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Личность в процессах обучения и воспитания

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Research article

Age-related changes in perseverance and stability of interests among adolescents in online and offline learning

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Abstract

Introduction. This article examines age-related changes in perseverance and stability of interests among adolescents within online and offline learning contexts. The relevance of the research lies in understanding how educational environments influence the development of personal characteristics that support academic achievement. Online learning requires greater self-regulation and motivation, whereas traditional educational settings foster stable interests through social interaction. Despite the widespread integration of digital technologies in education, differences in perseverance and stability of interests among adolescents across learning formats remain insufficiently studied.

Materials and Methods. The study involved 1,490 school students aged 10 to 18 years ($M = 14.2 \pm 1.7$ years), comprising 33.2% males ($n = 494$) and 66.8% females ($n = 996$). Participants were divided into two groups: 616 students engaged in online learning (41.3%), and 874 in offline learning (58.7%). Age groups were defined as 10–13 years ($n = 464$), 14–15 years ($n = 665$), and 16–18 years ($n = 361$). Perseverance and stability of interests were assessed using the Russian version of the GRIT scale. Data were analyzed using multivariate analysis of variance to evaluate the effects of age and learning format.

Results. Perseverance increased significantly with age ($F(2, 1490) = 5.70$; $p = 0.003$), indicating the development of self-regulation and goal-setting abilities. Stability of interests was higher among adolescents in offline learning ($F(1, 1490) = 28.48$; $p < 0.001$), confirming the importance of social interaction and structured educational settings. The interaction between age and learning format was also statistically significant ($F(2, 1490) = 4.32$; $p = 0.01$), although no significant age-related differences were observed in stability of interests.

Conclusions. The findings highlight the importance of the educational environment in shaping adolescents' personal characteristics. Offline learning supports stability of interests through social interactions and teacher engagement, whereas online learning relies more on internal motivation and self-regulation. Future research should explore pedagogical strategies that enhance perseverance and stability of interests in digital learning environments.

Keywords: adolescents, online education, offline education, motivation, perseverance, stability of interests, age-related changes, learning, GRIT

Научная статья

Возрастные изменения упорства и устойчивости интересов у подростков при онлайн- и офлайн-обучении

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Аннотация

Введение. Статья посвящена исследованию возрастных изменений упорства и устойчивости интересов у подростков в условиях онлайн- и офлайн-обучения. Актуальность исследования обусловлена влиянием образовательной среды на развитие личностных характеристик, способствующих академической успешности. Онлайн-обучение требует большей саморегуляции и мотивации, тогда как традиционная образовательная среда формирует устойчивые интересы за счет социального взаимодействия. Несмотря на активное использование цифровых технологий, вопрос о различиях в упорстве и устойчивости интересов подростков в зависимости от формата обучения остается открытым.

Материалы и методы. В исследовании приняли участие 1490 школьников в возрасте от 10 до 18 лет ($M = 14,2 \pm 1,7$ года). Выборка включала 33,2% мальчиков ($n = 494$) и 66,8% девочек ($n = 996$), разделенных на две группы: 616 подростков обучались онлайн (41,3%), 874 — офлайн (58,7%). Также респонденты были классифицированы по возрасту на три подгруппы: 10–13 лет ($n = 464$), 14–15 лет ($n = 665$) и 16–18 лет ($n = 361$). Оценка изучаемых характеристик проводилась с использованием русскоязычной версии шкалы GRIT. Для обработки данных применялся многомерный дисперсионный анализ с оценкой влияния возраста и формы обучения.

Результаты. Установлено, что показатель упорства значимо возрастает с возрастом ($F(2, 1490) = 5,70$; $p = 0,003$), что свидетельствует о развитии саморегуляции и целеустремленности. Устойчивость интересов оказалась выше у подростков, обучающихся офлайн ($F(1, 1490) = 28,48$; $p < 0,001$), что подтверждает значимость социального взаимодействия и структурированной образовательной среды. Взаимодействие факторов также оказалось статистически значимым ($F(2, 1490) = 4,32$; $p = 0,01$), однако различия между возрастными группами по устойчивости интересов не выявлены.

