On the Path to Success: The Influence of Motivation and Self-Regulation Resources on the Academic Success of University Students

Marina A. Merikova
Moscow State University of Psychology and Education, Moscow, Russia
ORCID: https://orcid.org/0000-0003-2334-7608, e-mail: merikova@gmail.com

Currently, the higher education system is constantly changing: the education of increasing number of students is becoming associated with the use of distance technologies, which is why it is so important to identify motivational factors that have a potential impact on the academic success of students of different forms of education. The sample of the study consisted of 114 students of different forms of education (74 extramural students with the use of E-Learning and Distance Educational Technologies and 40 full-time students). Two indicators were used to measure academic achievements: the average score for all previous examination sessions and the self-appraisal of learning scale of the questionnaire by T.V. Kornilova et al. The Academic Motivation Scale (AMS) was used to study the motivational-semantic component, the Brief Self-Control Scale and the Style of self-regulation of behavior – SSRB 2020 questionnaire were used to study the motivational-regulatory component. The Explanatory Style of Successes and Failures (ESSF) technique and the General Self-Efficacy Scale by R. Schwarzer and M. Yerusalem, adapted by V.G. Romek, were used to study the cognitive-motivational component, the persistence and perseverance scale (Grit) was used to study the integrative component. The results showed that if strong internal motivation prevails, it sufficiently determines academic success, but if motivation is lacking or is external, other components, namely self-regulation resources and the style of explaining successes and failures in achievement activities, help to increase academic success. At the same time, the influence of the form of education was not revealed.

Keywords: motivation; self-regulation resources; style of behavior self-regulation; attributive style; educational success; university; distance learning; full-time study; average score; internal motivation; external motivation; students.

На пути к успеху: мотивация и ресурсы саморегуляции как предикторы академической успешности студентов

Мерикова М.А.
ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация
ORCID: https://orcid.org/0000-0003-2334-7608, e-mail: merikova@gmail.com

В настоящее время система высшего образования непрерывно меняется: обучение все большего количества студентов становится сопряжено с использованием дистанционных технологий, поэтому так важно определить мотивационные факторы, оказывающие потенциальное влияние на академическую успешность студентов различных форм обучения. Выборку исследования составили 114 студентов разных форм обучения (74 студента заочной формы обучения с применением электронного обучения и дистанционных образовательных технологий и 40 студентов очной формы обучения). Для измерения академических достижений использовались два показателя: средний балл за все предыдущие сессии и шкала самооценки обучения опросника Т.В. Корниловой и ее коллег. Для изучения мотивационно-смысловой компоненты мотивации использовался опросник «Шкалы академической мотивации» (ШАМ), для изучения мотивационно-регуляторной компоненты – краткая шкала самоконтроля и опросник «Стиль саморегуляции поведения – ССПМ 2020», для изучения когнитивно-мотивационной компоненты – методика «Стиль объяснения успехов и неудач» (СТОУН) и опросник общей самоэффективности Р. Шварцера и М. Ерусалема в адаптации В.Г. Ромека, для изучения интегративной компоненты – опросник упорства и настойчивости (Grit). Результаты

показали, что если преобладает сильная внутренняя мотивация, то она в достаточной степени определяет академическую успешность, но если мотивации не хватает либо она носит внешний характер, то повысить академическую успешность помогают другие компоненты, а именно – ресурсы саморегуляции и стиль объяснения успехов и неудач в достиженческой деятельности.

Ключевые слова: мотивация; ресурсы саморегуляции; стиль саморегуляции поведения; атрибутивный стиль; успешность обучения; вуз; заочная форма обучения; очная форма обучения; дистанционное обучение; средний балл; внутренние мотивы; внешние мотивы; студенты.

