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Adaptation of the academic motivation scale for future professionals in physical education and sports

Iuliia Pavlova [a] *, Lviv State University of Physical Culture, 11, Kostiushka Str., Lviv, 79007, Ukraine https://orcid.org/0000-0002-8111-4469

Ivanna Bodnar [b], Lviv State University of Physical Culture, 11, Kostiushka Str., Lviv, 79007, Ukraine https://orcid.org/0000-0002-7083-6271

Vadym Shvets [c], Training center named after Vasily Vyshivany, National Guard of Ukraine; Lviv State University of Physical Culture, 11, Kostiushka Str., Lviv, 79007, Ukraine https://orcid.org/0000-0002-1614-2412

Petro Petrytsa [d], Ternopil Volodymyr Hnatiuk National Pedagogical University, 2 Maxyma Kryvonosa Str., Ternopil, 46027, Ukraine https://orcid.org/0000-0002-7164-1900

Natalia Nalyvayko [e], Ivan Franko National University of Lviv, 1, Universytetska Str., Lviv, 79000, Ukraine https://orcid.org/0000-0003-2142-2133

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Abstract

The purpose of the research was to adapt the Academic Motivation Scale in the context of investigating students' motivation to study physical education and sports, including the assessment of psychometric properties and experimental validation of the model tool. In this study, a combination of quantitative and qualitative research methods was used. After comparison with alternatively possible models, the seven-factor model showed the highest correspondence. The test–retest factors were above 0.7 for all subscales, indicating high reliability of the questionnaire. The analysis of the participants' results revealed that the highest indicators were for extrinsic and identified regulation and internal motivation related to knowledge acquisition. The obtained version of the Academic Motivation Scale is a valid instrument and has acceptable psychometric properties and can be used to study the learning motivation of university students, in particular future specialists in physical education and sports.

Keywords: Extrinsic motivation; intrinsic motivation; reliability; student; validity.

* ADDRESS FOR CORRESPONDENCE: Iuliia Pavlova, Lviv State University of Physical Culture, 11, Kostiushka Str., Lviv, 79007, Ukraine

E-mail address: pavlova.j.o@gmail.com

1. Introduction

Motivation is a central concept in human behaviour. At its core, it is an impulse or desire for action; motivation is often seen as a category that can be quantified. The definition of motivation is focused on direction (Where am I putting my effort?), root cause (What made me do it?), intensity of activity (How hard am I trying?) and persistence (When or why am I giving up?) during an action. In recent decades, there has been an interest in both quantitative and qualitative assessments of motivation (Hassandra et al., 2003; Sarkis et al., 2020; Steinmayr et al., 2019; Yoo & Marshall, 2021). The quantity of motivation helps to understand the magnitude of motivation, while the quality of motivation refers to why an individual is motivated to engage in a particular behaviour. Understanding the causes of motivation contributes to a better understanding of the factors that influence and regulate a particular activity. The study of academic motivation enables a better understanding of a student's choices, capabilities and internal resources for mastering a profession and predicts activity during the study and the effectiveness of the study (Kim & Seo, 2018; Theobald, 2021; Urdan & Bruchmann, 2018; White et al., 2021). Since studying physical activity and sports and acquiring new knowledge, skills and abilities are also choices, it is crucial to understand what makes an individual choose this behaviour and how to gain the maximum benefit. A high level of motivation to pursue a degree in physical education and sports is associated with a number of both personal and social advantages (Rogowska et al., 2020, 2021; Thorburn, 2020). One of them is the increase in the level of physical activity and improvement of health, of both the individual and the target population, on which the individual's activity is oriented.

Among the known theories explaining motivation, the self-determination theory remains the most relevant and dynamic in its development. It helps to understand better the processes involved in activities during the study, leisure, professional, physical activity and sports (Vallerand et al., 2008). The theory is based on the concept of three basic psychological needs that are innate and universal to humans (the needs for competence, relatedness and autonomy) (Deci & Ryan, 1985; Ryan & Deci, 2000b; Vallerand, 2000). Satisfying these needs enhances the sense of well-being; increases motivation; and promotes perseverance, creativity and effectiveness. The social environment can either support or affect the satisfaction of our basic needs. In turn, neglecting or ignoring basic needs leads to the development of various types of psychopathology, anxiety and depression (Deci & Ryan, 1985; Ryan & Deci, 2000a, 2000b). The self-determination theory considers human behaviour as a result of interaction between the individual and the environment and identifies the following three types of motivation: amotivation, external motivation and internal motivation. Motivation forms a continuum containing amotivation through controlled external motivation to internal autonomous motivation. Introjection (when a person accepts value but does not identify with it) and integration (when there is a complete acceptance of the value of activity) are essential in this transition of motivation from extrinsic to intrinsic. The self-determination theory suggests that the choice of behaviour towards a high level of physical activity, a healthy lifestyle, is more likely to be made and adopted when the behaviour becomes autonomous.

