Development and Validation of a Math-specific Version of the Academic Motivation Scale (AMS-Mathematics) Among First-year University Students in Bulgaria

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Abstract **– This article presents the results of a modified version of the Academic Motivation Scale (AMS) (a sample of 256 Bulgarian students), based on the theory of self-determination. Different types of motivation related to the learning activity are identified. The results of the confirmatory factor analysis confirm acceptable compliance and the presence of five scales characterizing two types of internal motivation (general internal motivation and internal motivation for expertise) and two types of external motivation (introjected regulation and external regulation) and amotivation. All subscales are characterized by acceptable reliability (0.779 <0.916) and show predictive correlations with the overall level of academic motivation and other motivational constructs as expectations for success, academic self-assessment in mathematics, emotions in the learning process. By gender, it was found that girls have a stronger internal motivation, and by the "year of study" factor, the strongest internal motivation have university students from the senior classes.**

Keywords **– academic motivation scale, math, university student. validation**

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1. Introduction

Exploring the impact of motivation on student achievement in higher education is a topical issue not only because such a phenomenon is a predictor of the level of efficiency and success in higher education but also because it has a significant impact on the building of a career for the future by young people. Many studies on this subject have led to contradictory conclusions about learning outcomes and future careers. And although it is accepted by most young people that learning achievements do not play a significant role in career development, Strenze studies prove exactly the opposite. It is the motivation that has a decisive role in delivering effective learning activity as it stimulates and regulates its performance [1].

Motivation in learning is a complex and multidimensional structure, including not only motives, but also goals, strategies for responding to failures, sustainability, cognitive components and mechanisms [1]. There are many theories of motivation, but in most scientific studies the academic motivation is examined through the prism of two constructs: internal and external motivation.

2. Literature review

Some researchers consider internal motivation as an autonomous entity that is a consequence of the "flow." In the theory of the flow of Csikszentmihalyi, flow states are sources of meaning, but flow activity becomes a life commitment only if it appears important and meaningful to the individual [2]. Harter considers inner motivation as an opposition to the external: on one pole is the interest of the individual in the activity itself, and the other pole is regarded as an interest which is dictated by external causes. Hence the motives of one pole are considered to be favourable and reliable, and the motives of the other pole as preventing the full realization of the

learning activity. Some research shows that internal motivation is positively related to creative work, cognitive flexibility, and is a predictor of more effective learning strategies, sustainability, and learning achievements. In the internal motivation, the performance of the activity is accompanied by the experiences of the flow, expression of enthusiasm in the learning process and feelings of satisfaction from it [1].

Subsequently, the theory of self-determination emerged, which managed to overcome the initial opposition of motivation as external and internal. Its creators Ryan and Deci define very clearly the concept of internal and external motivation. In their view, external motivation is a diverse structure that is categorized into several types of regulation: external, introjected, identified and integrated. They differ according to the extent of the need for autonomy, i.e. the pursuit of activity by the person, the management of their behaviour [3]. Some studies, based on the theory of self-determination, state that, unlike external identification, integrated and internal motivation (i.e. autonomous forms of regulation), external introjected and external motivation are associated with lower learning efficiency, lower learning achievements and prosperity, and also a tendency for early school leaving [4]. Internal motivation is associated with activities that the individual does with pleasure. It arises when the social and surrounding environment stimulates the innate needs of autonomy, connectivity and competence in the individual. Based on the available psychological needs, Deci and Ryan identify several types of motivational styles:

Amotivation occupies the lowest level of need for autonomy in the continuum of motivational styles. People who are amotivated do not intend to act [3], they are neither internally nor externally motivated, and consider their actions not to depend on anything, or are beyond their control. External regulation is the second less self-defining behaviour that is being implemented to meet external demand. Introjected regulation is controlled by unforeseen circumstances such as increasing ego, guilt or anxiety [3]. Identified regulation is a more autonomous or self-defined form of external motivation, and implies that a person with such motivation attaches personal meaning to behaviour. The most autonomous form of external motivation is integrated regulation, which still differs from internal motivation with its instrumental, i.e. here lacks the feeling of pleasure or personal satisfaction [3]. At the top of the continuum is inner motivation, which is the most self-defining form of behaviour.

