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PSYCHOLOGICAL SCIENCE AND EDUCATION

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Discussions and Discourses

Psychological Science and Education. 2026. 31(2). ISSN: 1814-2052. ISSN: 2311-7273 (online)

Contents

Dear readers!

We are pleased to present to you the second issue of the journal Psychological Science and Education (No. 2). The issue's materials are presented in two traditional sections — “Developmental Psychology” and “Educational Psychology”, as well as in the section “Discussions and Discourses”.

The “Developmental Psychology” section opens with a study on age-related norms of non-verbal intelligence in children aged 3–7 years, based on Raven's matrices. The next topics include questions of psychological well-being among Russian adolescents within the EPOCH model, as well as the relationship between fluid intelligence and neurocognitive development in older preschoolers. The focus of this section also includes the development and validation of an emotional intelligence questionnaire for teachers at Nigerian universities, the connection between parental stress, burnout, and family upbringing with difficulties faced by preschool children, and family and cultural factors influencing the development of autonomy. Special attention is given to psychophysiological indicators of first graders' adaptation to academic workload, age-related changes in optimistic attributional style and self-efficacy in online and offline learning, as well as the validation of the “Children and Youth Resilience” test on a Russian sample. The section concludes with studies on future orientation as a mediator between the meaning of life and subjective well-being among Chinese students, and a bibliometric analysis of psychological aspects of children’s use of digital devices.

In the “Educational Psychology” section, the results of a study on the organization of practical training for future teachers in pedagogical universities are presented, along with data from a panel study on the accuracy of learning goals and academic success in an online course. The section includes works on the diagnostics of learning activities in a digital game-based environment, a literature review on the impact of socio-educational support in schools on student well-being, a qualitative analysis of the role of leadership styles in shaping the school climate, as well as an analysis of the factors and barriers to inclusive education for students with disabilities in low-income countries. The section concludes with a study on the synergy of TPACK and self-assessment as a pathway to strengthening teachers' professional commitment.

The “Discussions and Discourses” section features an article devoted to the analysis of psychological well-being in the context of personal and demographic parameters, which opens up space for professional debate on the nature of subjective well-being.

We hope that the materials of this issue will be useful to researchers, practicing specialists, and everyone interested in current trends in developmental and educational psychology.

The Editorial Board

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DEVELOPMENTAL PSYCHOLOGY (AGE PSYCHOLOGY)
ПСИХОЛОГИЯ РАЗВИТИЯ (ВОЗРАСТНАЯ ПСИХОЛОГИЯ)

Научная статья | Original paper

Age-specific norms of nonverbal intelligence in children aged 3–7 years from Raven's Colored Progressive Matrices

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Abstract

Context and relevance. Raven's Colored Progressive Matrices (CPM) are among the most widely used tools for assessing nonverbal intelligence in children. However, Russia currently lacks up-to-date normative data on preschool children's performance on this test, while existing norms are either outdated or based on foreign samples. The relevance of this study lies in the need to develop current norms for Russian-speaking children, accounting for age-related dynamics. **Objective.** The aim is to assess the developmental trajectory of nonverbal intelligence in preschool-aged children and establish age-specific norms for Raven's Colored Progressive Matrices for children aged 3–7 years. **Hypothesis.** CPM performance scores are expected to increase systematically with age. **Methods and materials.** The study involved 425 children aged 3–7 attending kindergartens in Moscow. Nonverbal intelligence was assessed using Raven's Colored Progressive Matrices, comprising 36 tasks (sets A, Ab, B). Testing was conducted individually, and data were analyzed using ANOVA with nonparametric adjustments, the Mann-Whitney U test, and the percentile method for norm determination. **Results.** Statistically significant differences were found between all age groups ($p < 0{,}001$). A slight decline in performance was observed among contemporary children aged 4,5–6 years compared to data from 1983–1997. **Conclusions.** The study provides up-to-date normative data for assessing nonverbal intelligence in Russian-speaking preschoolers. The results confirm the applicability of Raven's Colored Progressive Matrices for children as young as 3 years old. The derived norms can be used in psychodiagnostic practice.

Keywords: nonverbal intelligence, Raven's Progressive Matrices, preschool age, age-specific norms, psychodiagnostics, cognitive development

Supplemental data. Data set is available in the Laboratory of Child Psychology and Digital Socialization, Federal Scientific Center for Psychological and Interdisciplinary Research (FSC PMI). For data access write corresponding author.

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Нормы невербального интеллекта у московских дошкольников: данные Цветных прогрессивных матриц Равена

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Резюме

Контекст и актуальность. Существующие сегодня нормы развития невербального интеллекта дошкольников устарели или основаны на зарубежных выборках, что существенно снижает их применимость. Цветные прогрессивные матрицы Равена (ЦПМ) — один из наиболее признанных инструментов для стандартизированной оценки невербального интеллекта у детей. Разработка современных локальных норм развития невербального интеллекта по ЦПМ у дошкольников необходима для более точной психодиагностики российских детей дошкольного возраста с учетом возрастной динамики. **Цель**. Оценить динамику развития невербального интеллекта в дошкольном возрасте и разработать возрастные нормы выполнения теста Цветных прогрессивных матриц Равена для детей 3–7 лет. **Гипотеза**. Показатели выполнения ЦПМ Равена у дошкольников города Москвы будут демонстрировать линейный рост, что позволит разработать надежные локальные возрастные нормы невербального интеллекта. **Методы и материалы**. В исследовании приняли участие 425 детей в возрасте 3–7 лет, посещающих детские сады г. Москвы. Для диагностики невербального интеллекта использовалась методика Цветные прогрессивные матрицы Равена, состоящая из 36 заданий (серии A, Ab, B). Тестирование проводилось индивидуально, данные анализировались с помощью ANOVA с непараметрической поправкой, критерия Манна-Уитни и процентильного метода для определения норм. **Результаты.** Выявлены статистически значимые различия между всеми возрастными группами ($p < 0{,}001$). Обнаружено небольшое снижение результатов у современных детей 4 лет 6 месяцев — 6 лет по сравнению с данными 1983–1997 гг. **Выводы**. Исследование предоставляет актуальные нормативные данные для оценки невербального интеллекта у русскоязычных дошкольников. Результаты подтверждают возможность применения Цветных прогрессивных матриц Равена для детей с 3 лет. Полученные нормы могут быть использованы в психодиагностической практике.

Ключевые слова: невербальный интеллект, Прогрессивные матрицы Равена, дошкольный возраст, возрастные нормы, психодиагностика, когнитивное развитие

Дополнительные данные. Набор данных, собранных в рамках государственного задания ФНЦ ПМИ: лаборатория психологии детства и цифровой социализации ФНЦ ПМИ (с данными можно ознакомиться в лаборатории при обращении к автору для связи).

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Introduction

An important element of psychodiagnostics for preschool-age children is their intellectual development evaluation. Data obtained through research of children's intelligence help us understand the nature of learning difficulties and develop solutions for the educational process (Kanonir et al., 2024; Khoroshilov, 2007). The most common methods for assessing the intellectual development level in children in Russia are the Wechsler Intelligence Scale for Children, Raven's Progressive Matrices (RPM), the Cattell Culture Fair Intelligence Test (CFIT), and the Amthauer Intelligence Structure Test (IST) (Kanonir et al., 2024).

Raven's Progressive Matrices are one of the most popular tests for intellectual abilities assessment in practice and research, both in Russia as well as in other countries (Raven, Raven, Kurt, 2002; Pind, Gunnarsdottir, Johannesson, 2003; Kazem et al., 2009). Raven's Progressive Matrices is generally considered a tool for studying nonverbal intelligence. A distinction should be made between tests that measure nonverbal intelligence and tests that study intelligence and use stimuli that do not require verbal responses. The very concept of "nonverbal intelligence" does not imply specific intellectual operations or problem-solving techniques; it emphasizes that a person can effectively solve problems that do not require the use of speech; nonverbal intelligence "is not so much associated with knowledge as with the individual's skills formed on the basis of this knowledge and his/her psychophysiological, sensorimotor, and perceptual characteristics" (Filimonenko, Timofeev, 2001, p. 72). Thus, the classic Wechsler's test version consisted of two scales: tasks that required the use of speech (this included, among other things, arithmetic problems and a subtest related to memorizing numbers), and tasks that the respondent could perform silently, manipulating the objects offered to him/her. Moreover, a higher quality of non-verbal problem solving could depend on the subject's past experience, for example, his/her occupation, in which he/she developed the habit of working with coding or symbolization, which did not necessarily mean that he/she had better developed the corresponding mental operations. J. Raven created a test for

measuring productive mental activity, believing that previously developed scales, primarily the Stanford-Binet, diagnose reproductive ability, that includes "memorization, recall, and reproduction of primarily verbal material, which represents a cultural reserve of explicit knowledge, fixed in linguistic form" (Raven, Kurt, Raven, 1997, Sec. 1, p. 3). Productive ability consists of "resolving doubts, forming a new vision of a problem, going beyond the existing data in order to see the hidden, the non-obvious, … understanding complex problems with many interdependent variables" (Raven, Kurt, Raven, 1997, Sec. 1, p. 3). The nonverbal form was chosen to create universal tasks, so its completion would not require mastery of a general culture; in addition, Gestalt psychological theory, which was close to J. Raven, provided schemes for interpreting the specific abilities required to solve problems in series where the tasks were composed using different structuring principles. Further studies demonstrated that the data obtained as a result of diagnosing intelligence via J. Raven's methods may relate to different factors, for example, perceptual, visual-spatial and even verbal (Goharpey, Crewther, Crewther, 2013), just as the same errors may have qualitative differences and indicate dissimilar intellectual abilities, depending on both age and individual characteristics (Vucicevich, 2023, p. 65). Given this context, the expression "nonverbal intelligence", commonly applied in relation to Raven's Progressive Matrices, is used in our study in a broader sense as intelligence diagnosed by tests with nonverbal tasks; while the qualitative specificity of measured intelligence requires further research.

The Progressive Matrices were developed in 1936 by J. Raven and L. Penrose, based on the forms perception theory from Gestalt psychology and Charles Spearman's theory of neogenesis. The matrices' nonverbal nature eliminates the possibility of low scores due to a child's speech difficulties, makes the test accessible to a wide age range, and provides the ability to evaluate tasks performance speed to study the thought processes effectiveness (Scalisi, Cannoni, Traversari, 2020; Schmittmann, Hamel, 2006). In addition, the non-verbal test is convenient for mass diagnostic examinations (Khoroshilov, 2007) if the detailed author's manuals for the main test versions are available (Raven, Kurt, Raven, 1996, Sec. 1, 2, 3).

The age range for applying Raven's Progressive Matrices begins at 4 years and 6 months and has no upper limit. The method has several different variations. The most common test variants are the Standard Progressive Matrices (SPM), designed for adolescents of 8 to 11 years old and adults of 20 to 65 years old, the Colored Progressive Matrices (CPM), used for children of 4 years 6 months old up to 11 years old, people over 65 years and people with intellectual disabilities, and the Advanced Progressive Matrices (APM) for people with average and above intellectual abilities (Raven, 2008; Semago, Semago, 2005).

Due to the test's non-verbal nature, which allows it to be used in different cultures without translation, the norms for the CPM of children from the USA, obtained during the standardization of the methodology in 1986 (Raven, Kurt, Raven, 1996), are widely used. Despite the data showing that, given the similarity of such socio-cul-

tural factors as the country's urbanization degree, educational status, industrial development and ethnic homogeneity, there is a similarity in normative values (Raven, Kurt, Raven, 1996, Sec. 1, 2, 3, 4), Russian researchers highlight the problem of using the Raven's test in Russia, associated with reliance on generally accepted international norms and the lack of standardization of the Progressive Matrices on large-scale Russian samples (Kanonir et al., 2024; Khoroshilov, 2007; Davydov, Chmykhova, 2016).

The most recent data on normative indicators for children in Moscow and the Moscow region, based on the Colored Progressive Matrices (CPM), date back to 1983–1997 (Semago, Semago, 2005). Earlier studies of norms for CPM are difficult to locate for social rather than scientific reasons. In the USSR, following the 1936 decree of the Central Committee of the All-Union Communist Party "On Pedological Perversions in the System of People's Commissariats of Education", testing was practically banned, especially intelligence diagnostics, which could lead to gathering the data on intellectual differences between social classes and nationalities that could prove unacceptable to the dominant ideology of the time. Subsequently, although the decree was not repealed, psychodiagnostic procedures were used and developed in soviet psychology, but they were applied very locally and under control. L. Chuprov, describing the difficulties of the R. Amthauer's intelligence structure test adaptation in the USSR under the "severe restrictions on the intelligence research, especially in children", designates this work as "in fact... 'underground' activity of reviving psychometrics", when "tests for the sake of conspiracy were called methods", being developed mainly in defectology in the presence of "publishers and popularizers who, in the wake of an acute shortage of diagnostic tools, were actually engaged in spoiling the work of others, distributing techniques' counterfeit defective versions" (see: Sabanin, 2017, p. 227). Typographic printing of stimulus material was minimized; copying it independently was difficult, especially where color printing was required. As recently as the 1990s, in research and in practice, the copied Colored Progressive Matrices looked like sheets of gray-black images that psychologists colored by hand with colored pencils. The use of outdated norms negatively impacts the data quality reported by researchers (Raven, 2021).

The problem of the need to update norms is exacerbated by the study of two opposing effects discovered in the intelligence testing: the Flynn effect and the anti-Flynn effect. According to the Flynn effect, an increase in scores on tests aimed at measuring intelligence is observed over time (Flynn, 1984; Flynn, 1987), which is confirmed by both international (Pietschnig, Voracek, 2015; Williams, 2013; Wongupparaj, Kumari, Morris, 2015) as well as Russian studies (Sugonyaev, 2015; Sugonyaev, Grigoriev, 2019), which, among other things, introduce new explanatory principles for understanding this effect, associating it not so much with a quantitative increase, but with a redistribution of human cognitive potential in the 20th century (Valueva et al., 2017). The reverse Flynn effect demonstrates a decline in intellectual level in intergenerational samples (see: Teasdale, Owen, 2005; Platt, Keyes, McLaughlin,

Kaufman, 2019), although it is difficult to draw systematic conclusions about the generality degree of this effect, since it is observed to varying extent in different countries and at different ages (Flynn, Shayer, 2018). Currently, its causes can only be discussed at the hypothetical level: roots of the problem are considered in the social, economic, cultural, educational, and even environmental spheres; the increasing role of digital culture and time spent interacting with gadgets also falls into this range, but any other explanation that identifies technological or cultural changes chronologically coinciding with the anti-Flynn effect manifestation could be offered with equal success.

In recent years, international scientific articles have appeared highlighting modern norms for the CPM, both for school (Qiu, Hatton, Hou, 2020; Eissa et al., 2012) and preschool ages (Bildiren, 2017; Scalisi, Cannoni, Traversari, 2020), which is explained by widespread international CPM use in scientific research and psychological practice, as well as by the absence of specific norms for some countries and the outdated norms presence for others.

Methods and materials

Methods. To assess the preschoolers'nonverbal intelligence, this study used Raven's Colored Progressive Matrices (CPM) (Raven, Kurt, Raven, 1996). Each test task consists of a colored geometric matrix with a missing piece, which the respondent must select from six options (see Figure 1). The test has 36 tasks, divided into 3 series (A, Ab, B) with 12 matrices in each:

— A Series includes simple patterns (simple analysis of the structure's integrity).

— Ab Series — more complex analogies and transformations.

— B Series — complex spatial and logical problems.

There is no strict time limit for the task completion.

When the tasks are presented, the child hears an instruction. We used a modified version of the instructions by T. Rozanova and T. Egorova, tested on children with intellectual disabilities (Rozanova, 1978),

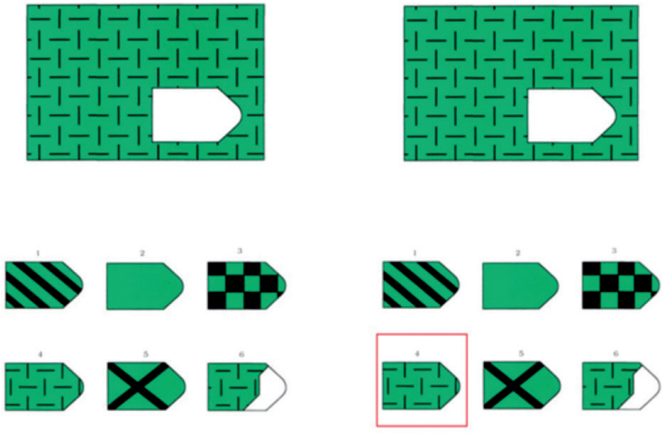

Fig. 1. Example of Raven's Colored Progressive Matrices test task

with simplified vocabulary to make them easier for younger children to understand: "*A little mouse came at night and gnawed holes in the carpets. Please help to fix them. Look, do you see a hole in the carpet? You need to pick out a piece out of these that matches the pattern. Only one of the pieces is correct. Show me which one.*"

The first task is designed to familiarize the child with the task type. If the child makes a mistake, he/she is asked to look at the options once again and select the one that matches the carpet pattern. If the child doesn't give the correct answer on the second attempt, he/she is corrected and the logic behind the task is explained. Answers cannot be corrected in subsequent tasks. Therefore, the minimum possible score in the test is 1, and the maximum is 36 (based on the number of tasks). The test is terminated if the child makes five consecutive errors at the beginning of any of the three series.

