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ORIGINAL SCIENTIFIC PAPER

Internal consistency reliability of the Serbian version of the EMI-2 questionnaire in the fitness population

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Abstract

Although it is crucial to know the motivation underlying engaging in various activities, including physical ones, there is no Serbian version of a questionnaire for assessing motivation for exercise. The aim of this study is to evaluate the internal consistency reliability of the Serbian version of the EMI-2 questionnaire (Markland & Ingledew, 1997) in the fitness population. The research sample consisted of 1087 participants who exercise in fitness centers in the territory of the Banja Luka region. The integrated measuring instrument is made up of two parts: the first, self-created part of the questionnaire was used to describe the participants, and second, the EMI-2 questionnaire was used to evaluate motivation for exercise. Descriptive statistics were used to describe the participants and the subscales. The Cronbach's alpha coefficient was calculated to assess the internal consistency reliability of the EMI-2 scale, and Pearson correlation coefficient was used among the EMI-2 subscales. The results indicate a good internal consistency reliability of the subscales in the range 0.606-0.850 and an overall internal consistency reliability of 0.932. Pearson's correlation coefficient indicates a statistically significant correlation between the subscales except for Social Recognition with Positive Health and Nimbleness. The Serbian version of the EMI-2 has satisfactory internal consistency reliability and interrelatedness of the subscales.

Keywords: motivation · exercise · fitness · questionnaire · internal consistency reliability

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Introduction

The original Exercise Motivations Inventory (EMI) was created to assess participation motives in exercise and physical activity (Markland & Hardy, 1993). Ryan and Deci (2007) state that self-determination theory (SDT) provides a useful theoretical basis for research on motivation and behaviours that lead to exercise, based on the fact that it is triggered by various reasons, experiences, and/or consequences, and the original EMI was developed to examine the functional significance of exercise motives from the perspective of self-determination theory (Deci & Ryan, 2013). Unfortunately, the original EMI was not effective in testing for fitness and health-related subscales, because the instrument did not measure fitness-related reasons to participate in exercises such as strength and endurance and it did not provide for one of the most obvious reasons for exercising: health-related motives that include the desire to avoid ill-health and to create positive health (Kim & Cho, 2022). Thus, Markland and Ingledew (1997) developed the Exercise Motivations Inventory–2 (EMI-2) scale. Hewitt, Deranek, McLeod, and Gudi (2022), based on the subscales of the EMI-2 questionnaire, implemented a new motivational construct as follows: Psychological motives consist of Stress Management, Revitalisation, Enjoyment, and Challenge; Interpersonal motives consist of Social Recognition, Affiliation, and Competition; Health motives consist of Health Pressures, Ill-Health Avoidance, and Positive Health; Body-Related motives include Appearance and Weight Management; Fitness motives consist of Nimbleness and Strength & Endurance. Regardless of the new construct for measuring motivation during exercise, it is necessary to adapt it for cross-cultural research (Sperber, 2004) and check its metric characteristics. One of the metric characteristics of a measuring instrument that must be evaluated in order to be applied in research and standardised is reliability. Reliability estimates the stability of measures and/or the equivalence of sets of items from the same test (internal consistency), which provides an estimate of the reliability of measurement and it is based on the assumption that items measuring the same construct should correlate (Kimberlin & Winterstein, 2008). There is a lack of studies indicating that the EMI-2 questionnaire for assessing exercise motivation has been standardised in the fitness population. In general, studies indicate that the EMI-2 translated into different languages has been used to assess motivation to exercise in relation to socio-demographic data and participant status (Vuckovic, Cuk, & Duric, 2023; Vuckovic & Duric, 2024) and in a university population of participants. Although not to such an extent, there is a study indicating that EMI-2 was used in fitness centres (Campos, Dos Santos, Sampaio, Maroco, & Campos, 2022; Karl Spiteri, John Xerri de Caro, Grafton III, & Broom IV, 2022; Vuckovic, Krejac, & Kajtna, 2022). However, there are no studies that indicate that the EMI-2 has been translated into Serbian, standardised, and used for the fitness population.
The aim of the study is to evaluate the internal consistency reliability of the Serbian version of the EMI-2 questionnaire in the fitness population.