The Academic Internal Motivation Scale (Lepper et al., 2005), the Academic Intrinsic and Extrinsic Motivation Scale (Bhat & Naik, 2016) and the Academic Motivation Scale (Vallerand et al., 1992) are used to study academic motivation. The Academic Motivation Scale (AMS) was developed by Vallerand et al. (1992), based on the self-determination theory. It is by far the best-known methodology for assessing motivation to learn. With this tool, seven different types of motivation can be assessed – three types of extrinsic motivation, three types of intrinsic motivation and amotivation. Unlike the developments of Ryan and Deci (2000a, 2000b), where intrinsic motivation is a complete

construct, the tool identifies three types of intrinsic motivation, including intrinsic motivation to know, to accomplish and to experience stimulation. Knowledge-related motivation is characterised by curiosity, intellectual search, search for meaning, epistemic need for rank and understanding. Motivation to accomplish characterises activities for pleasure and enjoyment that result from trying to do or create something; this type of motivation occurs when a person focuses more on the process than on the outcome. Motivation to experience stimulation covers participation in activities to stimulate the experiences (fun and excitement) that are derived from this activity.

The study of motivation to learn and implement healthy lifestyles requires quantitative assessment, using adapted tools that align with the current trends, approaches and theories. Scientific literature notes that the tool must be assessed for its psychometric properties to assess its internal structure, which ensures reliable data collection. Such an assessment is recommended in different contexts and populations, to check experimentally whether the resulting tool structure corresponds to the theoretical framework as well as to identify whether the available model corresponds to the theoretical structure. There is considerable controversy in the interpretation of whether common motives are shared by all cultures or whether they differ at the individual level. The answers of scholars to this question vary – some of them suggest that motivation varies from culture to culture and from individual to individual, but others suggest that there are motives common to all people (Alghariabeh, 2021). In turn, this reinforces the importance of culturally appropriate research tools. The aim of our study was to adapt the AMS in the context of investigating students' motivation to study physical education and sports, including the assessment of psychometric properties, by experimentally validating the resulting model tool.

2. Methods

2.1. Research design

In this study, a mixed method design, with a combination of quantitative and qualitative research methods, was used. Researchers provide the cultural adaptation of the Academic Motivation Scale (Vallerand et al., 1992), and for further validation, digital data collection and analysis are provided.

2.2. Participants

The study involved 1,120 people (females: n = 490, $M \pm SD$ = 20.1 ± 1.3 years; males: n = 630, $M \pm SD$ = 22.2 ± 2.4 years). Among those interviewed were future physical education and sports specialists as well as physical education and sport instructors. The respondents were students of Lviv State University of Physical Culture (females: n = 320, 20.5 ± 2.1 years; males: n = 271, 20.1 ± 1.8 years), Ternopil Volodymyr Hnatiuk National Pedagogical University (females: n = 170, 20.1 ± 1.4 years; males: n = 78, 21.1 ± 2.0 years) and Training centre named after Vasily Vyshivany of National Guard of Ukraine (males: n = 281, 25.8 ± 2.1 years). Students studied under the bachelor's programme, the exception was students of the Training centre who underwent special instructional courses and had an educational level not lower than a bachelor's degree.

2.3. Data collection instruments

The AMS was used in the paper (Vallerand et al., 1992). The questionnaire consists of 28 questions grouped into seven scales (four questions in each scale) (Table 1). A 7-point Likert scale was used to assess each question (1 – does not correspond, 7 – corresponds exactly).