The Raven's Colored Progressive Matrices test was given individually to each child. The testing procedure was presented as a game. Responses were recorded and then processed to obtain a final score as well as scores for each series.

Procedure. The evaluations took place in the first half of the day in isolated, quiet rooms at the Moscow kindergartens that children attended. Each child was individually tested with the Raven Colored Progressive Matrices. The average duration of each evaluation was approximately 7–10 minutes, including instructions.

The full testing procedure included: (1) standardized instructions, (2) one practice task, (3) the main part of 35 tasks (series A, Ab, B), (4) recording of responses in a protocol. Optimal conditions were ensured during testing: no distractions, neutral feedback, and the possibility to stop at any time. Upon completion, all participants received a reward sticker.

The obtained data were stored in encrypted form with unique identifiers being assigned. The study was approved by the Research Ethics Committee of the Federal Scientific Center for Psychological and Multi-disciplinary Research (conclusion No. 4 dated January 31, 2024). Research ethical procedures included written voluntary informed consent from parents for diagnostic testing of their children and emphasized the participants' right to withdraw from further testing at any time.

Data analysis was conducted via Microsoft Excel 2010 and Jamovi 2.3.21.0. Contingency tables (Pearson's chi-square test) were used to verify the distribution uniformity of children across age and gender subgroups. The Exploration module was used to calculate descriptive statistics (means, standard deviations, percentiles for normalization, etc.) and to plot diagrams. To avoid dependence on the distribution type and equality of variances, nonparametric methods or nonparametric corrections for parametric methods were used for subgroup comparisons. The Mann-Whitney U test and ANOVA with Welch's nonparametric correction were applied to assess gender differences and pairwise comparisons of age groups across semiannual intervals.

Sample. Although the age range for the Raven's Colored Progressive Matrices begins at 4 years 6 months (Raven, Kurt, Raven, 1996), in this study we attempted to expand the age range by including children as young as 3 years old to track the dynamics of children's nonverbal intelligence. A total of 425 preschoolers (219 boys, 206 girls) of 3 to 7 years old (M = 4,8 years; SD = 1,2)

participated in the study. All children attended public kindergartens. The sample was stratified into four main age groups:

— Junior group: 3 years — 3 years 11 months (n = 109; 62 boys, 47 girls)

— Middle group: 4 years — 4 years 11 months (n = 104; 47 boys, 57 girls)

— Senior group: 5 years — 5 years 11 months (n = 89; 42 boys, 47 girls)

— Preschool group: 6 years — 6 years 11 months (n = 123; 68 boys, 55 girls).

Results

The total sample (n = 425) was stratified not only by four age groups (junior, middle, senior, preschool group) but also by semiannual intervals within each group. Such a stratification proved itself in creating cognitive development norms for preschoolers (Filimonenko and Timofeev, 2001) and was used in our previous studies (Almazova et al., 2024; Veraksa, Almazova, Bukhalenkova, 2020).

The distribution of children by gender in each subgroup is presented in Table 1 as absolute values (n) and percentages (%). Statistical analysis using the Pearson chi-square test revealed no significant differences in the gender distribution between age groups ($\chi^2 = 4,87$; $p = 0,676$), indicating the homogeneity of the sample and its suitability for further analysis.

Age dynamics analysis of non-verbal intelligence development in 3–7-year-old children

One-way analysis of variance (ANOVA with Welch's nonparametric correction, see Table 2) showed that for almost all age groups across semiannual intervals there were statistically significant differences both in all test series and in the total score ($p < 0,001$).

Table 1

Distribution of preschool children in the sample by gender and age group

Age group	Age (*years (months)*)	Indicator	Boys	Girls
Junior	3 (0)–3 (5)	Absolute number	18	15
		%	54,5%	45,5%
	3 (6)–3 (11)	Absolute number	44	32
		%	57,9%	42,1%
Middle	4 (0)–4 (5)	AAbsolute number	15	20
		%	42,9%	57,1%
	4 (6)–4 (11)	AAbsolute number	32	37
		%	46,4%	53,6%
Senior	5 (0)–5 (5)	Absolute number	20	25
		%	44,4%	55,6%
	5 (6)–5 (11)	Absolute number	22	22
		%	50,0%	50,0%
Preschool	6 (0)–6 (5)	Absolute number	34	29
		%	54,0%	46,0%
	6 (6)–6 (11)	Absolute number	34	26
		%	56,7%	43,3%
Total		Absolute number	219	206
		%	51,5%	48,5%

Table 2

Results of one-factor ANOVA of Welch's series of Raven's Color Progressive Matrices test for age groups by semiannual intervals in children 3–7 years old

Indicator	Series A scores	Series Ab scores	Series B scores	Total score
ANOVA Уэлча F / NON-PARAMETRIC ANOVA (df1; df2)	36.30 (7; 159)	58.81 (7; 160)	33.14 (7; 143)	68,293 (7;160)
p — value	< 0,001	< 0,001	< 0,001	< 0,001

The Games-Howell multiple comparison method allowed us to trace a clearly interpretable stable age-related dynamic: the scores for each test series and the overall score consistently improve with age (see Figure 2, Figure 3).

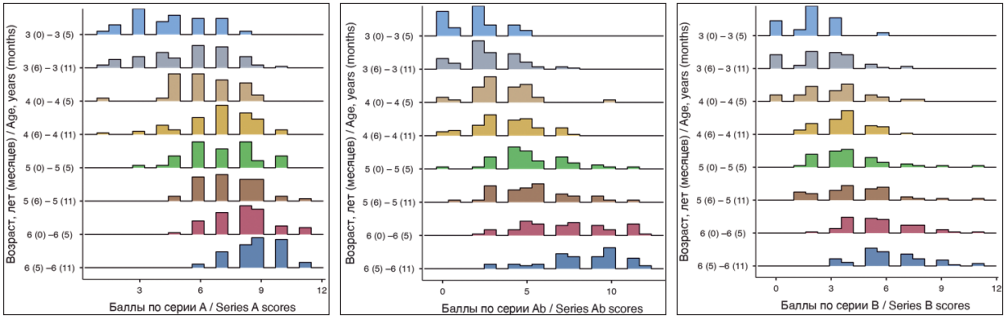

Fig. 2. Histograms of the distribution of scores on the series of Raven's Color Progressive Matrices test for age groups by semiannual intervals in children 3–7 years old

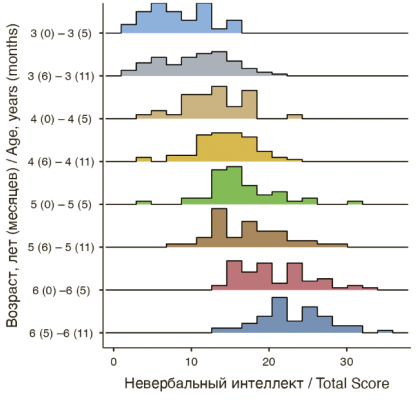

Fig. 3. Histogram of the distribution of the total score of the Raven's Color Progressive Matrices test for age groups by semiannual intervals in children 3–7 years old

Gender differences' analysis in the non-verbal intelligence development in 3–7-year-old children

Gender differences' analysis in task performance across the series revealed virtually no significant differences between boys and girls in most age categories (Mann-Whitney U, p> 0,05). The only statistically significant difference was found in the scores on the Ab series among children of the age of 4 years to 4 years 5 months in the kindergarten's middle groups (p = 0,033), but the difference in mean values was less than 0,5 points (see Figure 4).

Age norms creation of the non-verbal intelligence development in 3–7-year-old children

As a result, detailed age-specific standards of completing the methodology (see Table 3) were calculated, allowing to evaluate the nonverbal intelligence development level in preschool children of 3 to 7 years old. A distinctive feature of the developed standards is their semiannual gradation, which ensures a more accurate assessment of nonverbal intelligence development during the preschool period. Due to the lack of gender differences, gender was excluded when constructing the standards.

Normative values were calculated applying the percentile method, where the level boundaries were determined by the 15th (low level) and the 85th (high level) percentiles for each semiannual age interval. This method is widely used in psychometrics (Shmelev, 2013), as it helps to avoid rigid adherence to a normal distribution, while also kind of creating its imitation (with 15% of results at the extremes and 70% in the middle). When working with child samples, this is crucial, since it is difficult to maintain normal distribution in each individual sample; however, when combining samples, according to the central limit theorem, the distribution will begin to tend toward normality (Shiryaev, 2004).

The obtained data demonstrate a steady progress in indicators for all series of tasks as the children's age increases (see Figure 1, Figure 2).

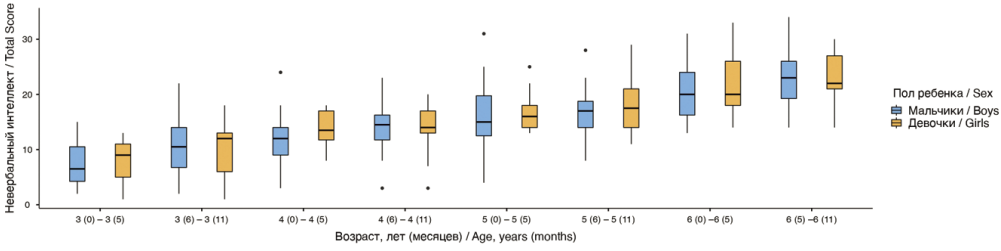

Fig. 4. Analysis of gender differences in the total score of the Raven's Colored Progressive Matrices test for age groups by semiannual intervals in children 3–7 years old

Table 3

Age-specific norms for performing the Raven's Color Progressive Matrices test for children 3–7 years old

Age group (years (months))	Level	Series A	Series Ab	Series B	Total Score
3 (0)–3 (5)	Low	£ 2	0	0	£ 3

Age group (years (months))	Level	Series A	Series Ab	Series B	Total Score
	Medium	3–7	1–4	1–3	4–12
	High	≥ 8	≥ 5	≥ 4	≥ 13
3 (6)–3 (11)	Low	≤ 2	≤ 1	0	≤ 4
	Medium	3–7	2–4	1–4	5–15
	High	≥ 8	≥ 5	≥ 5	≥ 16
4 (0)–4 (5)	Low	≤ 4	≤ 1	0	≤ 8
	Medium	5–8	2–5	1–5	9–17
	High	≥ 9	≥ 6	≥ 6	≥ 18
4 (6)–4 (11)	Low	≤ 4	≤ 1	≤ 1	≤ 10
	Medium	5–9	2–6	2–5	11–18
	High	≥ 10	≥ 7	≥ 6	≥ 19
5 (0)–5 (5)	Low	≤ 5	≤ 2	≤ 1	≤ 12
	Medium	6–9	3–7	2–6	13–21
	High	≥ 10	≥ 8	≥ 7	≥ 22
5 (6)–5 (11)	Low	≤ 5	≤ 2	≤ 1	≤ 15
	Medium	6–9	3–8	2–6	16–26
	High	≥ 10	≥ 9	≥ 7	≥ 27
6 (0)–6 (5)	Low	≤ 6	≤ 4	≤ 3	≤ 15
	Medium	7–9	5–10	4–8	16–26
	High	≥ 10	≥ 11	≥ 9	≥ 27
6 (5)–6 (11)	Low	≤ 6	≤ 5	≤ 4	≤ 18
	Medium	7–10	6–10	5–8	19–28
	High	≥ 11	≥ 11	≥ 9	≥ 29

The appendix to this article presents detailed descriptive statistics for the series of performance of the Raven's Colored Progressive Matrices test for 3–7-year-old children at semiannual intervals.

Discussion

Large-scale testing to clarify age norms for the CPM are regularly conducted in various countries. The lower limit of testing usually depends on the age at which formal education begins or on the available resources: for example, the Icelandic study begins at 6 years (Pind, Gunnarsdottir, Johannesson, 2003), the Buenos Aires study begins at 5 years 6 months (Raven, Raven, Kurt, 2002, Sec. 2), and the study of age norms in Oman cuts the lower limit to 5 years (Kazem et al., 2009). Research specifically examining norms for preschool children is not a priority. A serious problem in each case is the sample's quantitative characteristics: for example, in Iceland (Pind, Gunnarsdottir, Johannesson, 2003), the sample consisted of 550 children of 6 to 16 years old, meaning that norms for each age were formed based on data obtained from a study of 50 children.

The modern standard indicators we identified for preschool children of 4 years 6 months to 7 years old attending kindergartens in Moscow are, on average (see the descriptive table in the appendix to the article), inferior to the standard indicators for children of the same age in 1983–1997 [6], presented in Table 4. When examining

the results of 6–7-year-old children, there is a correspondence between the obtained average values and the indicators from thirty years ago. The presence of differences in the normative indicators for nonverbal intelligence in this study and the indicators identified about 30 years ago can be explained by the absence in the 1983–1997 sample of children with low results (below 8 points) on the CPM, as evidenced by the scatter of the obtained data presented in Table 4.

A significant question is the extent to which the CPM could be used for children between 3 years old and 4 years 6 months old, as the lower limit specified in the instructions is 4.5 years old (Raven, Raven, Court, 1998). For J. Raven, this limit was not random. According to J. Raven, the development of children's productive intellectual ability begins with the ability to distinguish identical figures and separate them from others, it passes through the ability to evaluate the figure's location in the perceptual field and only then reaches the ability to analyze the whole and identify its essential parts. J. Raven believed that a three-year-old child, given a matrix board with a drawn pattern and a cut-out hole for placing figures, will insert fragments with any pattern, rejoicing that everything fits the shape. Though, he also noted that already at this age "some children successfully complete the drawing in the first two or three matrices of Series A and leave the correct fragment in the correct position" (Raven, Kurt, Raven, 1997, Sec. 1, p. 23). A four-year-old child already pays attention to the pattern, although he/she ignores the elements' arrangement (for example, not distinguishing between vertically and horizontally depicted lines; "he/she only needs instructions to… try to select the correct fragment on the first try" (Raven, Kurt, Raven, 1997, Sec. 1, p. 24). At the same time, J. Raven had a general mistrust of the intelligence testing of children under 6 years of age, since in young children "attention and interest… are usually too fluid, and the results of intellectual activity are too inconsistent for any intelligence test to be able to reliably predict subsequent intellectual development" (Raven, Kurt, Raven, 1997, Sec. 2, p. 17). However, if we recall that this test was created to study productive mental activity, then the capabilities of younger children allow us to make more optimistic assumptions, both based on the views of Gestalt psychologists, on whom J. Raven relied and who believed that the ability to perceive "good form" is given to everyone from birth, as well as based on creative thinking research in preschoolers, which showed that four-year-olds can already "make a forecast of a situation ... and use a reproductive image to anticipate

Table 4

Average age-specific norms of CPM performance by children of Moscow city and Moscow region (1983–1997)

Age	Mean (points)	Range (in points)
4 years 6 months — 5 years 5 months	14	8–22
5 years 6 months — 5 years 11 months	17	12–24
6 years — 6 years 5 months	18	13–27
6 years 6 months — 7 months	20	14–29

the object's behavior" (Veraksa, 2021, p. 83). The main problem with using the CPM to study the young children's intelligence is, rather, establishing a rapport; as our research demonstrates, it is feasible to develop norms for children aged 3 to 4 years 6 months. This is consistent with the fact that even the reference materials for the standard CPM manual cite normative data obtained in Spain and the Netherlands in 1982, in which the youngest children tested were 3 years 9 months old (Raven, 2002).

Contemporary international research also emphasizes the importance of considering not only quantitative but also qualitative characteristics of the CMP tasks completion, including the time spent on them, which allows for a more thorough assessment of children's cognitive potential (Smirni, 2020; Smirni, Smirni, 2022). Smirni, in her work (Smirni, 2020), demonstrates that this allows for the identification of hidden potential and characteristics of a child's thinking that are not apparent in a quantitative interpretation of the results.