Method

The cross-sectional study conducted on the territory of the Banja Luka region, in the cities of Banjaluka and Laktaši, lasted 2 months, from October 15 to December 15.

Participants

The survey was conducted according to the "paper pencil" principle in the fitness centres (4 Life, InShape, Xtreme Fit, RMC Fitness Point, Energija, TC Aleksandar, Olympia, Nfit, Universum, Fitness Korner, Body Factory, Fit Abacija, CrossBox Infinity, Mr. Hapiness, Blue Line Fitness, Sport Fit BL, Dinamik, Fit for Fun, Gym Power, Nika, Sport Trend, Mentalitet, and Supreme) and in the fitness groups by Milan Celic, by Mladen Subic, by Nikola Knezevic, by Vedrana Pajic, and by David Petrovic. The total sample included 1087 participants, and Table 1 shows their descriptive characteristics.

Measures

The EMI-2 is a factorially valid tool for assessing a wide range of motives for participation in sporting activities in adult men and women and is suitable for both athletes and non-athletes (Markland & Ingledew, 1997) and is constructed from 51 items arranged in 14 subscales. The EMI-2 questionnaire was independently translated from English into Serbian by two translators (masters in psychology), and then it was retranslated from Serbian back into English. The translation was done in the 'Ijekavian dialect', which is understood throughout the entire Serbian-speaking area, regardless of the local dialects. The EMI-2, developed by Markland and Ingledew (1997), was used to assess the exercise motivation of fitness centre members. The EMI-2 scale consists of 51 items, and each item is measured on a 6-point Likert scale from zero ('Does not apply to me at all') to five ('Applies to me very much'), with higher scores indicating higher motivation to exercise, while other points represent intermediate

values on the scale. These subscales include Affiliation (item Nos. 10, 24, 38 & 49), Appearance (item Nos. 2, 18, 32 & 44), Challenge (item Nos. 14, 28, 42 & 51), Competition (item Nos. 12, 26, 40 & 50), Enjoyment (item Nos. 9, 23, 37 & 48), Health Pressures (item Nos. 11, 25 & 39), Ill-Health Avoidance (item Nos. 2, 16 & 30), Nimbleness (item Nos. 13, 27 & 41), Positive Health (item Nos. 7, 21 & 35), Revitalisation (item Nos. 3, 17 & 31), Social Recognition (item Nos. 5, 19, 33 & 45), Strength & Endurance (item Nos. 8, 22, 36 & 47), Stress Management (item Nos. 6, 20, 34 & 46), and Weight Management (item Nos. 1, 15, 29 & 43). Each subscale is determined by calculating the average of 3 to 4 appropriate items based on the EMI-2 scale scoring key.

Table 1. Descriptive Characteristics of the Participants

		n	%
Gender			
	Male	339	31.2
	Female	748	68.8
Age			
	Adolescent (13-18 yo)	74	6.8
	Young adult (19-34 yo)	639	58.8
	Middle-aged adult (35-49 yo)	310	28.5
	Young old adult (50-64 yo)	57	5.2
	Old adult (65+ yo)	7	0.6
Level of Education			
	Elementary school education	15	1.4
	Secondary school education	492	45.3
	Higher vocational education	89	8.2
	College education	491	45.2
Level of Training			
	Active (sport)	193	17.8
	Recreational	894	82.2
Training Frequency			
	1-2 trainings	132	12.1
	3-4 trainings	748	68.8
	≥5 trainings	207	19.0
Training Volume			
	30 minutes	10	0.9
	45 minutes	117	10.8
	60 minutes	666	61.3
	75 minutes	187	17.2
	≥90 minutes	107	9.8

Note. n- frequency; %- percentage

Procedure

The study was conducted in such a way that the questionnaires were distributed by fitness centres and/or groups based on the requested number of copies. The clients of the fitness centres and/or groups are instructed to fill out the questionnaires immediately after arriving at the training, i.e., before the start of the training, and return the completed questionnaire to the person from whom they received it. This study was approved in advance by the Decision of the Bodybuilding and Fitness Association of the Republic of Srpska, Banja Luka, number 104-01/2024 dated 14th October, 2024. Each participant voluntarily provided written informed consent before participating.

