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## RESEARCH ARTICLE

# Development and Validation of the Short Multidimensional Well-Being Questionnaire (SMWQ)

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### Abstract:

#### **Purpose:**

Psychological well-being and health are closely linked at older ages. It is widely recognized that adapted regular physical exercise improves drastically both the physical and emotional well-being and allows older adults to stay healthy longer, with a better quality of life. In the framework of a European project (MOTION) to increase the life expectancy, independence and quality of life of older adults, the aim of the current research was to develop and validate a brief, multi-faceted, self-report measure of well-being in older adults.

#### **Method:**

The aim of Study 1 was to establish the factor structure of the newly developed measure using Exploratory Factor Analysis (EFA). The aim of Study 2 was to replicate the measure's factor structure using Confirmatory Factor Analysis (CFA), and to evaluate test-retest reliability and convergent validity.

#### **Results:**

Analyses allowed generating a model of well-being comprising four dimensions: Perceived physical value, self-esteem and self-efficacy, socialization, and emotional reactions.

#### **Conclusion:**

The findings suggest that the SMWQ is appropriate for use with older adults and can help researchers and health professionals to assess the effects of APA programs.

**Keywords:** Well-being, Exercise, Adults, Framework, Reliability, Socialization, Emotional reactions.

## INTRODUCTION

Living an autonomous life, with the ability to carry out their basic tasks of daily life, is a key aspect for maintaining quality of life for the elderly persons. Nevertheless, aging often causes several structural and functional losses in muscle and bone mass, strength and hormonal production [1 - 5]. But health is affected not just as physiological and biological issues but also by psychological and emotional factors. Other deteriorations are observed in older adults such as emotional and cognitive functioning [6 - 8]. All these degradations affect autonomy and increase risk of falling and

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social isolation [9, 10]. One of the most important conditions for supporting autonomy is to maintain physical fitness. It is widely recognized that adapted regular physical exercise improves drastically both the physical and emotional well-being and allows older adults to stay healthy longer, with a better quality of life, while being more independent and far less costly to society [11 - 17]. Thus, Adapted Physical Activity (APA) is an effective and beneficial strategy for improving well-being in elderly persons.

Current solutions for the physical coaching of seniors suffer from major practical and economic limitations: either a highly expensive home coaching service or the obligation to be at or join a special place (e.g. a retirement home or a gym club). The mission of MOTION project is to increase the life expectancy, independence and quality of life of older adults through a novel holistic technology-based service for remote multi-user physical training of older adults at home by specialized coaches, thereby enabling a totally new level of physical training effectiveness. This project is part of the European Innovation Partnership on Active and Healthy Ageing (EIPAH) and aims at delivering an offer of remote adapted physical activity by using a collective tool of videoconference. This European project is based on a research consortium comprising one association, four industrial companies and four research and academic organizations from different members or associated countries. The principal aim of the MOTION project is to evaluate the effect of a new delivery system of an APA training programs to improve general quality of life. To ensure that effects of this program are complete and are not limited to physical dimensions, it is important to estimate its psychological impacts on participants. Psychological well-being of participants needs to be monitored using a short multidimensional well-being questionnaire before, during and after the APA training program.

However, well-being, in particular in psychological dimension, remains complex and multifactorial concept. Most of the time, general quality of life questionnaires or tools measuring psychological correlates such as depression, optimism, self-efficacy or self-esteem, are used. But these tools and questionnaires differ according to studies objectives and they assess rarely physical or corporal dimensions. Consequently, under the MOTION project, the main objective of this study is to develop and to validate a new questionnaire by considering that subjective well-being is the resultant of four dimensions: self-esteem and self-efficacy, socialization, emotional reactions and perceived physical value [18 - 21].

Given the shortcomings in existing measures, the aim of the current research was to develop and validate a brief, multi-faceted, self-report measure of well-being for older people. The objective was to develop a questionnaire that evaluates four main dimensions of well-being in older adults. Firstly, items were generated after reviewing validated questionnaires previously discussed, and, reliability analyses and an Exploratory Factor Analysis (EFA) were performed with a first sample of participants. Secondly, a Confirmatory Factor Analysis (CFA) was conducted with a second sample to test the model. Moreover, this sample also completed a set of other questionnaires to assess the construct validity of the questionnaire.

## **STUDY 1 - EXPLORATORY FACTOR ANALYSIS**

### **Items Generation**

The purposes of study 1 were to develop a pool of items, reduce this pool to a more manageable number, develop a first version of the questionnaire and perform reliability and Exploratory Factor Analysis (EFA). A scientific committee was established at the onset of the project to provide methodological and scientific support and included 5 members, each with expertise in quantitative and qualitative research and questionnaire development in psychology. After reviewing papers about well-being, physical perception, socialization, self-esteem, self-efficacy and emotional reactions assessments, this committee generated an initial pool of 45 items. These items were administered to 10 participants ( $M = 65.1$  ;  $SD = 7.4$ ) in order to improve their clarity and test responses modalities [22]. Finally, 35 items were retained. A committee from the first author's university was granted ethical clearance for the entire program of research.