Conclusion

The study identified current normative indicators for preschool age among Russian-speaking children in Moscow. A slight decrease in the current average indicators for Moscow children at the age of 4 years 6 months to 6 years (see table in the appendix) was found in comparison with data presented 30 years ago. The results of today's children and those of 6–7-year-old children between 1983 and 1997 were similar (see Table 4). Furthermore, when comparing the obtained results with generally accepted normative values established in the United States in 1986, it was shown that the results of Moscow children at the age of 5 years to 6 years 6 months were inferior to those of US children at the lower limit of the norm and superior at the upper limit of the norm for children at the age of 5 years 6 months to 7 years. No gender differences were revealed in the research.

Promising areas for further research include identifying normative indicators, evaluating task completion speed, and investigating regional differences in preschoolers' nonverbal intelligence assessments. Continuous study of nonverbal intelligence in children at the age of 3 and older also appears necessary to confirm the test's applicability, such as by evaluating correlations with other tests measuring children's cognitive abilities at this age.

Limitations. The present study was limited to preschool children from Moscow and did not encompass evaluations of nonverbal intelligence in children from other Russian regions. Therefore, the derived norms should be applied with caution when assessing children from other geographical areas. A small sample is an important limitation of this work. Therefore, the results obtained should be considered as preliminary. In the future, it is planned to increase the sample size, expand the geography of the study and include a wider age range. This makes it possible to increase the reliability and representativeness of the obtained age norms.

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Appendix

Descriptive Statistics for Raven's Colored Progressive Matrices Test Performance in Children Aged 3–7 Years

Age group	Indicator	Series A	Series Ab	Series B	Total score
3 (0) — 3 (5)	Min	1	0	0	1
	Max	8	5	6	15
	M	4,55	1,91	1,92	7,85
	SD	1,82	1,55	1,38	3,96
	Me	5	2	2	7
	Q1	3,00	0,00	1,00	5,00
	Q2	6,00	3,00	3,00	11,0
3 (6) — 3 (11)	Min	1	0	0	1
	Max	10	8	7	22
	M	5,39	2,78	2,57	10,4
	SD	2,07	1,76	1,75	4,83
	Me	6	2,50	3	11
	Q1	4,00	2,00	2,00	6,00
	Q2	7,00	4,00	4,00	13,3
4 (0) — 4 (5)	Min	1	0	0	3
	Max	9	10	8	24
	M	6,26	3,54	3,21	12,8

Age group	Indicator	Series A	Series Ab	Series B	Total score
	SD	1,58	1,87	1,96	4,13
	Me	6	3	3	13
	Q1	5,00	2,50	2,00	10,0
	Q2	7,00	5,00	4,00	15,5
4 (6) — 4 (11)	Min	1	0	1	3
	Max	10	8	7	23
	M	6,91	3,87	3,68	14,3
	SD	1,82	1,87	1,41	3,92
	Me	7	4	4	14
	Q1	6,00	3,00	3,00	12,0
	Q2	8,00	5,00	4,00	17,0
5 (0) — 5 (5)	Min	3	0	1	4
	Max	10	11	11	31
	M	7,09	5,29	4,11	16,4
	SD	1,68	2,20	2,03	4,72
	Me	7	5	4	16
	Q1	6,00	4,00	3,00	14,0
	Q2	8,00	7,00	5,00	18,0
5 (6) — 5 (11)	Min	5	1	1	8
	Max	11	11	11	29
	M	7,52	5,45	4,36	17,3
	SD	1,41	2,24	2,20	4,81
	Me	7	5	4	17
	Q1	6,00	4,00	3,00	14,0
	Q2	9,00	7,00	6,00	20,3
6 (0) — 6 (5)	Min	5	2	2	13
	Max	11	12	11	33
	M	8,08	7,17	5,71	21,0
	SD	1,42	2,53	1,88	4,82
	Me	8	7	5	20
	Q1	7,00	5,00	4,00	17,0
	Q2	9,00	9,00	7,00	24,0
6 (6) — 6 (11)	Min	6	3	3	14
	Max	11	12	11	34
	M	8,75	8,27	6,20	23,2
	SD	1,24	2,32	1,95	4,54
	Me	9	9	6	22,5
	Q1	8,00	7,00	5,00	20,8
	Q2	10,0	10,0	7,00	26,0

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Conflict of interest

The authors declare no conflict of interest.

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Ethical approval was obtained from the FSC PMR Ethics Committee (Ref. no. 4, 01/31/2024). Ethical aspects of the study included obtaining written voluntary informed consent from parents for diagnostics and the participants' right to withdraw from testing at any time.

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Psychological well-being of Russian adolescents: strengths and areas for development within the EPOCH model

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Abstract

Context and relevance. Adolescence is characterized by high vulnerability to stressors, which, against the backdrop of digitalization and social changes, makes the task of supporting adolescents' psychological well-being (PWB) particularly significant. Despite the existence of international studies on PWB within the EPOCH model framework, data on the structure and characteristics of PWB among Russian adolescents, as well as on the associations between PWB components and gender, age, and place of residence, are lacking. This hinders the design of targeted psychological and educational programs that account for the specifics of the Russian context. **Objective.** This study aims to identify the characteristics of psychological well-being among Russian adolescents within the EPOCH model framework, as well as to determine the nature of the associations between its components and socio-demographic factors (gender, age, place of residence) in comparison with data from international samples. **Hypothesis.** We hypothesized that the psychological well-being of Russian adolescents is culturally determined and is associated with gender, age, and place of residence. **Methods and materials.** An online survey involved 1332 adolescents (48,3% boys, 51,7% girls; 52,4% from large cities, 47,6% from villages/small towns; M = 15,30, SD = 1,20) from 6 regions of the Russian Federation. The Russian-language version of the EPOCH Measure, adapted by E.N. Volkova and I.V. Volkova, was used. Descriptive statistics, ANOVA, and correlation analysis were applied. **Results.** The overall psychological well-being score was M = 3,84 (SD = 0,63). The highest scores were obtained on the Engagement (M = 4,19, SD = 0,79) and Optimism (M = 4,01, SD = 0,82) scales; the lowest scores were on the Perseverance (M = 3,55, SD = 0,77) and Happiness (M = 3,63, SD = 0,78) scales. Girls scored significantly higher than boys on the Optimism, Connectedness scales and on the overall well-being score ($p < 0,01$, η^2 ranging from 0,006 to 0,033). Age differences were minimal (only Happiness was higher in younger adolescents, $p = 0,019$, $\eta^2 = 0,006$). Adolescents from villages/small towns had more pronounced scores on the Engagement scale ($p = 0,025$, $\eta^2 = 0,004$). **Conclusions.** The conducted study allows us to conclude that the psychological well-being of Russian adolescents indeed has culturally determined specificity: the high expression of the "Connectedness" and "Happiness" components brings the Russian sample closer to collectivistic cultures, while the relatively low scores on "Engagement" and

"Perseverance" indicate resource areas for development related to the formation of a subjective agency. The hypothesis regarding the association of PWB with socio-demographic factors was partially confirmed: significant gender differences were found (girls outperformed boys on Optimism, Connectedness, and the overall well-being score), whereas the influence of age and place of residence was minimal. The identified differences are consistent with data obtained from samples in other countries (Kern et al., 2019; Burger et al., 2023; Zeng et al., 2019). The results substantiate the need to develop and implement programs aimed at enhancing engagement, perseverance, and optimism, taking into account the identified gender and cultural characteristics.

Keywords: psychological well-being, adolescents, EPOCH model, Russian sample, socio-demographic factors, engagement, perseverance, optimism, connectedness, happiness

Supplemental data. The datasets are available from the publication authors upon request.

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Психологическое благополучие российских подростков: сильные стороны и зоны развития в модели EPOCH

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Резюме

Контекст и актуальность. Подростковый возраст характеризуется высокой уязвимостью к стрессорам, что на фоне цифровизации и социальных изменений делает особенно значимой задачу поддержки психологического благополучия (ПБ) подростков. Несмотря на наличие зарубежных исследований ПБ в рамках модели EPOCH, данные о структуре и особенностях ПБ российских подростков, а также о связи компонентов ПБ с полом, возрастом и местом жительства отсутствуют. Это затрудняет проектирование адресных психолого-педагогических программ, учитывающих специфику российского контекста. **Цель.** Представленное здесь исследование было направлено на выявление особенностей ПБ российских подростков в рамках модели EPOCH, определение характера связи его компонентов с социально-демографическими факторами (пол, возраст, место жительства) в сопоставлении с данными по зарубежным выборкам. **Гипотеза**. ПБ российских подростков имеет культурно обусловленную детерминацию и связано с факторами пола, возраста и места жительства. **Методы и материалы**. В онлайн-опросе приняли участие 1332 подростка (48,3% мальчиков, 51,7% девочек; 52,4% из крупных городов,

47,6% из сел/малых городов; M = 15,30, SD = 1,20) из 6 регионов Российской Федерации. Использовалась русскоязычная версия опросника EPOCH в адаптации Е.Н. Волковой, И.В. Волковой. Применялись методы описательной статистики, ANOVA, корреляционный анализ. **Результаты**. Интегральный показатель ПБ составил M = 3,84 (SD = 0,63). Наиболее высокие значения получены по шкалам «Взаимосвязь» (M = 4,19, SD = 0,79) и «Счастье» (M = 4,01, SD = 0,82); самые низкие — по шкалам «Вовлеченность» (M = 3,55, SD = 0,77) и «Упорство» (M = 3,63, SD = 0,78). Девочки показали значимо более высокие результаты по шкалам «Оптимизм», «Взаимосвязь» и интегральному показателю психологического благополучия, чем мальчики ($p < 0,01$, η^2 от 0,006 до 0,033). Возрастные различия были минимальны (только по «Счастью» у младших подростков выше, $p = 0,019$, $\eta^2 = 0,006$). Подростки из сел/малых городов имели более выраженные показатели по шкале «Взаимосвязь» ($p = 0,025$, $\eta^2 = 0,004$). **Выводы**. ПБ российских подростков действительно имеет культурно обусловленную специфику: высокая выраженность компонентов «Взаимосвязь» и «Счастье» сближает российскую выборку с коллективистскими культурами, тогда как относительно низкие показатели «Вовлеченности» и «Упорства» указывают на ресурсные зоны развития, связанные с формированием субъектной позиции. Гипотеза о связи ПБ с социально-демографическими факторами подтвердилась частично: выявлены значимые гендерные различия (девочки превосходят мальчиков по оптимизму, взаимосвязи и интегральному показателю), тогда как влияние возраста и места жительства оказалось минимальным. Выявленные различия согласуются с данными, полученными на выборках из других стран (Kern et al., 2019; Burger et al., 2023; Zeng et al., 2019). Результаты обосновывают необходимость разработки и внедрения программ, направленных на развитие вовлеченности, упорства и оптимизма, с учетом выявленных гендерных и культурных особенностей.

Ключевые слова: психологическое благополучие, подростки, модель EPOCH, российская выборка, социально-демографические факторы, вовлеченность, упорство, оптимизм, взаимосвязь, счастье

Дополнительные данные. Наборы данных доступны по адресу авторов публикации.

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Introduction

Adolescence is a critical developmental period during which the foundations of mental and psychological health, social adaptation, and life trajectories are established. At the same time, it is an age of heightened risk and vulnerability due to substantial bodily reorganization and the asynchronous development of key life domains — somatic, physiological, psychological, personal, and social. Research on contemporary adolescents indicates negative trends in personal development, including increases in loneliness, anxiety, depressive symptoms, non-suicidal self-injury, and suicide attempts, alongside decreases in happiness, life satisfaction, and well-being (Twenge, 2020). Psychological well-being (hereinafter, PWB) is closely linked to positive personal development. In adolescence, PWB

contributes to the development of emotion regulation, identity, prosocial behavior, and self-efficacy (Potanina, Morosanova, 2022; Martínez-Líbano et al., 2025; Pedditzi, Scalas, 2024; Tashjian et al., 2021; Van Hoof, Raaijmakers, 2002). Moreover, adolescents with higher PWB are less likely to experience chronic disease, anxiety, and depression in later life (Keyes, 2006), and they tend to demonstrate stronger academic performance, higher social engagement, and better social and family relationships (Isaeva et al., 2022; Keyes, 2006; Kim et al., 2024).

In positive psychology, PWB is conceptualized as the integration of satisfaction with multiple life domains and the development of mechanisms that support positive personal functioning in adolescents. Across different theoretical frameworks, these mechanisms are associated with adolescent resources and oriented toward the constructive resolution of developmental crises and positive socialization (Volkova, 2024; Zhdanova, Filippova, 2024; Ryff, 1989; Kern et al., 2016; Ryan, Deci, 2000). Of particular interest are studies of PWB in the context of the digitalization of adolescents' social lives (Belinskaya, Shaekhov, 2023; Volkova, Sorokoumova, 2024).

In the adolescent PWB model symbolically named "EPOCH" by its developers (Kern et al., 2016) — an acronym for Engagement, Perseverance, Optimism, Connectedness, and Happiness — five components are distinguished: engagement in activities, perseverance, optimism, connectedness with others, and feelings of happiness. Within this model, adolescent PWB is treated as an integrative personal characteristic combining satisfaction across life domains with the development of positive functioning mechanisms aimed at constructive age-related crisis resolution and positive socialization. According to researchers, the model's advantages lie in overcoming fragmented and deficit-focused views of well-being (e.g., absence of anxiety, reduced depression) and in integrating the two dominant approaches to well-being — hedonic and eudaimonic (Rikel et al., 2017; Tsvetkova et al., 2019). The EPOCH model is particularly valuable for its focus on personal strengths and resources, especially those that dominate in adolescence and are largely shaped by relationships within the educational environment (Polivanova, 2020; Rasskazova, Sadovnichaya, 2023). The model has been validated across diverse cultural contexts (the United States, China, Australia, and Europe) and has proven suitable for studying the PWB of contemporary adolescents (B rger et al., 2023; Chongwo et al., 2023; Holzer et al., 2021; Kern et al., 2019; Kim et al., 2022; Maurer et al., 2021; Ortiz-Correa et al., 2020; Ranieri et al., 2021; Setyandari et al., 2019; Taheri et al., 2020; Yusoff et al., 2024; Zeng et al., 2019).

Studying adolescents in countries with different cultural and social contexts using a unified methodological framework makes it possible to identify both general patterns in PWB development and variable parameters shaped by culture and social conditions. The aim of this study was to examine the characteristics of PWB among Russian adolescents by age, gender, and place of residence, and to compare these characteristics with findings from international samples. In our view, such evidence is essential for designing educational programs, psychological support interventions, and broader social support initiatives within the Russian educational system. We hypothesized that the PWB of Russian adolescents

is culturally conditioned and associated with gender, age, and place of residence.

Materials, methods, and data analysis

Sample. Data were obtained from a survey of 1332 adolescents in grades 6–11 from general education schools in six regions of the Russian Federation. Respondents were aged 12 to 18 years (M = 15,30, SD = 1,20). The sample included 48,3% boys and 51,7% girls; 52,4% lived in large industrial cities, and 47,6% lived in rural areas or small towns.

Procedure. Data collection was conducted online. Through teachers and school psychologists, participants received a link to a survey hosted on the Testograf platform. Adolescents were informed that participation was voluntary and anonymous. Primary data are stored by the organization affiliated with the authors and can be provided upon request.

Measures. Adolescent PWB was assessed using the 20-item self-report version of the EPOCH questionnaire (Kern et al., 2015; Kern et al., 2016), which has undergone validation and psychometric testing in a Russian-speaking sample (Volkova, Volkova, 2025). The questionnaire measures five scales — Engagement (involvement in activities), Perseverance (tenacity and persistence), Connectedness (relatedness to others), Optimism (hope and confidence in the future), and Happiness (positive mood and life satisfaction) — as well as an overall PWB index. Confirmatory factor analysis of the Russian version supported the original five-factor structure (χ^2/df = 1,42; RMSEA = 0,04 [0,03; 0,06]; CFI = 1,00; TLI = 0,99; SRMR = 0,06). Internal consistency ranged from acceptable to high (Cronbach's α = 0,63–0,84; McDonald's ω = 0,72–0,95), and the overall PWB index showed high reliability (α = 0,91) (Volkova, Volkova, 2025).

Data Analysis. Data were analyzed using descriptive statistics, analysis of variance (ANOVA), and Pearson correlation analysis. Statistical analyses were conducted in IBM SPSS Statistics 26.

Results

The values for the PWB scales and the overall index are presented in Table 1.

The overall PWB index falls within the moderate range of the scale, with a slight shift toward higher values. The highest mean scores were observed for Connectedness and Happiness, whereas Engagement, Perseverance, and Optimism were less pronounced.

All scales were significantly intercorrelated. Notably strong correlations were found between Optimism and Happiness, Connectedness and Happiness, and Optimism and Connectedness (Pearson's r = 0,738, 0,686, and 0,612, respectively). The full correlation matrix is presented in Table 2.