Statistical Analyses

Within descriptive statistics, frequencies were used to describe the participants, and the mean and standard deviation were used to describe subscales. The Cronbach's alpha coefficient was calculated to assess the internal consistency reliability of the EMI-2 scale. Interrelationships between subscales were examined using the Pearson correlation coefficient and Spearman rank correlation among subscales of the EMI-2 questionnaire, providing preliminary information on the internal structure of the instrument. Due to the fact that Pearson's correlation coefficient is sensitive to rating scales (Norman, 2010), Spearman's rank correlation was also applied. All statistical tests were analysed using the Statistical Package for the Social Sciences software (SPSS Statistics 20; IBM, Armonk, NY, USA).

Results

Table 2 indicates the values of the basic descriptive indicators for EMI-2 subscales.

Table 2. Descriptive Statistics of the EMI-2 Subscales

EMI-2 subscales	Rank	M±SD	Skewness	Kurtosis
Stress Management	7	3.71±1.13	-1.09	0.87
Revitalisation	2	4.42±0.74	-1.85	4.70
Enjoyment	4	4.09±1.01	-1.38	1.72
Challenge	9	3.57±1.24	-0.90	0.25
Social Recognition	14	1.56±1.43	0.64	-0.68
Affiliation	10	3.32±1.24	-0.48	-0.56
Competition	12	2.45±1.36	0.09	-0.92
Health Pressures	13	1.71±1.43	0.52	-0.72
Ill-Health Avoidance	6	3.99±1.04	-1.20	1.26
Positive Health	1	4.54±0.71	-2.12	5.73
Weight Management	11	3.29±1.29	-0.51	-0.62
Appearance	8	3.67±1.18	-0.98	0.54
Strength & Endurance	3	4.20±0.93	-1.50	2.38
Nimbleness	5	4.06±1.08	-1.31	1.45

Note. M- mean; SD- standard deviation

Table 2 shows the results of the EMI-2 subscales. In the range of mean and standard deviation values from the lowest to the highest, the order is as follows: Social Recognition, Health Pressures, Competition, Weight Management, Affiliation, Challenge, Appearance, Stress Management, Ill-Health Avoidance, Nimbleness, Enjoyment, Strength & Endurance, Revitalisation, and Positive Health. The distribution is approximately normal except for the Positive Health subscale, which indicates a deviation (negative skewness). Table 3 indicates the values of the Cronbach's alpha coefficient for the subscales of the EMI-2 questionnaire and a total of 51 items.

Table 3. Scales, Sample Item, Number of Items, and Cronbach's alpha coefficients of the EMI-2 Subscales

Scale	Sample Item	No. of Items	α
Stress Management	To give me space to think	4	0.771
Revitalisation	To recharge my batteries	3	0.606
Enjoyment	Because I feel at my best when exercising	4	0.834
Challenge	To give me goals to work towards	4	0.800
Social Recognition	To show my worth to others	4	0.820
Affiliation	To spend time with friends	4	0.767
Health Pressures	Because my doctor advised me to exercise	3	0.621
Ill-Health Avoidance	To prevent health problems	3	0.630
Positive Health	Because I want to maintain good health	3	0.757
Weight Management	To stay slim	4	0.763
Appearance	To have a good body	4	0.779
Strength & Endurance	To develop my muscles	4	0.803
Nimbleness	To maintain flexibility	3	0.823
Total		51	0.932

Note. α- Cronbach's alpha coefficients

The values of the Cronbach's alpha coefficients for the subscales indicate questionable internal consistency reliability for Revitalisation, Health Pressures, and Ill-Health Avoidance, acceptable internal consistency reliability for Positive Health, Weight Management, Affiliation, Stress Management, and Appearance, and good internal consistency reliability for Challenge, Strength & Endurance, Social Recognition, Nimbleness, Enjoyment, and Competition, while the total internal consistency reliability for 51 items is excellent. Table 4 indicates Pearson's correlation coefficients between EMI-2 subscales. Given that there are no discrepancies between Pearson's correlation coefficients and Spearman's rank correlation matrices, it shows the values of Pearson's correlation coefficients between EMI-2 subscales. Statistically significant correlation at the level of $p \leq 0.05$ and $p \leq 0.01$ was achieved among all subscales except for Social Recognition and Positive Health, and Social Recognition and Nimbleness. A strong correlation was achieved for Ill-Health Avoidance and Positive Health, Challenge and Strength & Endurance, Social Recognition and Competition, and Revitalisation and Enjoyment.