Table 1. The structure of the AMS

Types of motivation		Number of item
Intrinsic motivation	Intrinsic motivation to know	2, 9, 16, 23
	Intrinsic motivation to accomplish	6, 13, 20, 27
	Intrinsic motivation to experience stimulation	4, 11, 18, 25
Extrinsic motivation	Extrinsic motivation for identified regulation	3, 10, 17, 24
	Extrinsic motivation for introjected regulation	7, 14, 21, 28
	Extrinsic motivation for external regulation	1, 8, 15, 22
Amotivation		5, 12, 19, 26

Vallerand et al. (1992) suggested the following types of intrinsic motivation: intrinsic motivation to know (IMTK) – the student performs the activity for the satisfaction that comes from acquiring new knowledge; intrinsic motivation to accomplish (IMTA) – the student interacts with the environment to feel competent; intrinsic motivation to experience stimulation (IMES) – the student performs a task to feel stimulated. The questionnaire emphasises three types of extrinsic motivation: extrinsic motivation for external regulation (EMER) – behaviour is driven by external reward or threat; extrinsic motivation for introjected regulation (EMIN) – the student partly personalises the reasons for their actions, i.e., external influences partly find a response from the inner self in order to demonstrate their capabilities/avoid failure; extrinsic motivation for identified regulation (EMID) – activities are perceived as personally significant, i.e., students value the reward that such behaviour provides. Amotivation (AMOT) indicates that the student has neither extrinsic nor intrinsic motivation. The questionnaire allows for a separate calculation of the overall intrinsic and extrinsic motivation.

To adapt the tool, we used the English version of the questionnaire. All necessary procedures were performed for cultural adaptation of the questionnaire. In the first stage of the translation procedure, the scale was translated from English into Ukrainian, and in the second stage, the resulting version was retranslated into English (backward translation). Two independent translators were involved in this stage of the work, in particular the specialist involved in the backward translation did not know the English version of the questionnaire. During the second stage of the work, all inaccuracies and controversial issues that arose during translation were discussed with the study coordinator (I.P.) and the translators. The original version of the questionnaire was also compared with the version received after the backward translation – the statement was analysed for cultural and conceptual correspondence. Two English-speaking professionals were involved in this stage of work. These stages of work were carried out as part of a previous study (Kuśnierz et al., 2020).

The questionnaire was pre-tested in the form of individual interviews to see if it was easy and comprehensible. Participants were future physical education and sports specialists (n = 10, the average age of participants was $M \pm SD = 20.6 \pm 1.8$ years) and had the opportunity to note all difficulties in understanding the questionnaire, interpreting each question, etc. Persons involved in this stage of the study were not the part of whole study group.

2.4. Data generation process

The AMS was validated in several steps, including the use of exploratory and confirmatory factor analysis. The sample was randomly divided into two parts: one part of the data was used for exploratory analysis and the other part was used for experimental validation of the resulting model (confirmatory analysis). For investigation the stability of the questionnaire, the test–retest procedure was applied. Recommendations (Ardenska et al., 2019) were taken into account, according to which two conditions should be taken into account in order to determine the time period between the first

and subsequent testing. First, the time interval should be long enough for respondents to forget their answers, but also this time interval should be such as to avoid changes in respondents' subjective evaluations arising from the learning process. Thirty persons took part in this stage of the study.

Data collection was carried out in 2020–2021, and the survey was conducted using an online questionnaire form. Participants were informed of the aims and objectives of the survey, and also informed that it was anonymous and voluntary and they could opt out at any stage of the study. All respondents gave informed consent to participate in the study. During the study, ethical and moral principles were strictly followed in all stages of data collection and analysis.

2.5. Data analysis

Internal consistency of the questionnaire was assessed using Cronbach's alpha. The result was considered satisfactory if its value was ≥0.7 (Peterson & Kim, 2013; Shemwell et al., 2014).

The adequacy of the data for later use in factor analysis was tested using the Kaiser–Meyer–Olkin (KMO) test and the Bartlett sphericity test. Kaiser's criterion was used to determine the number of factors.

To assess the reliability of models and identify the best one, a set of indicators was used (Hu & Bentler, 1999): the ratio of χ^2 to the number of degrees of freedom df (χ^2/df), root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker–Lewis index (TLI), goodness-of-fit index (GFI) and standardised root mean square residual (SRMR). Some of the indicators (χ^2, RMSEA, GFI and SRMR) were considered determining indicators, as they are the ones that describe how well the proposed model fits the data set and which of the models is the most appropriate (McDonald & Ho, 2002).

When describing the data, we used indicators such as mean (*M*), standard error (SE) and standard deviation (SD). The data sets were compared using Student's *t*-test ($p < 0.05$). Data analyses were completed using IBM SPSS Statistics V. 23 (SPSS Inc., Chicago, IL) and AMOS V. 23.0.0 (Amos Development Corporation, Crawfordville, FL).

