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Original Article

Psychometric properties of the Hungarian adaptation of the Sport Motivation Scale II

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Abstract:
Introduction: Current research on sport motivation mostly focuses on the Self-Determination Theory, which has brought a qualitatively novel approach in the field by making a distinction between six types of motivation. The present study tested the reliability and validity of the Hungarian adaptation of the Sport Motivation Scale II (SMS-II) with a large sample of athletes. The assessment of the psychometric properties focused on the factor structure, construct validity and convergent validity of the Hungarian version. *Methods:* The sample included 1197 Hungarian athletes aged 11 to 67 years, who engaged in more than 50 different sports. The test battery comprised the Hungarian adaptations of the SMS-II, the Satisfaction With Life Scale (SWLS-H), the Rosenberg Self-Esteem Scale (RSES), the Competitive State Anxiety Inventory 2 (CSAI-2), and the Flow State Questionnaire (PPL-FSQ). *Results:* Considering that each subscale of the SMS-II consists of only three items, all subscales showed acceptable internal consistency. A confirmatory factor analysis revealed that the original six-factor model showed the best fit with the data. All fit indices obtained for this model fell within the acceptable range. The examination of construct validity revealed the expected simplex pattern of the subscales, while the associations between the SMS-II and the measures used to test convergent validity were consistent with those obtained in previous studies. *Discussions:* The Hungarian version of the SMS-II provides a reliable and valid measure of sport motivation based on the Self-Determination Theory. The only inconsistency between the observed data and the theoretical model was that intrinsic motivation did not show a closer association with integrated regulation than with identified regulation, which finding is probably related to the contents of the involved subscales. *Conclusions:* A possible future direction of construct validity analysis and improvement may be focused on content refinement. Specifically, the construct validity of the Hungarian SMS-II could possibly be improved by completing the items assessing intrinsic motivation with references to the positive experience directly related to the activity itself.
Keywords: **Self-Determination Theory, SMS-II, Hungarian version**

Introduction

Theoretical approaches to sport motivation

Motivation is an essential component of sports, which facilitates performance and thus contributes to positive experiences (Pelletier et al., 1995). Sport motivation has become a highly popular research field, whose popularity is reflected in the large number of related theoretical approaches. Biddle et al. (2007) summarized these theories in a multidimensional model encompassing five different theoretical frameworks:

(a) The belief-attitude theories such as the Theory of Planned Behavior attach primary importance to intentions, which enable one to envisage one's future actions (Ajzen, 1985).

(b) The competence-based theories such as the Self-Efficacy Theory emphasize the importance of a sense of competence in motivating the performance of a given task (Bandura, 1986).

(c) The control-based theories lay emphasis on the perceived control of one's own actions. Accordingly, the Self-Determination Theory makes a distinction between controlled and autonomous intentions (Deci & Ryan, 1985).

(d) Theories based on developmental stages such as the Transtheoretical Model assume that development entails continuous change, and that passage to a new developmental stage involves different factors at each stage (Prochaska & DiClemente, 1984).

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(e) Finally, hybrid models also focus on the simultaneous influence of several different factors. One of these models is the Health Action Process Approach (HAPA) specifically developed for explaining health behavior change, which makes a distinction between a motivation phase (developing intentions) and a volition phase (turning intentions into actions; Schwarzer, 1992).