Introduction

The study of various factors that influence students' academic achievements does not lose its relevance, since academic achievements are related to success in the professional sphere [31]. Commonly recognized factors are intellectual and motivational [3; 6], while the importance of motivational factors is explained by their role in the regulation of activity. T.O. Gordeeva's theoretical approach, which suggests taking into account the structure of motivation and considering some motivational variables as necessary conditions and others as mediators or moderators of the influence of the first variables on academic achievement, seems promising; therefore, in this study we will rely on the structural dynamic model of motivation of achievement activity proposed by T.O. Gordeeva [4]. According to this model, four blocks of motivational variables are distinguished: motivational-semantic, motivational-regulatory, cognitive-motivational and integrative. "The first includes a hierarchy of internal and external motives that trigger activity, the second - the process of goal-setting, including planning, self-regulation and self-control in the performance of activity, the third - cognitive predictors that trigger goal-setting and perseverance and include ideas about the causes of successes and failures, means of achieving goals and the measure of their possession, and the fourth - persistence, concentration and perseverance in achieving goals and encountering difficulties and failures" [4, c. 3].

Many studies have been devoted to the relationship between motivational and semantic variables and academic success [4; 8; 9; 12-15; 18; 19], while the role and place of the other components have been less studied [1; 2; 5; 29], especially in the transition to blended or

distance learning. Currently, digital learning environments (DLEs) are becoming increasingly important as a significant number of learning environments are being implemented that are realized through digital technologies. Initially, this was largely due to the changes in the world that the pandemic caused, but many students are now consciously choosing to study using distance technology. All this entails the question of the significance of motivational-regulatory, cognitive-motivational and integrative blocks in such a learning environment, as it is necessary, among other things, to develop new skills and abilities, an important condition of which is self-regulation. It can be assumed that these blocks will play a more important role in determining academic success when elements of distance learning are introduced.

If we consider self-regulation in relation to learning activity, we can say that it is a system of self-organization by the learner of his/her actions aimed at self-learning and self-education, as well as at the effective functioning of the student in the learning process. From the point of view of E. Yu. Ponomareva [17], the system of self-regulation assumes the presence of the following components: self-analysis of personal conditions, motivation in the successful process of a certain activity, goal setting and action planning, self-correction. The presence of these components is associated by some researchers with the ability to work independently in general. In the case when we talk about distance learning, independent work is especially important, because the success of learning directly depends on the student's ability to competently organize their activities. At the same time, according to the data obtained by the researcher, learning in a digital environment, in turn, also contributes to the improvement of self-regulation in students. Based on all this, we can say that the presence of developed self-regulation allows to achieve the goals associated with the acquisition of knowledge, skills and abilities in the digital educational environment. In this case, according to V.I. Morosanova, it is extremely important for successful learning to form an effective regulatory style. Its presence can be considered as a resource for activating the necessary individual features by compensating for the style features developed to different degrees.

Self-control, being the confidence in one's ability to consciously regulate one's behavior, is related to the personality's ability to self-regulate. It should also be noted that when acquiring knowledge in a digital environment, developed self-control is a significant component of successful learning [22], especially in distance learning [26], although its links with motivation and self-efficacy have not been found [21]. The role of attributional style, as the way people explain to themselves the reasons for various events, in predicting academic success has also been emphasized in various studies [23-25], with some evidence that attributional style is very important in blended learning [30].

Meanwhile, the empirical evidence regarding the components contributing to academic success is somewhat contradictory. For example, in one of the studies, regression analysis showed that only one indicator of self-regulation (time management) was statistically significantly included in the model. Moreover, its standardized regression coefficient beta is negative and close to zero (-0.03). The highest regression coefficient (0.53) turned out to be

for the indicator "Search for support", but it is statistically insignificant [27, p. 17]. Such results can be explained by the use of the regression method with the inclusion of all measured and highly correlated indicators at once. The absence of multicollinearity test and negative standardized regression coefficients allow us to doubt the explanatory power of self-regulation resources for the mean score on the session (r2=0.54). Another study found that although goal setting was related to academic success, this relationship was not mediated by self-efficacy, engagement, and learning satisfaction in online learning [28]. An extensive review [33] noted that among 73 articles on the contribution of self-regulation to academic success of mixed and distance learning students, only 63% of studies (N=46) found a positive effect; no effect was found in 19% of studies (N=14) and conflicting results were obtained in 18% of studies (N=13) [33].

