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THE SYSTEM OF PSYCHOLOGICAL PREDICTORS OF PERSISTENCE OF SUCCESSFUL AND UNSUCCESSFUL STUDENTS IN EDUCATIONAL ACTIVITIES

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Authors' Contribution:

A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection.

The relevance of research. The analysis of students' persistence in learning is a promising and insufficiently studied direction of volitional regulation of educational activity. The search for psychological (cognitive, emotional-volitional, motivational and personal) predictors of persistence is especially relevant (Magdalena Marszał-Wiśniewska, Ewa Jarczewska-Gerc, 2015). The formation of persistence in studies as a volitional quality of a person and a mechanism for self-regulation of activity can be considered as the goal of the efforts of counseling psychologists, psychological support workers who work with students in higher education institutions. The impacts that develop can be directed towards psychological predictors of persistence.

The aim of the study is to build an integral model that would be based on reliable empirical data and would combine a system of psychological predictors of student persistence in learning. It is also important to develop variants of this model for successful and unsuccessful students.

Sample and research methods. The sample - 156 people (125 women and 31 men) at the age from 17 to 26 years old - students of H.S. Skovoroda Kharkiv National Pedagogical University, Kharkiv State Academy of Physical Culture, Kharkiv Pedagogical Lyceum No. 4. Using the procedure of multiple regression analysis, the cumulative (systemic) influence of a number of factors on persistence in learning was assessed. Among them: GRIT general tenacity, alienation and burnout from learning, hardiness, coping strategies, sensitivity to feedback, Big-Five factors, dispositional optimism, academic self-regulation, procrastination and success. The results were processed both for the entire sample as a whole and separately for the groups of successful and unsuccessful students. The dependent variable in regression analysis was persistence in learning action. It was measured using the author's questionnaire by M. Kuznetsov and A. Halata (2017).

Results. The greatest influence on the part of diagnosed predictors was found for a group of students with low academic performance. The smallest number of predictors was found for the group of students with high academic performance. The most influential were the cognitive predictor of persistence - sensitivity to feedback and a strong-willed predictor - persistence according to the Grit method. Lack of academic procrastination is a behavioral factor in the development of persistence among successful and unsuccessful students. A distinctive characteristic for the formation of the optimal level of persistence in the group with low academic performance

was the dependence of persistence on emotional-volitional, behavioral and personal predictors.

Conclusions. The most powerful predictors of learning persistence are sensitivity to feedback, emotional stability, extraversion and conscientiousness, identified regulation of learning activity and regulation by one's own motivation, high hardiness of the individual, coping strategy aimed at solving a problem. Academic procrastination, external regulation of educational activity, coping strategy "emotions", alienation and burnout from learning negatively affect academic persistence.

Keywords: persistence, persistent learning action of a student, psychological predictors of student persistence in learning, emotional-volitional, cognitive, motivational, behavioral, personality predictors of persistent learning action, self-regulation of student's educational and professional activities, regression model of predictors of persistent learning action, persistence of successful students, persistence of unsuccessful students.

Система психологічних предикторів завзятості успішних та неуспішних студентів у навчальній діяльності

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A – дизайн дослідження; B – збір даних; C – статистичний аналіз; D – підготовка рукопису; E – збір коштів.

Актуальність дослідження. Перспективним і недостатньо вивченим напрямком вольової регуляції навчальної діяльності є аналіз завзятості студентів у навчанні. Особливо актуальним є пошук психологічних (когнітивних, емоційно-вольових, мотиваційних та особистісних) предикторів завзятості (Маршал-Вишневецька М., Ярчевська-Герц Е., 2015). Формування завзятості у навчанні як вольової якості особистості і механізму саморегуляції діяльності може розглядатися як мета зусиль психологів-консультантів, працівників служби психологічного супроводу, які працюють зі студентами в закладах вищої освіти. Впливи, що розвивають, можуть бути спрямовані на психологічні предиктори завзятості.

Мета дослідження. Метою даного дослідження є побудова такої інтегральної моделі, яка була б заснована на надійних емпіричних даних і об'єднувала б у собі систему психологічних предикторів завзятості студентів в навчанні. Також важливою є розробка варіантів цієї моделі для успішних, та неуспішних студентів.

Вибірка і методи дослідження. Вибірка – 156 осіб (125 жінок та 31 чоловіків) у віці від 17 до 26 років – студенти Харківського національного педагогічного університету імені Г.С. Сковороди, Харківської державної академії фізичної культури, Харківського педагогічного ліцею № 4. За допомогою процедури множинного регресійного аналізу оцінювався сукупний (системний) вплив на завзятість в навчанні загальної завзятості (зафіксованої за допомогою GRIT-шкали), відчуження та вигорання від навчання, життєстійкості, копінг-стратегій, чутливості до зворотного зв'язку, факторів Великої П'ятірки, диспозиційного оптимізму, академічної саморегуляції, прокрастинації і успішності. Оброблялися результати як для всієї вибірки в цілому, так і окремо в групах успішних і неуспішних

студентів. Залежної змінної у регресійному аналізі був показник завзятості у навчальній дії. Він вимірювався за допомогою авторського опитувальника М. Кузнєцова і О. Галати (2017).