Заключение. Результаты исследования подчеркивают важность образовательной среды для развития личностных качеств подростков. В офлайн-формате устойчивость интересов поддерживается за счет социальной среды и взаимодействия с преподавателями, тогда как в онлайн-обучении значимую роль играет внутренняя мотивация и развитая саморегуляция. Дальнейшие исследования могут быть направлены на выявление стратегий педагогической поддержки, способствующих развитию устойчивости интересов и академической настойчивости подростков в цифровой образовательной среде.

Ключевые слова: подростковый возраст, онлайн-обучение, офлайн-обучение, мотивация, упорство, устойчивость интересов, возрастные изменения, обучение, GRIT

Introduction

The digitalization of education has led to a growing number of adolescents studying online. This shift has affected not only teaching methods but also the development of personal traits, such as perseverance of effort and stability (or consistency) of interests. These characteristics determine an adolescent's ability to achieve long-term goals, adapt to challenges, and maintain motivation under difficult conditions.

The grit concept (Duckworth et al. 2007) views perseverance as the persistence of effort towards goals, while consistency of interests is considered as the capacity to maintain interest in an activity. Such qualities are particularly significant during adolescence, a period of active formation of personal resources. However, research suggests that online learning may reduce engagement and hinder the maintenance of interests, whereas offline environments are traditionally considered more conducive to forming motivational and social ties (Artino 2008; Kahu 2011; Steinmayr et al. 2019).

The concepts of 'perseverance of effort' and 'consistency of interests' within the grit model relate to a broader range of constructs describing student self-regulation. For instance, self-control (Duckworth et al. 2014) reflects the ability to suppress impulsive actions in the 'here and now', whereas perseverance of effort involves the long-term maintenance of effort despite setbacks. Academic buoyancy and academic resilience (Martin 2013) are similar to grit but incorporate cognitive and emotional coping strategies, whereas grit emphasizes the behavioral component (perseverance of effort) and consistency of interests. The choice of the grit model in this study is justified by its conciseness, the psychometric reliability of its Russian adaptation (Tyumeneva et al. 2019), and its proven predictive validity in educational contexts (Credé et al. 2017).

The influence of the educational environment on perseverance of effort remains an open question. Research confirms that successful learning requires developed self-regulation skills (Azevedo, Cromley 2004; Pintrich 2004; Wolters 1998; Zimmerman 2002). In online settings, these skills become crucial as students face greater autonomy and less external control. At the same time, a meta-analysis by Credé, Tynan, and Harms (Credé et al. 2017) suggests that the impact of perseverance of effort on academic success may be overestimated in comparison with traditional factors such as motivation and self-regulation.

Studies also highlight the importance of satisfying students' basic psychological needs (Deci et al. 1991; Ryan, Deci 2017). Specifically, online learning

requires high levels of computer self-efficacy, which influences engagement and consistency of interests (Sun, Rueda 2012). Social factors also play a significant role: support from the educational community helps to strengthen motivation and build self-confidence (Kersha, Obukhov 2023; Means et al. 2010; Shea, Bidjerano 2010).

In the Russian context, adolescents' consistency of interests across different learning formats remains insufficiently studied. Research by Gordeeva, Sychev and Sukhanovskaya (Gordeeva et al. 2022) identifies changes in academic motivation, characterized by an increased orientation towards intrinsic motivation and interest in learning, alongside rising anxiety. Studies by Erofeeva and Nartova-Bochaver (Erofeeva, Nartova-Bochaver 2020) emphasize the importance of grit as a personal resource, which is particularly vital for online learning. Meanwhile, work by Klimenskikh, Lebedeva, Polyakova and Golendukhina (Klimenskikh et al. 2020) points to different demands for self-organization across educational environments: the offline format relies more on social interaction, whereas online learning requires more advanced self-regulation skills.

Applied research shows that the use of interactive educational technologies, such as gamification, adaptive learning, and personalized pathways, helps maintain adolescent academic motivation in online environments (Deterding et al. 2011). Furthermore, Rovai (Rovai 2002) notes that a sense of learning presence plays a key role in distance education, creating conditions for consistent student interests.

Additional studies emphasize the importance of communication in the educational process (Mikhajlova, Parts 2023; Frolova, Esina 2021; Frolova et al. 2022). Both online and offline communication positively affect student motivation, but the mechanisms of their impact differ. According to data from Soldatova and Rasskazova (Soldatova, Rasskazova 2023), online students use cognitive self-regulation strategies more frequently, whereas the offline format is more conducive to emotional regulation. Shalaginova and Dekina (Shalaginova, Dekina 2020) examine the psychological aspects of distance learning and find that academic resilience facilitates successful adaptation to the online environment.