It can be assumed that when switching to blended, and even more so fully distance learning, the importance of all additional components (in addition to motivational and semantic) will increase and they will have a greater impact on learning outcomes than in face-to-face traditional learning. Thus, the hypothesis of this study was the following statement: motivational-regulatory, cognitive-motivational, and integrative components will play a more important role in predicting academic success in students using distance technologies. To test this hypothesis, students from the same institution were selected from full-time, face-to-face students and part-time, mixed-format, but predominantly distance learning students.

Method

Sampling. The study involved full-time and part-time students with the use of E-learning (EL) and distance education technologies (DET) at Maksim Tank Belarusian State Pedagogical University (BSPU). Full-time students (N=40, 90% female) were in their second year of study and never switched to distance learning at the university: both lecture and practical classes were conducted face-to-face, without the use of E-Learning and DLT (face-to-face). Distance learning students using EL and DLT (N=74, 92% female) were predominantly in the third year, which is approximately the same as the second-year full-time program. Distance learning classes were conducted on the following platforms: ZOOM, Big Blue Button, Moodle. In Moodle were developed training courses for all disciplines of the specialty, students were offered lectures, materials for practical classes, stimulating questions, tasks and practice-oriented materials, with which they could familiarize themselves both before and after classes. Knowledge was tested both orally in online classes and in the form of tests for all disciplines, which allowed for a comprehensive and unbiased assessment of the acquired competencies. Students had the opportunity to receive feedback from teachers not only during the classes, but also after them, addressing questions in Moodle and receiving answers, they closed gaps in knowledge (subject-subject interaction).

Procedure. The study was conducted at the end of the academic year (April-May). The testing was electronic (google forms), voluntary and anonymous.

Methods. To study the motivational and semantic component, we used the questionnaire "Academic Motivation Scale" (AMS) by T.O. Gordeeva et al. [7], including seven scales: three types of intrinsic motivation (cognitive, achievement, self-development motivation), three types of external

motivation of learning activity (self-esteem motivation, introjected, externalized) and amotivation. To study the motivational-regulatory component, we used questionnaires: a Brief Self-Control Scale by J. Tangney, R. Baumeister and A.L. Boon in the adaptation of T.O. Gordeeva et al. [5] and V.I. Morosanova's "Style of Self-Regulation of Behavior - SSRB 2020" questionnaire [16], designed to diagnose self-control behavior [16], designed to diagnose the development of conscious self-regulation and the profile of its style features, which are steadily manifested in various types of arbitrary activity and life situations, and allows to determine seven different aspects of self-regulation: goal planning, modeling of significant conditions for achieving the goal, programming of actions, evaluation of results, flexibility, reliability, perseverance, as well as the overall level of conscious self-regulation. To study the cognitive-motivational component, we used the Explanatory Style of Successes and Failures (ESSF) technique [6], which diagnoses the optimistic/pessimistic style of explaining successes and failures in achievement activities according to the parameters of globality, stability and controllability, and the general self-efficacy questionnaire by R. Schwarzer and M. Yerusalem in the adaptation of V.G. Romek [20]. To study the integrative component, we used the persistence and perseverance (Grit) scale by A. Duckworths et al. in the adaptation of Y.A. Tyumeneva et al. [32].

Two indicators were used to measure academic achievement: the average score for all previous sessions (10-point scale) and the questionnaire of T.V. Kornilova and her colleagues [11], which contains three scales of the original questionnaire (Acceptance of the implicit theory of "buildable intelligence", Acceptance of the implicit theory of "enriched personality", and Acceptance of learning goals), as well as an additional scale "Self-appraisal of learning".