One of the most commonly used scales for measuring motivation that is in line with the self-determination theory is the Academic Motivation Scale (AMS). This scale is validated with different populations, including English and French speaking students, from high school to university level, and it is tested for factorial invariance by gender. AMS was originally published in French in 1989, and shortly thereafter translated into English [5]. The AMS scale has three versions that are used in school students and university students. Although the original version of the AMS (Vallerand et al.) consists of seven subscales, four of which reflect different types of external motivation and three differences between forms of internal motivation, some studies consider only one dimension of internal motivation (internal motivation for knowledge) and therefore consider five subscales instead of seven [6],[7]. Each subscale consists of four items, and each item is a possible answer to the questions: "Why do you go to study at a university/school?" The subscales reflect the amotivation of the students/pupils (for example, frankly, I do not know; I really feel like I'm wasting time at university/school), external regulation (for example, to find a prestigious job later), introjected regulation (for example, because when I succeed at school/university, I feel important), identified regulation (because education will help me to prepare better for the career I have chosen), and intrinsic motivation (e.g., because I feel pleasure and satisfaction as I learn new things).

Vallerand and colleagues confirm the 7-factor structure of the French version of the scale using exploratory factor analysis (EFA) and subsequently confirmatory factor analysis (CFA) [6]. However, the divergent validity of the scale is not fully confirmed. Thus, the authors find that some types of inner motivation are better related to the introjected regulation than with the identified regulation. The authors found that the scale is reliable and internally cost-efficient (mean 0.80 and 0.81) in the studies of Vallerand et al. (tested for one month r=0.75 and 0.79) [5]. The cost-effectiveness for the five subscales evaluated during the development of the original AMS variant varied from 0.60 to 0.86 and from 0.76 to 0.86 in a study in other English-speaking countries [5]. Later, other versions in English and French are also available, but also Turkish [8],[9], Greek [10], Slovenian [11], Serbian [12], Croatian [13], Russian [1], Italian [6], German [14], and others. This multicultural phenomenon of validation of the AMS methodology and especially in the Balkan and Slavic countries gives grounds for the same scale to be validated for a Bulgarian sample too.

2.1 The influence of gender and age on motivation

Chouinard's studies on changes and dynamics during the school year in mathematics motivation at high school revealed a general decline in motivation between the beginning of the year and the end of the year. This decline is explained by a reduction in motivation factors: pursuing performance and mastering of goals, perceptions of teacher's support, using learning strategies, involvement in the learning process. In addition, among senior students, the perception of parental support, the perceived benefit of mathematics study, self-confidence are diminishing, while increased anxiety is observed. Chouinard's research shows that the difference between girls and boys in mathematics motivation is lessening during high school. This is due to a drop in motivation among boys and higher values for girls [15]. Other studies have shown that university female students have expressed more aspects of internal motivation and higher levels of identified control. Comparing achievements by gender for external motivation and amotivation shows different results. In some studies, the authors find that male university students have a higher degree of external motivation and amotivation. In other studies, however, there are no differences in the types of motivation by gender [16].

2.2 Determinants of mathematics learning motivation

2.2.1 The perception of the students about self-competence and control

The perception of competence corresponds to the student's assessment of his or her own ability to succeed in the study of a subject. In secondary school, the sense of competence and internal motivation for mathematics is stronger in boys than in girls [17].

In the theory of self-determination, raising a sense of competence for a given task helps to strengthen the internal motivation for this task.[18] Thus, if a learner who has a strong interest in a discipline and is confident that he or she will deal with, they will develop an internal motivation, higher than those whose interest or confidence is medium or low [19]. Learners who attribute their success to the effort they have put forward are performing better and are dealing effectively with the difficulties because they think they have control over their success. Some researchers find that attributing success to internal and controllable causes leads to higher mathematical performance. In turn, anxiety and uncertainty in success also affects mathematics results - low perception of own competencies and control over success often ends with a poor performance in mathematics.

2.2.2 Positive and negative emotions

Emotions felt by the learner are closely related to perceptions of competence, control and motivation, in a complex dynamics. One such important area of research on mathematics is the role of emotions in problem solving. Emotions such as curiosity, frustration, anxiety and surprise are an important part of the process of attempting to solve a non-routine problem. Such emotions focus attention and bias cognitive processes [20].