Результати. Найбільший вплив з боку діагностованих предикторів виявлено для групи студентів з низькою успішністю. Найменше число предикторів виявлено для групи студентів з високою успішністю. Найбільш впливовими виявилися когнітивний предиктор завзятості – чутливість до зворотного зв'язку та вольовий предиктор – завзятість за методикою Grit. Відсутність академічної прокрастинації є поведінковим чинником розвитку завзятості в успішних та неуспішних студентів. Відмінною характеристикою для формування оптимального рівня завзятості у групі з низькою успішністю є залежність завзятості від емоційно-вольових, поведінкових та особистісних предикторів.

Висновки. Найбільш потужними предикторами навчальної завзятості виступають чутливість до зворотного зв'язку, емоційна стабільність, екстраверсія та добросовісність, ідентифікована регуляція навчальної діяльності та регуляція власним спонуканням, висока життєстійкість особистості, копінг стратегія направлена на вирішення задачі. Показниками які негативно впливають на навчальну завзятість та навчальні завзяті дії є академічна прокрастинація, зовнішня регуляція навчальної діяльності, копінг направлений на емоції, вигорання та відчуження від навчання.

Ключові слова.

Завзятість, завзята навчальна дія студента, психологічні предиктори завзятості студентів у навчанні, емоційно-вольові, когнітивні, мотиваційні, поведінкові, особистісні предиктори завзятої навчальної дії, саморегуляція навчально-професійної діяльності студента, регресійна модель предикторів завзятої навчальної дії, завзятість успішних студентів, завзятість неуспішних студентів.

Introduction. Theoretical generalization of studies devoted to the problem of volitional regulation of educational actions among schoolchildren and students suggests that this period is characterized as the most sensitive for the development of self-regulation and regulatory functional systems (Kuznetsov, 2012; Kuznetsov, Halata, 2017). One of these systems is volitional quality - persistence (Olekseeva, 2017; Halata, 2017, 2018). Persistence in learning actions can be defined as a psychological mechanism for supporting the begun

learning action, which forms the ability for prolonged mental effort, interest in learning projects and volitional regulation of learning activity. The main property of persistent learning action is to continue acting despite difficulties and various distractors.

In our empirical studies it was found that the manifestation of the structural components of educational persistence reflects the degree of formation of personal, cognitive, emotional-volitional, motivational and activity structures of regulation of educational and professional activity of students (Halata, 2018, 2020). The correlations between persistence and hardiness indicate that the higher the level of hardiness of students, the ability to withstand educational stresses, difficult life circumstances and at the same time maintain the success of educational activities, the higher their level of persistence. The analysis of cognitive predictors of learning persistence suggests that sensitivity to feedback is one of the key elements in the regulation of learning and educational-professional activities. It is characterized by the need to evaluate the success of one's actions and to correct them in accordance with a given criterion; certain memories and information that are endowed with personal content, transformed into a meaningful experience, follow in the memory of a person.

The study of emotional-volitional self-regulation, which affects the development of learning persistence, showed that alienation and burnout from learning is inversely correlated with persistent learning actions. The closest negative interconnections were found between all measures of burnout and alienation techniques and learning actions. The motivational predictors of persistent learning actions were identified, which are represented by the correlation between learning persistence and intrinsic and identified motivation. Another component of motivational predictors of persistent learning activity is the low level or complete absence of academic procrastination. The most important activity predictors were empirically investigated, at which the optimal level of educational persistence is formed.

The problem of constructing a generalized integral model of the dependence of students' persistence in learning activity on the system of cognitive, emotional-volitional, motivational and activity predictors

remains relevant. It is also necessary to study the specifics of this dependence among successful and unsuccessful students. Therefore, the purpose of this article is to analyze the results of building such a model. The degree of its development depends on the effectiveness of psychological support of students within the psychological service of higher educational institutions. It is assumed that this support can be aimed at the formation of students' persistence in educational and professional activities.

Research methods and sample. Using the procedure of multiple regression analysis, the influence of the system of psychological predictors on students' manifestation of persistence in educational activity was studied. The indicator of persistent educational action, expressed in a metric scale, was used as a dependent variable. It was measured using the author's questionnaire by M. Kuznetsov and A. Halata (2017).

To build a reliable regression model, we used such criteria as 1) multiple correlation coefficient (R), which reflects the degree of dependence of the indicators of persistent learning action on the set of independent variables, 2) regressive beta coefficients (β), which show the degree of influence of each individual independent variable on the persistence index, 3) multiple determination coefficient (R^2), that is, the proportion of the total variance of the dependent variable, which is explained by the set of predictors, and 4) adjusted R^2 multiple determination coefficient to obtain a more rigorous and reliable confirmation of the reliability of the regression model.

The most reliable regression model was generated based on the following list of predictors.

1. *Academic performance* (arithmetic mean values of the current performance of students in the main, major disciplines).

2. *Alienation from learning*, which was diagnosed using the E.N. Osin (2015) questionnaire according to four parameters - vegetativeness (inability to believe in the truth, importance or value of educational activity), powerlessness (disbelief in one's ability to influence life situations while maintaining a sense of their importance), nihilism (belief in the absence of meaning and activity,

aimed at its confirmation through destructiveness) and adventurism (compulsive search for vitality through extreme activities).

