reduction, sleep quality, loss of excess weight, and maintenance of health. Our findings are consistent with other studies (Bethancourt et al., 2014; Capalb et al., 2014; Nielsen et al., 2014; Tumanova, 2019; Yarmohamadi, Saadati, Ghaffari & Ramezankhani, 2019; Pedersen, Hansen & Elmoose-Østerlund, 2021). When designing physical exercise programs, it is important to understand the reasons that motivate the elderly to participate in the organized physical exercise program. With this knowledge, exercises programs might become better tailored to the needs of the elderly. Aligning physical exercise programs with the values and needs of the elderly enhances the likelihood of their sustained commitment to the organized physical exercise program.

In addition to substantiating the validity of the scale in elucidating the factors influencing the decision-making of the elderly to participate in organized physical exercise, the study also verified its commendable reliability and stability.

The study was conducted on a representative sample of the elderly taking part in physical exercises at the School of Health Association, although the use of stratified random sampling instead of convenience sampling should be con-

sidered in future studies. Limitations of the study may arise from unequal gender representation and omission of certain statistical regions of Slovenia. Some limitations might also be associated with the subjective nature of participants' personal experiences.

While the four-factor model exhibited satisfactory psychometric properties, it might not have comprehensively addressed the entire scope of the factors influencing the participation of the elderly in organized physical exercise. Therefore, a suggestion for future studies is to expand the scale's statements, perform confirmatory factor analysis and test-retest analysis on a new sample of respondents. Furthermore, assessing the cultural sensitivity of the scale and performing intercultural adjustment would contribute to a better understanding of the factors influencing the decision-making of the elderly to take part in organized physical exercise.

## CONCLUSION

This study focused on the development and initial psychometric validation of a scale. It identified factors that influence decision-making of the elderly to take part in organized physical exercise programs. The resulting novel measurement instrument comprises four factors and 27 statements. It can help professionals, public and non-governmental institutions, organizations and associations in the planning and promotion of organized physical exercise programs for the elderly.

## REFERENCES

- Ahn, S. J., Kim, J. H., Chun, M., Yoon, W. S., Rim, C. H., Yang, D. S., ... Lee, D. S. (2020).** Physical activity status in relation to quality of life and dietary habits in breast cancer survivors: subset analyses of KROG 14-09 nationwide questionnaire study, *Quality of Life Research*, 29(12), 3353–3361. <https://doi.org/0.1007/s11136-020-02585-4>.
- Apaydin Kaya, Ç., Turan, N., Ozfirat, N., Ozel, S., Sezgin, S., Kucuk, V., ... Ay, P. (2013).** Investigation of reliability and validity of the Turkish version of the participation motivation questionnaire for older adults (PMQOA). *International Journal of Academic Research*, 5(5), 363–368. <https://doi.org/10.7813/2075-4124.2013/5-5/B.56>.
- Aro, A. A., Agbo, S., & Omole, O. B. (2018).** Factors influencing regular physical exercise among the elderly in residential care facilities in a South African health district. *African Journal of Primary Health Care & Family Medicine*, 10(1), 1–6. <https://doi.org/10.4102/phcfm.v10i1.1493>.