All data is presented in the repository of psychological research and instruments of the Moscow State University of Psychology and Education RusPsyDATA [10].

Statistical analysis. A two-factor analysis of variance was used to compare the motivational profiles of full-time and part-time students for a mixed experimental design (the between-group factor was the department (full-time/part-time) and the within-group factor was the academic motivation scales). To determine the contribution of motivation to academic success, which was measured using two indicators (academic performance and self-efficacy for learning), a multiple regression analysis was conducted using the academic success indicators in turn as the dependent variable and different types of motivation (subscales of the "Academic Motivation Scale" method) as predictors. A stepwise inclusive algorithm was used. To determine whether the motivational-regulatory, cognitive-motivational, and integrative components were important for learning effectiveness, measures of self-control, self-regulation of behavior, attributive style, self-efficacy, and persistence were added to the regression model. To select the most important predictors, a stepwise inclusive algorithm was used, statistically significant predictors were selected, and then the model was recalculated using the standard method to obtain regression coefficients and coefficient of determination. The analysis was performed separately for each group of students (full-time and part-time). Calculations were performed in the STATISTICA 12.0 program.

Results

The results of the comparison of motivational profiles showed that there is a statistically significant interaction with a strong effect between the variables form of study and academic motivation scale

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(F(6,672)=18.40; p<0.0001; η2=0.14), indicating significant differences between the profiles of students from different departments. Duncan's post hoc test showed statistically significant differences for all scales except the scales of self-esteem motivation (p=0.27) and introjected motivation (p=0.054). Comparisons of the mean (cf. figure) show that full-time students have more pronounced externalized motivation and amotivation (Duncan's post hoc test, p<0.001), while part-time students have all types of intrinsic motivation: cognitive (Duncan's post hoc test, p<0.001), achievement (Duncan's post hoc test, p<0.001) and self-development motivation (Duncan's post hoc test, p=0.014). The statistically significant interaction and the obtained averages indicate that intrinsic motivation prevails in part-time students, whereas extrinsic motivation prevails in inpatient students.
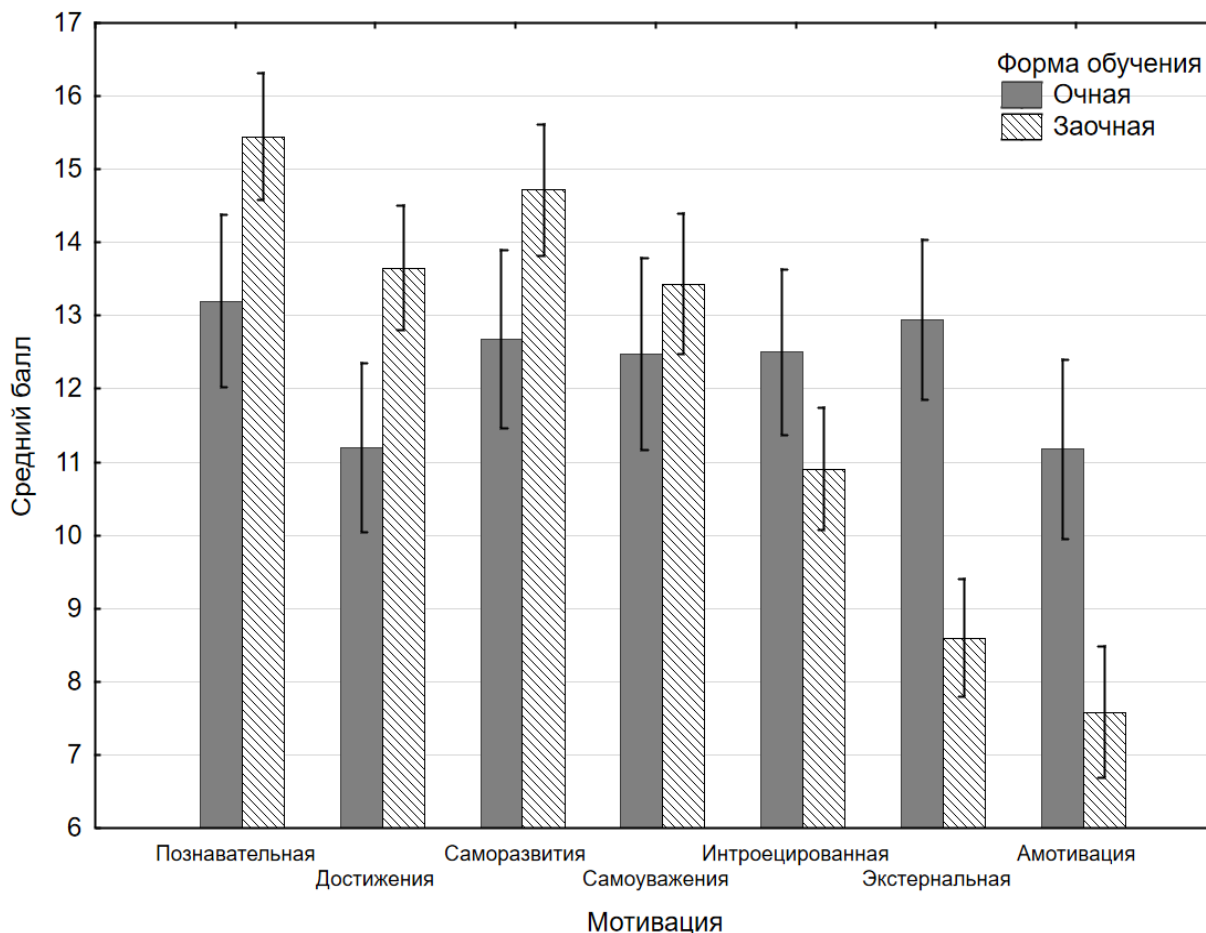
Fig. Mean values of academic motivation scales for full-time and extramural students (vertical bars indicate 95% confidence interval)