3. *Burnout from educational activities*, which was diagnosed according to three parameters (emotional exhaustion, depersonalization and reduction of professional achievements) using the Burnout Scale for pupils and students by E.N. Osin (2015).

4. *Dispositional optimism*, which was assessed using the dispositional optimism (LOT) questionnaire by Michael F. Scheier and Charles S. Carver modified by T.O. Gordeeva, O.A. Sychev, E.N. Osin (2010).

5. *Academic self-regulation*, which was diagnosed using the questionnaire of R.M. Ryan and D.R. Connell (Causal dimension scale II SRQ-A) modified by M.V. Yatsyuk (2008). We determined four indicators reflecting the state of motivation for educational activity of students - external regulation, introjected regulation, identified regulation and internal or intrinsic.

6. *Hardiness* of students' personality. Indicators of involvement, control and risk acceptance were diagnosed. For this, a short and adapted version of the vitality test by Salvatore R. Maddi and Suzanne C. Kobasa, performed by V.A. Olefir, M.A. Kuznetsov and A.V. Pavlova (2013).

7. *Academic procrastination* (Procrastination Scale for Student Population by Clarry H. Lay (1986). An adapted version of this scale proposed by T.Y. Yudeeva, N. Garanyan, D.M. Zhukova was used.

8. *Coping strategies*, which were investigated with the help of adapted T.A. Kryukova (2005) questionnaire by Norman S. Endler, James D. A. Parker. Indicators of coping, focused on solving the problem, on emotions, on avoidance, were recorded.

9. *Five factors of the Big-Five* (I - "Extraversion / Introversion", II - "Attachment / Solitude", III - "Self-control / Impulsivity", IV - "Emotional stability / Emotional instability", V - "Expressiveness / Practicality"); to measure them, a short version of the Big-Five questionnaire (TIPI) was used, which consists of ten questions, developed by Samuel D. Gosling, Peter J. Rentfrow, and William B.

Swann Jr. (2003) adapted by A. S. Sergeeva, B. A. Kirillov and A. F. Dzhumagulova (2016).

10. *The indicator of persistence*, which was determined using the adapted version of the GRIT-scale by Angela Duckworth. An adapted version of this scale created by A.V. Alekseeva (2017) was used.

11. *The indicator of sensitivity to feedback*, which was diagnosed using the appropriate scale developed by D.A Leontiev, A.N. Mospan, A.V. Mitina (2019).

A step-by-step procedure was used with inclusion (in ascending order of the p-level) in the regression equation of all independent variables and subsequent removal of those from it whose correlation with the criterion exceeds the given value $p = 0.1$. The purpose of using this mathematical and statistical procedure is to identify psychological predictors that affect the indicators of students' persistence when performing educational activities; determine the degree of influence of each predictor; to analyze the specifics of the composition and influence of predictors of persistence among students with different levels of academic performance. 3 regression models were built:

1) for the entire sample of subjects, 2) for students with high academic performance, 3) for students with low academic performance.

When calculating to increase the reliability, validity and predictive capabilities of regression models, mathematical and statistical requirements and limitations were strictly taken into account (Nasledova A.D., 2004). Firstly, all indicators included in the processing were presented in metric scales. Secondly, the indicators were used only on such scales that do not correlate with each other, or correlate at a fairly low level. Thirdly, the distribution of each of the indicators used was checked for normality (in all cases, the indices of asymmetry and excesses in modulus did not exceed 1.0).

The sample consists of 156 subjects (125 women and 31 men). The age of the subjects ranged from 17 to 26 years). The research was conducted on the basis of H.S. Skovoroda Kharkiv National

Pedagogical University, Kharkiv State Academy of Physical Culture, Kharkiv Pedagogical Lyceum No. 4. All calculations were performed using the Statistica 6.0 software.

Research results. Let us analyze the regression model of persistence in educational activity, built for the entire sample of subjects (Table 1).

Table 1

Summary multiple regression table in the entire sample of subjects

Predictors	β	S.E.E.	B	S.E.E.	t	p
Constant term			-3,312	1,601	-2,069	0,04
Persistence scale	0,305	0,068	0,158	0,035	4,471	0,00002
Feedback sensitivity	0,318	0,064	0,145	0,029	5,003	0,000002
Academic procrastination	-0,258	0,056	-0,054	0,012	-4,571	0,00001
Big-Five-V (openness of experience)	0,130	0,048	0,116	0,043	2,693	0,008
Identified regulation	0,166	0,064	0,100	0,038	2,600	0,01
Dispositional optimism	-0,135	0,059	-0,047	0,020	-2,293	0,02
Success	0,077	0,050	0,019	0,012	1,553	-
Coping avoidance strategy	-0,083	0,048	-0,020	0,012	-1,723	0,09
Big-Five-IV (Emotional stability)	0,090	0,050	0,072	0,040	1,797	0,07
Hardiness: risk acceptance	0,074	0,054	0,051	0,038	1,362	-
Big-Five-I (extraversion)	0,065	0,055	0,049	0,041	1,192	-

Notes: $R = 0.8661$; $R^2 = 0.7502$; adjusted. $R^2 = 0.7284$; $F = 34.408$; $p < 0.0000$;

standard estimation error: 1.2376

Eight predictors were identified, on which students' persistence in learning activities depends on a statistically significant level ($R = 0.866$; $F = 34.4$; $p < 0.0001$). The most influential of them is the sensitivity to feedback (i.e., the student's ability to properly respond to the success of his educational actions, to timely adjust the educational activity, taking into account the assessment of his own success) ($\beta = 0.318$; $p < 0.000002$). A student's persistence in learning depends on his ability to react to successes and failures, to correct his actions. That is, the student's ability to effectively influence the self-regulation of activities. This is a graduated, finely tuned and differentiated perception of the level of one's success in specific educational activities. It is also flexibility, that is, the ability to make the necessary changes to the plan and program of your educational activity.