The significant intercorrelations confirm the internal coherence of the EPOCH model and reveal meaningful links among its components. In particular, a positive outlook on the future is closely associated with current happiness and life satisfaction; a sense of belonging and social support contributes substantially to adolescents' global well-being; and the moderate but significant correlation between Optimism and Connectedness suggests that adolescents with a more positive life orientation may also develop stronger social ties, potentially due to more effective communication strategies and a more positive perception of others. The remaining correlations were significant and moderate. The uniformly positive pattern indicates that growth in

Table 1

Descriptive statistics of the results of the assessment of psychological well-being of adolescents (N = 1332)

Scales	Mean	Standard Deviation	Median	Minimum	25th Percentile	50th Percentile	75th Percentile	Maximum	Skew	Kurt
Engagement	3,55	0,77	3,50	1,00	3,00	3,50	4,00	5,00	–0,18	0,08
Perseverance	3,63	0,78	3,75	1,00	3,00	3,75	4,25	5,00	–0,27	–0,14
Optimism	3,81	0,84	4,00	1,00	3,25	4,00	4,50	5,00	–0,66	0,18
Connectedness	4,19	0,79	4,25	1,00	3,75	4,25	5,00	5,00	–1,16	1,35
Happiness	4,01	0,82	4,25	1,00	3,50	4,25	4,75	5,00	–1,04	1,08
Overall PWB	3,84	0,63	3,90	1,00	3,45	3,90	4,30	5,00	–0,77	1,21

Table 2

Correlation of values for the scales of psychological well-being

Scales	Engagement	Perseverance	Optimism	Connectedness	Happiness
Engagement	1				
Perseverance	0,476**	1			
Optimism	0,464**	0,567**	1		
Connectedness	0,357**	0,449**	0,612**	1	
Happiness	0,435**	0,514**	0,738**	0,686**	1

Note: «**» — correlation is significant at the 0,01 level (two-sided).

one PWB component (e.g., Perseverance) is likely to co-occur with growth in others (e.g., Engagement or Optimism).

Statistically significant gender differences were identified for Optimism, Connectedness, and the overall PWB index. Across age groups, significant differences were found only for Happiness; across residence groups, only for Connectedness. Associations of PWB with gender, age, and place of residence are presented in Table 3.

The results indicate that girls scored significantly higher on Optimism, Connectedness, and the overall PWB index. No significant gender differences were found for the other scales. Age differences were less pronounced: significant effects were detected only for younger adolescents on Happiness. Residence-related differences emerged for only one scale: adolescents from rural areas scored significantly higher on Connectedness.

Table 3

Differences in psychological well-being indicators depending on gender, age and place of residence

Predictor	Engagement	Perseverance	Optimism	Connectedness	Happiness	Overall PWB
	M(SD)	***M(SD)***	***M(SD)***	***M(SD)***	***M(SD)***	***M(SD)***
Gender						
Girls	3,58 (0,74)	3,61 (0,76)	3,87 (0,79)	4,33 (0,69**)**	4,05 (0,75)	3,89 (0,56)
Boys	3,52 (0,79)	3,65 (0,81)	3,75 (0,88)	4,04 (0,86)	3,97 (0,90)	3,79 (0,70)
F (p, η^2)	2,13 (0,145,0,002)	1,20 (0,274, 0,001)	7,48 (0,006, 0,006)	45,53 (<0,001, 0,033)	3,52 (0,061, 0,003)	8,78 (0,003, 0,007)
U (p)	U = 15234,5, p = 0,130	U = 15789,0, p = 0,358	U = 13892,5, p = 0,007	U = 12567,0, p < 0,001	U = 15012,5, p = 0,066	U = 13678,5, p = 0,002
Age group						
Younger adolescents, ages 13,4+0,6 years	3,56 (0,78)	3,63 (0,77)	3,76 (0,83)	4,25 (0,73)	4,12 (0,80)	3,86 (0,61)
Middle adolescents, ages 15,0+0,0 years	3,50 (0,79)	3,61 (0,77)	3,78 (0,83)	4,13 (0,82)	4,00 (0,83)	3,80 (0,64)
Older adolescents, ages 16,5+0,6 years	3,58 (0,74)	3,64 (0,80)	3,87 (0,85)	4,21 (0,81)	3,96 (0,83)	3,85 (0,64)
F (p, η^2)	1,39 (0,250, 0,002)	0,20 (0,819, 0,000)	2,43 (0,089, 0,004)	2,47 (0,085, 0,004)	**3,98 (0,019, 0,006)**	1,12 (0,328, 0,002)
H (df, p)	H (2) = 2,15, p = 0,341	H (2) = 0,41, p = 0,815	H (2) = 4,78, p = 0,092	H (2) = 5,12, p = 0,077	H (2) = 6,51, p = 0,039	H (2) = 2,05, p = 0,358
Place of residence						
city	3,58 (0,79)	3,65 (0,77)	3,81 (0,81)	4,14 (0,81)	3,99 (0,83)	3,84 (0,64)
village	3,53 (0,75)	3,61 (0,79)	3,81 (0,87)	4,24 (0,78)	4,03 (0,82)	3,84 (0,63)
F (p, η^2)	1,57 (0,211, 0,001)	1,22 (0,269, 0,001)	0,00 (0,980, 0,000)	**5,01 (0,025, 0,004)**	0,84 (0,358, 0,001)	0,05 (0,828, 0,000)
H (df, p)	H (1) = 1,72, p = 0,190	H (1) = 1,02, p = 0,313	H (1) = 0,01, p = 0,920	H (1) = 4,82, p = 0,028	H (1) = 0,67, p = 0,413	H (1) = 0,15, p = 0,699

Note: M and SD — mean and standard deviation; F — the F-statistic from a one-way ANOVA; p — level of statistical significance; η^2 — effect size measure (eta-squared); U — Mann-Whitney U test, a non-parametric test for comparing two independent groups; H — Kruskal-Wallis H test, a non-parametric counterpart to one-way ANOVA for three or more groups; df — degrees of freedom, calculated as (k-1), where k is the number of groups being compared.

Discussion

Our findings indicate that the PWB of Russian adolescents is culturally conditioned and associated with sociodemographic factors. At the same time, the results reveal both patterns shared with international samples and features specific to the Russian sociocultural context. As in studies by M. Kern and colleagues (Bürger et al., 2023; Kern et al., 2019; Holzer et al., 2021; Kim et al., 2022; Maurer et al., 2021; Ortiz-Correa et al., 2020; Ranieri et al., 2021; Setyandari et al., 2019; Taheri et al., 2020; Yusoff et al., 2024; Zeng et al., 2019), the highest scores in the overall well-being structure were observed for Connectedness, which is consistent with the developmental significance of communication, interaction, and group belonging in adolescence. The strongest correlations among Optimism, Happiness, and Connectedness likewise align with findings in other adolescent populations, underscoring their central role in overall PWB.

Russian adolescents demonstrated a relatively high level of PWB (mean overall score 3,84 out of 5). The highest mean was observed for Connectedness (4,19), which is consistent with data from collectivist cultures (e.g., China; Kern et al., 2019; Zeng et al., 2019), where social support is a key well-being resource. In the United States, Germany, and other Western countries, this indicator tends to be lower (Kern et al., 2019; B rger et al., 2023; Holzer et al., 2021). Elevated Connectedness in Russian adolescents may reflect the cultural value of close interpersonal ties, where family and friends traditionally play a major supportive role, as well as a broader orientation toward collective values.

Scores on Happiness (4,01) were also high, comparable to data from Scandinavian countries (Maurer et al., 2021) and substantially higher than, for example, in Korea (Kim et al., 2022). One possible explanation is that adolescents' happiness may be shaped by comparatively lower competitive pressure in Russia, including lower academic competition than in contexts such as Korea, and therefore weaker pressure for persistent high achievement.

Scores on Optimism (3,81) fell within the moderate range. Russian adolescents appear more optimistic than many of their Asian peers (especially in Korea; Kim et al., 2022), but less optimistic than adolescents in Scandinavian countries (Maurer et al., 2021). In our view, this pattern reflects both perceptions of societal strength, stability, and resilience and characteristics of adolescents' personal chronotope (Tolstykh, 2010) — their temporal competence, which influences behavior, emotional responses, decision-making, and academic outcomes. The content of this chronotope — its realism, balance, and future orientation — functions as both a prerequisite and correlate of optimistic attitudes toward present and future life. From this perspective, optimism in Russian adolescents appears to be characterized more by cautious hope than by ambitious confidence.

Russian adolescents scored lower on Engagement (3,55) and Perseverance (3,63) than peers in the United States, Germany, and Austria (Kern et al., 2019; B rger et al., 2023; Holzer et al., 2021), as well as in Korea and China (Kim et al., 2022; Zeng et al., 2019). The combination of relatively high overall PWB (3,84) and comparatively low Engagement (3,55)

may be interpreted in several ways. First, high Connectedness (4,19) may function as a compensatory mechanism and a key well-being resource. In collectivist cultures — where Russia is often positioned — deep social ties (family, friends, reference groups) are fundamental values and major sources of positive affect, security, and belonging. In our data, strong correlations of Connectedness with Happiness (r = 0,686) and Optimism (r = 0,612) support this interpretation. Russian adolescents may maintain high overall PWB primarily through relational satisfaction (Connectedness) and positive affect (Happiness), even when immersion in meaningful activities (Engagement) or persistence in goal pursuit (Perseverance) is less pronounced. In this sense, social relationships may serve as a collective buffer against lower activity engagement. The sense of belonging and support can be strong enough to compensate for reduced task involvement. For Russian adolescents, well-being based on individual achievement, autonomy, and self-realization (high Engagement) may function as an alternative to well-being grounded in relationships and socially approved roles, as reflected in stable beliefs such as “It is more important to be a good person than a good specialist”.

Second, the prioritization of Connectedness over Engagement and Perseverance may also reflect differences in psychological costs across behaviors that sustain these components. In the Russian cultural context, maintaining high connectedness may require less deliberate effort and intrinsic motivation than sustained achievement in demanding activities. Social ties may be formed and maintained more naturally within family and school structures, whereas deep engagement in study, creative work, or sports often requires the targeted development of intrinsic motivation, autonomy, and obstacle management — capacities that may be difficult to develop under strong external regulation or limited adolescent agency.

Gender differences in adolescent PWB mirror global trends: in many countries, girls report higher well-being, largely due to stronger connectedness and higher optimism.

No significant *age-group differences* were found in the Russian sample (p > 0,05), whereas Western samples typically show higher PWB among younger adolescents; this discrepancy requires further study. In addition, some significance values close to the critical threshold warrant more detailed analysis.

Place of residence. Unlike findings from the United States, where rural adolescents tend to report lower PWB, the Russian sample showed higher well-being among rural adolescents, primarily due to higher Connectedness scores. This points to the special role of strong social ties in supporting adolescent well-being in Russian contexts. At the same time, effect sizes for sociodemographic predictors were small. On the one hand, this may indicate substantial contributions from other variables not included in the current analysis; on the other hand, it may reflect sociocultural specificities of adolescent development in Russia. These patterns require further investigation.

Conclusion

The PWB of Russian adolescents appears to be shaped by a distinctive configuration of components. Key strengths and developmental resources are the col-

lectivist advantages of well-being — strong social connectedness and happiness. Vulnerabilities, barriers, and developmental constraints are associated with the formation of personal agency, particularly lower perseverance and engagement in activity. Russian adolescents may experience relatively high social well-being; however, for more balanced and sustainable PWB, it is important to strengthen persistence, intrinsic motivation, personal responsibility, initiative, and autonomy. This indicates a need to adjust educational policy and practice, as well as parenting strategies, toward greater support for adolescent independence, responsibility, and goal-directedness. The development of optimism — linked both to perceptions of societal strength, stability, and resilience and to a cautious orientation toward the future — also represents a key zone of proximal development for adolescent PWB.

Gender differences in the PWB of Russian adolescents are consistent with global trends. The absence of significant effects of age and place of residence (except for Connectedness) may reflect sample homogeneity and lower social differentiation among Russian adolescents compared with peers in some other countries. At the same time, age and residence effects may prove more substantial in specific social categories (e.g., orphans, children of migrants), which defines important directions for future research. Further work may also examine how overall PWB and its individual components influence adolescent socialization, especially under conditions of digital transformation. Additional directions include designing interventions aimed at increasing engagement, perseverance, and optimism among Russian adolescents.

Limitations. The results of the study should be interpreted with several limitations in mind. The main ones include the general nature of the adolescent sample, which prevents generalizing the findings to all Russian adolescents, and the use of a cross-sectional design, which identifies correlations but does not establish causal relationships. The use of online self-reports may have introduced social desirability bias, and the analysis was focused on a limited set of socio-demographic predictors, while other important factors (familial, school-related, personality) were not considered. This likely explains the small effect sizes observed.

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Irina V. Volkova — application of statistical, mathematical or other methods for data analysis; conducting the experiment; data collection and analysis; visualization of research results.

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Relationship of fluid intelligence with other indicators of neurocognitive development in children of senior preschool age

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Abstract

Context and relevance. The existing studies on the relationship between fluid intelligence (FI) and other neurocognitive functions, including in children, are contradictory: the relationship between fluid intelligence and short-term and long-term memory, attention, and fine motor development remains debatable, as does the question of the possibility of FI training through targeted development of individual cognitive skills. **Objective.** The aim of this study is to assess the associations of FI with a number of other indicators of neurocognitive development in older preschool children. **Hypothesis.** In older preschool children, FI is associated with indicators of working memory, short-term and long-term memory, attention, and fine motor skills. **Methods and materials.** The examination of the participants was conducted within the framework of the project "Study of neurobiological predictors of academic success in children" (Priority 2030) using the hardware and software system SHUHFRIED (Tower of London — Freiburg version, TOL-F; Motor Learning Skills test, short form according to Sturm and Büssing, Motor Learning Skills, MLS) and neuropsychological examination using the method of A.R. Luria adapted for older preschool children aged 6–7 years (Glozman, 2006). A total of 169 children were examined; 98 participants, 68 boys, 30 girls, completed all assessment procedures, median age 6,5 [6,0; 7,0] years. **Results**. FI has significant correlations with a number of neurocognitive development indicators, among which the closest and most significant are with dynamic, oral, and kinesthetic praxis; the ability to plan and create a copying strategy based on analytical and holistic components of perception (such as copying a three-dimensional image); hand movement coordination; fine motor skills; interaction of the afferent and efferent links of optical-constructive activity; acoustic gnosis; awareness of body schema; and spatial organization of movement. **Conclusions**. According to the data obtained, FI in senior preschool age has correlations with a wide range of neurocognitive development indicators, and, thus, it is not possible to single out only one target for FI training. To achieve results in the field of FI enhancement, more integrative approaches to training that cover a variety of cognitive functions and tasks should probably be considered.

Keywords: fluid intelligence, memory, attention, praxis, fine motor skills, senior preschool age

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Связь флюидного интеллекта с другими показателями нейрокогнитивного развития у детей старшего дошкольного возраста

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Резюме

Контекст и актуальность. Имеющиеся к настоящему времени исследования о связи флюидного интеллекта (ФИ) с другими нейрокогнитивными функциями, в том числе у детей, противоречивы: связь ФИ с кратковременной и долговременной памятью, вниманием, развитием мелкой моторики остается дискутабельной, так же как и вопрос о возможности тренировки ФИ путем таргетного развития отдельных когнитивных навыков. **Цель.** Оценка ассоциаций ФИ с рядом других показателей нейрокогнитивного развития в старшем дошкольном возрасте. **Гипотеза.** У детей старшего дошкольного возраста ФИ ассоциирован с показателями рабочей памяти, кратковременной и долговременной памяти, внимания и мелкой моторики. **Методы и материалы**. Обследование участников проводилось в рамках проекта «Исследование нейробиологических предикторов академической успешности детей» (Приоритет–2030) с помощью аппаратно-программной системы SHUHFRIED (методика Лондонский Тауэр, Фрейбургская версия, англ. Tower of London — Freiburg

version, TOL-F; тест Навыки моторного обучения, краткая форма по Штурму и Бюссингу, англ. Motor Learning Skills, MLS) и нейропсихологического обследования с помощью методики А.Р. Лурии в адаптации для детей старшего дошкольного возраста 6–7 лет (Глозман, 2006). Всего обследовано 169 детей, полностью все процедуры оценки прошли 98 участников, 68 мальчиков, 30 девочек, медианный возраст — 6,5 [6,0; 7,0] лет. **Результаты.** ФИ имеет значимые корреляции с целым рядом показателей нейрокогнитивного развития, среди которых наиболее тесные и значимые — с динамическим, оральным и кинестетическим праксисом, возможностями планирования и создания стратегии копирования с опорой на аналитические и целостные компоненты восприятия (копирование трехмерного изображения), координацией движений рук, мелкой моторикой, взаимодействием афферентного и эфферентного звеньев оптико-конструктивной деятельности, акустическим гнозисом, осознанием схемы тела и пространственной организации движения. **Выводы**. Согласно полученным данным, ФИ в старшем дошкольном возрасте имеет корреляции с широким набором показателей нейрокогнитивного развития, и, таким образом, выделить только одну мишень для тренировки ФИ не представляется возможным. Для достижения результатов в области повышения ФИ, вероятно, следует рассматривать более интегративные подходы к тренировкам, которые охватывают разнообразные когнитивные функции и задачи.