- Bethancourt, H. J., Rosenberg, D. E., Beatty, T., & Arterburn, D. E. (2014).** Barriers to and facilitators of physical activity program use among older adults. *Clinical Medicine & Research, 12*(1/2), 10–20. <https://doi.org/10.3121/cmr.2013.1171>.
- Buman, M. P., Daphna Yasova, L., & Giacobbi, P. R. Jr. (2010).** Descriptive and narrative reports of barriers and motivators to physical activity and sedentary older adults. *Psychology of Sport and Exercise, 11*(3), 223–230. <https://doi.org/10.1016/j.psychsport.2010.02.002>.
- Cannon, M. L. (2015).** What is aging? *Disease-a-Month, 61*(11), 454–459. <https://doi.org/10.1016/j.disamonth.2015.09.002>.
- Capalb, D. J., O'Halloran, P., & Liamputtong, P. (2014).** Why older people engage in physical activity: an exploratory study of participants in a community-based walking program. *Australian Journal of Primary Health, 20*(1), 74–78. <https://doi.org/10.1071/PY12090>.
- Chen, Y., While, A. E., & Hicks, A. (2015).** Physical activity among older people living alone in Shanghai, China. *Health Education Journal, 74*(2), 156–167. <https://doi.org/10.1177/0017896914523943>.
- Ciumărnean, L., Milaciu, M. V., Negrean, V., Orasan, O. H., Vesa, S. C., Salagean, O., ... Vlaicu, S. I. (2022).** Cardiovascular risk factors and physical activity for the prevention of cardiovascular diseases in the elderly. *International Journal of Environmental Research and Public Health, 19*(207), 1–16. <https://doi.org/10.3390/ijerph19010207>.
- Coats, A. J. S., Forman, D. E., Haykowsky, M., Kitzman, D. W., McNeil, A., Campbell, T. S., & Arena, R. (2017).** Physical function and exercise training in older patients with heart failure. *Nature Reviews Cardiology, 14*(9), 550–559. <https://doi.org/10.1038/nrcardio.2017.70>.
- Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., Dempsey, P. C., ... Tate, D. F. (2016).** Activity/exercise and diabetes: A position statement of the American Diabetes Association. *Diabetes Care, 39*(11), 2065–2079. <https://doi.org/10.2337/dc16-1728>.
- de Guzman, A. B., Jatulan, E. H. M., & Jimenez, J. A. C. A. (2015).** Explicating physical activity preferences of community-dwelling filipino elderly in urban and rural settings: a conjoint analysis. *Educational Gerontology, 41*(4), 251–266. <https://doi.org/10.1080/03601277.2014.954492>.
- Dèdelé, A., Chebotarova, Y., & Miškinytė, A. (2022).** Motivations and barriers towards optimal physical activity level: A community-based assessment of 28 EU countries. *Preventive medicine, 164*(November), 1–7. <https://doi.org/10.1016/j.ypmed.2022.107336>.
- Devereux-Fitzgerald, A., Powell, R., Dewhurst, A., & French, D. P. (2016).** The acceptability of physical activity interventions to older adults: A systematic review and meta-synthesis. *Social Science & Medicine, 158*, 14–23. <https://doi.org/10.1016/j.socscimed.2016.04.006>.
- Field, A. (2009).** *Discovering statistics using SPSS*. Los Angeles (USA): SAGE Publications Ltd.
- Franke, T., Sims-Gould, J., Nettlefold, I., Ottoni, C., & McKay, H. A. (2021).** “It makes me feel not so alone”: features of the Choose to Move physical activity intervention that reduce loneliness in older adults. *BMC Public Health, 21*(1), 1–15. <https://doi.org/10.1186/s12889-021-10363-1>.

- Grishin, N. (2012).** Metoda - 1000 gibov [The 1000 movements method]. Ljubljana (Slovenia): samozaložba.
- Johnson, S. F., Barrera, K., & Yochim, B. P. (2018).** Cognition and aging. In B. P. Yochim & E. L. Woodhead (Eds.), *Psychology of Aging: A Biopsychosocial Perspective* (pp. 157–175). New York: Springer Publishing Company.
- June, A., & Marty, M. A. (2018).** Death and the Dying Process, Bereavement, and Widowhood. In B. P. Yochim & E. L. Woodhead (Eds.), *Psychology of Aging: A Biopsychosocial Perspective* (pp. 273–298). New York: Springer Publishing Company.
- Kachooei, A. R., Ebrahimzadeh, M. H., Salimi, E., Razi, S., Erfani-Sayyar, R., & Salehi, M. (2015).** Short Form-McGill Pain Questionnaire-2 (SF-MPQ-2): A cross-cultural adaptation and validation study of the Persian version in patients with knee osteoarthritis. *Archives of Bone and Joint Surgery*, *3(1)*, 45–50. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4322125/>.
- Langhammer, B., Bergland, A., & Rydwik, E. (2018).** The importance of physical activity exercise among older people. *BioMed Research International*, *2018*, 1–3. <https://doi.org/10.1155/2018/7856823>.
- Lee, Y. J., & Hung, W. L. (2011).** The relationship between exercise participation and well-being of the retired elderly. *Aging & Mental Health*, *15(7)*, 873–881. <https://doi.org/10.1080/13607863.2011.569486>.
- Lee, Y., Kim, J., Han, E. S., Chae, S., Ryu, M., Ahn, K. H., & Park, E. J. (2015).** Changes in physical activity and cognitive decline in older adults living in the community. *Age*, *37(2)*, 1–10. <https://doi.org/10.1007/s11357-015-9759-z>.
- Levasseur, M., Généreux, M., Bruneau, J.-F., Vanasse, A., Chabot, É. Beaulac, C., & Bédard, M.-M. (2015).** Importance of proximity to resources, social support, transportation and neighborhood security for mobility and social participation in older adults: results from a scoping study. *BMC Public Health*, *15(1)*, 1–19. <https://doi.org/10.1186/s12889-015-1824-0>.
- Midlöv, P., Leijon, M., Sundquist, J., Sundquist, K., & Johansson, S.-E. (2014).** The longitudinal exercise trend among older Swedes aged 53–84 years – a 16-year follow-up study. *BMC Public Health*, *14(1)*, 40–53. <https://doi.org/10.1186/1471-2458-14-1327>.
- Morgan, P. J., Cleave-Hogg, D., DeSousa S., & Tarshis, J. (2004).** High-Fidelity patient simulation: validation of performance checklists. *British Journal of Anaesthesia*, *92(3)*, 388–392. <https://doi.org/10.1093/bja/ae081>.
- Moschny, A., Platen, P., Klaubner-Mielke, R., Trampisch, U., & Hinrichs, T. (2011).** Barriers to physical activity in older adults in Germany: a cross-sectional study. *International Journal of Behavioral Nutrition and Physical Activity*, *8*, 1–10. <https://doi.org/10.1186/1479-5868-8-121>.
- Nielsen, G., Wikman, J. M., Jensen, C. J., Schmidt, J. F., Gliemann, L., & Andersen, T. R. (2014).** Health promotion: The impact of beliefs of health benefits, social relations and enjoyment on exercise continuation. *Scandinavian Journal of Medicine & Science in Sports*, *24 (Supplement 1)*, 66–75. <https://doi.org/10.1111/sms.12275>.
- Pan, B., Ge, L., Xun, Y., Chen, Y., Gao, C., Han, X., ... Tian, J. (2018).** Exercise training modalities in patients with type 2 diabetes mellitus: a systematic review and network meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *15(1)*, 1–14. <https://doi.org/10.1186/s12966-018-0703-3>.