### **Participants**

The sample consisted of 868 participants including university students and elder students recruited in senior association (278 women and 590 men) and voluntarily participated in the study 1 intended to test the factorial structure of the 35-items version of the questionnaire. Participants received no compensation for completing the questionnaire. They were between 22 to 76 years old ( $M = 38.2$ ,  $SD = 16.4$ ).

## Measures

Participants were ensured that their participation would remain anonymous. They answered the 35-items questionnaire using a 5-point Likert-type scale ranging from 1 (“completely disagree”) to 5 (“completely agree”).

## Analysis

An EFA was conducted using SPSS version 22 and used to identify the latent structure of the item set and to reduce its length. This analysis was chosen in order to understand, in a more parsimonious manner, the associations between the measured variables with principal components analysis with orthogonal (varimax) rotation [23]. To ensure minimal ambiguity between factors, criteria for an acceptable factor solution were that factors have a minimum eigenvalue of 1, the exclusion of pattern coefficients below 0.40, the exclusion of items loading 0.40 or more if there was cross loading greater than 0.30 on any other factors, and that there should be a minimum of three items on each factor [24].

## Result

In order to ensure that the assumptions of EFA were satisfactory, sampling adequacy was tested. Bartlett’s test statistic was significant ( $\chi^2(990) = 12225.79, p < 0.01$ ) indicating that the correlation matrix was appropriate for factor analysis. Consequently, EFA was conducted and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was high (0.85) providing further support for the appropriateness of the data to be used for factor analysis [24]. Results showed a four-factor solution with 23 items and cumulatively accounted for 68.8% of the observed variance Table (1). The first extracted factor accounted for 21.9% of the total variance, the second for 17.5%, the third for 16.6% and the fourth for 12.8%. The first factor included 6 items and was labeled as Perceived Physical Value. The second factor comprised of 6 items and was labeled as self-esteem and self-efficacy. The third factor was represented by 6 items and was labeled Socialization. Finally, the fourth factor included 5 items and was labeled Emotional reactions.

**Table 1. Factor loadings for the 23-item short multidimensional well-being questionnaire.**

	Variance	PPV	SESE	S	RE
<i>I am satisfied with my body</i>	21.9%	0.797			
<i>My body is beautiful to look at</i>		0.757			
<i>I feel good about myself physically</i>		0.705			
<i>On the whole, I am satisfied with my physical capacities</i>		0.702			
<i>I tire easily</i>		0.679			
<i>I have difficulties with dressing undressing</i>		0.401			
<i>I am easily discouraged</i>	17.5%		0.706		
<i>I struggle to cope with social events</i>			0.527		
<i>I have difficulties in concentrating</i>			0.505		
<i>Faced with problem, I can find several solutions</i>			0.469		
<i>Whatever happens, I am able to adjust myself</i>			0.468		
<i>Sometimes I think that I am useless</i>			0.452		
<i>I enjoy meeting people for socializing</i>	16.6%			0.673	
<i>I am comfortable with people</i>				0.663	
<i>I have difficulties with meeting with people</i>				0.62	
<i>I am not an easy person to get along with</i>				0.575	
<i>I have a desire to make new activities</i>				0.492	
<i>I am engaged in group activities</i>				0.440	
<i>I get irritated easily</i>	12.8%				0.577
<i>I lose easily my temper</i>					0.556
<i>I am often unhappy, sad or depressed</i>					0.499
<i>I am often nervous or tense</i>					0.47
<i>I am easy-going</i>					0.445

PPV: Perceived Physical Value; SESE: Self-Esteem and Self-Efficacy; S: Socialization; ER: Emotional Reactions.

## STUDY 2 - CONFIRMATORY FACTOR ANALYSIS, INTERNAL CONSISTENCY AND CONVERGENT VALIDITY

### Participants

To examine the a priori factor structure of the questionnaire, a confirmatory factor analysis (CFA) was performed. For this purpose a second sample consisted of 325 volunteers aged from 56 to 71 years old ( $M = 62.6$ ;  $SD = 5.7$ ; 124 women and 201 men).