Ключевые слова: флюидный интеллект, память, внимание, праксис, мелкая моторика, старший дошкольный возраст

Финансирование. Исследование выполнено при финансовой поддержке программы «Приоритет-2030» в рамках научного проекта «Исследование нейробиологических предикторов академической успешности детей».

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Introduction

Fluid intelligence (FI) is an important predictor of academic success. Research suggests that FI factors such as induction, deduction, classification, general sequential and quantitative thinking determine its important role in an individual's acquisition of new skills and abilities (Rzhanova, Alekseeva, Burdukova, 2020; Johann, 2020; Li, 2021; Passolunghi, 2022; Vernucci, 2021).

According to Cattell, FI is an individual's ability to think logically and solve problems in new, non-standard situations, regardless of previously acquired knowledge (Cattell, 1987). The key tenet of Cat-

tell's theory is the presence of two main factors in the structure of intelligence: FI and crystallized intelligence (the latter is associated with the acquisition of knowledge, sociocultural experience, and the individual's educational environment) (Cattell, 1963). Subsequently, within the framework of Cattell-Horn-Carroll, FI began to be considered one of the key primary cognitive abilities, along with crystallized intelligence (McGrew, 2023).

The issue of the relationship between FI and other indicators of neurocognitive functioning in both adults and children is relevant, since the presence of associations with individual cognitive functions opens up opportunities for developing programs for the development of FI through targeted training of individual cognitive skills.

Particular attention is paid to the relationship between FI and working memory (WM). According to a number of researchers, WM is the most powerful predictor of FI (Luo, 2020). It is an active system that is responsible for storing a limited amount of information and the ability to operate on this information within a short period of time (Rzhanova, Alekseeva, Burdukova, 2020; Nisbett et al., 2012). Kyllonen and Christal were the first to show extremely high correlation coefficients (0,80–0,88) between WM and FI in adults (Kyllonen, Christal, 1990). A strong and stable relationship between WM and FI was confirmed by the results of other studies (Conway et al., 2002; Kane et al., 2004). The close relationship between FI and WM is also supported by the results of neurobiological studies: the same brain structures (prefrontal and parietal cortex) are activated when performing FI and WM tasks (Gray, Chabris, Braver, 2003; Luo, 2020). Overall, the strong correlation between WM and FI in adults is recognized by the scientific community. The determinants of this relationship remain controversial.

Colom et al. (2005, 2006) found that individual differences in FI levels were significantly associated with both WM and short-term memory (STM). In some studies, STM was a stronger predictor of FI than WM, leading the researchers to conclude that the relationship between WM and FI was based on the volume of STM (Colom et al., 2008). However, other studies failed to confirm the mediating role of STM in the relationship between WM and FI (Cochrane, Green, 2021; Conway et al., 2002).

One of the versions explaining the observed relationship between WM and FI is the assumption of the determining role of attentional control mechanisms (Engle, 2010; Schroeders et al., 2016). In FI tasks, cognitive control is necessary for problem analysis, monitoring the solution process, and adapting the solution strategy in accordance with how successfully the subject copes with the task. Similarly, cognitive control is required in tasks assessing WM to maintain representations retrieved from memory in the field of consciousness when faced with interfering phenomena. Two independent studies confirmed the theory of attention as a determinant of the relationship between FI and WM (Colom et al., 2008; Jaeggi et al., 2011). The authors suggest that executive control, which is responsible for the distribution and concentration of attention during problem solving and its switching to more important tasks, plays a fundamental role in the relationship between FI and WM (Kane et al., 2004).

In children, the relationship between WM and FI has been studied significantly

less (Erostarbe-P rez, 2022). A number of studies have shown the influence of STM on the relationship between the studied variables (Hornung et al., 2011; Tillman, Nyberg, Bohlin, 2008). According to the study by Hornung et al. (Hornung et al., 2011; 160 children aged six years), it is the STM component that is associated with FI at this age stage. Other studies have demonstrated the opposite picture, that is, the absence of a significant effect of STM on the relationship between FI and WM (Bayliss et al., 2005; Engel de Abreu, Conway, Gathercole, 2010; Swanson, 2008).

Alekseeva et al. (2018) reported the results of a study examining the relationship between FI and other aspects of cognitive abilities in school-aged children using the Kaufman tests. The main findings highlight the link between FI and memory, both short-term and long-term (LTM), which may indicate the importance of a comprehensive approach to intelligence development.

Of great importance are the data from training experiments demonstrating the possibility of developing FI through WM training (Jaeggi et al., 2008, 2011). However, these data were not confirmed in other studies, including a randomized controlled trial (Redick et al., 2013; Thompson et al., 2013). The discussion about the possibility of influencing FI through WM training remains relevant. The possibility of such training was demonstrated in a meta-analysis of 20 studies (Au et al., 2015), but subsequently in two other studies, including a meta-analysis, these results were criticized and recognized as lacking a serious evidence base (Bogg, Lasecki, 2015; Melby-Lervåg, Hulme, 2016).

According to recent studies, fine motor skills and WM are the cognitive abilities most closely associated with FI in samples of primary school children (Memisevic, Dedic, Malec, 2023). However, other studies have shown a relatively weak relationship between fine motor skills and intelligence in children (Jenni et al., 2013).

Thus, the studies available to date on the relationship between FI and other neurocognitive functions, including in children, are contradictory: the relationship between FI and STM and LTM, attention, fine motor skills remains debatable, as does the question of the possibility of training FI through targeted development of individual cognitive skills.

This inconsistency in the literature may be due to the fact that most studies focus on analyzing isolated associations between FI and specific cognitive functions (WM, attention, or motor skills) across different samples and age groups. A comprehensive analysis of a wide range of neurocognitive indicators in a single sample of older preschool-aged children has not previously been conducted, making it impossible to assess the relative contribution of various functions and their relationship with FI within a single diagnostic paradigm. This necessitated the study presented here, which was based on the following hypothesis: FI in older preschool-aged children is associated with indicators of WM, STM, LTP, attention, and fine motor development. The aim of the study was to evaluate the associations of FI with a number of other indicators of neurocognitive development in older preschool-aged children.

Materials and methods

The children were examined as part of the project “Study of neurobiological predictors of academic success in children.” Inclusion criteria: written voluntary consent

form a parent; child's age at inclusion: 5 years 10 months — 7 years 4 months; child's ability to understand and follow instructions. Exclusion criteria: previously diagnosed hearing, vision, and motor impairments; severe mental and neurological disorders diagnosed by a psychiatrist and/or neurologist; concussion within the last year, other traumatic brain injury, or neurosurgical intervention on the brain; paroxysmal activity on the EEG; alalia; severe chronic diseases, developmental defects, cachexia, hereditary diseases; chronic mental disorders, alcohol and/or drug addiction in parents.

The Leiter-3 International Performance Scale (4 core subtests of the cognitive block, K) was used to assess FI (n = 169) (Royd, 2014). The Leiter-3 test is designed to assess an individual's ability for abstract thinking, problem solving, and behavioral adaptation, independent of verbal or language skills. It consists primarily of visual-spatial tasks, which minimizes the impact of language barriers. The Leiter-3 demonstrates high validity and is actively used in clinical practice, education, and research (Giofrè et al., 2024; Lichtenstein et al., 2022).

The neuropsychological examination (n = 130) was based on the method of A.R. Luria, adapted for older preschool children aged 6–7 years (Glozman, 2006); the tests used are presented in the table in the Results section.

The assessment of WM, attention, and fine motor skills was conducted using the hardware and software complex (HSC) SHUHFRIED (Vienna Test System, Austria) (n = 114). Three subtests were analyzed:

1. The Tower of London Freiburg Version (TOL-F) test. The main variables assessed are planning ability (the ability to cognitively model alternative solutions and evaluate the consequences of an action before it is performed), WM, and inhibitory control — components of executive functioning (EF) (Berg, Byrd, 2002). The validity of the TOL-F was confirmed in the study by Debelak et al. (2016).

2. The MLS test (Fine Motor Skills Assessment, Short Form according to Sturm and Büssing) includes 8 subtests 4 for each hand and evaluates the following indicators: purposefulness of movements, calmness of the hands/tremor, precision of hand and wrist movements, dexterity of the hands and fingers, speed of hand and wrist movements, speed of wrist and finger movements.

3. To assess attention, the Determination Test was used: a test of reaction to several stimuli (presentation of color stimuli and sound signals), to which the respondent responds by pressing the corresponding buttons on the response panel and using the pedals. The test requires dividing attention between different stimulus modalities (visual and acoustic), as well as between different response options (pressing a button with the hand or using the pedal).

To date, data on the experience of using the SCHUHFRIED APCS in Russia for carrying out psychological and pedagogical research have been published (Yakimova, Perminov, 2020).

Ninety-eight study participants (68 boys and 30 girls, median age 6.5 [6,0; 7,0] years) completed all assessment procedures. All children were permanent residents of Nizhny Novgorod and Russian-speaking. The study was continuous and cross-sectional. Not all children had completed all planned assessment methods by the time of writing

this article (the study is ongoing), and some participants dropped out of the study due to parental refusal to participate. Therefore, the number of children assessed by different specialists varies. The database of children's assessment results is published in the RusPsyDATA repository of psychological research and tools (Zhilyaeva et al., 2025).

Data analysis was performed using StatSoft Statistica 6.0. The data distribution was non-normal (Shapiro-Wilk test), and Spearman's rank correlation coefficient (ρ) was used to assess correlations between variables. Correlations were considered significant at $p < 0,05$.

Results

The table presents the results of the analysis of correlations of the integral indicator FI — IQ — with the results of the assessment of other neurocognitive functions.

Table

Correlations (Spearman) of the fluid intelligence quotient with the results of assessment of other neurocognitive functions

Variable	Number of observations	Correlation coefficient	p
Neuropsychological examination			
Attention (proofreading test)	121	–0,19	0,036
Coordination of hand movements, fine motor skills (graphomotor test, "fence")	117	–0,41	< 0,0001
Dynamic praxis (execution of a complex motor program with a visual demonstration of a sample)	121	–0,46	< 0,0001
Possibilities of planning and creating a copying strategy based on analytical and holistic components of perception (copying a three-dimensional image)	121	–0,44	< 0,0001
Kinesthetic praxis (praxis of finger postures based on a visual model)	120	–0,30	0,00073
Kinesthetic organization of movements of speech organs (oral praxis)	118	–0,40	< 0,0001
Interaction of the afferent and efferent links of optical-constructive activity (copying a circle, square, triangle and rhombus, Denman figures)	121	–0,48	< 0,0001
Acoustic gnosis (reproduction of rhythmic structures based on an auditory pattern)	119	–0,43	< 0,0001
Awareness of the body scheme, spatial organization of movement (Head's test: copying a pose from a model; performing a hand pose according to verbal instructions)	121	–0,32	0,00031
Visual gnosis (recognition of noisy images)	121	–0,16	0,074
Operational (working) memory (memorization capacity at 1 presentation, 10-word test)	121	–0,10	0,26
Delayed (long-term) auditory memory (delayed recall in the 10-word test after interference)	120	–0,23	0,013
Mechanical memory (memorization by the 3rd–4th presentation in the 10-word test)	121	–0,22	0,014
Visual memory (remembering and recognizing two groups of three images of objects)	121	–0,35	< 0,0001

Variable	Number of observations	Correlation coefficient	p
Ability to categorize and generalize (4th odd one out test)	120	–0,34	0,00018
Understanding instructions (observation by a specialist)	121	–0,37	< 0,0001
Performance (observation by a specialist)	120	–0,26	0,0047
Perseverance (observation by a specialist)	121	–0,28	0,0020
Pace of activity (observation by a specialist)	121	–0,13	0,15
HSC SCHUHFRIED, determination test (DT)			
Number of incorrect reactions	113	–0,23	0,016
Speed of response	113	–0,17	0,071
Number of reactions	113	0,18	0,054
Number of correct reactions	113	0,26	0,0058
HSC SCHUHFRIED, fine motor skills test (MLS)			
Hits, Number of errors (Left hand)	113	–0,10	0,31
Hits, Error duration, seconds (Left hand)	113	–0,11	0,24
Hits, Total duration, seconds (Left hand)	113	0,09	0,36
Hits, Number of hits (Left hand)	113	0,16	0,090
Hits, Number of errors (Right hand)	113	–0,29	0,0020
Hits, Error duration, seconds (Right hand)	113	–0,29	0,0021
Hits, Total duration, seconds (Right hand)	113	0,04	0,66
Hits, Number of hits (Right hand)	113	0,09	0,36
Tracing lines, Number of errors (Left hand)	113	0,22	0,018
Tracing lines, Error duration, seconds (Left hand)	113	–0,06	0,54
Tracing lines, Total duration, seconds (Left hand)	113	0,19	0,041
Tracing lines, Number of errors (Right hand)	112	0,10	0,32
Tracing lines, Error duration, seconds (Right hand)	112	–0,05	0,64
Tracing lines, Total duration, seconds (Right hand)	112	0,26	0,0059
Stability, Number of errors (Left hand)	112	0,21	0,028
Stability, Error duration, seconds (Left hand)	112	–0,23	0,016
Stability, Number of errors (Right hand)	112	0,07	0,48
Stability, Error duration, seconds (Right hand)	112	–0,23	0,015
Tapping, Number of hits (Left hand)	113	0,20	0,034
Tapping, Number of hits (Right hand)	113	0,25	0,0089
HSC SCHUHFRIED, Tower of London test (TOL)			
Planning ability	113	0,07	0,45
Correctly solved tasks with 4 movements	113	0,02	0,82
Correctly solved tasks with 5 movements	113	0,05	0,61
Correctly solved tasks with 6 movements	113	0,10	0,32
Changes in decision	113	0,13	0,16
Selecting a locked ball	113	–0,15	0,12

Variable	Number of observations	Correlation coefficient	p
Selecting a locked rod	113	0,05	0,57
Selecting an invalid position	113	–0,11	0,24
Number of correct decisions	113	0,20	0,035

Note: HSC — hardware and software complex. The results of the neuropsychological assessment are coded in such a way: the more deviations from the norm, the higher the score. Therefore, the correlation coefficients of the neuropsychological battery indicators with the IQ are negative.

Discussion

According to the obtained results (see Table), in older preschool children, FI does not have significant associations with the working memory indicator (10-word test, memorization capacity at 1 presentation). The overwhelming majority of data on a close correlation between FI and WM were obtained in samples of adults (Conway et al., 2002; Engle, 2010; Gray, Chabris, Braver, 2003; Kane et al., 2004; Kyllonen, Christal, 1990). In the only published study we found on the relationship between WM and FI in children, the authors concluded that in childhood, the relationship between FI and WM is based on cognitive control mechanisms, but not STM (Engel de Abreu, Conway, Gathercole, 2010).

Moreover, we obtained a highly significant correlation between visual memory and FI (ρ = –0,199; p = 0,000094). It is likely that visual working memory is most involved in completing the Leiter-3 tasks. Verbal working memory, which has a different neurobiological basis, apparently does not contribute to the FI indicator in older preschool age. At the same time, the verbal mechanical and LTM indicators in our study correlate with FI, albeit weakly. This is consistent with the data of other researchers (Alekseeva, Rzhanova, Burdukova, 2018; Hornung et al., 2011; Tillman, Nyberg, Bohlin, 2008).

Significant correlations of attention indices with FI, obtained using both neuropsychological assessment and the SCHUHFRIED HSC (determination test), are consistent with each other, as well as with the data of other researchers who have demonstrated a connection between attention indices and FI (Colom et al., 2008; Engle, 2010; Jaeggi et al., 2011; Schroeders et al., 2016). The authors of the cited studies explain the connection between attention and FI in the context of a close relationship between attention and IF. In our study, IF was tested using the TOL test of the SCHUHFRIED HSC, and the number of correct decisions in this test also correlated with FI (ρ = 0,20; p = 0,035).

Thus, the results obtained in this study indicate the existence of a relationship between various components of memory (except verbal working memory), attention, EF and FI, previously presented in the literature.