3. Results

3.1. Preliminary analysis

According to a preliminary analysis of the results, there were no missing data in the study set. All scales are linked by correlations of different strengths. Positive correlations between extrinsic and intrinsic motivation were found, indicating that the respondents who had high intrinsic motivation were also characterised by high extrinsic motivation. Lemos and Verissimo (2014) noted that extrinsic and intrinsic motivation can coexist with each other, and this phenomenon was not contradictory. This suggests that, for a given sample, both extrinsic and intrinsic motivation may be the cause of a particular behaviour.

Statistics for the AMS scales (Table 2) showed that respondents had a relatively high degree of intrinsic cognitive motivation and identifiable regulation (EMID), which makes behaviour valuable and important to the student. Respondents had a low level of amotivation. The indicators of kurtosis (range = −0.47 to 0.68) and skewness (range = −0.87 to 0.72) showed that there was no normal distribution.

Table 2. Descriptive statistics of the AMS

Scale	*M* ± SE	SD	Skewness; kurtosis	The number of questions	*rjx*	*α–x*
IMTK (*α* = 0.847)	21.89 ± 0.18	5.02	−0.71; 0.15	2	0.563	0.853
				9	0.728	0.787
				16	0.740	0.781
				23	0.719	0.791
IMTA (*α* = 0.845)	18.85 ± 0.20	5.57	−0.29; −0.33	6	0.643	0.818
				13	0.719	0.785
				20	0.680	0.803
				27	0.679	0.803
IMES (*α* = 0.835)	18.61 ± 0.20	5.67	−0.26; −0.41	4	0.544	0.841
				11	0.707	0.772
				18	0.733	0.760
				25	0.685	0.784
EMID (*α* = 0.856)	22.06 ± 0.19	5.34	−0.87; 0.33	3	0.665	0.828
				10	0.692	0.817
				17	0.744	0.795
				24	0.690	0.818
EMIN (*α* = 0.809)	19.21 ± 0.21	5.94	−0.48; −0.38	7	0.553	0.794
				14	0.595	0.771
				21	0.690	0.724
				28	0.666	0.741
EMER (*α* = 0.744)	20.47 ± 0.18	5.19	−0.80; 0.68	1	0.201	0.856
				8	0.665	0.556
				15	0.609	0.592
				22	0.651	0.561
AMOT (*α* = 0.878)	10.94 ± 0.23	6.37	0.72; −0.47	5	0.700	0.856
				12	0.694	0.859
				19	0.794	0.819
				26	0.756	0.835

M – mean; SD – standard deviation; SE – standard error; *α* – Cronbach's *α*; *α–x* – Cronbach's alpha if the item was deleted; *rjx* – item-total correlation (an indicator of correlation between the item and the overall result).

3.2. Reliability of the questionnaire

The reliability and internal consistency of the questionnaire were evaluated using Cronbach's alpha factor (Table 2). Cronbach's alpha value for the whole questionnaire was 0.910, including each of the individual scales in the range 0.744–0.878. The results obtained exceed the minimum allowable value ($\alpha > 0.7$) (Peterson & Kim, 2013; Shemwell et al., 2014). The alpha value of each scale was at an acceptable level (α = 0.809–0.878) and showed no improvement when individual questions were excluded.

3.3. Exploratory factor analysis

KMO values and the Bartlett test showed that the data can be used for factor analysis (KMO = 0.949; χ^2 = 10482.9, df = 378, $p < 0.001$). According to the results of the exploratory factor analysis (method of principal axes and promax rotation), three factors were identified in the structure of the questionnaire, whose eigenvalues exceeded 1 and together explained 60.053% of the total variance

(Table 3), which is sufficient (Streiner, 1994). In particular, the first factor explained 42.784% of the total variance, the second 9.743% and the third 7.527%.