Current research on sport motivation is primarily based on various theories of perceived control, and particularly frequently on the Self-Determination Theory (SDT, Deci & Ryan, 1985), which comprises six subtheories (Taylor, 2015). The SDT suggests that individuals have three basic psychological needs such as autonomy, competence and relatedness. The need for autonomy is the motivation for having control over one's life and for purposeful activity. The frustration of this need is associated with a sense of external control and constraint. Competence includes a sense of agency and achievement of the desired outcomes. When one's need for competence is frustrated, one experiences failure and questions one's own agentic qualities. Finally, having relationships with significant others whom one may rely on is an equally important need. When one's need for relatedness is not fulfilled, one experiences rejection and loneliness (Ryan & Deci, 2002). The intrinsic vs. extrinsic nature of one's motivation largely depends on the personal significance of the given situation, which in turn is a result of a previous appraisal of the fit between the given situation and one's personal objectives. Intrinsically motivated activity may only emerge in an environment that supports autonomy and competence, in which one faces challenges that meet one's abilities, and one's true potential is reinforced by adequate social feedback. The SDT makes a distinction between three orientations differing in the characteristic perception of environmental conditions. Autonomous orientation characterizes individuals whose task choices are consistent with their personal values, thus task performance provides them with adequate challenge and satisfaction. Autonomous athletes show a proactive attitude during training sessions, consider and benefit from social feedback relevant to their progress, and adjust their lifestyle to their long-term objectives in sport. Individuals with a controlled orientation are motivated to perform tasks by external rewards or stimulation. Such individuals are primarily characterized by their willingness to compromise, that is, they are ready to accept external control, while they may also show resistance occasionally. The most characteristic experience of individuals having an impersonal orientation is that they cannot adequately regulate their behavior as required by the desired outcome, thus they develop a sense of incompetence. Such individuals find that all tasks they face are beyond their abilities, and achievement of the desired outcome is unrelated to their behavior (Deci & Ryan, 2000).

The SDT has brought a qualitatively new approach to the field by distinguishing between four types of extrinsic motivation differing in the level of autonomy associated with each (Deci & Ryan, 1985). The lowest autonomy is involved in external regulation, which describes one whose behavior is driven by various types of positive and negative external reinforcement (i.e., reward and punishment). For example, an athlete is clearly motivated by external conditions if they choose to train harder in order to achieve better reputation or to gain financial profits from sponsors and competitions. Individuals characterized by introjected regulation tend to introject the causes of their behavior, as a result of which these causes determine their behavior as part of their personality, while the original external causes do no longer need to be present to elicit the given behavior. For example, one's motivation is determined by introjected regulation if one engages in regular physical activity to improve one's outward appearance. In this case, the activity is in part driven by pride and a need for self-esteem, while it is also motivated by the avoidance of shame and anxiety (e.g., in cases when an athlete thinks they are not in their best shape). Individuals described by identified regulation perceive the causes of their behavior and the associated values as their own. This type of motivation involves minimal conflict between internalized goals and external expectations, that is, motivated behavior is self-determined. Among athletes, identifiers are those who attend training sessions to be with their friends or to contribute to team performance (Deci & Ryan, 1991). Integrated regulation further improves the consistence between previous drives and future needs. Integrated regulation is associated with flow experience, which is clearly related to intrinsic motivation. The SDT describes external and introjected regulation as the two types of controlled extrinsic motivation, while identified and integrated regulation as the two types of self-determined extrinsic motivation (Vallerand, 2007).

Drawing on the SDT, Vallerand (1997) developed a Hierarchical Model of Intrinsic and Extrinsic Motivation (HMIEM) modell, which defines amotivation and intrinsic motivation as the two opposite poles of a continuum with the various types of extrinsic motivation as intermediate categories. Amotivation characterizes individuals who have a lack or loss of motivation. Amotivated athletes perceive themselves as incompetent, as having no adequate control over their movements, and their actions as unrelated to the outcomes. By contrast, intrinsically motivated individuals are driven by the joy and satisfaction associated with the activity they engage in. Most researchers agree that intrinsic motivation is a unitary construct, while some authors argue that it comprises several distinct motives. For example, Pelletier et al. (1995) suggest that athletes who explore new training methods or new techniques are driven by the intrinsic motivation to know, whose internal source is the resulting sense of competence. Furthermore, the intrinsic motivation towards accomplishment, which is closely related to self-efficacy, is the primary driving force of athletes who strive to bring their techniques or skills to perfection. Finally, the intrinsic motivation to experience stimulation characterizes athletes who do sports out of a need for joy, aesthetic pleasure, excitement or entertainment. Most authors consider this type of motivation

identical with intrinsic motivation in general, which they define by the pleasure associated with activity as its key characteristic.