Persistence turned out to be an essential indicator, which was measured using the Grit scale (that is, a combination of purposefulness and persistence of interests, which can manifest itself in the mental regulation of any activity) ($\beta = 0.305$; $p < 0.00002$).

The third in importance is the fact that there are no signs of academic procrastination ($\beta = -0.258$; $p < 0.00001$). So, persistent learning action is incompatible with the practice of postponing the solution of certain learning problems for the future. The absence of the habit to procrastinate is a specific psycho-regulatory pattern of persistent action, in which the inevitability and obligation to achieve an educational goal is emphasized.

At a statistically significant level, a motivational predictor also manifested itself in its influence on the dependent variable - the identified regulation ($\beta = 0.166$; $p < 0.01$). In the concept of motivation, Deci, E. L., & Ryan, R. M. (1985), the sources of incentives to activity (locus of causation) are located in a continuum, the poles of which are events in the external world (stimuli) and motivational phenomena of completely internal origin. There is a gradation of causal loci from those perceived by the subject as external, imposed from the outside, to those perceived as internal, within the Self.

In the taxonomy of motives of human activity Deci, E. L., & Ryan, R. M. between the states of amotivation and completely internal motives are four types (levels) of motivation - external, introjected, identified and integrative. The presence of identified motives for educational activity indicates a fairly high maturity of motivational regulation, about its obtaining of a predominantly intrinsic nature. With such regulation, the subject gets access to various internal psychological resources, in particular, strong-willed. These resources provide the level of persistence needed to address most of the challenges in higher education.

Dispositional optimism turned out to be an obstacle for students to show persistence in educational activities. It negatively affects the dependent variable ($\beta = -0.135$; $p < 0.02$). With pronounced dispositional optimism, the student's positive expectations regarding the results of its educational activity noticeably prevail over negative expectations. Under such conditions, student falls into a "psychological trap": student is confident of success in the educational process, without exerting effort, labour and energy. Its sensitivity to negative feedback signals is reduced. According to the concept of mental regulation of action by Julius Kuhl, in this case, the balance of four personality subsystems is disturbed - memory of intentions, intuitive behavior, extended memory and the object recognition system (Jens-Uwe Martens, Julius Kuhl 2017). Among people with pronounced dispositional optimism, the subsystem of intuitive behavior is overly activated, as well as a related subsystem of extended memory (Khomulenko T.B., Dotsevich T.I., 2014). Therefore, they underestimate danger signals and do not think about possible mistakes and negative consequences, they are ineffective in situations where you need to be consistent, planned, patient and persistent (Wilson, P.M, Rogers, W.T, Rodgers, W.M, & Wild, T.C, 2006). It becomes clear that the best conditions for persistence are created by 1) the presence of a firm intention and a clear goal (activated memory of intention) and 2) the manifestation of analyticism in the collection and interpretation of information, especially one that indicates possible obstacles and threats (object

recognition subsystem). These two features are common to moderate pessimists. This information is also confirmed by the fact that such personality variable as openness to experience (the fifth parameter of the Big-Five) ($\beta = 0.130$; $p < 0.008$) turned out to be quite influential. This personal disposition is close to the object recognition subsystem in the Julius Kuhl concept. This personal disposition manifests itself in the subject's curiosity, its focus on collecting and analyzing various and contradictory information about objects, readiness for action, and, if necessary, for changes.

The two most influential predictors, which nevertheless entered the regression model, turned out to be significant at the $p < 0.1$ level. These are emotional stability (factor IV of Big-Five) ($\beta = 0.090$; $p < 0.07$) and coping avoidance strategy ($\beta = -0.083$; $p < 0.09$). The ability not to succumb to mood swings, control emotions and inclinations, self-sufficiency and self-confidence, consistency in plans and composure help students to overcome the difficulties and stresses of educational activities. They are not afraid of difficulties: coping with problems in study by avoiding them, as a rule, is not characteristic. It is such students who leave the impression of persistence in educational actions, patient, consistent and inclined to bring the begun to the end.

According to this regression model, persistence in student learning activities can be anticipated using the following equation:

$$PLA = -3,312 + 0,158PA + 0,145SF - 0,054AP + 0,116BP(V) + 0,1ID - 0,047DO - 0,02CS + 0,072BP(IV),$$

where PLA is persistence in learning actions, PA is persistence of action, SF is sensitivity to feedback, AP is academic procrastination, BP (V) is the 5th factor of the Big-Five (openness to experience), ID is identified regulation, DO is dispositional optimism, CS - coping avoidance strategy, BP (IV) - 4th factor of the Big Five (emotional stability).