The COVID-19 pandemic changed supplementary and informal education for school students, as analyzed by Pavlov et al. (Pavlov et al. 2021). The authors note that highly autonomous students adapt better to new learning formats, whereas those with less autonomy struggle to organize their studies. Research by Shmurygina and Ovchinnikova (Shmurygina, Ovchinnikova 2023) highlight motivation as a key factor of successful online learning;

specifically, intrinsic motivation fosters consistent interests in adolescents, while students oriented towards external stimuli more frequently face difficulties. Studies by Martin (Martin 2013) show that academic buoyancy and academic resilience are vital for overcoming educational challenges. In online learning, adolescents more often encounter daily demands that require flexibility and adaptability.

Richardson and Newby (Richardson, Newby 2006) identify levels of cognitive engagement in online learning, showing that deep engagement (e.g. reflection) promotes consistent interests. Russian and Belarusian research, along with international evidence, suggests that self-regulation resources — such as identifying goal-achievement requirements, evaluating results, action planning, and perseverance — are important factors for student success in digital environments (Radchikova et al. 2023; Means et al. 2014).

Thus, theoretical analysis indicates that the components of grit — perseverance of effort and consistency of interests — are key characteristics of motivational and regulatory stability of adolescents in contemporary educational settings. However, their age-related changes and potential differences between online and offline formats remain insufficiently studied.

These theoretical and empirical grounds lie behind the following aim and hypotheses of the present study.

This study aims to identify the age-related changes of grit components (perseverance of effort and consistency of interests) in adolescents within online and offline learning environments.

The research hypotheses are as follows:

1. **The pattern of age-related changes in grit components** among adolescents in online learning corresponds to the pattern observed in those learning offline.
2. **The digital educational environment** influences the levels of grit components: the manifestations of perseverance of effort and/or consistency of interests in the online group may differ in degree compared to the offline group.

Materials and Methods

Participants. The study involved 1,490 school students, comprising 494 (33.2%) males and 996 (66.8%) females. The mean age of the participants was 14.2 ± 1.7 years (median 15, range 10–18). The sample was divided into two comparison groups.

The first group consisted of 616 (41.3%) online students with a mean age of 13.97 ± 1.8 years (me-

dian 14, range 10–18). This group comprised students from the Foxford Private Home School, who followed the national secondary school curriculum entirely via distance learning. Instruction was organized in three modes: interactive webinars, small classes of up to 15 students with answering ‘in front of the class’, and recorded lessons; homework was assigned after every lesson, and final grades were based solely on tests. Gamification elements were used to maintain motivation. Information regarding the duration of study in this format or previous experience of in-person schooling was not collected.

The second group consisted of 874 (58.7%) offline students with a mean age of 14.4 ± 1.7 years (median 15, range 10–18). This group comprised students from 15 state schools in the Moscow region following the same national curriculum. The educational process was organized in a traditional in-person format: daily lessons within a classroom system, in-class tests, and regular face-to-face teacher–student interaction. Information and communication technologies were used only occasionally — for electronic gradebooks, homework assignments, and demonstration materials during lessons. There were no systematic online courses, webinars, or blended learning formats in these schools, ensuring a clear contrast with the fully online format of the Foxford Private Home School.

Additionally, three age-based comparison groups were identified: 464 (31.1%) students aged 10–13; 665 (44.6%) students aged 14–15; and 361 (24.2%) students aged 16–18.

Procedure. The study was conducted in the middle of the academic year (November–January). Testing was electronic (Google Forms), voluntary, and anonymous.

Measures. To study the motivational–behavioral component of the motivational process, the Russian version of the Grit Scale was used, comprising two indicators: perseverance of effort and consistency of interests (Tyumeneva et al. 2019). Raw scores were calculated by averaging the item scores, after recoding reverse-scored items. The reliability of the subscales (Cronbach’s alpha) was 0.82 for ‘perseverance of effort’ and 0.83 for ‘consistency of interests’, indicating high internal consistency.