Self-report measures of sport motivation

In contrast to the model offered by the SDT, the early measures of sport motivation developed in the 1980s showed a lack of adequate complexity or poor psychometric properties (e.g., McAuley et al., 1989; Weiss et al., 1985). The increasing research interest attracted by sport motivation called for a multidimensional measure based on a solid theoretical background. Since the SDT continuum integrates the various types of motivation into a quasi-simplex pattern, the theory provided an adequate conceptual framework for the development of a valid measure. On this basis, Pelletier et al. (1995) developed the Sport Motivation Scale (SMS), which assesses five different types of perceived causes of engaging in sports activity including amotivation, external regulation, introjected regulation, identified and intrinsic motivation, this latter comprising the above mentioned three subtypes. No measure of integrated regulation was included in the SMS, since this type of motivation was defined in the framework of the SDT only later. The scale showed adequate psychometric properties as reflected in its factor structure, and in the internal consistency of, and correlations between its subscales. As a widely used measure, the SMS has had essential impact on the current understanding of sport motivation in the literature, and the empirical findings obtained with the scale have consistently supported its reliability and construct validity, and the proposed simplex pattern of the measured constructs (Clancy et al., 2016).

However, the psychometric adequacy of the SMS, with especial regard to its internal consistency and factor structure, was repeatedly questioned during the 2000s, since confirmatory factor analyses of the scale indicated poor fit with the observed data, which could not be consistently explained by cultural or conceptual differences (e.g. Cresswell & Eklund, 2005). In response to these methodological difficulties, new self-report measures of sport motivation were developed. The first of these alternative measures was the SMS-6 developed by Mallett et al. (2007), who revised the items of the original SMS, some of which they removed by integrating the different subtypes of intrinsic motivation into one subscale, while they included a new subscale assessing integrated regulation in consistence with the SDT. Over time, however, the limitations of this promising new instrument were also revealed one by one. The wording of some items were unusual for athletic communities, while the data obtained with the new integrated regulation subscale showed a large overlap with those obtained for identified regulation and intrinsic motivation (Pelletier et al., 2007).

At about the same time, Lonsdale et al. (2008) developed the Behavioral Regulation in Sport Questionnaire (BRSQ) using an entirely new set of items. The BRSQ also contains a subscale tapping integrated regulation, and it is available in two versions differing in whether a global measure of intrinsic motivation (BRSQ-6) or a specific measure of each subtype is provided by the scale (BRSQ-8). The BRSQ and its subscales showed the expected factor structure and adequate internal consistency, whereas somewhat inconsistent findings were obtained by the simplex pattern analysis. While the associations between the subscales were generally consistent with the expected pattern, they did not adequately discriminate between external and introjected regulation, nor did integrated regulation and identified regulation differ in their relationship with intrinsic motivation (Clancy at al., 2016).

With a renewed effort to meet the challenges posed by the measurement of sport motivation, Pelletier et al. (2013) revised the original SMS with support from the authors of, and experts on the SDT. The revised scale (SMS-II) showed better readability, face validity and consistency with its theoretical basis compared to the original version. Drawing on sports coaches' suggestions, some items of the original SMS were removed, while others were revised. The three subscales assessing the three subtypes of intrinsic motivation were replaced with one single global measure, thus improving the economy of the instrument without a considerable loss of complexity. A total of 18 items were used to compose the six subscales of the SMS-II in consistence with the SDT, which showed the expected factor structure and adequate internal consistency. Although the observed data only partly supported the expected simplex pattern, since introjected regulation was more closely associated with integrated regulation than with identified regulation, the authors argue for using the separate integrated regulation subscale, having regard to the importance of construct validity. Being convinced that the SMS-II is the best available option for measuring sport motivation, the authors support the employment of the instrument in various countries, cultures and sports. The existing national adaptations of the SMS-II include, among others, Brazilian (Nascimento et al., 2014), Swedish (Stenling et al., 2015), Spanish (Pineda-Espejel et al., 2016), Chinese (Li et al., 2016), French (Pelletier et al., 2017) and Turkish versions (Öcal & Sakalli, 2018).