While the result can have a direct impact on emotion (for example, the pleasure of passing an exam), other impacts are related to the learner's presentation in the situation (such as pride or relief that they have succeeded). Like the sense of control, emotions can occur before, during or even after the activity (for example, joy or anxiety during the assessment). Emotions affect academic performance. Experimental mood studies show that emotional states affect the motivational and cognitive processes that are related to cognitive results [21]. Findings show that positive emotional states promote creativity, flexibility, and holistic ways of thinking, which is also a prerequisite for internal motivation, while negative emotional states induce more analytical, detailed and rigorous ways of processing information [22],[24].

Studies on student emotions confirm their role in academic performance. For example, many studies have found that anxiety has a negative impact on solving complex or difficult tasks requiring cognitive resources and negatively impact achievements in age groups and academia [23],[24].

Evidence of links between emotions and achievements other than anxiety and performance is rather limited. For learning pleasure, positive correlations with learning outcomes and internal motivation were observed. For anger, shame, and overall negative effect, negative correlations with performance were found, but there is no evidence about motivation. For boredom and hopelessness, the findings show that the relationship between these emotions and the performance is negative [24].

AMS has never been tested for factor validity and structure for the Bulgarian academic context. In this study, the psychometric values and capabilities of the Bulgarian version of AMS are measured and examined in a sample of freshmen students from Bulgarian higher education institutions. The aim of the present study is to approbate, validate and create a new mathematics motivation scale for Bulgarian university students: to evaluate the five-factor model of academic motivation and to assess the internal coherence of subscales; 2) to establish correlations

between AMS subscales; 3) to explore the links between the subscales of the AMS results and two of the motivational consequences such as perceptions of confidence in mathematical success, as well as the perceptions of control over the current year (by self-evaluation).

3. Hypotheses

In this study, the constructive validity of the AMS scale was tested by a sample of Bulgarian students. The invariant of the scale measurement was verified by gender. We also wanted to know if the scale is sufficiently reliable and internally coherent.

The convergent validity of the AMS scale is established in this study with the internal correlations between internal AMS scales and the correlations of the AMS scale with the degree of beliefs in mathematical success and the presence of learned helplessness, as well as with the scale of academic motivation level. It is assumed that, according to the starting points of the theory of self-determination, there are correlations between the different types of motivation; the correlations between the types of internal motivation will be higher than the correlations between the internal types and the external types of motivation. It is also assumed that there is a negative correlation between the types of internal motivation and amotivation. Furthermore, it is assumed that the positive correlation between the types of internal motivation and the beliefs in mathematical success during the school year will be established, as well as a negative correlation between amotivation and the beliefs in failure in mathematics, as well as the presence of learned helplessness. It is also assumed that the high levels of academic motivation will positively correlate with the scales for introjected, external regulation and internal motivation, and negatively with amotivation. This study also identifies the differences in AMS scales by gender, year of study, and area of the specialty studied.

Participants in the study. The study covered 256 participant students in first year at Plovdiv University Paisii Hilendarski. Of these, 187 are students in mathematics and information specialties, and 69 are in humanitarian specialties. 187 students took part to verify the reliability and validity of the scale. With the remaining 69 students, a second study was conducted to establish test-retest. The surveyed individuals were given detailed instructions to complete the test and were given sufficient time. The average age of the surveyed persons is 20.35 years, of which 55% were male and 43% female.

4. Procedure

Students first reported their age, gender, year of study, and specialty. Then, they answered a question about the degree of confidence in their mathematical success: "To what extent are you confident in your mathematical success during this school year?" The degree of confidence in mathematical success was measured with a 7-point Likert scale (1 - I will not be able to do anything at all; 7 - I will do excellently).

Then the students were given two statements from which they had to choose one: "If I decide and wish, I can solve even with the most difficult problems in mathematics" and "Although I do the best I can, mathematics is a very difficult subject ". By choosing one of the two statements it can be determined which students are inclined to approach mathematics with learned helplessness and which - with optimism.

Questionnaire for assessing the level of academic motivation by A. Velichkov [25]. It is designed for students. It contains 11 statements. Seven of them are for high academic motivation and four - for low. This method measures the overall motivational status associated with the trainees at the university.

Mathematical problems and emotions. The participants in the study were given a problem related to the topics they studied in geometry. Once they solved the task, the participants had to mark out what emotion they had experienced after they had solved the problem.