- Patel, A., Schofield, G. M., Kolt, G. S., & Keogh, J. W. L. (2013).** Perceived barriers, benefits, and motives for physical activity: two primary-care physical activity prescription programs. *Journal of Aging and Physical Activity, 21(1)*, 85–99. <https://doi.org/10.1123/japa.21.1.85>.
- Pedersen, M. R. L., Hansen, A. F., & Elmoose-Østerlund, K. (2021).** Motives and barriers related to physical activity and sport across social backgrounds: implications for health promotion. *International Journal of Environmental Research and Public Health, 18(11)*, 1–16. <https://doi.org/10.3390/ijerph18115810>.
- Pels, F., & Kleinert J. (2016).** Loneliness and physical activity: A systematic review. *International Review of Sport and Exercise Psychology, 9(1)*, 231–260. <https://doi.org/10.1080/1750984X.2016.1177849>.
- Polit, D. F., & Beck, C. T. (2006).** The content validity index: are you sure you know what's being reported? critique and recommendations. *Research in Nursing & Health, 29(5)*, 489–497. <https://doi.org/10.1002/nur.20147>.
- Sanchez-Bayona, R., Gardeazabal, I., Romanos-Nanclares, A., Fernandez-Lazaro, C. I., Alvarez-Alvarez, I., Ruiz-Canela, M., ... Toledo, E. (2021).** Leisure-time physical activity, sedentary behavior, and risk of breast cancer: Results from the SUN ('Seguimiento Universidad De Navarra') project. *Preventive Medicine, 148*, 1–8. <https://doi.org/10.1016/j.ypmed.2021.106535>.
- Shaikh, A. A., & Dandekar, S. P. (2019).** Perceived benefits and barriers to exercise among physically active and non-active elderly people. *Disability, CBR & Inclusive Development, 30(2)*, 73–83. Retrieved from <https://dcidj.uog.edu.et/index.php/up-j-dcbrid/article/view/332>.
- Sims-Gould, J., Miran-Khan, K., Haggis, C., & Liu-Ambrose, T. (2012).** Timing, experience, benefits, and barriers: older women's uptake and adherence to an exercise program. *Activities, Adaptation & Aging, 36(4)*, 280–296. <https://doi.org/10.1080/01924788.2012.729188>.
- Singam, N. S. V., Fine, C., & Fleg J. L. (2020).** Cardiac changes associated with vascular aging. *Clinical Cardiology, 43(2)*, 92–98. <https://doi.org/10.1002/clc.23313>.
- Stathi, A., McKenna J., & Fox, K. R. (2010).** Processes associated with participation and adherence to a 12-month exercise programme for adults aged 70 and older. *Journal of Health Psychology, 15(6)*, 838–847. <https://doi.org/10.1177/1359105309357090>.
- Statistical Office of the Republic of Slovenia (2023).** Projekcije prebivalstva EUROPOP2023 - demografska bilanca in izbrani kazalniki, Slovenija, 2022–2100 [EUROPOP2023 population projections – demographic balance and selected indicators, Slovenia, 2022–2100]. Retrieved from <https://pxweb.stat.si/SiStatData/pxweb/sl/Data/Data/05U3019S.px/>.
- Tang, W., Hu, J., Zhang, H., Wu, P., & He, H. (2015).** Kappa coefficient: a popular measure of rater agreement. *Shanghai Archives of Psychiatry, 27(1)*, 62–67. <https://doi.org/10.11919/j.issn.1002-0829.215010>.
- Tavakol, M., & Wetzel, A. (2020).** Factor Analysis: a means for theory and instrument development in support of construct validity. *International Journal of Medical Education, 11*, 245–247. <https://doi.org/10.5116/ijme.5f96.0f4a>.
- Tonet, E., Vitali, F., Serenelli, M., Bugani, G., Ruggiero, R., Biscaglia, S., ... Sella, G. (2018).** Physical activity intervention for elderly patients with reduced physical performance after acute coronary syndrome (HULK study): rationale and design of