Statistical analysis. Statistical analysis was performed using Statistica 12. Reliability analysis with Cronbach’s alpha was conducted to assess the internal consistency of the questionnaires. To evaluate the effects of the factors on the variables, a two-way multivariate analysis of variance was performed. The dependent variables were ‘perseverance of effort’ and ‘consistency of interests’, while

the factors were the learning format (online, offline) and age group (10–13, 14–15, 16–18 years). The multivariate analysis included the assessment of Wilks' Lambda. The effect size for the factors was expressed as the eta-squared coefficient. Duncan's test was used for post hoc analysis. The threshold for statistical significance was set at $p < 0.05$. Both grit indicators ('perseverance of effort' and 'consistency of interests') were calculated as mean scores on a five-point scale, allowing them to be interpreted as interval. The minimum subsample size in this two-way design was 126 respondents (online, 16–18 years), and the maximum was 401 (offline, 14–15 years). With $n \geq 100$, the distribution of sample means approaches normality, and the F-test in the multivariate two-way analysis of variance and subsequent univariate two-way analyses of variance remains robust to moderate non-normality and unequal variances.

Results

Descriptive statistics for the entire sample and for individual groups of adolescents are presented in Tables 1 and 2. Based on the descriptive statistics, there is a roughly equal distribution of grit scale indicators regardless of age and learning format. One can note only a weak trend of increasing perseverance of effort with age (approximately 0.1 points for each age group). Additionally, a higher group mean score on the consistency of interests scale is observed among adolescents in offline

learning compared to the online learning group (Table 1).

Descriptive statistics for the variables across different categories under factor interaction are provided in Table 2.

To achieve the research aim, a multivariate analysis of variance was first conducted, with Wilks' Lambda used to assess the results. The results of the analysis established that the variables of the motivational-behavioral block collectively differ statistically significantly across different learning formats ($F(2, 1490) = 14.24$; $p < 0.0001$; $\eta^2 = 0.01$) and age ($F(4, 1490) = 3.29$; $p < 0.05$; $\eta^2 = 0.004$). Variable values depend on the learning format by 1.9% and on age by 0.4%. The influence of factor interaction on all dependent variables is at the level of $F(4, 1490) = 2.94$; $p < 0.05$; $\eta^2 = 0.004$ (Table 3).

Next, we considered the influence of factors on individual variables of the motivational-behavioral block. It was revealed that the perseverance of effort indicator depends statistically significantly on the students' age ($F(2, 1490) = 5.70$; $p < 0.01$; $\eta^2 = 0.008$), but does not depend on the learning format (online or offline, $F(1, 1490) = 0.75$; $p = 0.38$; $\eta^2 < 0.01$). The interaction effect of learning format and age is statistically non-significant ($F(2, 1490) = 0.93$; $p = 0.39$; $\eta^2 < 0.01$). Based on the results of pairwise comparisons of respondent groups of different ages, it was established that students aged 16–18 have predictably higher scores on the perseverance of effort scale compared to adolescents aged 10–13 ($p = 0.002$). These results indicate that

Table 1. Descriptive statistics (mean $\pm$ standard deviation) and internal consistency indices of questionnaire scales across different factor categories

Sample	Persistence	Stability of interests
Entire sample	3.33 $\pm$ 0.92	2.89 $\pm$ 0.86
Offline learning	3.31 $\pm$ 0.96	2.98 $\pm$ 0.90
Online learning	3.36 $\pm$ 0.86	2.77 $\pm$ 0.79
10–13 years old	3.23 $\pm$ 0.94	2.92 $\pm$ 0.90
14–15 years old	3.33 $\pm$ 0.90	2.85 $\pm$ 0.84
16–18 years old	3.46 $\pm$ 0.91	2.94 $\pm$ 0.82

Табл. 1. Описательная статистика (среднее $\pm$ стандартное отклонение) и показатели внутренней согласованности шкал опросников в зависимости от различных категорий факторов

Выборка	Упорство	Устойчивость интересов
Вся выборка	3,33 $\pm$ 0,92	2,89 $\pm$ 0,86
Офлайн-обучение	3,31 $\pm$ 0,96	2,98 $\pm$ 0,90
Онлайн-обучение	3,36 $\pm$ 0,86	2,77 $\pm$ 0,79
10–13 лет	3,23 $\pm$ 0,94	2,92 $\pm$ 0,90
14–15 лет	3,33 $\pm$ 0,90	2,85 $\pm$ 0,84
16–18 лет	3,46 $\pm$ 0,91	2,94 $\pm$ 0,82

Table 2. Descriptive statistics of variables across different categories for the interaction of factors