Academic motivation scale by Vallerand et al. [15]. In order to determine the level of internal and external motivation, a "AMS-Mathematics" (AMS-M) was developed. It corresponds in form and content to the school student and university student version of the AMS of R. Vallerand et al., which measures the amotivation, external regulation, internal regulation, identified regulation, and internal motivation. It consists of 28 statements [15]. The surveyed persons are offered to evaluate in a 7-point scale the different options for answers to the question "Why do you study mathematics?" AMS was translated from English to Bulgarian by experts in English linguistics, pedagogy and psychology, and then it was given to an independent translator to translate the Bulgarian version back to English. The original version of the AMS and the translated version were given to be compared by third-parties who are fluent in Bulgarian and English. When finding discrepancies and lack of consistency in some statements, the latter were edited to obtain a homogeneous variation. Participants in the study completed the test during a seminar in geometry. They were informed that the purpose of the tool is to identify the reasons why they study mathematics. The questionnaire was filled in anonymously and the participants were convinced that the results would in

no way affect their academic performance at the university.

The introduction presents the results of validation studies in which authors verify the reliability and constructive, convergent and discriminatory validity of the English and French versions of AMS.

5. Results

To measure students' motivation, we use the AMS of Vallerand et al. [5]. The AMS contains 28 items.

An analysis of items and scales was first done. An Exploratory factor analysis was used to check the construct validity. We've deleted thirteen items because they belong to more than one hidden variable and have relatively low factor weights. Thus, in our study AMS was reduced to 15 items. In this way, we received a short version of the motivation test. The short version of the motivation scale makes it possible to combine it with other scales to get more details about the predictors and the characteristics of the motivation. A short version of the scale for motivation was also made by Wilkesmann, Fischer & Virgillito (2002). These authors reduce their version of the scale for motivation up to 19 items.

In our case, there were differentiated five instead of the initial seven factors. The KMO value is 0.869, meaning that the sample is sufficient to conduct an analysis and an explanation of variation of 58%, the following factors were obtained: "introjected regulation"(IR) (α = 0.853), "External Regulation" (ER) (α = .854), "Amotivation" (A) (α = 0.779), Internal Motivation (IM) (α= 0.942) and "Internal Motivation for Expertise" (IME) (α= 0.828). Compared to the original AMS scales, in AMS-Mathematics, the IM scale is somewhat "wider" (here the items range from "identified regulation" scale from the original version of the test), while IR, ER and A are based on the same items from Vallerand et al. [5]. In addition, there is no "identified regulation" scale as part of the items belonging to this scale in the original version falls within the scale of internal motivation, which means that Bulgarian respondents consider that the attribution of personal meaning and autonomy of behavior is one of inner motivation. During the study, several items were deleted, which belonged to more than one variable or had low factor weights.

Below, in Table 1. are given the factor excerpts of the scale for academic motivation - Bulgarian version.

Table 1. Principal component analysis: academic motivation

Rotated Component Matrix[a]

	Component				
	IM	ER	IR	A	IME
9. For me math is like a game: I am entertained with it and I learn new things.	.699				
13.For the pleasure of surpassing myself in mathematics.	.742				
23. Because math is my friend with whom I discover many new and interesting things.	.779				
25. Because of the thrill I feel when I solve interesting and challenging tasks in mathematics	.810				
27. Maths is just a hobby, which makes me want to be good on other subjects as well.	.689				
5. Honestly, I do not know. Sometimes I have the feeling that I'm just wasting my time with this maths.				.870	
7. To prove to myself and others that I can solve tasks myself.			.870		
21. To prove to myself and others that I am smart and intelligent.			.742		
12. Before mathematics seemed to be more meaningful, to me but now I wonder if it makes sense to continue with it.				.828	
19.I can not understand why we have to deal with mathematics, and honestly, I do not care much anymore.				.705	
3. Because if I now learn mathematics, one day I will be able to work what I dream of becoming.		.775			
8.To be able to find a nice and prestigious job when I graduate.		.910			
17. Because maths will help me find my dream job.		.765			
16.For the pleasure of being an expert in mathematics.					.805
18. Because I like to solve problems from any collections books of mathematics.					.869

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Confirmatory Factor Analysis

In order to confirm the structure of the Exploratory factor analysis, a confirmatory factor analysis was performed using AMOS. Confirmatory factor analysis (a) allows the researcher to see how well the data fits into a particular theoretical model (b) assists researchers to be precise in defining constructions. In this case, the theoretical model consists of five correlated factors.