- a randomized clinical trial. *BMC Cardiovascular Disorders*, 18(1), 1–9. <https://doi.org/10.1186/s12872-018-0839-8>.
- Trinh, L., Kramer, A. F., Rowland, K., Strom, D. A., Wong, J. N., & McAuley, E. (2021).** A pilot feasibility randomized controlled trial adding behavioral counseling to supervised physical activity in prostate cancer survivors: behavior change in prostate cancer survivors trial (BOOST). *Journal of Behavioral Medicine*, 44(2), 172–186. <https://doi.org/10.1007/s10865-020-00185-8>.
- Tumanova, B. (2019).** Physical activity and older adults. *Trakia Journal of Sciences*, 17 (Supplement 1), 692–695. <https://doi.org/10.15547/tjs.2019.s.01.113>.
- van Baal, P. H. M., Hoogendoorn, M., & Fischer, A. (2016).** Preventing dementia by promoting physical activity and the long-term impact on health and social care expenditures. *Preventive Medicine*, 85, 78–83. <https://doi.org/10.1016/j.ypmed.2016.01.013>.
- Vargas, N. (2020).** Physical Activity and Function in the Elderly. New York (USA): Nova Medicine and Health.
- Vilela de Sousa, T., Cavalcante, A. M. R. Z., Lima, N. X., Souza, J. S., Sousa, A. L. L., Brasil, V. V. ... Silveira, E. A. (2023).** Cardiovascular risk factors in the elderly: a 10-year follow-up survival analysis. *European Journal of Cardiovascular Nursing*, 22(1), 43–52. <https://doi.org/10.1093/eurjcn/zvac040>.
- Wang, B., Wu, Y., Zhang, T., Han, J., Sun, W., & Yu, L. (2019).** Effect of physical activity on independent living ability among community-dwelling elderly in urban areas of Liaoning Province in China: A population-based study. *BMJ Open* 9(10), 1–8. <https://doi.org/10.1136/bmjopen-2018-023543>.
- Windle, G. (2014).** Exercise, physical activity and mental well-being in later life. *Reviews in Clinical Gerontology*, 24(4), 319–325. <https://doi.org/10.1017/S0959259814000173>.
- Winett, R. A., & Ogletree A. M. (2019).** Evidence-based, high-intensity exercise and physical activity for compressing morbidity in older adults: a narrative review. *Innovation in Aging*, 3(4), 1–15. <https://doi.org/10.1093/geroni/igz020>.
- Woodhead, E. L. (2018).** Personality and Emotional Development. In B. P. Yochim & E. L. Woodhead (Eds.), *Psychology of Aging: A Biopsychosocial Perspective* (pp. 111–134). New York: Springer Publishing Company.
- World Health Organization. (2010).** Global Recommendations on Physical Activity for Health. Geneva (Switzerland): World Health Organization.
- Yamakita, M., Kanamori, S., Kondo, N., & Kondo, K. (2015).** Correlates of regular participation in sports groups among Japanese older adults: JAGES cross-sectional study. *PLoS ONE*, 10(10), 1–18. <https://doi.org/10.1371/journal.pone.0141638>.
- Yamasaki, T. (2023).** Preventive strategies for cognitive decline and dementia: benefits of aerobic physical activity, especially open-skill exercise. *Brain Sciences*, 13(3), 1–13. <https://doi.org/10.3390/brainsci13030521>.
- Yarmohammadi, S., Saadati, H. M., Ghaffari, M., & Ramezankhani, A. (2019).** A systematic review of barriers and motivators to physical activity in elderly adults in Iran and worldwide. *Epidemiology and Health*, 41, 1–11. <https://doi.org/10.4178/epih.e2019049>.
- Zubiashvili, T., & Zubiashvili, N. (2021).** Population aging – a global challenge. *Ecoforum Journal*, 10(2). Retrieved from <http://ecoforumjournal.ro/index.php/eco/article/viewFile/1248/754>.