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Cultural Adaptation and Psychometric Properties of the Shirom-Melamed Vigor Measure (SMVM) with Workers in Spain

Manuel Pulido-Martos, Montserrat Meléndez-Domínguez, and Esther Lopez-Zafra

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Cultural Adaptation and Psychometric Properties of the Shirom-Melamed Vigor Measure (SMVM) with Workers in Spain

Abstract.

Shirom's (2003) proposal about engagement focuses on vigor. Under this approach, vigor is considered an affect that mediates the relationship between resources, behaviors and attitudes related to psychological functioning and health. It is important for occupational health professionals to have adequate measures of this construct. The Shirom-Melamed Vigor Measure (SMVM) was developed to capture this sense of energy comprising three components (physical strength, emotional energy and cognitive liveliness). In the absence of a Spanish version of the SMVM, our aim is to perform a cultural adaptation and to further analyze its psychometric properties. In Study 1, we culturally adapt the SMVM in Spanish samples. It incorporates a careful development of a three-step procedure according to the International Test Commission (ITC) and qualitative analyses to ensure a consensus version. Twenty-six individuals were involved. In Study 2, the responses of 203 workers from different organizations show the validity and reliability of the instrument. Confirmatory factor analyses (CFA) yield a model with three interrelated dimensions showing good fit indices. Furthermore, concurrent validity is demonstrated. Finally, we discuss the usefulness of the SMVM for occupational health professionals.

Keywords. Cultural Adaptation, Measurement, Vigor, Positive Occupational Health Psychology.

Developing instruments for psychological assessment at work has evolved from traditional to new constructs related to optimal performance and health in work settings. These new constructs are situated under the paradigm of Positive Occupational Health Psychology (POHP; Bakker & Derks, 2010). POHP aims to promote employee health through the identification of factors and variables

that contribute to optimal performance. Work engagement is one of these processes included in POHP (Ko & Donaldson, 2011). It is a component of holistic health, and due to its effects on health and on the results derived from work, it can be considered an element that joins in the common interests of professionals responsible for health surveillance and promotion in work centers and social agents concerned with organizational results (Torp, Grimsmo, Hagen, Duran, & Gudbergsson, 2013).

Among the study of engagement perspectives, Shirom (2003) proposes the multidimensional construct of “vigor”. He defines it as an affect that represents a pattern of responses to contextual cues, that is, “an emotional response interaction with significant elements of the work and its context comprising interrelated feelings of physical strength, emotional energy and cognitive liveliness” (Shirom, 2003, p. 12). Shirom (2011) identifies resources of organizational, group, job and individual antecedents through which vigor mediates an open range of consequences, such as satisfaction at work, mental and physical health, performance and organizational efficiency. Most empirical studies have focused on analyzing the consequences of vigor and, specifically, its consequences for physical health (Armon, Melamed, & Vinokur, 2014; Shirom, Melamed, Berliner, & Shapira, 2012; Shirom, Toker, Melamed, Berliner, & Shapira, 2010, 2013) and mental health (Derman, 2008). Regarding mental health, vigor is included as part of the quality of life concept, and the results show that the effects of vigor on mental well-being are straightforward (for a review, see Shirom, 2011). Furthermore, self-related beliefs are also strongly influenced by affect and are of great importance to health psychology (Forgas, 2013).

With the aim of analyzing the conceptual domain of vigor, Shirom (2003) has created the Shirom-Melamed Vigor Measure (SMVM). Although the original scale comprises 14 items, the latest version of the SMVM consists of 12 items that evaluate affective states at work related to physical strength, emotional energy, and cognitive liveliness. There are adaptation and validation or translation studies in different countries, including Turkey (Bilgel, Bayram, Ozdemir, Dogan, &

Ekin, 2012), South Africa (Derman, 2008), Norway (Furunes & Mykletun, 2012), the U.S. (Little, Nelson, Wallace, & Johnson, 2011; Steel et al., 2012; Wefald, Mills, Smith, & Downey, 2012), and Canada (Remo, 2012). In Israel, the country in which it was developed, studies report its psychometric properties (Armon et al., 2014; Armon & Shirom, 2011; Shirom & Shraga, 2009). To date, however, there is no other study that validates the scale in a Hispanic language or that uses it with Hispanic samples in countries where they have a large presence (i.e., US).