Multiple fitness indexes were evaluated to support the model. The x2 / df ratio was included as an absolute fitness index with acceptable chi-square score corrected for degrees of freedom defined as less than five. We looked at two gradual adjustment indexes, the TLI index and the IFI index, with values close to .95 indicating good fit. We have also included the Comparative Index of Fitness (CFI) with values greater than .90 considered to be a good fit. Finally, we examined the approximate square error of approximation (RMSEA). Values below 0.05 show good fit, and values that are above .08 represent reasonable approximation errors. The model we tested had acceptable degree of fitness indexes as follows: x2 = 114.75 (df = 79), p = .01, $\chi 2$ / df = 1.453, TLI = 0.937, IFI =0.954, CFI =0.953, RMSEA = 0.061. The five factors correlate very well and have good regression weights.

The determination of the rentability of AMS-Mathematics is confirmed both by the internal correlations between the different subscales. In general, the correlations between the scales are in line with the theoretical concept of structure and the relationship between the types of motivations. For example, between two scales for internal motivation the correlation is very strong (r = 0.913). These results are in line with those of Guay et al., (2015), and also in the original author version of Vallerand et al. (1989). There is a negative relationship between the scale of "amotivation" and the two scales of internal motivation (r = - 0,247) and (r = - 0,181) and a negative correlation between the "amotivation" scale and the "external motivation" scale (r = - 0,034). Some factors are strongly related to each other. There is also a positive correlation between the scale of "external motivation - external regulation" and the " introjected regulation" scale (r = 0,342) and external regulation scale (r = 0,277). A moderate positive correlation is observed in both external motivation scales regulation and external regulation) (r = 0.632). This all speaks of a good consistency between the different scales.

In order to verify the discriminatory validity of SIMM, the hypothesis testing method was used. The results of the T-test are statistically significant in the five subscales of the AMS-Mathematics between students of Social sciences and students studying at the Faculty of Mathematics and Informatics, IME (t = - 3,048, sd = 5,69; p = 0,013); IM (t = - 4.048, sd = 4.69; p<0.001); IR (t = - 2.46, sd = 4.21, p = 0.043); ER (t = - 5.12, sd = 4.09, p = 0.029) and A (t = - 2.08, sd = 5.74, p = 0.072). Analysis of variance (ANOVA) showed statistically different gender factors only on several scales: (IME) - F (156,364) = 5,409; p = 0.023 and (IM) F (97.607) = 2.94; p = 0.059). In both cases it is found that girls have higher values on these two scales. In this sense, our results are partly confirmed by those of Guay et al., (2015), namely that female students have expressed more aspects of internal motivation [16]. No statistically significant differences were noted on the scales: (BP) F (227,897) = 0,795; p = 0.346); (A) F (217,218) = 1,182; p = 0.281) and (IR) F (185.519) = 0.014; p = 0.905). The "year of study" factor found that the third year students had the highest levels of internal motivation F (193,243) = 2,948; p = 0.58), and the lowest values on this scale were shown by first year students. Students who study the first year showed high levels on the "Amotivation" scale (82,531) = 3,624; p = 0.032) and the "External regulation" scale F (87.316) = 3.24; p = 0.047) and no significant differences were noted on the "introjected regulation" F (11,947) = 0.928; p = 0.400). These results indicate that in the first year of their studies students are still not professionally oriented or their motivation to complete their studies is related to the belief in finding a prestigious profession for the future. In the third year of their studies, internal motivation is likely to increase significantly because unmotivated students have dropped out after the first and second year of study. In the fourth year of training, internal motivation again falls because a large part of the students are engaged in company practices and in preparation for a state examination, which implies a stronger external motivation. In this sense, these results are in line with those of Chouinard (2001), which reduces the perceptions of teacher support and engagement in the learning process [15].

The convergence validity of AMS-Mathematics is confirmed by the measurement of the correlations between subscales of AMS-Mathematics and the general level of academic motivation (A.Velichkov) [25]. It was found that the high level of academic motivation correlates in statistically significant with internal motivation (r = 0.865), with internal motivation for expertise (r = 0.803), introjected regulation (r = 0.537), external regulation (r = 0.362) and amotivation (r = - 0.145). These results are an indication of good consistency between SIMM and the questionnaire to measure the overall level of academic motivation.