However, it is noteworthy that the relationship between FI and other indica-

tors of children's neurocognitive development is closer and more significant. Thus, FI has significant correlations (see table) with dynamic praxis, the ability to plan and create a copying strategy based on analytical and holistic components of perception, hand coordination, fine motor skills, the interaction of the afferent and efferent links of optical-constructive activity, the kinesthetic organization of speech movements, acoustic gnosis, awareness of body schema, spatial organization of movement, kinesthetic praxis, as well as comprehension of instructions, performance, and perseverance. Furthermore, a large number of significant weak correlations were obtained between FI and fine motor skills, assessed by the MLS test of the SCHUHFRIED HSC. While conflicting data on the relationship between fine motor skills and FI in children are presented in the literature (Jenni et al., 2013; Memisevic, Dedic, Malec, 2023), there is no data on the relationship between FI and other indicators of neurocognitive functioning described above in the available sources.

Conclusions

According to the data obtained in our study, FI in older preschool children correlates with a wide range of neurocognitive development indicators, including various types of praxis, gnosis, visuospatial functions, and fine motor skills. However, significant links with verbal working memory are absent, which may indicate the leading role of visuospatial systems in the implementation of FI at this age. Thus, it is not possible to single out a single target for FI training, which is consistent with the concept of FI as a complex dynamic system based on the interaction of various cognitive processes and neural networks. To achieve results in improving FI in older preschool children, it is likely necessary to consider integrative training approaches encompassing a wide range of cognitive functions.

Limitations. The associations obtained in this cross-sectional study cannot be interpreted as cause-and-effect relationships, nor can it be concluded that the development of neurocognitive traits associated with FI will contribute to the development of FI. A reverse relationship cannot be ruled out: children with more developed FI have higher scores on other tests due to their more highly developed FI. However, the obtained results create the basis for further prospective experimental studies that will be able to confirm or refute the hypothesis that FI can be developed through comprehensive training of several neurocognitive development indicators.

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Academic staff emotional intelligence questionnaire (ASEIQ): development, validation, and bifactor modelling in Nigerian universities

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Abstract

Context and relevance. Emotional intelligence (EI) is widely recognized as crucial in educational settings, but instruments specifically measuring EI among higher education instructors, particularly university lecturers, remain scarce. Therefore, developing a context-specific questionnaire for this population is imperative. **Objective**. To develop and validate the Academic Staff Emotional Intelligence Questionnaire (ASEIQ) for Nigerian university lecturers. **Methods**. A sample of 3122 lecturers from two Nigerian universities participated. The data were analysed via exploratory factor analysis (EFA; $n = 262$), confirmatory factor analysis (CFA; $n = 1300$), and bifactor modelling ($n = 1560$). Reliability was assessed via Cronbach's alpha, McDonald's omega, and split-half reliability with Spearman–Brown correction. **Results**. EFA identified five factors that cumulatively explained 74,12% of the variance. CFA confirmed a bifactor model as the one with the best fit, demonstrating strong reliability ($\alpha = 0,85$–$0,99$) and validity (AVE > 0,50). **Conclusions**. The ASEIQ is a valid, reliable tool for assessing EI among Nigerian university lecturers, filling a critical gap in context-specific EI measurement.

Keywords: empathy, instrument validation, internal motivation, self-awareness, self-regulation, social skills

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Вопросник оценки эмоционального интеллекта академического персонала (ASEIQ): разработка, проверка и бифакторная модель в университетах Нигерии

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Резюме

Контекст и актуальность. Эмоциональный интеллект (ЭИ) широко признается важным элементом в образовательных условиях, однако инструменты, специально предназначенные для измерения ЭИ среди преподавателей высших учебных заведений, особенно преподавателей университетов, остаются редкостью. Поэтому создание инструмента, учитывающего специфику такой выборки, является необходимым. **Цель**. Разработка и проверка валидности Анкеты эмоционального интеллекта академического персонала (ASEIQ) для преподавателей университетов Нигерии. **Методы**. В исследовании приняли участие 3122 преподавателя из двух университетов Нигерии. Данные были проанализированы с помощью исследовательского факторного анализа (EFA; n = 262), подтверждающего факторного анализа (CFA; n = 1300) и бифакторного моделирования (n = 1560). Надежность анкеты оценивалась с помощью коэффициентов альфа Кронбаха, омега Макдональда, метода разделения пополам и формулы коррекции Спирмена–Брауна. **Результаты**. Эксплораторный факторный анализ (EFA) выявил пять факторов, объясняющих 74,12% дисперсии. Конфирматорный факторный анализ (CFA) подтвердил, что бифакторная модель является наиболее оптимальной (обладает наилучшим соответствием), демонстрируя высокую надежность (α = 0,85–0,99) и валидность (средняя извлеченная дисперсия (AVE) > 0,50). **Выводы**. Опросник ASEIQ является валидным и надежным инструментом для оценки эмоционального интеллекта среди преподавателей университетов Нигерии, восполняя критический пробел в контекстно-специфических методах измерения ЭИ.

Ключевые слова: эмпатия, валидация методики, внутренняя мотивация, самосознание, саморегуляция, социальные навыки

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Дополнительные данные. Данные доступны по ссылке: https://ruspsydata.mgppu.ru/workflowitems/229/view.

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Introduction

Lecturers play a central role in higher education by handling multiple responsibilities, including teaching, research, and service to the wider community (Akah et al., 2022; Odigwe, Bassey, Owan, 2020; Owan, Bassey, Ubi, 2023). Alongside these core tasks, they also manage administrative duties and guide students through mentorship (Owan, Odigwe et al., 2022), all of which influence how well graduates perform in their professional lives (Aduma et al., 2022). To manage these demands effectively, emotional intelligence (EI) is essential. Studies link EI among lecturers to improved student learning, greater sensitivity to learners' needs, and more welcoming classroom experiences (Sellbom, Tellegen, 2019). EI also helps lecturers cope with job stress, especially during remote work, and supports their mental health and job satisfaction (Iacolino et al., 2023).

Although EI is widely recognised as important, most African universities lack reliable tools for measuring it among academic staff. Existing questionnaires, mostly designed in Western countries, often fail to produce dependable results and do not align with the realities of African lecturers (O'Connor et al., 2024). This limits efforts to assess emotional skills and support academic staff development (Sellbom, Tellegen, 2019). This study responds to that need by designing and validating the Academic Staff Emotional Intelligence Questionnaire (ASEIQ) for Nigerian universities.

Theoretical framework of emotional intelligence

Salovey and Mayer defined emotional intelligence (EI) as the ability to monitor and differentiate one's own emotions and those of others to guide thought and behaviour (Salovey, Mayer, 1990). Mayer et al. later stressed its role in emotional awareness, understanding, and regulation (Mayer, Caruso, Salovey, 2016). Bar-On saw EI as noncognitive traits supporting adaptation, such as optimism (Bar-On, 1997), while Goleman described it as emotional skills used in social interactions (Goleman, 1995). Scholars now view EI in terms of regulation (García-Martínez et al., 2021), recognition, and affective management (Rodrigues et al., 2019). High EI supports well-being (Salovey, Grewal, 2005). Mayer et al. identified four main EI abilities: perception, facilitation, understanding, and management (Mayer, Caruso, Salovey, 2016).

In line with recent literature, emotional intelligence (EI) is best understood through two major theoretical models: the ability model and the mixed model. These models are associated with three primary assessment methods: (1) performance-based tests (aligned with ability models), (2) self-report questionnaires based on ability models, and (3) self-report questionnaires based on mixed models. Based on these classifications, the two dominant models of EI are clarified:

1. Ability model: The ability model sees emotional intelligence as a set of cognitive-emotional abilities. It involves perceiving, understanding, using, and managing emotions, typically measured through performance-based tasks that assess how individuals solve emotional problems or apply emotions to thinking (Khassawneh et al., 2022).

2. Mixed model: The mixed model combines emotional abilities with personality traits. It includes skills like self-awareness, empathy, and motivation. Developed by Goleman and Bar-On, it treats emotional intelligence as both measurable and developable, useful for improving relationships, well-being, and workplace performance (Bar-On, 1997; Owan, 2023).

This study adopted Goleman's mixed model of emotional intelligence, which outlined five core domains: self-awareness, social awareness, self-regulation, empathy, and motivation (Goleman, 1995). These were grouped into two broad

dimensions, as shown in Figure 1. The interpersonal dimension included social abilities such as empathy and contextual sensitivity (Owan, 2023), which supported emotional regulation during social interactions (Mercader-Rubio et al., 2022). The intrapersonal dimension focused on internal abilities like emotional self-control and goal-driven motivation (Okwuduba et al., 2021), supported by reflective thinking. These two dimensions worked together, and their relevance depended on the specific emotional or social demands present in a given situation.

Measuring emotional intelligence: review of existing instruments

The measurement of emotional intelligence (EI) remains contested, with competing models producing varied instruments (see Supplementary Data 2). Most tools were developed in Asia, Europe and America, with little representation from Africa or Australia. Only two African studies conducted in Zambia (Musonda, Shumba, Tailoka, 2013) and South Africa (Jonker, Vosloo, 2008), have adapted EI scales regionally. No Nigerian study has contextualised EI for academic staff. Existing models, such as the nine-layer pyramid (Drigas, Papoutsi, 2021) and emotional competence assessment (Bartroli et al., 2022), focus on schoolteachers. Given the role of EI in teaching effectiveness (Vashisht et al., 2023), this study introduces the ASEIQ to address that gap.

Materials and methods

Instrument development

The Academic Staff Emotional Intelligence Questionnaire (ASEIQ) was adapted from a validated instrument (Bru-Luna et al., 2021) following cross-cultural adaptation protocols to reflect socio-professional dynamics in developing nations (Han et al., 2022). A 4-point Likert scale (1 = *Strongly Disagree*, 4 = *Strongly Agree*) minimises central tendency bias (Douglas, Ewell, Brauer, 2023). The initial 40-item pool operationalized five factors: self-awareness, self-regulation, social awareness, motivation, and empathy. See the supplementary material for more details at https://ruspsydata.mgppu.ru/workflowitems/229/view.

Face and content validation

Three psychometricians and four educational psychologists assessed the items for clarity, relevance, and simplicity. Content validity was calculated based on average scores of experts' agreement, with I-CVI scores between 0,86 and 1,00, and an S-CVI/Ave of 0,92, exceeding the 0,90 cut-off. Semi-structured interviews with ten Nigerian lecturers led to the revision of unclear wording, removal of redundant items, and ad-

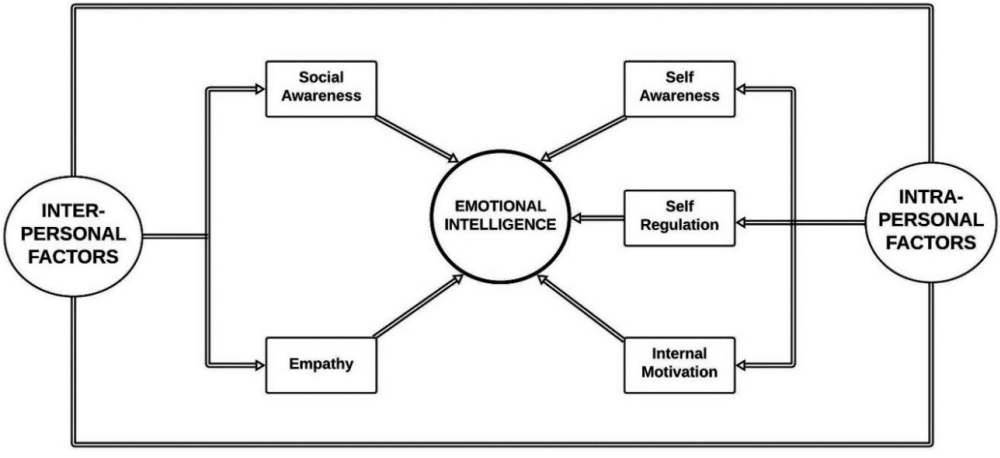

Fig. 1. Mixed model of emotional intelligence conceptual model developed for this study

justment of scale length, following mixed-method validation guidelines (Cheung et al., 2024).

Participants

A stratified sample of 3145 lecturers was recruited from Nigerian universities, exceeding the minimum requirements for confirmatory factor analysis (CFA) and structural equation modelling (SEM) (Khassawneh et al., 2022). The participants were allocated to three subsamples via sequential assignment:

EFA: *n* = 262 (10:1 participant-to-item ratio for 26 items)

CFA: *n* = 1300 (20:1 ratio × 2.5 scaling factor)

Bifactor: *n* = 1560 (20:1 ratio × 3 scaling factor) (Reise et al., 2021).

After exclusions, 3122 lecturers were retained:

- Gender: Male (51,6%, *n* = 1611); Female (48,4%, *n* = 1511)
- Age: <40 years (26,7%, *n* = 834); 40–49 (24,2%, *n* = 755); 50–59 (21,4%, *n* = 667); ≥ 60 (27,7%, *n* = 865)
- Qualifications: Master's (54,4%, *n* = 1699); Doctorate (45,6%, *n* = 1423)
- Ranks: Assistant Lecturer (18,9%, *n* = 589); Lecturer II (14,7%, *n* = 459); Lecturer I (19,3%, *n* = 603); Senior Lecturer (13,7%, *n* = 427); Associate Professor (20,4%, *n* = 637); Professor (13,0%, *n* = 406)

Results

Exploratory factor analysis (EFA)

Data screening showed no missing values. Normality checks using histograms, Q-Q plots, and normality tests revealed minor deviations from normality, but most items were within acceptable limits. No univariate outliers were found, though 23 multivariate outliers ($p < 0,001$) were detected and removed, leaving 3122 valid responses. Descriptive statistics met recommended SEM thresholds (Casale et al., 2021). Exploratory factor analysis (EFA) was conducted on subsample 1 (n = 262) using principal axis factoring with varimax rotation (Coşkun et al., 2023). Factors with eigenvalues above 1 were retained, while items with loadings below 0,40 (e.g., SOA6, EMP5) were excluded. The final five-factor structure accounted for 74,12% of total variance. KMO (0,87) confirmed sampling adequacy, and Bartlett's test ($\chi^2[351] = 7544,95$, $p < 0,001$) supported factorability (see Table 1).

Table 1

Loadings of exploratory factor analysis for the ASEIQ (n = 262)

Factors	Item label	EFA		
		λ	λ²	ε
Self-regulation	SRE3	0,97	0,94	0,06
	SRE1	0,97	0,94	0,06
	SRE7	0,97	0,93	0,07
	SRE5	0,96	0,92	0,08
	SRE2	0,95	0,91	0,09
	SRE6	0,95	0,90	0,10
	Σ	50,77	50,55	0,45
Empathy	EMP3	0,96	0,92	0,08
	EMP2	0,94	0,89	0,11
	EMP4	0,94	0,88	0,12
	EMP7	0,91	0,82	0,18
	EMP8	0,90	0,81	0,19
	Σ	40,65	40,32	0,68
Self-awareness	SAW8	0,90	0,81	0,19
	SAW6	0,89	0,79	0,21

Factors	Item label	EFA		
		λ	λ²	ε
	SAW1	0,89	0,79	0,21
	SAW3	0,89	0,79	0,21
	SAW5	0,88	0,77	0,23
	Σ	40,44	30,95	10,05
Social awareness	SOA4	0,83	0,69	0,31
	SOA5	0,82	0,67	0,33
	SOA8	0,82	0,66	0,34
	SOA1	0,80	0,63	0,37
	SOA2	0,79	0,62	0,38
	Σ	40,05	30,29	10,71
Internal motivation	INM3	0,76	0,58	0,42
	INM7	0,75	0,56	0,44
	INM1	0,75	0,56	0,44
	INM5	0,73	0,54	0,46
	INM8	0,71	0,51	0,49
	Σ	3,70	2,74	2,26

Confirmatory factor analysis (CFA)

Confirmatory factor analysis (CFA) was used to examine variable–factor relationships, assess model fit, and test the structure of the ASEIQ (Ekpenyong et al., 2022; Owan, Emanghe et al., 2022). Four models were evaluated using subsample 2 (n = 1300) (see Table 2): a single-factor model, a correlated five-factor model, a second-order model (Figure 2), and a bifactor model combining a general EI factor with five specific dimensions (Figure 3) (Owan, Bassey, Ubi, 2023). The single-factor model showed poor fit ($\chi^2(299) = 4818,35$, RMSEA = 0,241, CFI = 0,396, TLI = 0,344). In contrast, the other three models met standard fit criteria. Of these, the bifactor model showed the best performance (RMSEA = 0,043, CFI = 0,982, TLI = 0,979) and had the lowest values on information criteria (AIC = 1772,79, BIC = 2159,25), confirming it as the most appropriate structure for the ASEIQ.