In general, studies report adequate internal consistency. Regarding the extracted variance, that is, the total amount of variance collected by the latent construct, Wefald et al. (2012) report a value of .71. For concurrent validity, there are positive correlations with measures of positive affect and general self-efficacy (Littel et al., 2011). Studies that aim to analyze the factorial structure of the SMVM report mixed results based on the original 14-item version (Armon et al., 2014; Shirom, 2003; Shirom et al., 2012; Shirom & Shraga, 2009), a 13-item version (Armon & Shirom, 2011) and a 12-item version (Bilgel et al., 2012; Derman, 2008; Little et al., 2011; Remo, 2012; Wefald et al., 2012).

However, the disparity in the results can be due to the use of different versions. Furthermore, methodological and language issues of responding to items should be addressed. Thus, in the absence of a Spanish version of the SMVM, our objective is twofold: a) to culturally adapt the SMVM into Spanish, presenting a rigorous process to ensure cultural reliability by means of interviewing (Study 1); and b) to further analyze the reliability and factorial structure of the Spanish SMVM using Confirmatory factor analyses (CFA) with working samples, providing new evidence of validity (Study 2).

Study 1

To ensure cultural adaptation, we followed a three-step process, as recommended by the International Test Commission (ITC), revised by Muñiz, Elosua and Hambleton (2013). Additionally, to further pretest the clarity of the items and to increase the item quality and the

appropriateness of the response formats, we used cognitive interviewing, which is a qualitative method in which a small sample (between 10 and 30) representing the target population is interviewed (Danner et al., 2016). To that end, we first obtained permission from Samuel Melamed to administer his SMVM (Shirom, 2003). This instrument is a 12-item scale measuring the frequency of experiencing each of 12 feelings described during the last 30 working days. These items comprise three dimensions: physical strength (5 items; i.e., “I feel energetic”), emotional energy (4 items; i.e., “I feel able to show warmth to others”), and cognitive liveliness (3 items; i.e., “I feel I can think rapidly”); the response format ranges from 1 (*almost never*) to 7 (*almost always*). Then, we performed two steps. First, six individuals were involved in the translation and adaptation of the SMVM (Shirom, 2003) to Spanish, and second, 20 workers in public or private organizations from southern Spain (60% men; Mage = 35.4 years; SD = 6.82; range = 22-47) responded to the interview. (The versions are available by request).

Translators performed a back translation and reported on the clarity ($M = 8.81$; $SD = 1.21$; 1 = *item was very unclear* to 10 = *very clear*) and difficulty ($M = 8.54$; $SD = 1.70$; 1 = *item was very difficult to translate* to 10 = *very easy*) of their performing work on the translation for each SMVM item¹. This was followed with a second cognitive interview with 20 individuals. Their responses showed that the difficulty of the questionnaire was low ($M = 1.55$; $SD = 1.15$; 1 = *not at all difficult* to 10 = *very difficult*), whereas the method of asking was perceived as highly adequate ($M = 9.25$; $SD = 0.91$; 1 = *not adequate* to 10 = *highly adequate*), and the scale format was also considered highly adequate ($M = 8.85$; $SD = 1.39$; 1 = *not adequate* to 10 = *highly adequate*). Furthermore, the participants had to choose the best translated option, except for items 1, 4, 5, 10, 11 and 12, in which they were asked whether they found it easy to understand the question. There were disagreements on items 2, 6 and 7, with a percentage lower than 80% in the participants' choices. Thus, these items in the final version were decided upon by a committee of experts in Positive Health Psychology (PHP) at the university and bilingual teachers at a language center, resulting in a consensus version.