Most related Hungarian studies used a Hungarian translation of the original SMS, (Járai, 2004; Tsang et al., 2005; Szemes & Harsányi, 2015), while no valid Hungarian version has been published. Paic et al. (2018) developed a Hungarian version of the Sport Motivation Scale (H-SMS), which showed excellent psychometric properties in terms of factor structure and internal consistency. The authors made a distinction between effective (psychomotor) and cognitive orientation as the two aspects of intrinsic motivation, which was, in their view, more consistent with the true nature of the construct. However, further tests need to be conducted to confirm the validity of the H-SMS (e.g., tests on convergent validity, or a simplex pattern analysis for testing construct validity). The importance of further development is reflected in the finding that reducing the size of the scale

alone is not enough, new items should also be added to improve the consistency between theory and measurement (Mallett et al., 2007; Pelletier et al., 2013).

Psychological correlates of sport motivation

Recent empirical studies of sport motivation suggest that self-determination shows a close positive relationship with flow experience (Kowal and Fortier, 1999), self-esteem (Quested & Duda, 2011), and satisfaction with life (Li et al., 2016). Furthermore, intrinsic motivation is positively related to task orientation, and perceived support for autonomy (Pelletier et al., 2017). By contrast, self-determination has been found to be negatively associated with burnout symptoms (Lemyre et al., 2006), distress (Lundqvist & Raglin, 2014), anxiety (Schaefer et al., 2016), antisocial behavior (Hodge & Gucciardi, 2015), narcissism (Roberts et al., 2015).

The present study assessed the psychometric properties of the Hungarian adaptation of the SMS-II, including its factor structure, internal consistency, construct validity, and convergent validity. We assume that by confirming the original SMS-II also obtain six reliable factors in Hungarian sample, with a simplex pattern corresponding to hierarchical levels, showing a low or moderate relationship in term of anxiety, life satisfaction, self-esteem and flow experience.

Methods

Participants

The study involved 1197 athletes, who engaged in a total of more than 50 individual and team sports with a regularity of at least twice a week. Of the overall sample, 599 participants (50.0%) were males, and 598 (50.0%) were females. The participants' age varied between 11 and 67 years (M = 27.8, SD = 10.3), while the number of their active years in sport ranged from 0 to 58 (M = 13.2, SD = 10.1), these data reflecting heterogeneity in both respects. By level of sports activity, 479 participants (40.0%) pursued sports for recreational purposes, that is, they did not engage in competition. From a sport psychological perspective, the context of recreational sport is essentially different from that of competitive sport (e.g., competitive anxiety is not applicable to those engaging in recreational sports activities), therefore the recreational athletes involved in the present study were treated as a special subsample. The reason for their involvement was that the increased heterogeneity of the sample contributed to the generalizability of the findings on the reliability and validity of the Hungarian SMS-II. Of the involved competitive athletes, 224 (18.7%) competed at a local level, 407 (34.0%) at a national level, and 87 (7.3%) at an international level (for the employed classification system, see Hanton and Connaughton, 2002).

Instruments

A back-translation procedure was carried out to obtain a Hungarian version of the SMS-II whose contents would be consistent with those of the original English scale. First, three independent translators each prepared a Hungarian translation of the 18 original items of the SMS-II. The three translations were then compared and their discrepancies discussed. The resulting first Hungarian version of the scale was back-translated into English by a fourth translator. The original and back-translated English versions were compared by Luc Pelletier, the developer of the original SMS-II, who suggested certain corrections. The revision of the first Hungarian version was carried out with the assistance of a competent professional reviser. The most important corrections were made to the three items assessing introjected regulation. Namely, these items were reworded so that they specifically referred to the respondent rather than to any person in general as the one who would feel bad if not taking time to do sports. The final Hungarian version of the SMS-II was approved by Luc Pelletier.

In consistence with the original scale, the Hungarian version also consisted of 18 items, which were designed to assess the six types of motivation defined by the SDT, that is, intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation. The respondents were instructed to indicate the extent to which the reason for doing sports described by each item corresponded with their own personal reasons. Each Likert item was rated on a seven-point scale ranging from "Does not correspond at all" (1) to "Corresponds completely" (7). The sum of item scores for each subscale indicated the level of the respective type of motivation, higher scores indicating higher levels in all cases.

In consistence with the validation of the French and Chinese adaptations of the SMS-II, the convergent validity of the Hungarian version was tested with self-report measures of satisfaction with life, self-esteem, competitive anxiety, and flow experience, which showed close associations with sport motivation in previous studies (see Table 1).