Bifactor model evaluation

The bifactor model showed better fit than other CFA models, based on indices such as RMSEA, χ^2, SRMR, TLI, and CFI (Table 3). However, traditional indices alone may not separate general and specific factors clearly (Flores-Kanter, Mosquera, 2023). Advanced indices were computed using the BifactorIndicesCalculator (Dueber, 2017) with a subsample of 1560 (Table 2). The results (Table 4) showed a strong general factor ($\omega = 0,94$), but low subscale ωH values (< 0,80) and weak ECV (0,05) and IECV (0,01–0,09) suggested multidimensionality. Despite high PUC (> 0,80), caution was advised. The high ARPB (0,78) further supported adopting the bifactor model (Owan, Bassey, Ubi, 2023).

Internal construct validity

Table 5 presents the internal construct validity results of the ASEIQ, based on data from the second subsample (n = 1300). These values were drawn from the bifactor confirmatory factor analysis, which showed better fit than the other tested models. Since AMOS does not automatically generate average variance extracted (AVE) and composite reliability (CR), both were computed manually.

Convergent validity was supported, as all AVE values were above 0,50 (Owan, Emanghe et al., 2022), ranging from 0,55 to 0,92. This shows that each factor explained a suf-

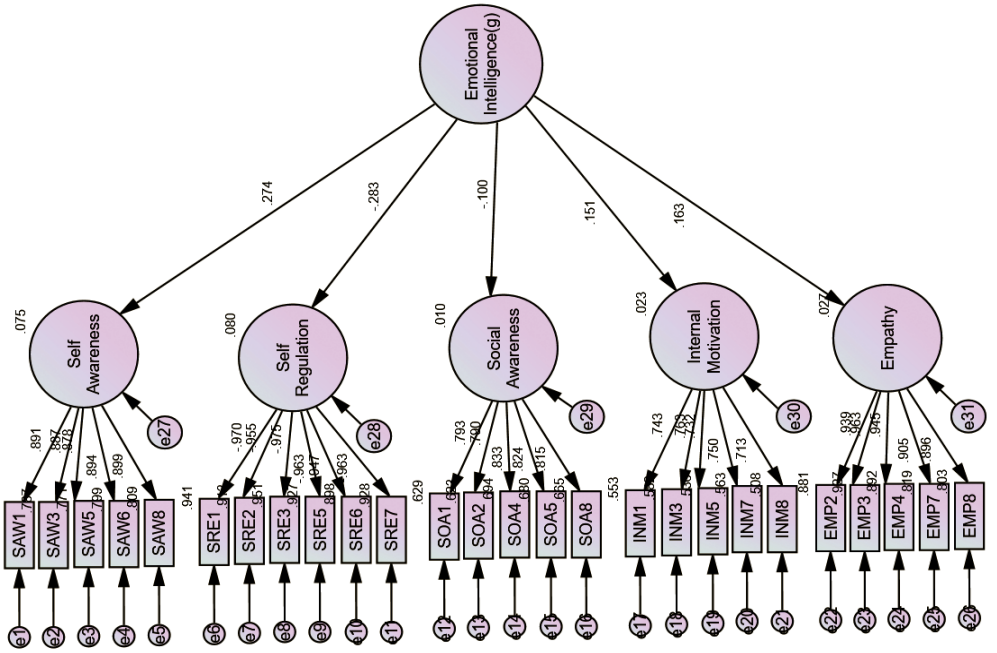

Fig. 2. Standardized second-order CFA model of the ASEIQ (n = 1300)

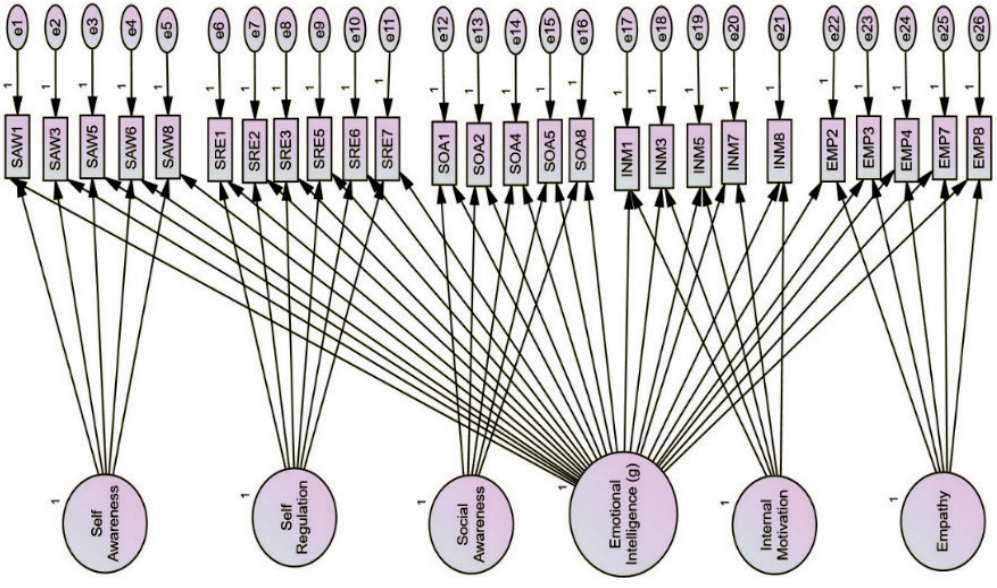

Fig. 3. Standardized nested or bifactor CFA model of the ASEIQ (n = 1300)

Table 2

Standardized confirmatory factor analysis loadings for the single, oblique, second-order and bifactor models of the ASEIQ (n = 1300)

Items	Single Factor Model	Oblique or Correlated Factor Model					(Schmid–Leiman transformation) Second–order Model						Bi–Factor or Nested Model					
	g	1	2	3	4	5	g	1	2	3	4	5	g	1	2	3	4	5
SAW1	0,11	0,89					0,24	0,83					0,02	0,89				
SAW3	0,07	0,89					0,24	0,82					0,02	0,89				
SAW5	0,03	0,88					0,24	0,81					0,02	0,88				
SAW6	0,08	0,89					0,24	0,83					0,02	0,89				
SAW8	0,08	0,90					0,25	0,83					0,02	0,90				
SRE1	0,97		–0,97				0,27		–0,87				0,04		0,97			
SRE2	0,96		–0,96				0,27		–0,85				0,01		0,96			
SRE3	0,98		–0,98				0,28		–0,87				0,02		0,98			
SRE5	0,96		–0,96				0,27		–0,86				–0,01		0,96			
SRE6	0,95		–0,95				0,27		–0,85				0,01		0,95			
SRE7	0,96		–0,96				0,27		–0,86				0,01		0,96			
SOA1	0,01			0,79			–0,08			0,78			0,00			0,79		
SOA2	0,00			0,79			–0,08			0,78			0,00			0,79		
SOA4	–0,02			0,83			–0,08			0,82			0,00			0,83		
SOA5	0,01			0,82			–0,08			0,81			0,00			0,83		
SOA8	–0,02			0,82			–0,08			0,80			0,00			0,82		
INM1	0,09				0,74		0,11				0,72		0,00				0,74	
INM3	0,05				0,76		0,12				0,73		0,00				0,76	
INM5	0,05				0,73		0,11				0,70		0,01				0,73	
INM7	0,01				0,75		0,11				0,72		0,01				0,75	
INM8	0,07				0,71		0,11				0,69		0,00				0,71	
EMP2	0,01					0,94	0,15					0,91	–1,17					1,62
EMP3	0,04					0,96	0,16					0,93	0,43					0,87
EMP4	0,03					0,95	0,15					0,92	0,42					0,85
EMP7	0,04					0,91	0,15					0,88	0,37					0,81
EMP8	0,03					0,90	0,15					0,87	0,41					0,80
Latent S^2	1,0	1,0	1,0	1,0	1,0	1,0	1,0	0,03	0,23	0,10	0,08	,08	1,0	1,0	1,0	1,0	1,0	1,0
λ (unique)								0,93	0,89	0,99	0,96	0,97						
λ (Second–order)								0,27	–0,28	–0,10	0,15	0,16						

Note: 1 = Self-awareness; 2 = Self–regulation; 3 = Social awareness; 4 = Internal motivation; 5 = Empathy.

Table 3

Comparing the fit indices of the CFA models of the ASEIQ (n = 1300)

Criteria	Single factor	Oblique	Second-order	Bifactor	Recommended Benchmarks
χ2(df)	4818,35(299), p < 0,05	504,01(289), p < 0,05	506,44(294), p < 0,05	505,57(273), p < 0,05	p > 0,05
RMSEA	0,241	0,053	0,053	0,043	< 0,08
SRMR	0,247	0,031	0,037	0,024	< 0,08
CFI	0,396	0,971	0,972	0,982	≥ 0,95
TLI	0,344	0,968	0,969	0,979	≥ 0,95
AIC	19432,78	2145,85	2145,58	1772,79	Lower is better
BCC	19435,53	2149,14	2148,6	1776,92	Lower is better
BIC	19690,42	2453,03	2428	2159,25	Lower is better
CAIC	19742,42	2515,03	2485	2237,25	Lower is better

Table 4

Auxiliary fit evaluation of the dimensionality of the bifactor CFA models of the ASEIQ (n = 1560)

Dimensions	ECV (S&E)	ECV (NEW)	ω/ω_S	ω_H/ω_{HS}	Relative ω	H	FD
General factor	0,05	0,05	0,94	0,12	0,13	0,80	0,94
Self-awareness	0,18	0,92	0,93	0,86	0,92	0,91	0,93
Self-regulation	0,24	0,91	0,96	0,88	0,91	0,94	0,94
Social awareness	0,17	0,99	0,90	0,89	0,99	0,90	0,95
Internal motivation	0,14	0,98	0,84	0,82	0,98	0,84	0,91
Empathy	0,22	0,97	0,96	0,94	0,97	0,96	0,97
IECV = 0,01 to 0,09; PUC = 0,831; ECV = 0,051; ARPB = 0,784.							

ficient share of its item variance. Internal consistency was also adequate, with CR values between 0,86 and 0,99, exceeding the 0,70 threshold.

Discriminant validity was examined using the Fornell–Larcker criterion (Fortuna, Modliński, 2021), which compares the square root of each factor's AVE to its correlations with other factors. In Table 5, each bolded diagonal value is higher than the correlations in the same row or column. This confirms that the factors were clearly distinct within the ASEIQ structure.

Table 5

Evidence supporting the construct validity of the ASEIQ (n = 1300)

Factors	AVE	CR	1	2	3	4	5
1. Self-regulation	0,92	0,99	**0,96**				
2. Empathy	0,86	0,97	0,03	**0,93**			
3. Self-awareness	0,79	0,95	0,08	0,04	0,89		
4. Social awareness	0,66	0,91	0,00	–0,02	–0,08	**0,81**	
5. Internal motivation	0,55	0,86	0,07	0,07	0,00	0,04	**0,74**

Notes: AVE = Average variance extracted (Values > .50 indicate convergent validity); CR = Composite reliability estimates (Values > .70 are acceptable); Bolded values are square roots of AVE. The square root of AVE > Correlation estimates off-diagonal for discriminant validity.

Reliability

The ASEIQ showed strong reliability across subsamples, assessed using Cronbach's alpha, McDonald's omega, and Spearman–Brown split-half reliability. All indices ranged from 0,85 to 0,99 (Table 6), confirming high internal consistency. Self-regulation and empathy recorded the strongest omega values. These consistent results across methods and dimensions affirm the ASEIQ as a reliable tool for measuring emotional intelligence.

Discussion

This study developed and validated the Academic Staff Emotional Intelligence Questionnaire (ASEIQ), a psychometric instrument designed to assess emotional intelligence (EI) among university lecturers in Nigeria. Grounded in a five-factor model, such as self-regulation, empathy, self-awareness, social awareness, and internal motivation, the ASEIQ aligns with Goleman's framework (Goleman, 1995), which conceptualizes EI as an integration of personal and social competencies. Confirmatory factor analysis (CFA) revealed that a bifactor model, positing EI as both a general construct and domain-specific factor, provided the optimal fit. This finding corroborates prior research advocating bifactor approaches in EI measurement (Owan, 2023; Owan, Bassey, Ubi, 2023), enabling simultaneous evaluation of global EI and subcomponents to clarify their interrelationships (Fotopoulou et al., 2021).

The ASEIQ had robust psychometric properties, with high internal consistency across subsamples (Cronbach's α = 0,87–0,94; McDonald's ω = 0,89–0,95). These reliability indices exceed established thresholds, confirming that the tool is suitable for consistent EI measurement among Nigerian academics. This reliability mirrors findings from analogous EI instruments validated across diverse contexts (Bartroli et al., 2022; Hallit et al., 2023; Pérez-Escoda, López-Cassà, Alegre, 2021). The ASEIQ's contextual adaptation to Nigeria's academic environment is critical, given that EI is empirically supported to reduce occupational stress, strengthening collegial relationships, and improving teaching effectiveness. By addressing region-specific dynamics, this tool facilitates targeted investigations of EI's impact on pedagogical quality and institutional leadership.

While primarily validated in Nigeria, the ASEIQ holds promise for cross-cultural adaptation in regions with similar educational challenges. Future studies should assess its gen-

Table 6

Scale-level reliability coefficients of the ASEIQ

Sample	Dimensions	k	α	ω	r_{tt}
Subsample 1 (n = 262)	Self-awareness	5	0,95	0,95	0,95
	Self-regulation	6	0,99	0,99	0,99
	Social awareness	5	0,91	0,91	0,90
	Internal motivation	5	0,86	0,86	0,87
	Empathy	5	0,97	0,97	0,96
Subsample 2 (n = 1300)	Self-awareness	5	0,96	0,96	0,96
	Self-regulation	6	0,99	0,99	0,99
	Social awareness	5	0,92	0,92	0,91
	Internal motivation	5	0,87	0,87	0,88
	Empathy	5	0,98	0,98	0,97
Subsample 3 (n = 1560)	Self-awareness	5	0,94	0,94	0,94
	Self-regulation	6	0,98	0,98	0,98
	Social awareness	5	0,90	0,90	0,90
	Internal motivation	5	0,85	0,85	0,86
	Empathy	5	0,97	0,97	0,96

eralizability by administering the tool in diverse sociocultural contexts, including other African nations and global settings. Such comparisons clarify whether the ASEIQ requires cultural modifications or retains universal applicability.

This study has three main limitations. First, although the ASEIQ was based on Goleman's earlier model, it does not completely align with his updated version, which outlines four core domains: self-awareness, self-management, social awareness, and relationship management. Second, the study did not assess whether the ASEIQ can predict outcomes like teaching effectiveness or emotional competence. Further work is needed to test its practical use in education and related fields. Third, the ASEIQ was not compared with other recognised emotional intelligence tools, which limits confidence in its external validity and theoretical alignment.

Conclusions

The Academic Staff Emotional Intelligence Questionnaire (ASEIQ) provides a robust tool for examining the relationships among lecturers' emotional intelligence (EI), teaching effectiveness, and professional performance in Nigeria. While initially validated within Nigerian academia, the ASEIQ's methodological design enables cross-cultural adaptation. Future studies should assess its validity across diverse contexts to determine generalizability and facilitate cross-national comparisons of EI's role in educational systems. Such research could inform global applications while advancing theoretical insights into cultural influences on EI. As a psychometrically sound instrument, the ASEIQ holds dual significance: (1) enhancing quality assurance in Nigerian higher education and (2) contributing to international scholarship on emotion-cognition interactions in academia. Further refinements could establish the ASEIQ as a key resource for global universities seeking to develop emotionally intelligent pedagogical practices and improve institutional outcomes.

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The relationship between parenting stress, burnout, maternal parenting style, and emotional and behavioral difficulties in preschool children

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Abstract

Context and relevance. Parenting stress and burnout have a significant impact on the mental health of parents and children. In this regard, the factors and consequences of parenting stress and burnout are being actively studied. However, comprehensive studies of the effects of parenting stress and burnout, and parenting disorders on the formation of emotional and behavioral difficulties in children have not been conducted. **Objective.** The aim of the work is to identify the relationship between the variables of parenting stress, parental burnout, parenting style used by mothers of preschoolers, emotional and behavioral problems in their children. **Hypotheses.** 1. Parenting stress, parental burnout, characteristics of the parenting style of mothers and emotional and behavioral difficulties of preschoolers are closely interrelated: parenting stress and burnout affect the emotional and behavioral variables of the child directly and indirectly, through parenting style. 2. There are mutual influences between the violations existing in the process of upbringing of preschool mothers (redundancy of guardianship and control (prohibitions, requirements)) and the level of parenting stress and burnout. **The sample** of the study involved 76 mothers (26–47 years old, M = 36 years old) of preschoolers (4–7 years old, M = 5,3 years old) living in the city of St. Petersburg. **Methods and materials.** The scale of parenting stress (J.O. Berry, adaptation by Yu.V. Misiyuk), the questionnaire of the level of parental burnout (I.N. Efimova), the questionnaire of the analysis of family interaction (ACB), (E.G. Eidemiller, V.V. Justickis), the questionnaire of emotional and behavioral difficulties (CBCL/4-18) (T. Achenbach) were used. **Results.** The style of maternal parenting, represented by the redundancy of requirements, prohibitions and sanctions, contributes to the appearance of parenting stress. Parenting stress provokes emotional exhaustion (burnout) of mothers, which can contribute to increased hypoprotection. The appearance of external problems of preschoolers is facilitated by the use of redundancy and/or insufficiency of requirements, prohibitions and sanctions by mothers. Whereas the internal problems of a preschooler appear as a result of the mother's stay in a state of emotional exhaustion, provoked by the excess of demands placed on the child. **Conclusions.** The study showed that parenting stress, parental burnout, and maternal parenting style mutually affect each other, and the development of emotional and behavioral problems in preschoolers is both a consequence of parenting stress and burnout, as well as the result of the parenting style used by mothers.