Study 2

Once the scale was properly translated and adapted, we conducted a second study to analyze its psychometrics properties.

Methods

Participants

The participants were two hundred and three workers (57.6% men; $n = 117$) with a mean age $M = 42.25$ ($SD = 9.08$; age range = 22 to 63) working in public (31%) or private (69%) organizations in southern Spain. Regarding the types of organizations, 43.9% of the sample worked in the service sector, 9.5% in health, 9% in education, 6% in construction, 5.5% in the food industry, and 4% in industry, and the remaining sample was divided between other sectors including finance, transport and telecommunications. A total of 22.7% of the sample were managers and had employees under their responsibility. Regarding educational level, 9.4% of the participants completed primary school; 8.4% completed secondary studies; 27.1% completed high school or job training; 23.2% completed an associate degree; 21.7% completed graduate studies; and 9.9% completed post-graduate studies, whereas 0.3% had no education.

Instruments

Sociodemographics. The participants were asked about their gender, age, activity sector and whether they were managers.

Shirom-Melamed Vigor Measure (SMVM; Shirom, 2003). The Spanish adaptation was derived from Study 1.

Generalized Self-Efficacy Scale (GSE; Schwarzer & Jerusalem, 1995). This instrument measures the stable feeling of competence to handle different situations. The answers are provided on a Likert scale ranging from *strongly disagree* (1) to *strongly agree* (4). The α in this study was high (.89).

Utrecht Work Engagement Scale (UWES-17; Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002). This version consists of 17 items and measures three subscales: a) six items measuring vigor ($\alpha = .83$), b) five items measuring dedication ($\alpha = .88$) and c) six items measuring absorption ($\alpha = .76$). Respondents complete instrument scale using a 7-point Likert scale.

The S10/12 Job Satisfaction Questionnaire (Meliá & Peiró, 1989). With a 7-point Likert scale (1 = *very dissatisfied*, 7 = *very satisfied*), this 12-item questionnaire gives an overall measure of job satisfaction related to different aspects of the work (supervision, physical environment and benefits). The internal consistency was high ($\alpha = .91$).

Procedure

Workers receiving a medical examination as part of a workplace prevention program were informed of the research objectives, and voluntary consent was obtained following protocols approved by the university's ethics committee.

Data Analyses

The factorial structure and the goodness of fit of different models of measurement are determined by CFA. The advantages of CFA are that it analyzes the instrument's construct validity (considering it a subgroup of specific items for each dimension and not as a global group) and analyzes factors as free from error by separating the total variance into that explained and that not explained by the factor.

The violation of the assumption of multivariate normality of the data (Mardia's coefficient = 41.63) suggested the use of the robust method of maximum likelihood estimation with EQS 6.1 software (Satorra & Bentler, 1994). The index-setting criteria are the S-B χ^2 (χ^2 by Satorra-Bentler) with a nonsignificant p value, a NNFI (*Bentler-Bonett Non-Normed Fit Index*) and CFI (*Comparative Fix*

Index) above 0.95 and a RMSEA (*Root Mean Square Error of Approximation*) below 0.07 (Hooper, Coughlan, & Mullen, 2008). The convergent validity, an index of the suitability to reflect the evaluated construct, was studied by analyzing standardized factor loadings with cut-off values $\geq .60$ (Chin, 1998). For all other analyses, SPSS (v. 20) software was used. The reliability of the dimensions of the instrument was examined from the measurement model with a better fit. It showed correlations between the error terms by composite reliability (ρ) (Raykov, 2004), with .70 as an acceptable cut-off value (Nunnally & Bernstein, 1994). The composite reliability and extracted variance (Hair, Black, Babin, & Anderson, 2009) were also calculated from the standardized factor loadings, with appropriate values of .70 and .50, respectively. For the reliability of the items, we considered the multiple correlation coefficients squared (R^2), derived from CFA, and based evaluations on an acceptable minimum value of .50. The concurrent validity relationship with other instruments measuring related constructs was determined by the Pearson correlation coefficients.