Table 4. Pearson's correlation coefficients between the EMI-2 subscales

Subscales	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
Stress Management														
Revitalisation	0.51**													
Enjoyment	0.37**	0.68**												
Challenge	0.43**	0.39**	0.48**											
Social Recognition	0.27**	0.11**	0.20**	0.46**										
Affiliation	0.35**	0.38**	0.57**	0.46**	0.37**									
Competition	0.32**	0.31**	0.41**	0.56**	0.64**	0.56**								
Health Pressures	0.22**	0.10**	0.07*	0.27**	0.34**	0.28**	0.31**							
Ill-Health Avoidance	0.37**	0.43**	0.18**	0.32**	0.15**	0.23**	0.17**	0.37**						
Positive Health	0.46**	0.57**	0.37**	0.32**	0.04	0.27**	0.17**	0.19**	0.61**					
Weight Management	0.28**	0.21**	0.09**	0.31**	0.24**	0.19**	0.19**	0.19**	0.33**	0.24**				
Appearance	0.26**	0.31**	0.30**	0.44**	0.31**	0.28**	0.27**	0.12**	0.28**	0.30**	0.51**			
Strength& Endurance	0.40**	0.40**	0.42**	0.61**	0.29**	0.30**	0.34**	0.12**	0.32**	0.42**	0.26**	0.50**		
Nimbleness	0.36**	0.43**	0.30**	0.42**	0.04	0.29**	0.27**	0.22**	0.48**	0.56**	0.23**	0.28**	0.41**	

Note. *-statistical significance ≤ 0.05; **-statistical significance ≤ 0.01

Discussion

The aim of this study was to evaluate the internal consistency reliability of the Serbian version of the EMI-2 measuring instrument. The results show that the Serbian version of the EMI-2 possesses satisfactory metric characteristics, as evidenced by the internal consistency reliability of individual subscales and the 51 items of the complete measuring instrument. Additionally, the correlation matrix demonstrates mutual statistical significance, with the exception of Social Recognition with Positive Health and Nimbleness scores. In the continuation of the discussion, other versions and correlation matrices of the EMI-2 questionnaire will be commented on.

The EMI-2 represents an adaptable measuring instrument for other cultures and languages, as indicated by the Maltese version (Spiteri et al., 2022) and the Brazilian-Portuguese version in Portuguese, given that the mentioned language is primary for both nations (Campos et al., 2022), while Rodrigues, Moutao, Teixeira, Cid, and Monteiro (2022) state that the EMI-2 has also been translated into German, Arabic, and Spanish, and Gallotta et al. (2021) used the Italian version of the EMI-2 in their study. Considering the history of the Slavic peoples and the speaking area, there are two versions of the EMI-2 questionnaire that could be similar to the Serbian version, namely the Slovenian version (Vuckovic et al., 2023) and the Croatian version (Vlasic, Baric, Oreb, & Kasovic, 2002).

Short scales (e.g., scales with fewer than ten items) commonly have quite low Cronbach's values (e.g., 0.5), but ideally, the Cronbach's alpha coefficient of a scale should be above 0.7 (DeVellis, 2012). According to DeVelis (2012), as in this study, Boren (2017) in the results of his study indicates the questionable reliability of the 3-item subscales, especially for Revitalisation, Health Pressures, and Ill-Health Avoidance. Also, a study conducted on dance fitness participants indicates unacceptable reliability for the Revitalisation subscale and questionable reliability for the Health Pressures and Ill-Health Avoidance subscales (Kimbrough, Rosselli, & Crutcher, 2017), while the other studies also conducted on the population of fitness and training centre clients indicate acceptable, good, and excellent reliability of the EMI-2 subscale (Feito, Brown, Box, Heinrich, & Petruzzello, 2018; Vuckovic et al., 2023). In most studies, the Health Pressures subscale indicates both poor values (Box, Feito, Brown, Heinrich, and Petruzzello, 2019; Bycura, Feito, and Prather, 2017; Schlegl, Dittmer, Hoffmann, and Voderholzer, 2018) and questionable values (Galan-Lopez, Lopez-Cobo, García-Lazaro, and Ries, 2022; Schlegl, et al., 2018), regardless of the participants' characteristics. Furthermore, the Revitalisation subscale indicates questionable values (Box et al., 2019; Feito et al., 2018), while the study (Schlegl et al., 2018) conducted on participants with eating disorders (anorexia and bulimia) and healthy subjects indicates lower values of the Revitalisation and the Ill-Health Avoidance subscales compared to other subscales of the EMI-2 questionnaire. Feito et al. (2018) indicate that deleting items from subscales with lower Cronbach's alpha values did not result in an increase in the total Cronbach's alpha value.