The predictive capabilities of this equation are quite reliable. In accordance with the value of the multiple coefficient (R^2), the studied set of predictors explains 75.02% of the total variance of the results of

measuring the dependent variable (indicator of students' persistence in learning action). The hypothesis about the influence of the group of predictors on this parameter can be considered proven, since the value of the F-test (34.408) is statistically significant ($p < 0.00001$). The results of the regression analysis are illustrated in Fig. 1.

Let's consider a regression model on a sample of students with high academic performance (Table 2).

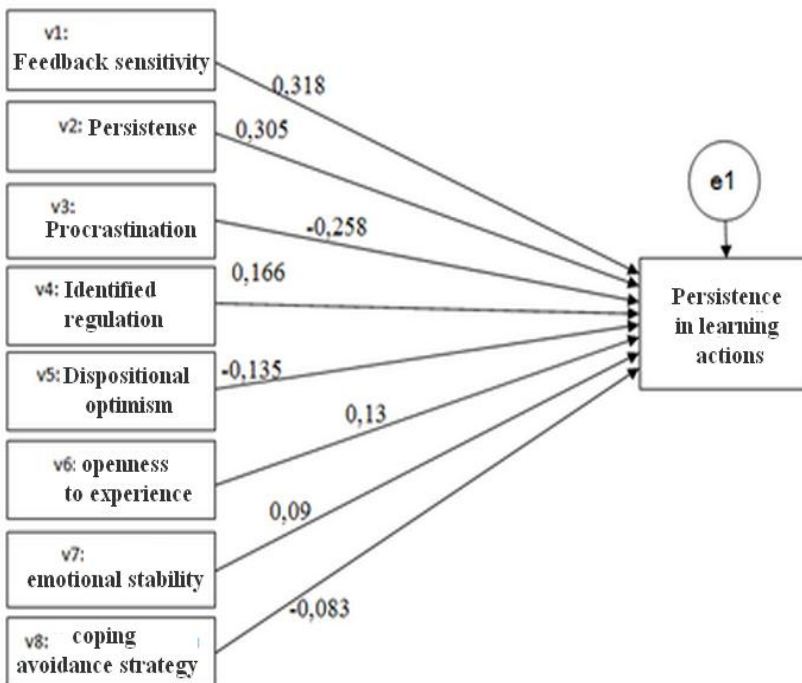


Fig. 1. Model of psychological predictors of students' persistence in learning activities.

Notes: for each predictor, a standardized coefficient β is indicated, which links it to the dependent variable and reflects the degree of its influence; the cumulative influence of the predictors is due to 75.02% of the total variance; e1 - model error, namely, the residual proportion of the variance of the dependent variable minus the influence of the independent variable ($1 - R^2$) e1 = 24.8% of the total variance).

The list of predictors of learning persistence remained unchanged. The set of predictors, which included six variables, turned out to be closely related to the dependent variable at the level $R = 0.8602$ ($F = 15.09$; $p < 0.000001$). Predictors explain 74% of the total variance in the dependent variable.

Table 2

Multiple regression table for a sample of subjects with high academic achievement

Предиктори	β	S.E.E.	B	S.E.E.	t	p
Constant term			-7,151	2,682	-2,666	0,010
Persistense scale	0,384	0,095	0,236	0,059	4,034	0,000
Feedback sensitivity	0,262	0,094	0,139	0,050	2,769	0,008
Big-Five-I (extraversion)	0,064	0,083	0,048	0,062	0,777	0,440
Procrastination scale	-0,216	0,090	-0,042	0,018	-2,391	0,020
Identified regulation	0,221	0,095	0,160	0,069	2,315	0,025
Dispositional optimism	-0,241	0,097	-0,085	0,034	-2,481	0,016
Hardiness: risk acceptance	0,247	0,088	0,156	0,056	2,803	0,007
Alienation scale nihilism	0,155	0,099	0,114	0,073	1,566	0,123
Alienation scale vegetativeness	-0,173	0,106	-0,116	0,071	-1,633	0,108
Alienation scale powerlessness	0,115	0,087	0,087	0,066	1,331	0,189

Notes: $R = 0.8602$; $R^2 = 0.7400$; adjusted. $R^2 = 0.6909$; $F = 15.086$; $p < 0.000001$;

standard estimation error: 1.2397

The most influential predictor for a sample of students with high academic performance was the general persistence scale ($\beta = 0.384$; $p < 0.0001$), which was diagnosed using the Grit technique. In other words, successful students should see the ultimate goal of educational action as their main task and do everything to achieve this goal in the future. Such students will not be disappointed and worry about

negative emotions due to unsatisfactory teacher reviews or low grades, but will move in the direction to change this.

The second most important predictor of persistence is the *sensitivity to feedback* ($\beta = 0.262$; $p < 0.008$). This predictor is presented as the degree of development of the ability of a differentiated response of an individual to the success of their own educational actions and their subsequent correction to achieve high goals. Thus, successful students manage their own success with persistence, change the plan of their educational activities and most closely approach their goal. Therefore, we can conclude that persistence depends on the student's ability to manage its own activities, assess the situation and analyze the reasons for their own negative success.