Results

Different measurement models were tested: a mono-factorial structure model (M1); a model of three related factors (M2), each representing a different dimension of vigor; a model equal to M2 that allowed for correlation of some error terms (M3); and a model with three first-order factors and a second-order factor (M4). Table 1 shows the adjustment of the indices resulting from the CFA analyses of the dimensionality of the SMVM factor structure.

The results show inadequate indices for Models 1, 2 and 4. Model 3, derived from reviewing the modification indices (MIs) and the inclusion of correlations between the item 1-2, 2-3 and 7-8 error terms, showed an adequate fit to the data.

See Figure 1 for the M3 standardized solution. All factor loadings had values above .70 and were significant, showing an adequate convergent validity. The correlations between the three factors of vigor were high (.55-.76) without compromising the discriminant validity. Regarding the reliability indices, the ρ values for physical strength, cognitive liveliness and emotional energy (.87, .73 and

.83, respectively), the composite reliability (.95, .87 and .89, respectively) and the extracted variance (.80, .70 and .68, respectively) indicate adequate reliability of the dimensions. The multiple correlation squared coefficients (R^2), derived from the CFA, are all above .50 (.50-.95), indicating the adequate individual reliability of the items.

See Table 2 for the Pearson correlation coefficients (convergent validity). Each dimension score shows significant positive correlations with other dimensions assessing constructs related to vigor at work (all $ps < .001$) and has coefficients between .31 and .66.

Discussion

Vigor as an affect has proven to be related to physical (Armon et al., 2014; Shirom et al., 2010, 2012, 2013) and mental health (Derman 2008). Shirom (2003) assesses vigor at work as an affective state through the SMVM comprising three dimensions: physical strength, cognitive liveliness and emotional energy. Although the SMVM has been adapted for use in other countries, no study has assessed the psychometric properties of the SMVM in Hispanic countries. Thus, we conducted two studies to address methodological and language issues to culturally adapt this scale through cognitive pretesting and to provide further evidence of the psychometrics properties of the Spanish SMVM using CFA in a sample of Spanish employees.

Study 1 validated the cultural adaptation of the SMVM in Spanish samples. Furthermore, it incorporated a careful design of three-step translation, back translation (Muñiz et al., 2013) and qualitative analysis to ensure a consensus version resulting in an SMVM Spanish version with specific adaptations in five out of the 12 items.

The validity and reliability of the instrument were demonstrated in Study 2. For the factorial structure, the 12-item version and measurement model with the best fit had three interrelated factors that were in agreement with the structure obtained in previous studies (Remo, 2012; Wefald et al., 2012). In our case, the optimal model fit emerged when the correlations between the error terms in some items were allowed. The inclusion of these correlations, in the context of the Spanish language,

was justified and sufficiently interpreted (Jöreskog, 1967). Our study also showed adequate reliability of both the dimensions and the items. The correlations between the three factors were high, although the analysis of the alternative models (mono-factorial) ensured their distinctiveness. For convergent validity, we measured self-efficacy, engagement (vigor, dedication and absorption) and work satisfaction, showing positive and significant associations with the SMVM dimensions. As expected, self-efficacy was positively related to the three dimensions of the SMVM. Furthermore, positive associations with the three dimensions of engagement were found. The vigor dimension of engagement considers the combination of energy level perceptions with motivation and resilience (Shirom, 2011). This relationship has been demonstrated in previous studies, including those by Smith, Wefald, Downey and Gopalan (2008) and Steele et al. (2012). Moreover, Smith et al. (2008) and Steele et al. (2012) found positive relationships between vigor at work and job satisfaction, which is in agreement with our results.