### Analysis

Absolute and incremental fit indices were used to estimate the sufficiency of the overall fit of the measurement models: Satorra-Bentler  $\chi^2/df$  ratio [25], Non-Normed Fit Index NNFI [26], Comparative Fit Index (CFI) [27], Standardized Root Mean Squared Residual SRMR [24, 27], and Root Mean Squared Error of Approximation RMSEA [27, 28]. The NNFI and CFI indices range from 0 to 1, with values above 0.900 representing an acceptable fit of the model [25, 27]. Values of SRMR and RMSEA close to or lower than 0.050 demonstrate an acceptable fit [24]. According to Hu and Bentler [27], the cut-off criterion for SRMR is close to 0.080 and for RMSEA is close to 0.060. To test the internal consistency, Tabachnick and Fidell [24] suggested that Cronbach's  $\alpha$  coefficient should exceed 0.70 for an acceptable internal consistency.

Finally, convergent validity was used to examine the relationships between questionnaire scores and other measures intended to assess similar constructs. The measurement of an instrument with similar constructs will indicate positive correlations, whereas an instrument with different constructs will indicate negative correlations. Thus, convergent validity was tested using two self-report instruments entitled French version of EuroQol assessing perceived health [29], ISP-25 measuring physical perception [30, 31], Generalized Self-Efficacy Scale [24, 32], EES assessing self-esteem [33, 34] and ESDV-5 assessing subjective well-being [35, 36].

## RESULTS

The four-factor model indicated a good fit of the instrument according to the fit indices. The  $\chi^2/df$  ratio was 1.29, the NNFI 0.97, the CFI 0.95, the SRMR 0.07 and the RMSEA 0.05 [35, 36]. Internal consistency was measured by Cronbach's alpha coefficient and reliability analysis indicated that the factors were internally consistent (Perceived Physical Value:  $\alpha = 0.762$ ; Self-Esteem and Self-Efficacy:  $\alpha = 0.716$ ; Socialization:  $\alpha = 0.713$ ; Emotional Reactions:  $\alpha = 0.701$ ). Finally, correlations showed that Socialization was significantly correlated with ESDV-5 ( $r = 0.453$ ,  $p < 0.01$ ), Self-Esteem and Self-Efficacy was significantly correlated with General Self-Efficacy Scale ( $r = 0.605$ ,  $p < 0.01$ ) and with EES ( $r = 0.625$ ,  $p < 0.01$ ), Perceived Physical Value was significantly correlated with ISP-25 ( $r = 0.767$ ,  $p < 0.01$ ) and EuroQol ( $r = 0.367$ ,  $p < 0.01$ ).

## CONCLUSION

The present paper reports on the development and initial validation of an older adults-specific measure of psychological well-being: the Short Multidimensional Well-being Questionnaire (SMWQ). Several studies on subjective well-being can be found but Diener, Oishi and Lucas [36] underline that these studies often measure a single dimension of well-being or ill-being. Diener [37] provided to assess subjective well-being through both cognitive and emotional dimensions. Other questionnaires assess life quality of satisfaction but are adapted to make comparisons with reference group and do not reflect specificity of patients' problems [38] or assess death, end-of-life and privacy [39]. With a broad and multidimensional perspective, self-efficacy [32] and self-esteem [34] could be included as a follow-up to elderly persons. Moreover, the attached, estimated or perceived value to physical condition could be an integral part of any well-being evaluation. Some questionnaires refer to strength, flexibility, physical skills and appearance such as Physical Self-Perception Profile [31]. Finally, there are several tools to assess life quality or subjective well-being but they are validated with different target populations and objectives than MOTION project. The 4-factor structure of the SMWQ allows older adults to report on four dimensions of well-being such as Perceived Physical Value, Self-Esteem and Self-Efficacy, Socialization and Emotional Reactions. We assumed that these four factors are determining dimensions in assessment of APA programs effects [40].

The SMWQ is a short and a self-report assessment, correlated with other measures intended to assess similar constructs. Unlike the others existing questionnaires, the SMWQ involves four essential dimensions and we assume that this new questionnaire is useful and relevant to estimate the effects of adapted physical activities. By providing an

insight into subjects' well-being on both a short- and long term, the SMWQ distinguished itself from other questionnaires usually found in the field that aim to assess well-being. Another context of use may be in longitudinal and transversal analyzes [41]. Moreover, its use should allow studying relationships between four extracted dimensions. Validation studies must be made to ascertain the psychometrics of the instrument before it can be used in clinical studies and in human and social sciences.

However, there are some limitations to the current study that point to directions for future research. First, the SMWQ is a self-report tool and desirability bias may exist. Consequently, it would be relevant to associate this well-being multidimensional evaluation with behavioral and physical measures. Second, the questionnaire was developed for elderly and some items were adapted to this age. Future studies could develop a version adapted to adolescents or adults with health problems. Indeed, the SMWQ was developed to estimate effects of APA program through a multi-dimensional perspective. We assume that this tool would allow having a global approach of the APA program impact. Indeed, for a major scientific strength, it is necessary to validate this questionnaire with different groups of people affected by different health problems.

### CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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