Table 3. The structure of AMS (results of the exploratory factor analysis)

Scale and number of items	F1 (intrinsic motivation)	F2 (extrinsic motivation)	F3 (amotivation)
IMES4	0.545		
IMES11	0.894		
IMES18	0.928		
IMES25	0.733		
IMTA6	0.686		
IMTA13	0.729		
IMTA20	0.877		
IMTA27	0.698		
IMTK2	0.392		
IMTK9	0.689		
IMTK16	0.764		
IMTK23	0.481		
EMIN7		−0.558	
EMIN14	−0.474	−0.391	
EMIN21		−0.605	
EMIN28		−0.630	
EMER1		−0.412	
EMER8		−0.874	
EMER15		−0.839	
EMER22		−0.947	
EMID3		0.577	
EMID10		0.507	
EMID17		0.651	
EMID24		0.504	
AMOT5			0.764
AMOT12			0.814
AMOT19			0.900
AMOT26			0.899
Number of elements	12	11	4
Cronbach's α	0.933	0.750	0.865
AVE	0.516	0.443	0.716
CRC	0.924	0.529	0.909

AVE – Average variance extracted; CRC – Composite reliability coefficient.

The factor loads of all elements were significant and exceeded 0.32, which is acceptable (Tabachnick & Fidell, 2013). According to the results obtained, the selected factors combined the scales of intrinsic motivation (the first factor), extrinsic motivation (the second factor) and amotivation (the third factor). One of the questions (#14) was related to several factors simultaneously (first and second). Content analysis of this question found that it had a somewhat similar meaning to intrinsic and extrinsic motivation, which confirmed the idea of discarding these elements from the scale

(Algharaibeh, 2021). Based on the results of the exploratory factor analysis, a questionnaire including 27 questions and 3 scales was proposed.

Cronbach's alpha for each of the obtained structural parts of the questionnaire corresponded to the required level and was in the range of 0.750–0.933. CRC and AVE scores were also adequate for all content parts (AVE ≥ 0.40, CRC ≥ 0.7).

3.4. Confirmatory factor analysis

The original model, which consisted of 7 factors, was compared with alternative possible models, namely a 5-factor model consisting of amotivation combined into a single factor of the intrinsic motivation scales and 3 factors corresponding to extrinsic motivation scales (Ryan & Deci, 2000b); a 3-factor model consisting of amotivation and 2 separate factors covering intrinsic and extrinsic motivation scales; a 2-factor model consisting of 24 statements covering extrinsic motivation scales; and a 1-factor model covering extrinsic motivation scales.

The original seven-factor model was compared with alternative models using a set of indicators (Table 4). Some of the analysed models had poor χ^2/df and RMSEA scores (the three-factor model – χ^2/df=6.40, RMSEA = 0.098; two-factor model – χ^2/df = 7.53, RMSEA = 0.108; and one-factor model – χ^2/df = 12.03, RMSEA = 0.140), and were excluded from further analysis. The model we obtained from the exploratory factor analysis also had low acceptability (χ^2/df = 5.58; CFI, GFI, and TLI < 0.9; RMSEA > 0.08). On the combined indices analysed, the 7-factor model, which consisted of 28 items, showed the highest correspondence (χ^2/df = 4.09, RMSEA = 0.074, CFI, TLI, and GFI >0.9). Such a seven-factor model was used later in the calculation and interpretation of the results.

Table 4. Comparative characteristics of the AMS models

Indicators	Recommended values	7-factor model	5-factor model	3-factor model	2-factor model	1-factor model	3-factor model (obtained in the study)
χ^2		1,347.678	1,528.440	2,221.871	1,883.309	4,209.761	1,776.21
df		329	340	347	250	350	318
χ^2/df	≤5	4.09	4.49	6.40	7.53	12.03	5.58
p		0.000	0.000	0.000	0.000	0.000	0.000
CFI	≥0.9	0.903	0.887	0.822	0.819	0.633	0.856
GFI	≥0.9	0.837	0.871	0.761	0.77	0.565	0.782
TLI	≥0.9	0.889	0.874	0.806	0.802	0.605	0.842
RMSEA (90% CI)	≤0.08	0.074 (0.07; 0.079)	0.079 (0.075; 0.083)	0.098 (0.094; 0.102)	0.108 (0.103; 0.112)	0.140 (0.136; 0.144)	0.09 (0.086; 0.094)
SRMR	≤0.08	0.080	0.091	0.120	0.120	0.148	0.110

To study the stability of the tool, the Ukrainian version of the questionnaire was filled in twice by the students. The test–retest factors were above 0.7 for all subscales, indicating high reliability of the questionnaire.

3.5. Simplex pattern study

To analyse the simplex pattern, correlations between AMS scales were examined using the recommendations of (Cokley, 2000; Vallerand et al., 1993). The correlations between the scales are shown in Figure 1.