Sample	10–13 years old		14–15 years old		16–18 years old	
	Offline	Online	Offline	Online	Offline	Online
Persistence	3.19 ± 1.04	3.26 ± 0.83	3.29 ± 0.91	3.40 ± 0.87	3.47 ± 0.92	3.42 ± 0.88
Stability of interests	3.03 ± 1.00	2.80 ± 0.77	2.88 ± 0.87	2.79 ± 0.81	3.09 ± 0.83	2.66 ± 0.73

Табл. 2. Описательная статистика переменных в зависимости от различных категорий при взаимодействии факторов

Выборка	10–13 лет		14–15 лет		16–18 лет	
	Офлайн	Онлайн	Офлайн	Онлайн	Офлайн	Онлайн
Упорство	3,19 ± 1,04	3,26 ± 0,83	3,29 ± 0,91	3,40 ± 0,87	3,47 ± 0,92	3,42 ± 0,88
Устойчивость интересов	3,03 ± 1,00	2,80 ± 0,77	2,88 ± 0,87	2,79 ± 0,81	3,09 ± 0,83	2,66 ± 0,73

Table 3. Results of multivariate analysis of variance assessing the impact of factors on the GRIT scale scores

Effect	F, empirical value of the analysis of variance	p, level of statistical significance	η^2 , effect size
Age (df = 4, 1490)	3.29	0.011	0.004
Learning format (df = 2, 1490)	14.25	< 0.0001	0.019
Age* Learning format (df = 4, 1490)	2.94	0.019	0.004

Табл. 3. Результаты многомерного дисперсионного анализа с оценкой влияния факторов на показатели шкалы GRIT

Эффект	F, эмпирическое значение дисперсионного анализа	p, уровень статистической значимости	η^2 , величина эффекта
Возраст(df = 4, 1490)	3,29	0,011	0,004
Форма обучения (df = 2, 1490)	14,25	< 0,0001	0,019
Возраст* Форма обучения (df = 4, 1490)	2,94	0,019	0,004

with age, adolescents develop the ability to work towards achieving personal goals, regardless of failures and serious obstacles along the way.

The variable ‘consistency of interests’ depends on the adolescents’ learning format ($F(1, 1490) = 28.48$; $p < 0.001$; $\eta^2 = 0.019$), but does not depend on age ($F(2, 1490) = 1.13$; $p = 0.32$; $\eta^2 < 0.01$). At the same time, the factor interaction effect is statistically significant ($F(2, 1490) = 4.32$; $p = 0.01$; $\eta^2 < 0.01$). However, the results of the post hoc analysis revealed no statistically significant differences (or trends towards them) between students of different age groups. It can be concluded that consistency of interests is greater among students in offline learning than among those in online learning. In other words, adolescents studying offline more

frequently demonstrate longer commitment to their own goals and interests (Table 4).

Discussion

The present study aimed to identify the age-related changes in grit components — perseverance of effort and consistency of interests — in adolescents, and to determine how the learning format (online or offline) influences these characteristics. The results confirmed both hypotheses, clarifying the functional role of grit within digital and traditional educational environments.

Mean scores on the perseverance of effort scale increase statistically significantly from the younger to the older adolescent group. This effect is consistent

Table 4. Results of one-way two-factor analysis of variance assessing the impact of factors on the GRIT scale scores

GRIT scale Learning format		Effect		
		Learning format	Age	Learning format*Age
Stability of interests	F	28.49	1.13	4.33
	p	<0.001	0.32	0.01
	η^2	0.02	–	0.01
Perseverance	F	0.76	5.70	0.94
	p	0.39	0.003	0.40
	η^2	–	0.01	–
df		1, 1490	2, 1490	2, 1490

Note: F — empirical value of the analysis of variance; p — level of statistical significance; η^2 — effect size; df — degrees of freedom.