The third predictor of persistence for a sample of successful students is the indicator of the *hardiness risk acceptance scale* ($\beta = 0.247$; $p < 0.007$). This means that persistent students evaluate difficult and sophisticated learning situations as a challenge for growth and development, therefore, they work harder on tasks, have a greater openness to experience, and are diversified to changes as opportunities for development. The risk-taking student also exhibits certain innovative tendencies in relationships with people, in communication and, of course, learning. Therefore, student develops new attitudes, approaches to achieving the educational goal, develops its own techniques for overcoming obstacles in its path.

An essential and significant indicator of the development of persistence among successful students is the lack of *dispositional optimism* ($\beta = -0.241$; $p < 0.016$). Dispositional optimism is a negative predictor of the personality characteristic of persistence, although optimism represents a system of positive expectations of a student about its future, but this has a direct detrimental effect on persistence. So, if a successful student is constantly in a state of euphoria from positive experiences and hopes, the control and regulation of educational activity may decrease, which will lead to a decrease in educational persistence and, accordingly, to a decrease in persistent actions in the process of achieving the goal. Students will live in their

dreams and reveries about the expected result, however, they will more often respond with passive behavior to learning tasks, they will procrastinate more and success will gradually decrease (Gordeeva T.O., Osin E.N., 2010). Optimistic students, as a rule, underestimate the risks and obstacles that may appear on the way, take risks in hopeless endeavors, for example, choosing a topic for a thesis or course work, the desire to write and accept hard work, questions for preparation in seminars, etc. persistence will decrease, since the student's expectations will not be confirmed by the results, which is likely to cause alienation and burnout from learning (Gordeeva T.O., Sychev O.A., Osin E.N., 2010; Felton J., Gibson B., Sanbonmatsu D. 2003). Our results are also confirmed in a number of studies, where it was proved that persistence and perseverance turned out to be mutually exclusive personal characteristics that were possessed by optimistic students and had a negative relationship between academic success and optimism (Williams G., 2014).

The *identified regulation* has a decisive influence on the formation of high persistence among successful students ($\beta = 0.221$; $p < 0.025$). A student with a predominantly identified self-regulation begins to appreciate the result of its own learning activity and does work, homework, writes projects because he wants to understand the essence of the subject and learning becomes the greatest value for such a student. Therefore, the higher the level of identified regulation among students with high academic performance, the more they are interested in the subject, experience interest and pleasure from the learning process and situation of learning and they are ready to show any efforts aimed at achieving successful results in educational activities.

The last predictor of persistence in the group of high-performing students was the absence of signs of *academic procrastination* ($\beta = -0.216$; $p < 0.020$). Since procrastination is the polar opposite of persistence, which leads to the fact that a successful student either does not try to initiate an educational action at all or will lose enthusiasm and commitment and willingness to complete the work. Students which are able to complete all study assignments on time do

not allow the development of internal conditions for low control over their own activities. Therefore, procrastination is incompatible with self-regulation and high persistence in educational activities (Rebetez M., Rochat L., Barsics C., Van der Linden M., 2018). According to this regression model, the results of academic persistence among successful students are highlighted in the following equation:

$$PEASS = -7,151 + 0,236PA + 0,139SF + 0,156HRA - 0,085DO + 0,16IP - 0,042AP$$

where PEASS - persistence in the educational activities of successful students, PA – persistence of action, SF - sensitivity to feedback, HRA - hardiness in risk acceptance, DO - dispositional optimism, IP - identified regulation, AP - academic procrastination.

The results of regression analysis are illustrated in Fig. 2.

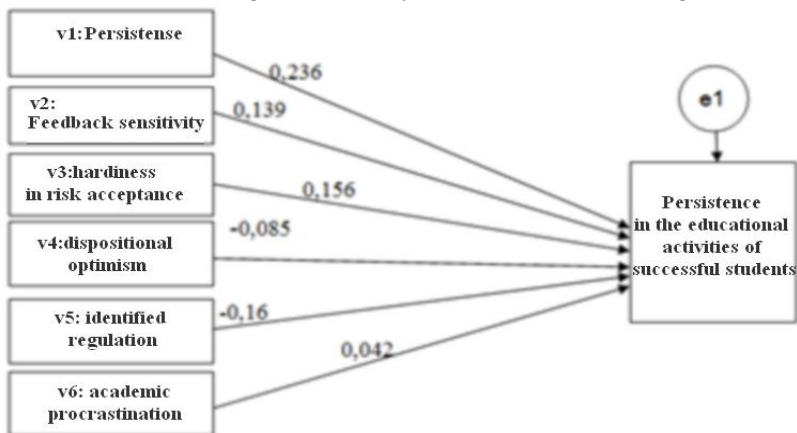


Fig. 2. Model of psychological predictors of students' perseverance in educational activities for a sample of subjects with high academic persistence.

Notes: for each predictor, a standardized coefficient β is indicated, which links it to the dependent variable and reflects the degree of its influence; the cumulative influence of predictors accounted for 74% of the total variance; e1 - model error, that is, the residual proportion of the variance of the dependent variable minus the influence of the independent variable ($1 - R^2$) e1 = 26% of the total variance).