The simplex pattern in the AMS was not supported. When moving diagonally and then to the left in the correlation matrix, the correlation value tended to fluctuate, instead of following a decreasing trend. Also, correlations between neighbouring subscales were in some cases lower (instead of being higher) than correlations between subscales that are further apart in the matrix. For example, neighbouring sub-scales, EMER and EMIN, had lower correlations (r = 0.62) than separated sub-scales, EMER and EMID (r = 0.69); the same applies to adjacent IMTK and IMTA sub-scales (r = 0.76) and IMTK and IMES sub-scales (r = 0.77).

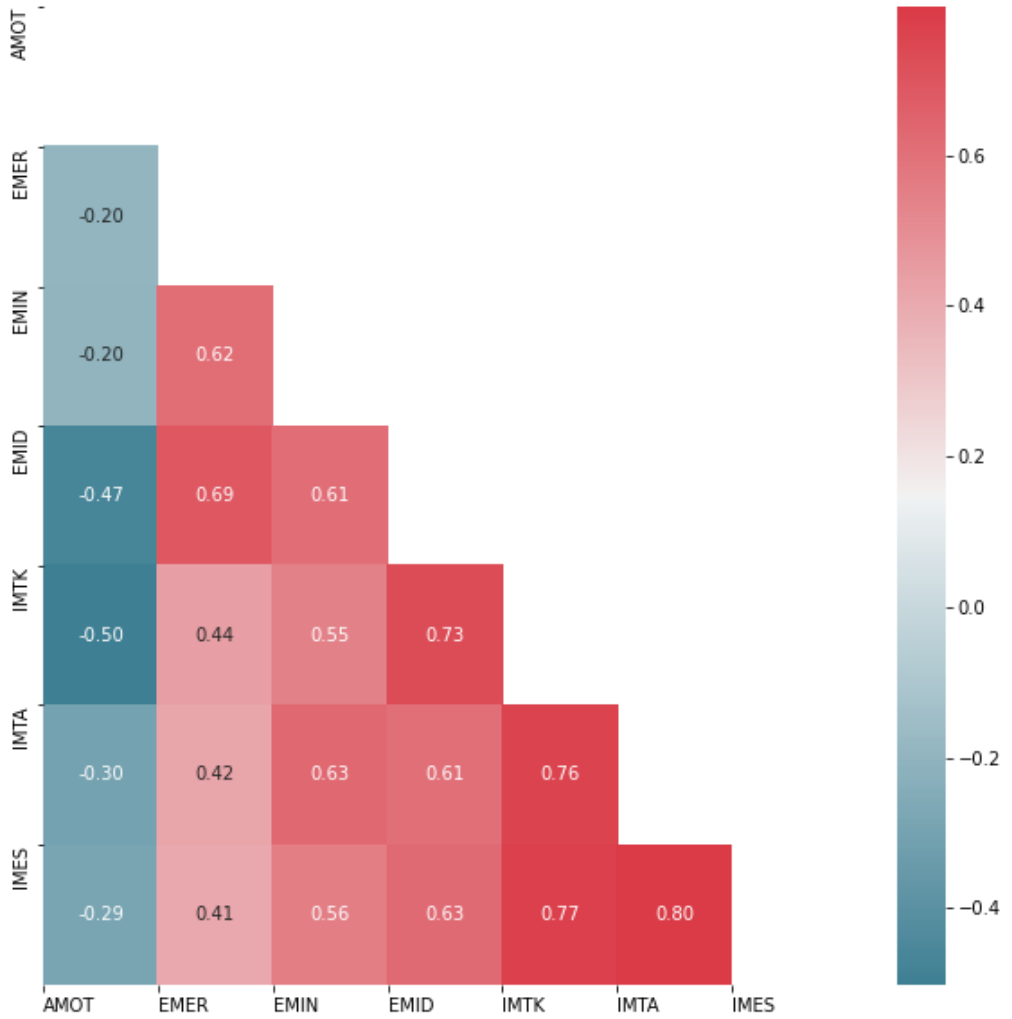

Figure 1. Correlation between AMS scales

High correlations were observed between intrinsic motivation factors (r = 0.76–0.80) and medium magnitude correlations between extrinsic motivation factors (r = 0.61–0.69). Fairly high correlations were observed between individual scales of extrinsic motivation and intrinsic motivation (r = 0.61–0.73, for scales of intrinsic motivation and identified regulation). As expected, amotivation correlated negatively with other subscales.