Satisfaction with life was assessed with a short Hungarian version of the Satisfaction With Life Scale (SWLS-H; Martos et al., 2014), which is an adaptation of the original SWLS (Diener et al., 1985). The five items of the SWLS-H compose a unifactorial Likert scale, which does not contain any reverse-scored items. The respondents rated each item on a seven-point scale ranging from "Strongly disagree" (1) to "Strongly agree" (7) Higher total scores indicated higher levels of satisfaction with life.

Self-esteem was measured with a Hungarian version of the Rosenberg Self-Esteem Scale (RSES-H; Rózsa & Komlósi, 2014), which provides a global measure of self-esteem in consistence with the original RSES (Rosenberg, 1965). In line with the original scale, the RSES-H also consists of ten items, five of which are reverse-scored. The respondents rated each Likert item on a four-point scale ranging from "Strongly disagree" (1) to "Strongly agree" (4). Higher total scores indicated higher levels of self-esteem.

Competitive anxiety was assessed with the Competitive State Anxiety Inventory 2 (CSAI-2; Martens et al., 1990; adapted for Hungarian by Sipos et al., 1999). The CSAI-2 taps the cognitive and somatic components of pre-competition anxiety, and performance-related self-confidence. These three dimensions of competitive anxiety are measured with three scales, each comprising nine of the 27 items of the inventory. The respondents indicated the extent to which each Likert item applied to them on a four-point rating scale ranging from "Not at all" (1) to "Very much so" (4). The sum of item scores for each scale indicated the level of cognitive anxiety, somatic anxiety, and self-confidence, higher scores indicating higher levels in all cases.

Flow experience was assessed with the Flow State Questionnaire of the Positive Psychology Lab (PPL-FSQ; Magyaródi et al., 2013), which was originally developed in Hungarian to provide a self-report measure of the construct proposed by Csíkszentmihályi (1990). The 23 items of the PPL-FSQ compose two scales assessing two essential aspects of the flow state, that is, the skills-challenges balance and absorption in the task. The respondents indicated the extent to which each Likert item applied to them on a five-point rating scale ranging from "Strongly disagree" (1) to "Strongly agree" (5). Higher total scores indicated higher levels of flow experience.

Table 1. *The associations of each SMS-II subscale with the measures used in previous studies to test convergent validity*

<table>
<tr><td>Sport motivation (SMS-II)</td><td>Intrinsic motivation</td><td>Integrated regulation</td><td>Identified regulation</td><td>Introjected regulation</td><td>External regulation</td><td>Amotivation</td></tr>
<tr><td>Anxiety (CSAI2)</td><td colspan="3">no relationship (Schaefer et al., 2016)</td><td colspan="3">low positive (Schaefer et al., 2016)</td></tr>
<tr><td>Self-esteem (RSES)</td><td colspan="2">low positive (Quested & Duda, 2011)</td><td>no relationship (Quested & Duda, 2011)</td><td>low negative (Quested & Duda, 2011)</td><td>no relationship (Quested & Duda, 2011)</td><td>moderate negative (Quested & Duda, 2011)</td></tr>
<tr><td rowspan="2">Satisfaction with life (SWLS)</td><td colspan="4">low positive (Li és mtsai, 2016)</td><td>no relationship (Li et al., 2016)</td><td>low negative (Li et al., 2016)</td></tr>
<tr><td colspan="4">moderate positive (Pelletier et al., 2013, 2017)</td><td colspan="2">moderate negative (Pelletier et al., 2013, 2017)</td></tr>
<tr><td>Flow experience (PPL-FSQ)</td><td>high positive (Kowal & Fortier, 1999)</td><td colspan="2">moderate positive (Kowal & Fortier, 1999)</td><td colspan="2">no relationship (Kowal & Fortier, 1999)</td><td>low negative (Kowal & Fortier, 1999)</td></tr>
</table>

Procedure and data analysis

The research plan was reviewed and licensed by the local university research ethics committee under Ref. No. ET: 365/2016/P) prior to data collection, which began in September 2016. The participants were recruited with convenience sampling. Some of them provided data online, while others in a paper-and-pencil format. After being informed on the objectives of the study and giving informed consent, the participants completed a test battery anonymously, which took approximately 20 minutes.