The adequate psychometric properties of the instrument allow occupational health professionals to use it among Spanish employees in any sector of activity. However, the analysis of the factor structure of the SMVM results and the data adjustment to a model of three related factors lead to some considerations in its use. Thus, it would be appropriate to obtain a score in each of the subscales that constitute the SMVM and not an overall score. Indeed, following Shirom's (2003) theoretical proposal of vigor, we could determine the levels of physical strength, cognitive liveliness and emotional energy of each employee, which could also be interrelated with each other as part of the same affective response. Another aspect to consider would be the use of the SMVM as a screening instrument alone. Although there is sufficient evidence of the predictive validity of the instrument in relation to health (Armon et al., 2014; Derman, 2008; Shirom, Melamed et al., 2012; Shirom, Toker et al. 2012, 2013), performance and organizational effectiveness (Carmeli, Ben-Hador, Waldman, & Rupp, 2009; Smith, Rasmussen, Mills, Wefald, & Downey, 2012; Steele et al., 2012; Wefald et al., 2012), and job satisfaction (Aydogan, Dogan, & Bayram, 2009; Steele et al.,

2012), Shirom (2011) proposes a model that includes other variables that help to predict these results. Thus, the model indicates that the instrument should be applied combined with additional instruments that could allow a more exhaustive forecast of the variables of interest.

However, this study has some limitations. First, the participants answered all questions about their perceptions at only one point in time; thus, in future studies the instrument's temporal stability, including test-retest indices, should be analyzed. Second, our sample was recruited through convenience sampling. Although the analyses show adequate psychometric properties and, therefore, the instrument's suitability for occupational health professionals, further studies introducing a stratified sampling method are necessary to verify the invariance of measurement of the SMVM (Cheung & Rensvold, 2002).

This type of verification would enable studies to analyze the differences among different groups (gender, age, occupation ...) in the workplace and to understand their implications for occupational health. For health professionals who work in labor organizations, having a scale such as the SMVM would facilitate their evaluation of constructs within the scope of the POHP. Among other things, this would make it possible to verify the effectiveness of so-called "positive interventions" in work contexts (Bakker & Derks, 2010; Luthans, 2002) aimed at promoting the development of employee states (among which affective states such as vigor would be included). Furthermore, by number of speakers, Spanish is the second mother tongue of the world. Thus, it is very convenient to have measurement instruments in the field of occupational health developed or adapted to this language.

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Table 1. Goodness of fit indices for the tested models.

	S-B χ^2	df	<i>p</i>	NNFI	CFI	RMSEA	90% CI of RMSEA
Model 1	546.27	54	.000	0.28	.41	0.21	(0.20-0.23)
Model 2	154.42	52	.000	0.84	.88	0.10	(0.08-0.12)
Model 3	86.43	48	.000	0.94	.95	0.06	(0.04-0.08)
Model 4	154.42	51	.000	0.84	.88	0.10	(0.08-0.12)

Note. S-B $\chi^2 = \chi^2$ by Satorra-Bentler; df = degrees of freedom; NNFI = Bentler-Bonett Non-Normed Fit Index; CFI = Comparative Fix Index; RMSEA = Root Mean Square Error of Approximation; CI = confidence intervals.

Table 2. *Correlation coefficients among dimensions.*

	1	2	3	4	5	6	7	8
1. Physical strength	-							
2. Cognitive liveliness	.65	-						
3. Emotional energy	.51	.50	-					
4. Self-efficacy	.46	.53	.48	-				
5. Vigor (engagement)	.66	.56	.45	.42	-			
6. Dedication	.56	.53	.45	.40	.79	-		
7. Absorption	.34	.42	.33	.33	.75	.76	-	
8. Job satisfaction	.51	.31	.54	.29	.46	.54	.30	-

Note: All p coefficients are below .001.