Table 1 presents the results of descriptive statistics and comparative analysis of part-time and full-time students for all other parameters used in the study (motivational-regulatory, cognitive-motivational and integrative components). It was found (Table 1) that, in general, self-regulation parameters and the level of self-control and self-efficacy are developed in students of both

departments at approximately equal levels, with part-time students being characterized only by significantly more pronounced goal planning (t(112)=-2.09; p<0.05), although the effect size is smaller than average (Cohen's d<0.5). It can be noted that no significant differences were found in the parameters of attributional style and level of optimism on positive and negative events, as well as in the level of stability of interests and persistence in full-time and extramural students. Based on this, we can conclude that full-time and part-time students differ mainly in academic motivation, and motivational-regulatory, cognitive-motivational and integrative components are expressed in them equally. In this regard, it is particularly interesting to test whether the contribution of these equally and dissimilarly expressed components to academic success differs with different forms of learning. Multiple regression analysis was used for verification.

Table 1

Results of Comparing the Motivational Components of Extramural and Full-Time Students: Descriptive Statistics and Student's t-test Results

Parameter	Full-Time M±σ	Extramural M±σ	t	Cohen's d
Style of Self-Regulation of Behavior				
Goal Planning	12,3±4,11	13,8±3,59	-2,09*	0,41
Modelling Conditions	13,3±3,00	13,4±2,79	-0,30	0,06
Programming Actions	15,1±2,68	14,9±2,99	0,24	0,05
Evaluation of Results	11,4±3,08	12,6±3,61	-1,89	0,37
Flexibility	14,2±2,88	13,8±3,18	0,62	0,12
Reliability	8,9±3,71	9,8±3,46	-1,32	0,26
Perseverance	14,2±3,28	14,6±2,79	-0,61	0,12
General Level of Self-Regulation	89,4±14,1	93,1±13,44	-1,40	0,27
«Self-Control» Method				
Level of Self-Control	36,7±8,78	38,9±7,03	-1,46	0,29
General Self-Efficacy Scale				
Level of Self-Efficacy	29,8±5,33	30,5±5,48	-0,69	0,13
Adult Explanatory Style of Successes and Failures Questionnaire				
Stability Parameter	58,7±8,93	61,2±7,98	-1,54	0,30
Globality Parameter	69,4±12,46	71,3±10,45	-0,87	0,17
Control Parameter	72,8±10,31	71,2±11,55	0,76	0,15
Optimism in a situation of success	93,5±15,79	92,9±14,02	0,19	0,04