The normality test, the reliability test and the Spearman rank correlation analysis were performed with Ropstat v. 2.0 (Takács, 2016), while the confirmatory factor analysis was performed with Mplus v. 6.11 statistical programs (Muthén & Muthén, 1998-2012).

Results

The measured continuous variables were checked for normality, which was based on the criteria for skewness and kurtosis proposed by Tabachnick and Fidell (2013). Some of the SMS-II subscales showed non-normal distribution according to the obtained ranges of skewness (-1.2 to 2.2) and kurtosis (-0.5 to 5.0), as often occurs in social science research (see Barnes et al., 2001).

The internal consistency of the employed self-report measures was tested with Cronbach's α coefficients, whose value was considered acceptable from .70 (see Nunnally, 1978). Taking into account that each subscale comprised only three items, the obtained Cronbach's αs (ranging from .62 to .80; see Table 2) revealed that all subscales showed adequate internal consistency (see Nagybányai Nagy, 2006). Acceptable Cronbach's αs were

obtained also when calculated separately for competitive athletes (ranging from .61 to .79) and for recreational athletes (ranging from .64 to .84; see Table 3).

The construct validity of the Hungarian SMS-II was tested with a confirmatory factor analysis (CFA) and with a simplex pattern analysis. Of the fit indices obtained with the CFA, the following selection was used to evaluate model fit: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR; for the selection criteria, see Brown, 2006). The obtained values were evaluated according to the following criteria: CFI ≥ .95; TLI ≥ .95; RMSEA ≤ .06; .05 ≤ SRMR ≤ .08 (see Hu and Bentler, 1999). The simplex pattern analysis was performed to establish whether the subscales theoretically predicted to be closer to each other on the extrinsic-intrinsic continuum were actually more closely associated than more distant ones (Pelletier et al., 2013). The findings confirmed that the theory-based six-factor solution showed the best fit with the observed data in both the competitive and recreational groups of athletes (see Table 4).

The obtained Spearman's ϱ coefficients revealed that 14 of the 15 paired correlations were consistent with the expected simplex pattern. The only finding that contradicted the theoretical model was that intrinsic motivation did not show a closer association with integrated regulation (ϱ = .422, p<0,001 and .454, p<0,001 for competitive and recreational athletes, respectively) than with identified regulation (ϱ = .589, p<0,001 and .569, p<0,001, respectively). In sum, the associations between the subscales of the Hungarian SMS-II were generally consistent with the expected simplex pattern (see Table 5 and 6).

Table 2. *The subscales, descriptive data and internal consistency of the Hungarian SMS-II*

SMS-II subscale	*M*	*SD*	Skewness	Kurtosis	Cronbach's α
Intrinsic motivation	5,79	1,20	-1,2*	1,3*	0,80
Integrated regaulation	5,48	1,29	-0,9*	0,2	0,76
Identified regulation	5,34	1,24	-0,9*	0,5*	0,80
Introjected regulation	4,50	1,44	-0,3*	-0,5*	0,68
External regulation	2,11	1,07	1,4*	2,5*	0,62
Amotivation	1,64	1,00	2,2*	5,0*	0,74

Note. * $p < .05$

Table 3. *Internal consistency of each SMS-II subscale for competitive and recreational athletes*

SMS-II subscale	Competitive athletes (*N* = 718)	Recreational athletes (*N* = 479)
Intrinsic motivation	.79	.82
Integrated regulation	.75	.75
Identification	.77	.84
Introjected regulation	.67	.70
External regulation	.61	.64
Amotivation	.75	.72

Table 4. *Measures of fit between the theoretical six-factor model and the data obtained with the SMS-II from competitive and recreational athletes*

	Competitive athletes (*N* = 718)	Recreational athletes (*N* = 479)
CFI	.92	.94
TLI	.89	.92
RMSEA	.06	.06
SRMR	.07	.06

Table 5. *Spearman's ϱ coefficients of the correlations between the SMS-II subscales for competitive athletes*