Let us consider a regression model on a sample of students with poor academic performance, including ten predictors (see Table 3).

Table 3

Multiple regression table for a sample of subjects with low academic achievement

Predictors	β	S.E.E.	B	S.E.E.	t	p
Constant term			-1,627	2,037	-0,799	0,428
Persistence scale	0,431	0,074	0,195	0,033	5,830	0,000
Feedback sensitivity	0,508	0,068	0,201	0,027	7,427	0,000
Alienation scale powerlessness	-0,106	0,061	-0,089	0,051	-1,731	0,089
Procrastination scale	-0,225	0,072	-0,045	0,014	-3,134	0,003
Big-Five-IV (Emotional stability)	-0,150	0,060	-0,112	0,045	-2,479	0,016
Coping avoidance strategy	-0,108	0,055	-0,026	0,013	-1,962	0,054
Big-Five-V (Openness of experience)	0,198	0,054	0,163	0,044	3,659	0,001
Big-Five-II (Attachment)	-0,157	0,056	-0,144	0,052	-2,793	0,007
Alienation scale vegetativeness	0,244	0,077	0,172	0,054	3,159	0,002
Alienation scale nihilism	-0,203	0,077	-0,155	0,059	-2,638	0,011
Coping strategy focused on emotions	0,164	0,068	0,033	0,014	2,402	0,019
Burnout emotional exhaustion scale	-0,151	0,075	-0,092	0,046	-2,017	0,048

Notes: $R = 0.9211$; $R^2 = 0.8484$; adjusted. $R^2 = 0.8186$; $F = 28.457$; $p < 0.00001$;
 standard estimation error: 0.9626

These predictors explain almost 85% of the total variance and are closely related to the dependent variable ($R = 0.9211$; $F = 28.5$; $p < 0.00001$). The most influential predictor in this system is the manifestation of *sensitivity to feedback* ($\beta = 0.508$; $p < 0.0001$). It is important for students with low academic performance, as well as students with high academic performance, to analyze the results of their own educational activities, the assessment and perception of the

desired results, and the development of mechanisms for correcting activity based on the results of this assessment.

The second most important predictors of persistence for students with low academic performance is the *persistence scale* ($\beta = 0.431$; $p < 0.0001$). Students are aware of their own goal of study, their interests do not change throughout their studies at the university, which is an important factor in the regulation of educational activities.

At a statistically significant level, the predictor of the absence of *academic procrastination* appeared in its influence on the dependent variable ($\beta = -0.225$; $p < 0.003$). That is, academic procrastination is a factor preventing the development of educational persistence. Procrastination is usually defined as a dysfunctional phenomenon in which students unconsciously postpone a task or action despite expected negative consequences, and such behavior is usually characterized as an inability to self-regulate educational activities in the direction of achieving the desired goal. The results argue that the higher the level of delay in completing educational tasks among students, the lower the level of performance of these students and the lower the level of academic persistence, which entails problems with self-regulation and bringing to an end the begun.

It is not surprising and is perceived as a completely natural predictor of the *absence of nihilism* on the scale of alienation from learning ($\beta = -0.203$; $p < 0.011$). Therefore, if a student is performing poorly, he still retains the belief that learning is enjoyable and makes sense.

The fifth factor of the Big-Five, *openness to experience* ($\beta = 0.198$; $p < 0.001$), affects the development of persistence among students with low academic performance at a statistically significant level. Therefore, if a student has low academic performance - he still retains the belief that learning brings pleasure, and has a certain meaning. That is, educational activity, in itself, is not attractive for such students, and it will be attractive only if personal indicators prevail over motivational ones. The group of students with low academic performance has the influence of such a predictor as *attachment* ($\beta = -0.157$; $p < 0.007$), according to the Big Five

questionnaire. The scale has two polarities, attachment and detachment or antagonism, and it is antagonism that predicts persistence. The authors of the questionnaire note that the expression of attachment is the trust of the individual, compliance in activities, the ability to empathize, altruism, and so on. However, the unsuccessful student needs exactly "belligerent" character traits, such as antagonism, to achieve what he wants. Although these character traits often lead to conflicts within the student group or with teachers. These character traits are defense mechanisms of students with low academic performance.

Coping strategy aimed at emotions is one of the predictors of persistence development ($\beta = 0.164$; $p < 0.019$). According to the definition of coping, which emphasizes the close connection between a person and its ability to cope with stressful situations, students with low academic performance are guided by a coping strategy aimed at emotions to actively express them, to control feelings.

The two most influential predictors, which nevertheless entered the regression model, turned out to be significant at the $p < 0.1$ level. These are *emotional stability* (factor IV of the Big-Five) ($\beta = -0.15$; $p < 0.016$) and *emotional exhaustion on the burnout scale* ($\beta = -0.151$; $p < 0.048$). E.N. Osin noted that the absence of exhaustion and burnout in general, can increase the level of cognitive activity of students, increase the level of achievement, reduce fatigue and exhaustion, which is associated with learning. One of the very interesting results of our regression model is negative emotional stability, namely neuroticism as one of the predictors of persistence among low-performing students. This is also confirmed by coping, which guides students in the event of stress and intense learning situations, so they need an outlet for negative emotions to develop an optimal level of persistence.