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Optimism in a situation of failure	107,4±15,52	110,68±13,78	-1,17	0,23
Optimism in situations of achievement	120,1±15,58	121,0±14,00	-0,33	0,06
Optimism in interpersonal situations	80,8±10,59	82,6±10,69	-0,87	0,17
General level of optimism	200,9±24,78	203,7±21,36	-0,62	0,12
«GRIT» Method				
Stability of interests	20,5±5,55	21,5±4,29	-1,05	0,21
Perseverance	17,5±3,95	18,1±3,54	-0,86	0,17

The results of regression analysis are presented in Table 2 for extramural students and in Table 3 for full-time students. It can be seen that for students of both departments motivation (motivational-semantic component) predicts academic performance slightly lower than self-assessment of learning ($r2=0.12$ and $r2=0.33$ for correspondence students and $r2=0.12$ and $r2=0.40$ for full-time students). Self-development motivation turned out to be the main predictor for extramural students and achievement motivation for full-time students. Thus, in both cases, internal motivation is the determinant.

Table 2

Results of Regression Analysis for Predicting Academic Success (Grade Average and Self-Appraisal of Learning) by Different Indicators of Motivational-Semantic Component and by Indicators of Motivational-Semantic, Motivational-Regulatory, Cognitive-Motivational and Integrative Components for Extramural Students

Academic Success	Performance (Average Grade)	Self-Appraisal (Implicit Theories and Learning Objectives Questionnaire, scale 4)
Motivational-Semantic Component		
Predictors	Self-development motivation (0,34)	Self-development motivation (0,57)
r^2	0,12	0,33
Motivational-Semantic, Motivational-Regulatory, Cognitive-Motivational, and Integrative Components		
Predictors	Self-development motivation (0,25)	Self-development motivation (0,42)
	Evaluation of results (0,25)	Overall level of conscious self-regulation (0,32)
r^2	0,17	0,41

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Note: standardized regression beta coefficients are given in parentheses (p<0.05).

When adding the indicators of motivational-regulatory, cognitive-motivational and integrative components for extramural students, the model included only the indicators of self-regulation of behavior (Table 2). The mean score can be predicted a little better if we take into account not only motivation but also outcome evaluation, i.e., the development and adequacy of respondents' evaluation of themselves, their actions, and the results of their activities and behavior. In addition to motivation, the general level of conscious self-regulation contributes to the prediction of learning self-appraisal. The little changed coefficients of determination (0.12 vs 0.17 for academic achievement and 0.33 vs 0.41 for learning self-appraisal) suggest that the role of self-regulation resources is not significant.

Table 3

Results of Regression Analysis for Predicting Academic Success (Grade Average and Self-Appraisal of Learning) on Different Indicators of the Motivational-Semantic Component and on Indicators of Motivational-Semantic, Motivational-Regulatory, Cognitive-Motivational and Integrative Components for Full-Time Students

Academic Success	Performance (Average Grade)	Self-Appraisal (Implicit Theories and Learning Objectives Questionnaire, Scale 4)
Motivational-Semantic Component		
Predictors	Achievement Motivation (0,35)	Achievement Motivation (0,64)
r^2	0,12	0,40
Motivational-Semantic, Motivational-Regulatory, Cognitive-Motivational, and Integrative Components		
Predictors	Achievement Motivation (0,39)	Achievement Motivation (0,53)
	Modeling of meaningful conditions (0,28)	Persistance (0,39)
	Action programming (0,48)	Globality (-0,41)
		Stability (0,55)
r^2	0,46	0,70

Note: standardized regression beta coefficients are given in parentheses (p<0.05).