The criterion's validity of the test is confirmed by the measurement of the correlations between the AMS-Mathematics subscales and the various motivational consequences. For example, one-factor dispersion analysis has shown that students who have reported their optimism in dealing with the most difficult tasks during the study have shown that they are internally motivated to study mathematics (on a scale of "internal motivation to learn mathematics - F (773,865) = 4,879, p = 0,030). The same is true for those students who have high levels of internal motivation for expertise (F (117,782) = 3,651, p = 0,054, and those who show learned in helplessness mathematics have shown high values on the "amotivation" scale F (173,108) = 4,827, p = 0,031 Students who report high values on the introjected regulation scale also show the belief that they can cope with the most difficult math tasks - F (168, 175) = 3,92, p = 0.053 There was no statistically significant difference on the "external regulation" scale (F (221.763) = 0.28, p = 0.867). Thirthermore, one correlation analysis found that students who showed high values on both scales measuring inner motivation reported high scores for their own mathematical success during the school year (r = 0.351, p = 0.01 and r = 0.360; p = 0.01), in those who are externally motivated no correlation is observed (r = 0.035; p = 0.771), students who have reported high levels of amotivation tend to indicate low values for their own success in mathematics during the school year (r = - 0,303; p = 0.01). No statistically

significant differences were observed for other scales. High and statistically significant correlations give reason to suppose that the constructs are interconnected. Significant relationships with other scales are proof of the validity of the scale. Similar correlation dependencies demonstrating the validity of AMS-Mathematics subscales and other motivational effects such as hourly concentration, psychological well-being at school, academic performance in school, and attitudes and intentions to continue education [5].

Criterion validity of the scale is also found in the relationship between emotions and the subscales of the AMS-Mathematics. It was reported on the BM scale that its predictors were emotions such as satisfaction and pride and, to the least, disgust and anger - F (65,573) = 2,352; p = 0.057. A statistically significant difference was also recorded on the BP scale - F (58,18) = 1,97; p = 0.059, the leading emotion is anger. It can be assumed that this emotion is a result of experienced frustration among students with a similar style, that is, as a result of the perception or belief that an unresolved task can be an obstacle to achieving some instrumental expectations - obtaining a diploma, finding a work, etc. The remaining subscales did not report a statistically significant difference.

Studies on the adaptation and standardization of a particular scale are topics of major importance for educational research as they provide an opportunity to collect reliable and valid data subsequently. The understanding of motivation and its dynamics is one of the main prerequisites for good process in education. When there is a quality tool to measure student and university student motivation then it is possible for educators and school administrators to periodically monitor the level of motivation for learning in mathematics. The present study found out the results of the constructive and convergent validity of the Bulgarian form of AMS (Vallerand et al.) [5] which is based on the theory of Deci and Ryan [3]. The internal consistency of the scales proved to be high, the Cronbach alpha varies between 0.916 and 0.779 for a sample of students, indicating that the items are understandable for Bulgarian students.

6. Conclusion

The main objectives of this study were to validate the AMS-Mathematics's factor structure, which is a modified version of AMS, gender differences, course, specialties by the different subscales, and to evaluate relationships with the variables related to the criterion.

A five-factor structure with good fit indexes in structural model has been identified, indicating that this model is suitable for explaining the data received from Bulgarian students. All five subscales have good internal consistency.

The correlations between subscales reveal a pattern that corresponds to the self-determination theory where the neighbouring subscales have stronger positive correlations, and the more remote one either don`t establish a significant relationship or the relationship is negative.

The correlations between the AMS-Mathematics subscales and the variables associated with belief in the success in mathematics, as well as the self-esteem in mathematics, as well as the emotions, indicate results that match the projections of the self-determination theory.

The value of AMS-Mathematics is that with a short scale, a wide range of motivational styles can be explored, based on the self-determination theory. The results of the present study indicate the factor structure and invariance among the Bulgarian sample, the reliability and the predictable validity. The translated version of AMS in English captures the original constructions for the Bulgarian context to a large extent, and for the future this scale can also be used for other purposes. For example, predictors and consequences of academic motivation.

The present study also has limitations. For example, these results should be supported by longitudinal studies to confirm the constant nature of the scale structure and also to study other age groups based on a larger sample.

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