Variables	1.	2.	3.	4.	5.	6.
1. Intrinsic motivation	-					
2. Integrated regulation	.422**	-				
3. Identification	.589**	.593**	-			
4. Introjected regulation	.246**	.454**	.437**	-		
5. External regulation	.093*	.086*	.195**	.358**	-	
6. Amotivation	-.231**	-.310**	-.208**	-.029	.259**	-

Note. * $p < .05$; ** $p < .01$

Table 6. *Spearman's ϱ coefficients of the correlations between the SMS-II subscales for recreational athletes*

Variables	1.	2.	3.	4.	5.	6.
1. Intrinsic motivation	-					
2. Integrated regulation	.454**	-				
3. Identification	.569**	.581**	-			
4. Introjected regulation	.276**	.531**	.410**	-		
5. External regulation	.143**	.145**	.202**	.390**	-	
6. Amotivation	-.180**	-.177**	-.164**	-.033	.198**	-

Note. ** $p < .01$

Convergent validity was tested with correlation analyses. The obtained significant coefficients were evaluated according to the following criteria: low < .400 < moderate < .700 < high (see Guilford & Perry, 1951). Convergent validity was also tested with Spearman's ϱ coefficients calculated for the associations between the Hungarian SMS-II and the theoretically related self-report measures. In terms of magnitude, low correlations were obtained for competitive anxiety, self-esteem, and satisfaction with life (ϱs ranged from -.173 to .265), while moderate correlations were found for flow experience (ϱs ranged from -.486 to .419; see Table 7). Both somatic and cognitive competitive anxiety showed significant negative correlations with amotivation and introjected regulation, while only cognitive anxiety showed a significant negative association with external regulation. No significant association was found for intrinsic motivation, integrated regulation, and identified regulation. Self-esteem was positively associated with integrated regulation and negatively with amotivation, while no significant correlation was found for the other SMS-II subscales. Satisfaction with life was significantly associated with all subscales except external regulation. Positive correlations were obtained for intrinsic motivation, integrated regulation, identified regulation, and introjected regulation, while a negative correlation was found for amotivation. The competitive and recreational athletes showed differences in the associations observed between flow experience and the SMS-II subscales. The only significant relationship found in the competitive group was a negative correlation shown by amotivation, while several significant correlations were observed in the recreational group, including positive associations obtained for intrinsic motivation, integrated regulation, and identified regulation, and a negative correlation found for amotivation. The above findings are consistent with those obtained in previous studies, that is, they support the convergent validity of the Hungarian SMS-II.

Table 7. *Spearman's ϱ coefficients of the correlations between each SMS-II subscale and their hypothetical psychological correlates*

	Level of activity	Intrinsic motivation	Integrated regulation	Identification	Introjected regulation	External regulation	Amotivation
Cognitive anxiety	competitive	.076^{+}	.043	-.009	.166**	.199**	.265**
Somatic anxiety	competitive	.017	-.007	-.043	.088*	.066	.099*
Self-confidence	competitive	.143**	.230**	.206**	.049	.013	-.128**
Self-esteem	competitive	.041	.134**	.064	.018	-.044	-.144**
	recreational	.121	-.175	-.080	.021	.021	-.142
Satisfaction	competitive	.129**	.222**	.167**	.109**	.073^{+}	-.173**
with life	recreational	.111	-.089	-.062	-.066	.062	-.234
Flow state	competitive	.249	.268^{+}	.179	-.059	-.213	-.486**
	recreational	.225**	.419**	.303**	.122	-.024	-.254**

Notes. Cognitive anxiety, somatic anxiety, and self-confidence was measured with the CSAI-2, self-esteem with the RSES, Satisfaction with life with the SWLS, and flow state with the PPL-FSQ. The CSAI-2 was not administered to recreational athletes. $^{+}$ $p < .10$; * $p < .05$; ** $p < .01$

Discussion

The present study assessed the psychometric properties of the Hungarian adaptation of the Sport Motivation Scale II originally developed by Pelletier et al. (2013). The findings suggest that the Hungarian SMS-II provides a reliable and valid measure of sport motivation based on the Self-Determination Theory. Considering the small number of items composing each subscale, all of them showed adequate internal consistency. The theoretical factor structure was statistically confirmed, and a simplex pattern analysis generally revealed the expected pattern of associations between the subscales, which findings support that the scale has adequate construct validity.