For full-time students (Table 3), on the contrary, the coefficients of determination increased significantly when self-regulation resources were added to the model (0.12 vs 0.46 for academic performance and 0.40 vs 0.70 for self-appraisal of learning), indicating their more important role in determining academic success in this case. In addition, compared to part-time students, such resources entered the model somewhat more: modeling meaningful conditions and action programming was found to be important for predicting grade average, and persistence, globality, and stability were found to be important for predicting self-appraisal for learning.

Discussion

The results of the study demonstrated that the level and nature of motivation in learning activities are somewhat different among students of different forms of study. In particular, extramural distance education students have more pronounced intrinsic motivation than full-time students. At the same time, full-time students are more inclined to external motivation and somewhat more often demonstrate a lack of interest and a sense of meaningfulness of learning activities. It can be assumed that such differences are caused by the learning format itself, since learning through distance technologies most often implies greater student autonomy in studying learning materials, greater involvement in the learning process and awareness.

Meanwhile, the parameters of self-regulation, self-control, self-efficacy, persistence and perseverance actually have no differences among students of different forms of learning. This may indicate that, in general, the personal components responsible for the success and achievement of goals in any activity, including learning, do not undergo significant changes in the process of full-time or part-time education.

The results of regression analysis show that the hypothesis of the study was not confirmed. Contrary to the assumption that motivational-regulatory, cognitive-motivational, and integrative components would be more important in predicting academic success when applying distance learning, the study established the opposite pattern. Motivational-regulatory, cognitive-motivational and integrative components in general are significant predictors of academic success, while for full-time students the role of these motivational components is especially great (when they are added, the coefficient of determination doubles). It can be assumed that for extramural students the internal motivation itself, the desire to obtain certain knowledge is a sufficient stimulus to learning, to achieve higher results, while full-time students require additional factors (in the form of the development of self-regulation parameters, self-efficacy and self-control). Consequently, if the motivational-semantic component is strongly expressed, it sufficiently determines academic success, but if motivation is lacking or is external in nature, other components, namely self-regulation resources and style of explaining successes and failures in achievement activities, help to increase academic success.

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The main limitation of this study is the small sample size, which may have affected the reliability of the results and the possibility of their extension to the general population.

Conclusions

1. Full-time students have more pronounced externalized motivation and amotivation, while part-time students have all types of internal motivation: cognitive, achievement and self-development motivation. At the same time, students of different forms of education practically do not differ in the expression of motivational-regulatory, cognitive-motivational and integrative components.

2. The contribution of motivational-regulatory, cognitive-motivational and integrative components to academic success is quite contradictory and has a different character depending on the form of education. In particular, these components make the most significant and complex contribution to the success of academic activity in full-time students, while academic success in part-time students is mostly conditioned only by the influence of motivational factors. These results may be related to the revealed specificity of motivational structure of students of different forms of education. Based on this, it can be assumed that in the absence of intrinsic interest in academic achievements, full-time students have to use additional sources in the form of self-regulation, optimism, self-control, self-efficacy and persistence.

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Информация об авторах

Мерикова Марина Андреевна, аспирант кафедры возрастной психологии имени профессора Л.Ф. Обуховой, ФГБОУ ВО «Московский государственный психолого-

педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация, ORCID: https://orcid.org/0000-0003-2334-7608, e-mail: merikova@gmail.com

Information about the authors

Marina A. Merikova, Postgraduate Student, Department of Developmental Psychology, Moscow State University of Psychology and Education, Moscow, Russia, ORCID: https://orcid.org/0000-0003-2334-7608, e-mail: merikova@gmail.com