3.6. Academic motivation of students studying physical education and sports

Analysis of male and female results due to the 7-factor model, which consist of 28 items, found the highest scores for extrinsic and identified regulation as well as for intrinsic motivation related to knowledge acquisition, the lowest for amotivation, and the IMTA and IMES intrinsic motivation scales (Table 5). Statistically significant differences were found for separate indicators. In particular, the results on the IMTK, IMTA, IMES and EMIN scales differed. The results show that females had lower values on almost all scales of extrinsic and intrinsic motivation.

Table 5. Comparison of motivation among males and females

Scales	The number of points that can be obtained for each scale	Females		Males		*t*	*p*
		M (SD)	95% CI	*M* (SD)	95% CI		
IMTK	4–28	21.34 (4.98)	20.82; 21.87	22.31 (5.01)	21.84; 22.77	−2.70	0.007
IMTA	4–28	17.94 (5.32)	17.38; 18.50	19.55 (5.67)	19.02; 20.07	−4.07	0.000
IMES	4–28	17.79 (5.47)	17.22; 18.37	19.24 (5.75)	18.70; 19.77	−3.59	0.000
Internal motivation	12–84	56.71 (15.49)	55.06; 58.36	61.09 (15.10)	59.69; 62.49	−3.99	0.000
EMID	4–28	21.68 (5.42)	21.11; 22.25	22.35 (5.26)	21.86; 22.83	−1.74	0.081
EMIN	4–28	18.43 (5.75)	17.83; 19.04	19.82 (6.03)	19.26; 20.38	−3.29	0.001
EMER	4–28	20.59 (5.21)	20.05; 21.14	20.37 (5.18)	19.89; 20.85	0.59	0.552
External motivation	12–84	60.09 (15.25)	58.47; 61.72	62.54 (14.47)	61.20; 63.88	−2.33	0.022
Amotivation	4–28	11.26 (6.24)	10.60; 11.92	10.69 (6.46)	10.09; 11.29	1.24	0.214

4. Discussion

The AMS has been translated into national languages by research teams around the world (Can, 2015; Karin et al., 2016; Orsini et al., 2015; Sarkis et al., 2020; Zhang et al., 2015); its structure and usability has been rigorously tested in different cultural (Can, 2015; Urdan & Bruchmann, 2018) and educational (Stover et al., 2012) contexts, and attention has also been paid to the psychometric properties of the tool (Can, 2015; Cokley et al., 2001; Édi et al., 2008; Fairchild et al., 2005; Grouzet et al., 2009; Karin et al., 2016; Orsini et al., 2015; Stover et al., 2012; Zhang et al., 2015). The tool was validated for the population of the United States (Cokley et al., 2001), China (Zhang et al., 2015), Italy (Alivernini & Lucidi, 2008), Turkey (Can, 2015), Singapore (Caleon et al., 2015), China (Zhang et al., 2015) and Indonesia (Natalya & Purwanto, 2018). The adaptation of this questionnaire for the Ukrainian population was carried out for the first time in the framework of this study. A special feature of this study is the involvement of students acquiring a profession in physical education and sports, and their choices are related to healthy lifestyles and high levels of physical activity.

The paper analyses the structure of the Ukrainian version of the questionnaire and checks its validity. Initially, an exploratory factor analysis produced a model consisting of 27 questions and factors of amotivation, extrinsic and intrinsic motivation. According to the self-determination theory,

amotivation is considered a state in which a person lacks the will to engage in a particular activity because of low perception of their own competence, inability to assess the value of an activity or its consequences and inability to see the relationship between their actions and the outcome. Extrinsic motivation is caused by external rewards, pressure or punishment (Deci & Ryan, 1985). The AMS covers three types of extrinsic motivation – external regulation, introjected regulation and identifiable regulation. External regulation refers to an activity in order to satisfy certain external requirements or to obtain rewards; introjected regulation refers to an activity that is implemented to avoid feelings of anxiety or guilt, or to obtain recognition; an identified regulation involves the individual recognising the significance of the action and a certain degree of will in performing the action, but the goal itself remains external to them. Internal motivation is determined by the task itself; it arises in addition to the needs. In the presence of intrinsic motivation, we engage in certain activities only for pleasure, not because of external pressure or reward, but also without the need to achieve a specific result (Ryan & Deci, 2000a, 2000b). Manifestations of intrinsic motivation include feeling happy to learn; learning new things; learning orientation, integration and immersion in tasks (Gottfried et al., 1994); making greater effort; feeling motivated; low levels of anxiety and nervousness (Cury et al., 2006); trying to solve difficult tasks; persistence; wanting to improve one's skills; and high levels of engagement in tasks (Boggiano & Barrett, 1985).