McFadden, Berry, McHugh, and Rodgers (2018) confirm the results of the correlation matrix in their study, in which there was no statistically significant correlation for the Social Recognition subscale with Positive Health and Nimbleness. As a reason for this, it may lie in the fact that Social Recognition is the most insignificant motive for exercise, which is supported by several studies (Ball, Bice, & Parry, 2014; Box, Feito, Matson, Heinrich, & Petruzzello, 2021). This is supported by the results of the Rahman, Liang, Gu, Ding, and Akter (2019) study, which highlights the negative effects of Social Recognition on motivation and the worst ranking of the mentioned subscale, as well as the Nimbleness subscale, while the Positive Health subscale is convincingly the best ranked. This can confirm the results of the correlation matrix of this study, in which no statistical significance was achieved between Social Recognition as the worst and Positive Health as the best ranked, and also no significance between the subscales Social Recognition and Nimbleness as poorly ranked. Therefore, the Social Recognition motive remained a relatively unimportant reason to exercise (Box et al., 2021).

The studies (Bycura et al., 2017; Feito et al., 2018) indicate statistically significant relationships between CrossFit training frequency and all EMI-2 subscales except motives related to Health Pressures, Ill-health Avoidance, and Appearance, while only Weight Management was negatively correlated with CrossFit training frequency. Six motivational subscales are identified as differentially important motivating factors for exercise between the different age groups and indicate that Challenge and Competition were more important for youth, while Revitalisation, Ill-Health Avoidance, Positive Health, and Appearance were the main reasons for exercising in adults (Vuckovic et al., 2023). Furthermore, differences in subscales were identified between genders. Therefore, Social Recognition and Competition were more important for males, while Ill-Health Avoidance, Positive

Health, and Weight Management were the main motivators for women's exercise (Vuckovic et al., 2023), while Bycura et al. (2017) also point to the Stress Management and Appearance subscales as important motivational factors for women and Challenge, Strength & Endurance, and Nimbleness for men.

Conclusion

The strength of this study is reflected in the fact that the obtained version of the measuring instrument has satisfactory internal consistency reliability and is applicable in Serbian-speaking areas. Also, the strength of the study is reflected in the fact that the research and evaluation of internal consistency reliability was conducted on a relevant number of participants, that is, in the fitness population, which allows the Serbian version of EMI-2 to be used in kinesiology, which also reflects the practical application of this study. This study has certain limitations; only the evaluation of the internal consistency reliability and intercorrelations between subscales of the Serbian version of the EMI-2 was conducted without the evaluation of other metric characteristics (e.g., factorial structure, test–retest reliability, and associations with external criteria), and the authors were not present with the participants during the survey. Recommendations for future studies would be to conduct a retest with the Serbian version of the EMI-2, to evaluate other metric characteristics of the Serbian version of the EMI-2, and to use the Serbian version of the EMI-2 in surveying other groups of participants.

The practical application of the Serbian version of the EMI-2 questionnaire is reflected in the fact that coaches and fitness instructors can obtain information on what motivates and drives their clients in the exercise and training process, and based on this, they can plan and programme training, form training groups and know how to approach the client so that motivation during the entire training process is at a continuous level to achieve the intended and desired results through exercise.

It is concluded that the evaluation indicates that the Serbian version of the EMI-2 has satisfactory internal consistency reliability and interrelatedness of the subscales.

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