The only inconsistency between the observed data and the theoretical model was that intrinsic motivation did not show a closer association with integrated regulation than with identified regulation, which finding is probably related to the contents of the involved subscales. The intrinsic motivation and identified regulation subscales both concern progress, albeit different aspects of it. Intrinsic motivation is closely related to the positive experiences of progress, while identified regulation is focused on the very opportunity to progress. By contrast, the items of the integrated regulation subscale assess the personal significance of sport and exercise. It has to be noted that the patterns of associations found in some previous studies were also inconsistent with the theoretical predictions. Paic et al. (2018) revealed associations highly similar to each other, which may be related to cultural factors, while the theoretical relationship between integrated regulation and identified regulation predicted by Lonsdale et al. (2014) was so close that it practically excluded differentiation between the two subscales. A possible future direction of construct validity analysis and improvement may be focused on content refinement. Specifically, the construct validity of the Hungarian SMS-II could possibly be improved by completing the items assessing intrinsic motivation with references to the positive experience directly related to the activity itself. The analysis of the associations between the various sport motivation types and their hypothetical psychological correlates revealed findings clearly consistent with those obtained in previous studies (Kowal & Fortier, 1999; Li et al., 2016; Pelletier et al., 2013, 2017; Quested & Duda, 2011). That is, the findings obtained with the Hungarian SMS-II corroborate the convergent validity of the measure.

Interestingly, the associations shown by self-esteem and satisfaction with life revealed differences between competitive and recreational athletes: both measures were related to motivational orientation in the competitive group, but neither in the recreational group. In the former group, both measures were most closely associated with integrated regulation, that is, the more a competitive athlete regarded their sport as part of their life, the higher general satisfaction and self-esteem they reported. In line with the above differences, Wilson et al. (2003) found a lower and less consistent association between satisfaction with life and intrinsic motivation among those who did sports less regularly. Furthermore, the findings reported by Zamani et al. (2016) and Brodáni et al. (2015) support that self-esteem is positively associated with the regularity and intensity of sports activity. The authors defined the optimal levels of physical activity according to the relevant WHO guidelines, and a significant effect on self-esteem was only found for those whose activity reached the predefined levels. In the present study, the regularity and intensity of sports activities pursued by the recreational athletes often fell short of the WHO recommendations, which explains why their self-esteem and satisfaction with life were more or less unrelated to sport motivation.

An unexpected finding of the convergent validity analysis was that the flow state measure did not show a significant association with either of the more autonomous forms of motivation (i.e. intrinsic motivation, integrated regulation, identified regulation) among the competitive athletes, which contradicts previous findings, although the direction of the associations was consistently positive as expected.A possible explanation for these results is that only 42 competitive athletes completed the flow state measure as opposed to 156 recreational athletes. Another possible explanation is offered by the methodological differences between the present study and previous studies. For example, Kowal and Fortier (1999) assessed "master's-level" swimmers, who represented a highly specific population, and the authors calculated linear correlations for the associations between the swimmers' motivational characteristics and flow experiences (without reporting data on the normality of the involved variables), while the present study assessed monotonic relationships measured with Spearman's ϱ coefficients, since the correlated variables showed non-normal distribution.

Conclusions

In sum, the psychometric properties of the Hungarian SMS-II suggest that the scale provides a valuable self-report measure of sport motivation for both researchers and practitioners. Due to the small number of items, the scale may be easily administered in either individual or group settings. Furthermore, the instrument may also be useful for coaches, since their athletes' motivational state may be easily assessed before and monitored during training programs. It can also broaden the scope for intercultural research. The data obtained with the scale inform practitioners' efforts at employing adequate means to improve their athletes' motivation and at efficiently screening them for early burnout symptoms. It has to be kept in mind, however, that as all self-report measures, the Hungarian SMS-II also provide data that potentially involve social desirability biases. Adding a social desirability measure to the scale might eliminate this problem. Furthermore, future research should also focus on a more thorough reliability analysis of the Hungarian SMS-II (particularly regarding its test-retest reliability), and on the possible relationships of sport performance and sporting habits with changes in the obtained sport motivation measures over time.

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