The theoretical model envisaged by the developers of the questionnaire consists of seven factors (Vallerand et al., 1992), but this structure is only confirmed for part of the adapted versions of the AMS (Cokley et al., 2001; Fairchild et al., 2005; Karin et al., 2016; Orsini et al., 2015; Zhang et al., 2015). Instead, other studies have proposed alternative models that differ in the number of factors (Ardenska et al., 2019; Grouzet et al., 2009; Sarkis et al., 2020). In our experimental test, we found that the 7-factor model, which consist of 28 items, was the best fit (χ^2/df < 5, RMSEA < 0.08, CFI, TLI, and GFI > 0.9). This indicates that the calculation of the level of motivation can be performed on seven scales that cover intrinsic motivation, extrinsic motivation and amotivation.

Vallerand et al. (1992) hypothesised that seven AMS subscales should correspond to a simplex pattern, namely neighbouring subscales have stronger positive correlations compared to subscales that are further apart on the motivation continuum. Also, amotivation should have the strongest negative correlations with the three types of intrinsic motivation. Today, this simplex structure of motivation remains controversial. Empirical studies (Cokley et al., 2001; Vallerand et al., 1992, 1993) have not revealed a clear simplex structure of the questionnaire. In particular, some researchers have emphasised that introjected regulation is more self-deterministic than identified regulation (Cokley et al., 2001). According to our results, the EMID scale has a stronger correlation with intrinsic motivation (r = 0.63–0.73) compared to extrinsic motivation scales, which is typical for simplex models. This result also confirms the assumption of Cokley et al. (2001) that the EMIN scale, actually concerned with self-efficiency and self-value, is conceptually closer to intrinsic motivation. As expected, amotivation was negatively correlated with other motivation subscales, with the closest association found with the IMTK scale. If EMIN and EMID are swapped in the correlation matrix, bringing the EMIN closer to the intrinsic motivation subscale, the matrix we calculated is more consistent with the simplex pattern, primarily with respect to the extrinsic motivation subscale.

Our result also contradicts the study by Lepper et al. (2005), which reported low correlations between different forms of motivation. Sufficiently strong positive correlations between extrinsic and intrinsic motivation factors indicate that Ukrainian students may be motivated by both extrinsic and intrinsic factors. Females had lower levels of motivation on almost all scales compared to males and higher levels of amotivation. The main influence on male and female behaviour was intrinsic

motivation related to knowledge, as well as extrinsic regulation and identified regulation. This may indicate that external incentives and rewards predominate among the reasons for learning in physical education and sports, but that such activities are perceived by students as socially meaningful, accept the real value of the behaviour and value the rewards that such behaviour provides. The peculiarities of the formed sample can partly explain higher levels of males' motivation. Thus, future instructors of physical education and sports for servicemen were involved in the study. Physical training is a fundamental means of improving combat readiness. The instructor in physical culture and sports actually helps intensify the process of combat training and provides the appropriate level of socio-psychological atmosphere in the team. Furthermore, the instructor in physical training and sports must objectively assess, control, guide and correct servicemen's behaviour under the team's requirements. Accordingly, it can be assumed that a high level of motivation to learn and further self-improvement is part of the professional competence of instructors.

5. Conclusion and recommendations

Cultural adaptation and testing of the psychometric properties of the AMS were carried out. The Ukrainian version of the AMS is a valid version of the instrument and has acceptable psychometric properties and can be used to study the learning motivation of university students, in particular future specialists in physical education and sports. The questionnaire consists of 28 questions and 7 scales that cover intrinsic motivation, extrinsic motivation and amotivation. The advantages of the questionnaire are full compliance with international standards of cultural adaptation, modern approaches and theories of understanding motivation; small volume of the questionnaire, which makes it convenient to use in population studies; possibility to apply the questionnaire for cross-cultural studies; calculation of a quantitative indicator of motivation as both a set of indicators characterising different types of extrinsic and intrinsic motivation, and as a single index. The analysis of the participants' results revealed that the highest indicators were for extrinsic and identified regulation and internal motivation related to knowledge acquisition. For males and females, differences were identified on the scales of both internal and external motivation.

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