Табл. 4. Результаты одномерного двухфакторного дисперсионного анализа с оценкой влияния факторов на показатели шкалы GRIT

Шкала методики Форма обучения		Эффект		
		Форма обучения	Возраст	Форма обучения*Возраст
Устойчивость интересов	F	28,49	1,13	4,33
	p	< 0,001	0,32	0,01
	η^2	0,02	–	0,01
Упорство	F	0,76	5,70	0,94
	p	0,39	0,003	0,40
	η^2	–	0,01	–
df		1, 1490	2, 1490	2, 1490

Примечание: F — эмпирическое значение дисперсионного анализа; p — уровень статистической значимости; η^2 — величина эффекта; df — степени свободы.

with the notion of the gradual development of self-regulation and goal-setting during adolescence (Pintrich 2004; Zimmerman 2002). The age-related increase in behavioral perseverance is likely related to the accumulation of educational experience, the formation of volitional qualities, and a growing awareness of the value of long-term goals. Unlike perseverance of effort, consistency of interests showed no pronounced age trend, potentially indicating its relative stability as a personality trait. This suggests that this component is closer to motivational–value orientations, which remain stable throughout adolescence, rather than to malleable behavioral strategies.

Consistency of interests was found to differ statistically significantly depending on the learning format. Adolescents in offline environments demonstrated higher scores, regardless of age. This may stem from the specific features of the in-person educational environment, where interest is maintained through daily social interaction, role modelling, and

an atmosphere of engagement (Kahu 2011; Ryan, Deci 2017). Online learning, by contrast, requires greater autonomy and intrinsic motivation, thus presenting an additional challenge for adolescents, especially during the development of self-regulation.

The differing sensitivity of grit subscales to individual (age) and contextual (learning format) factors may indicate the functional autonomy of the construct's components. These data align with the dichotomous view of the Grit Scale, where perseverance of effort and consistency of interests are considered separate, albeit interrelated, aspects of behavioral persistence (Tyumeneva et al. 2019). Although no correlational analysis was conducted in this study, the different determinants of the two components support the expediency of analyzing them separately.

Comparing grit with similar motivational constructs, such as academic buoyancy and academic resilience (Martin 2013), highlights the model's specific behavioral orientation. Unlike the cognitive–

emotional aspects of overcoming difficulties, grit emphasizes sustained effort (perseverance of effort) and consistency of interests. Consequently, the identified effects demonstrate that behavioral perseverance is more closely related to age-related changes, while consistency of interests is more closely linked to educational environment parameters.

The findings possess both theoretical and practical significance. As the first of its kind conducted on a Russian adolescent sample, the study demonstrated the differentiated influence of age and learning format on grit components, thereby clarifying the model of self-regulation development. This suggests that age and environment affect different mechanisms of academic grit, which must be considered when designing pedagogical strategies. Specifically, consistency of interests in online formats should be fostered through practices that enhance social presence — such as tutor support, group projects, and regular feedback. Perseverance of effort, meanwhile, can be purposefully developed through training in goal-setting, self-assessment of progress, and self-monitoring, which are effective in both digital and traditional environments. Elements of gamification and adaptive learning can further increase engagement and foster long-term motivation (Deterding et al. 2011).

The study has several limitations. Its cross-sectional design does not allow for tracking changes in grit components at the level of individual respondents. Furthermore, the offline group was limited to a single region, and data were collected via self-reporting, potentially reducing the accuracy of the results. The study did not record potential moderators such as the duration of previous online learning experience, family support levels, or socio-economic status. These factors should be included in future longitudinal studies aimed at experimentally testing programs for developing perseverance of effort and consistency of interests among adolescents across various learning formats.

Conclusions

The present study demonstrates that perseverance of effort increases statistically significantly

from early to late adolescence, whereas consistency of interests shows no age-related differences but depends on the educational format, peaking in traditional in-person environments. This confirms both our hypotheses: (1) the similarity of age-related changes in grit components across online and offline settings, and (2) the specific influence of learning formats primarily on consistency of interests.

These findings clarify the structure of grit during adolescence, revealing the differing sensitivity of its subscales to individual (age) and environmental (learning format) factors, thereby contributing to the theoretical understanding of self-regulation behavioral aspects in education. Promising directions for further research include longitudinal designs with broader geographical samples, the inclusion of objective academic activity indicators, the consideration of external moderators (family support, digital competence), and the experimental testing of programs for the differentiated development of perseverance of effort and the maintenance of consistency of interests across various learning formats.

Conflict of Interest

The author declares that there is no conflict of interest, either existing or potential.

Конфликт интересов

Автор заявляет об отсутствии потенциального или явного конфликта интересов.

Ethics Approval

The author declares that the study complies with all ethical principles applicable to research involving humans and animals.

Соответствие принципам этики

Автор сообщает, что при проведении исследования соблюдены этические принципы, предусмотренные для исследований с участием людей и животных.

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