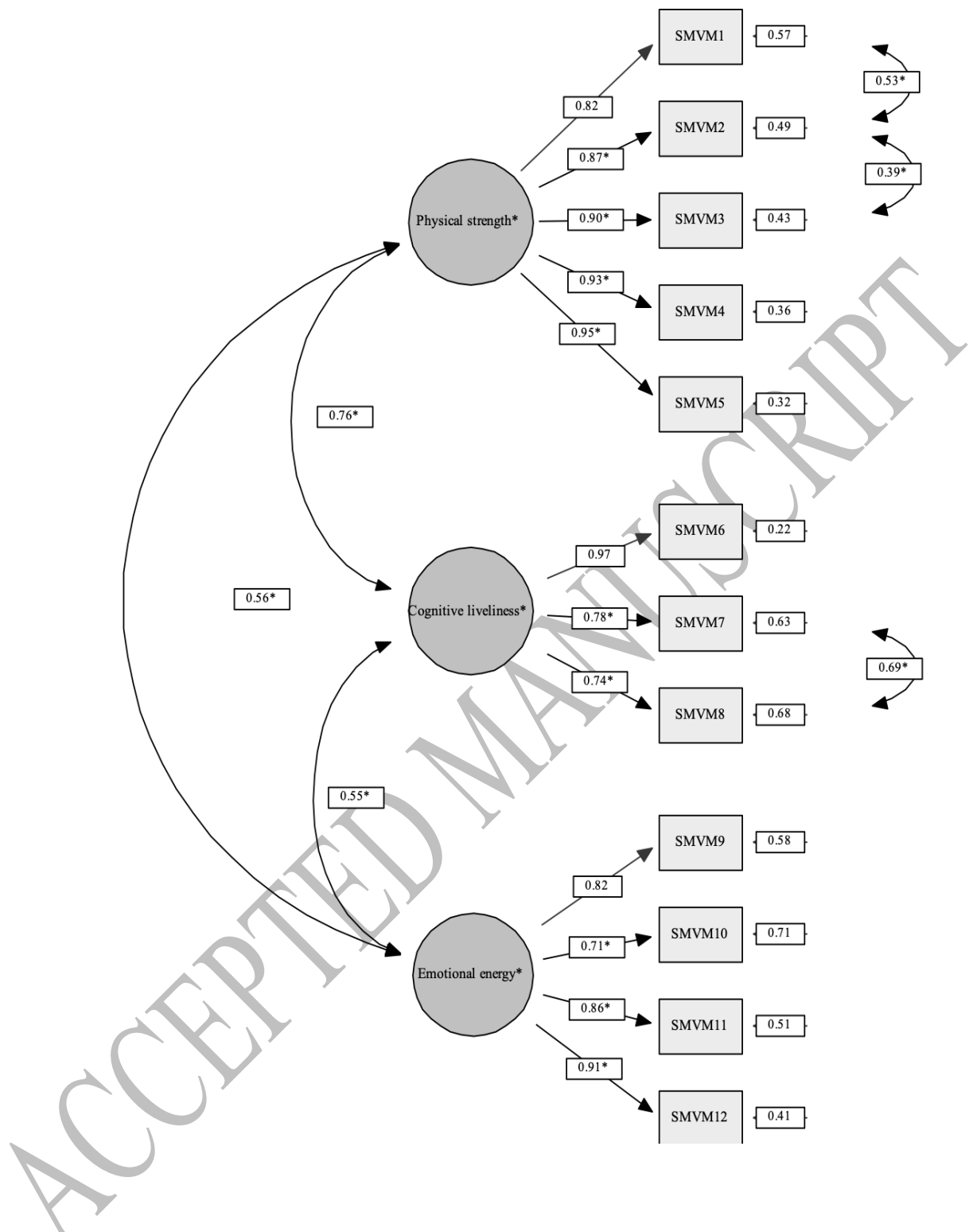


Figure 1. Factor loadings and correlations for the structural SMVM measurement model.

Note. All factor loadings and correlations between factors and error terms were significant ($p < .001$).

ⁱ Complementary material about the process and tables with the Study 1 procedure are available upon request.

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