This regression model for a sample of students with low academic performance can be described by the following equation:

$$\begin{aligned} ZNDUS = & -1,627 + 0,201SF + 0,195PA + 0,172VA - 0,045AP - 0,155AN + 0,163BF(V) \\ & + 0,033CE - 0,144BF(II) - 0,092EB - 0,112BF(IV) \end{aligned}$$

where ZNDUS - persistence in educational actions of unsuccessful students, SF - sensitivity to feedback, PA - persistence of action, VA - vegetativeness alienation scale, AP - academic procrastination, AN - alienation nihilism scale, BF (V) – Big-Five - V factor openness of experience, CE - coping strategy focused on emotions, BF (II) – Big-Five - II factor attachment, EB - scale of emotional burnout - exhaustion, BF (IV) – Big-Five - IV emotional stability factor.

The results of regression analysis are illustrated in Fig. 3.

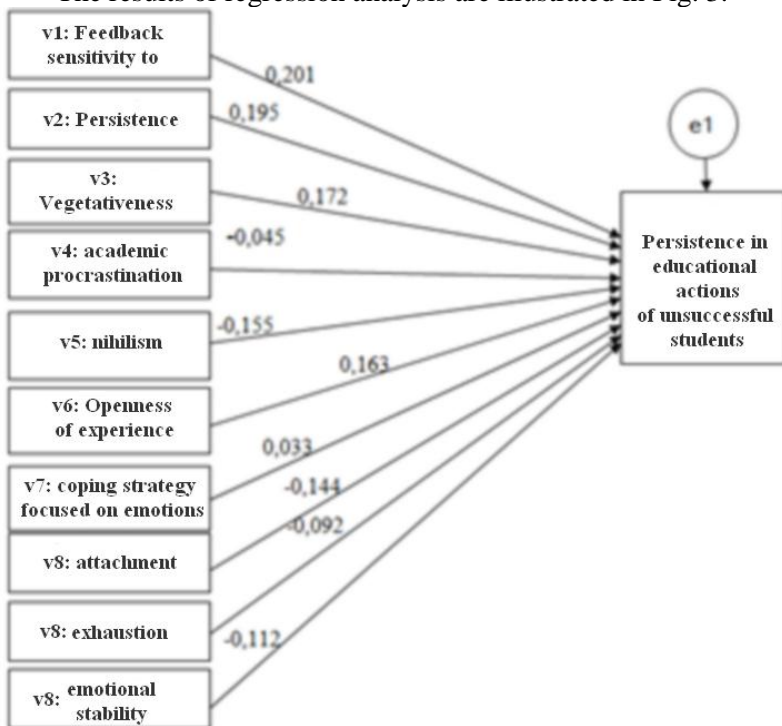


Fig. 3. The model of psychological predictors of students' persistence in educational activities for a sample of subjects with low academic performance.

Notes: for each predictor, a standardized coefficient β is indicated, which links it to the dependent variable and reflects the degree of its influence; the cumulative influence of predictors is due to 86.02% of the total

variance; $e1$ - model error, that is, the residual proportion of the variance of the dependent variable minus the influence of the independent variable ($1 - R^2$) $e1 = 26.8\%$ of the total variance).

The analysis of each multiple regression model leads to the following **conclusions**:

1. The greatest influence on the part of diagnosed predictors was found for the group of students with low academic performance. The smallest number of predictors was found for the group of students with high academic performance (five in total).

2. The most influential were the cognitive predictor of persistence - sensitivity to feedback and a strong-willed predictor - persistence according to the Grit methodology. A high sensitivity to feedback is one of the most important conditions for successful academic and professional activity and the development of persistence, as students analyze their actions, manage emotions and make attempts to change the potential state of affairs. In addition, the lack of academic procrastination is a behavioral factor in the development of persistence among successful and unsuccessful students.

3. For a group of students with high academic performance, cognitive, volitional, behavioral and motivational predictors turned out to be the most important for the formation of the optimal level of persistence. That is, for the development of persistence, successful students in most cases are guided by the analysis of feedback, identified by the regulation of activity, where educational activity is attractive by itself, and moderate optimism, since high optimism is an obstacle to the formation of persistence. Personality traits do not play a role in developing persistence among successful students. However, a distinctive feature of students with low academic performance is the dependence of persistence on emotional-volitional, behavioral and personal predictors. This indicates that it is personal character traits, stable emotional state and qualitative analysis of their own activities that are factors in the development of persistence among students with low academic performance.

On the basis of multiple regression models, it is possible to

determine the main directions of practical work with students in the context of their psychological support in the psychological service of universities in order to strengthen the volitional qualities of the individual and with an emphasis on persistence in educational and professional activities.

Prospects for further research. There is a need to expand the research approach to the educational persistence of schoolchildren; it is necessary to consider and empirically examine the gender and age characteristics of educational actions among students and separately among schoolchildren. The differential psychological approach to the problem of educational persistence is promising, that is, the development of a typology of educational persistence taking into account the peculiarities of the character of students. A potential study is the dynamics of educational persistence in adolescence, as well as the dependence and change of educational persistence under the influence of the professional orientation of schoolchildren and students.

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