Keywords: parenting stress, parental burnout, parenting, child emotional and behavioral disorders, preschooler

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Взаимосвязь родительского стресса, выгорания, стиля материнского воспитания и эмоционально-поведенческих трудностей дошкольников

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Резюме

Контекст и актуальность. Родительский стресс и выгорание оказывают значимое влияние на психическое здоровье родителей и детей. В связи с этим активно изучаются факторы и последствия родительского стресса и выгорания. Однако комплексных исследований влияния родительского стресса и выгорания, а также нарушений воспитания на формирование эмоциональных и поведенческих трудностей у детей не проводилось. **Цель.** Выявление взаимосвязи между переменными родительского стресса, родительского выгорания, используемого матерями дошкольников стиля воспитания, эмоциональных и поведенческих проблем у их детей. **Гипотезы.** 1. Родительский стресс, родительское выгорание, характеристики стиля воспитания матерей и эмоционально-поведенческие трудности дошкольников тесно взаимосвязаны: родительский стресс и выгорание влияют на эмоциональные и поведенческие переменные ребенка напрямую и опосредованно, через стиль воспитания. 2. Существуют взаимные влияния между нарушениями, имеющимися в процессе воспитания у матерей дошкольников (избыточность опеки и контроля (запретов, требований)), и уровнем испытываемого родительского стресса и выгорания. **Выборка.** В исследовании приняли участие 76 матерей (26–47 лет, M = 36 лет) дошкольников (4–7 лет, M = 5,3 лет), проживающих в городе Санкт-Петербург. **Методы и материалы.** Использовались шкала родительского стресса (J.O. Berry, адаптация Ю.В. Мисиюк), опросник уровня родительского выгорания (И.Н. Ефимова), опросник анализа семейного взаимодействия (АСВ), (Э.Г. Эйдемиллер, В.В. Юстицкис), опросник эмоциональных и поведенческих трудностей (CBCL/4-18) (Т. Ахенбах). **Результаты**. Стиль материнского воспитания, представленный избыточностью требований, за-

претов и санкций, способствует появлению родительского стресса. Родительский стресс провоцирует эмоциональное истощение (выгорание) матерей, которое может способствовать усилению гипопротекции. Появлению внешних проблем дошкольников способствует использование матерями избыточности и/или недостаточности требований, запретов и санкций, тогда как внутренние проблемы дошкольника появляются в результате пребывания матери в состоянии эмоционального истощения, спровоцированного избыточностью предъявляемых к ребенку требований. **Выводы.** Исследование показало, что родительский стресс, родительское выгорание и стиль материнского воспитания взаимовлияют друг на друга, а развитие эмоционально-поведенческих проблем дошкольников является как следствием родительского стресса и выгорания, так и результатом применяемого матерями стиля воспитания.

Ключевые слова: родительский стресс, родительское выгорание, воспитание, эмоциональные и поведенческие нарушения ребенка, дошкольники

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Introduction

From the moment the child is born, the parent faces a wide range of demands, an overabundance of which provokes the appearance of parenting stress (hereinafter referred to as PS). K. Deater-Deckard notes that “the key feature of any PS theory is to establish a balance between the parent’s perception of the requirements of the parental role and access to available resources to meet them” (author’s translation) (Deater-Deckard, 2004). Together with the concept of PS, the term “parental burnout” (PB), which is used by I.N. Efimova, is defined as “a multidimensional construct that includes a set of negative psychological experiences and maladaptive behavior of the mother and father associated with child-parent interaction when parents carry out activities for the care of children, their upbringing and development” (Efimova, 2013).

The study of these phenomena in Russia has begun relatively recently. Most of the research in the world is devoted to the study of the factors and causes of PS and PB (Blanchard et al., 2023; Lee et al., 2013; Mikolajczak, 2019; Ilyina, 2021; Savenysheva, 2019).

Due to the fact that PS and PB occur during the interaction and care of a child, we consider it necessary to consider these phenomena in the context of parent-child relations, as well as taking into account the psychological characteristics of the child.

The results of research on the relationship of PS with emotional and behavioral difficulties in children are quite contradictory. Some researchers (Williford, 2007) believe that a child’s bad behavior predicts a higher level of PS. The second group of researchers (Zhu et al., 2024; Xu, Zhu, 2024; Lee, Lee, 2024; Carapito et al., 2020) say that it

is PS that predicts the external behavior of a child in the future, while the third group of researchers (Neece et al., 2012) report their combined influence on each other. The fourth group of researchers (Crnic et al., 2005; Benzies et al., 2014) conclude that it is not the child's behavior itself that has a significant impact on the PS level, but the parents' assessment of this behavior. Studies investigating the association of PB with emotional and behavioral difficulties in children are rare abroad (Ping et al., 2023; Chen et al., 2022; Woine et al., 2024) and absent in Russia. It was found that parental burnout of mothers and fathers has a predictive effect on the internal and external problems of children (Woine et al., 2024).

Cognitive difficulties in children are also considered in connection with the effects of PS and PB, which also demonstrate contradictory data. Some authors (Zha et al., 2024) report the negative effects of PS on a child's cognitive functions (concentration, planning, self-regulation, inhibitory control), while others (Täljedal et al., 2025) conclude that a child's cognitive difficulties contribute to an increase in PS levels, while others (Yakupova and Suarez, 2024) note that a high level of PB is associated with a child's better results in auditory-speech memory, which may probably indicate that parents who are more invested in the development of their children have a greater risk of PB.

The same differences can be traced in longitudinal studies. The results of a six-year study revealed the negative impact of PS on both children's prosocial outcomes and their cognitive development, through parental responsiveness (Ward, 2020). Another longitudinal study demonstrated the presence of dynamic mutual changes between PS, parent behavior, and child behavior over time. The negative behavior of the child (aggression) at an early age increased the level of PS, but did not affect the behavior of the parent, whereas the behavior of older children (5, 7, 10 years) contributed to the intensification of PS and negatively affected the behavior of parents (Mackler, 2015). The results of a cross-sectional study of the longitudinal relationships between internal and external difficulties of children and PS mothers showed the existence of links of small and medium effect. However, models of structural equations with cross-delay did not show predictive power of either behavior or PS (Paynter, 2024).

Few studies examining the links between PS and PB and parenting strategies have found that parents with high levels of PS are more likely to adopt neglectful and authoritarian parenting strategies (Ponnet, 2012). At the same time, parents who adopt an authoritarian parenting style were more likely to experience symptoms of PB (Mikkonen, 2023) and are more likely to be less responsive, inconsistent in parenting (Wang, 2019) and form an unsupportive behavior style (Lee, Lee, 2024). Parents with elevated PB levels are predisposed to an increased risk of neglect and violence towards their children (Mikolajczak et al., 2019).

When analyzing the relationship between either PS or PB, parenting characteristics and individual variables of the child (cognitive flexibility, behavior (externalizing and internalizing), social competence, insecurity, social skills), an indirect role of parenting characteristics is observed (Sun et al., 2025; Woine, 2024; Xu, Zhu et al., 2024; Lee, Lee, 2024; Carapito et al., 2020). The study of the connections of all the components we considered (PS, PB, emotional and behavioral characteris-

tics of the child and parenting style) was found only in one study on fathers (Ping et al., 2023). The relevance of this work lies in the insufficient study of the phenomena of PS and PB in the context of child-parent relations and the psychological characteristics of a child in both foreign and domestic psychology.

The purpose of this work is to identify the relationship between PS, PB and the parenting style used by preschool mothers with emotional and behavioral problems in their children. Thus, the research focuses on the "relationship" between the variables studied: a) between PS and PB; b) between PS and the type of inharmonious upbringing (later, as a result of factor analysis, derived as the inharmonious parenting style); c) between the variables PB (namely emotional exhaustion) and the type of inharmonious upbringing; d) between the styles of inharmonious parenting and the emotional and behavioral difficulties of preschoolers; e) between PS and the emotional and behavioral difficulties of preschoolers; f) between PB (namely, emotional exhaustion) of mothers and the emotional and behavioral difficulties of preschoolers.

Mothers of preschool children were selected as participants in the study due to the fact that:

— most of the time, it is mothers who bear the main burden of raising children;

— they have a parenting style, and it can be diagnosed;

— they have not yet fully adapted to their parental role, which can provoke PS and PB.

We assume that: 1) PS, PB, violations in mothers' parenting and emotional and behavioral difficulties of preschoolers are closely interrelated: PS and PB affect the emotional and behavioral characteristics of a child directly and indirectly, through existing parenting disorders; 2) the presence of violations in the parenting process of preschool mothers (redundancy / insufficiency of guardianship and control (prohibitions, requirements)) can be both a cause and a consequence of maternal PS and PB.

Materials and methods

The study involved 76 mothers (26–47 years old, M = 36 years old) of preschoolers (4–7 years old, M = 5,3 years old) living in St. Petersburg (Russian Federation). 78% of mothers are officially married and raise a child with their spouse. 50% of mothers worked full-time, 28% did not work, and 22% had part-time jobs. A total of 34% of the mothers had only one child, 51% had two, and 14% had three. The participants were recruited in the state preschool educational institutions of St. Petersburg. The mothers agreed to participate in the study and chose a convenient format for filling out the questionnaires: paper or electronic.

To identify the stress levels of mothers (PS and PB), the following methods were used:

1. The Parental Stress Scale by Berry and Jones (1995), validation of Yu.V. Misiyuk and I.V. Tikhonova (Misiyuk, 2022).

2. Questionnaire on the level of parental burnout (Efimova, 2013).

To study the characteristics of the parenting style of mothers, the questionnaire for the analysis of family interaction (ACB) by E.G. Eidemiller and V.V. Justitskis (Leaders, 2007) was used, aimed at identifying the specifics of the inharmonious educational influence of parents towards their children (violations in upbringing) and determining the level of protection, the degree of satisfaction of needs, the number and quality of requirements for the child, the

instability of parenting style. On the basis of which, the styles of maternal upbringing were derived in the work.

To identify emotional and behavioral difficulties in preschoolers, the questionnaire for assessing child behavior for the age group from 4 to 18 years (CBCL/4-18) by T. Achenbach (edited by I.V. Kuznetsov, 2010) was used.

Mathematical and statistical processing methods: analysis of mean values, frequency analysis, correlation analysis, factor analysis (SPSS Statistical 21), AMOS path model.

Results

The overall PS level of the mothers in the sample was 35,72 points, which is determined at a lower-than-average level. The frequency analysis also did not find high indicators for the overall level of PS, however, 24% of mothers showed high values on the scale of “parental stressors”, which may indicate that mothers are overwhelmed by the demands of parenthood.

PB indicators are presented at different levels: mothers’ emotional exhaustion is average (M = 17,05), depersonalization is low (M = 4,76), and reduction of parental achievements is high (the child is valuable) (M = 35,68). However, the results of the frequency analysis revealed the presence of critical values on all scales of PB: 20% of mothers experience exhausted of their emotional resources; 7% of mothers formally relate to the needs of the child and 18% are dissatisfied with themselves as a parent.

The analysis of the average values of the parenting characteristics of mothers did not reveal any critical values indicating the presence of violations in the parenting process. However, frequency analysis showed that 62% of mothers reached the level of critical values of impaired interaction with their child in at least one indicator. Mothers most often use strategies of minimal sanctions (32%), insufficient requirements-prohibitions (29%) and requirements-responsibilities (18%), as well as hyperprotection (9%).

An analysis of the average indicators of emotional and behavioral difficulties of preschoolers found that mothers are more likely to pay attention to aggressive manifestations and attention problems in their children.

The results of the correlation analysis of PS and PB demonstrate significant associations of all indicators of maternal emotional exhaustion and reduction of parental achievements with all indicators of PS ($p < 0,01$), whereas the scale of depersonalization is associated only with the general level of PS ($r = 0,273$; $p < 0,05$) and parental damage ($r = 0,237$; $p < 0,05$).

The results of a correlation analysis of PS and PB parameters with indicators of emotional and behavioral characteristics of preschoolers demonstrated that the overall PS level is associated with anxiety, attention problems, impaired socialization, aggression, internal and external problems of the child. Of the PB scales, only the emotional exhaustion of mothers is associated with all indicators, including the child’s isolation, while the reduction of parental achievements is associated only with thinking problems, and there are no links on the depersonalization scale (Table 1).

The overall rate of adjustment disorders in children is associated with both PS and PB, and the strength of the association with indicators of emotional exhaustion ($r = 0,469$; $p < 0,01$) is higher than with the overall level of PS ($r = 0,365$; $p < 0,01$). Thus, the results of this study reveal links between PS and PB with various types of emotional and behavioral problems in children.

Table 1

The results of the correlation analysis of PS, PB indicators with emotional and behavioral characteristics of children

Emotional and behavioral characteristics of children	General PS level	Emotional exhaustion
Closedness		0,280*
Anxiety	0,319**	0,327**
Disruption of socialization	0,234*	0,370**
Attention problems	0,348**	0,372**
Aggression	0,251*	0,356**
Internal problems	0,311**	0,338**
External problems	0,250*	0,364**
General indicator of adaptation disorder	0,365**	0,469**

Note: «*» — correlation is significant at the 0,05 level; «**» — correlation is significant at the 0,01 level.

Table 2

The results of the correlation analysis of PS and PB indicators with the disorders of preschool children's mothers in the parenting

Disoders in the process of parenting	General PS level	Emotional exhaustion	Depersonalization	Reduction in parental achievement
Hypoprotection	0,490**	0,331**	0,428**	–0,445**
Ignoring the child's needs	0,396**	0,438**	0,340**	–0,303**
ЧExcessive sanctions	0,283*			
Minimal sanctions				0,247*
Hnstability of parenting style	0,265*	0,237*		

Note: «*» — correlation is significant at the 0,05 level; «**» — correlation is significant at the 0,01 level.

As a result of the correlation analysis of PS and PB parameters with indicators of disorders in the upbringing process (Table. 2) it was found that all indicators of maternal PS and PB are associated with disorders in the parenting process such as hypoprotection and ignoring the needs of the child. In addition, indicators of the overall level of PS are associated with excessive sanctions. It should be noted that the PB indicator "reduction of parental achievements" has negative associations with hypoprotection and ignoring the needs of the child and a positive association with the minimization of sanctions. In addition, the instability of the maternal parenting style is associated with the general level of PS and the emotional exhaustion of the mother.

To reduce the number of variable impairments in the parenting process (11 pieces) we conducted a factorization of parenting disorders (using a factor analysis using the principal component method with varimax rotation, KMO = 0,65), obtaining

3 factors corresponding to three styles of dysfunctional parenting: redundancy (includes excessive demands — responsibilities (0,533), prohibitions (0,691), sanctions (0,579) and instability of parenting style (0,537), insufficiency (includes indulgence (0,622) and insufficient requirements — duties (0,674), prohibitions (0,529), sanctions (0,551)) and hypoprotection (includes hypoprotection (0,599), ignoring needs (0,534) and a negative value of hyperprotection (-0,526). The cumulative percentage with a three-factor structure was 52,3% (11,573% redundancy, 19,845% insufficiency, 20,905% hypoprotection).

The results of the analysis of the relationship of integral indicators — PS, PB (emotional exhaustion), maternal parenting style with emotional and behavioral difficulties of preschoolers indicate that the dysfunctional style of maternal parenting: 1) redundancy and instability in requirements, prohibitions and punishments is associated with the general level of PS ($r = 0,417$; $p < 0,01$) and emotional exhaustion of preschool mothers ($r = 0,263$; $p < 0,05$); 2) insufficiency of requirements, prohibitions and sanctions is associated only with external behavioral problems of children ($r = 0,227$; $p < 0,05$); 3) hypoprotection and neglect — only with a general PS level ($r = 0,234$; $p < 0,05$).

The theoretical model and its empirical verification

Based on the results of correlation analysis (empirical data) and theoretical data (assumption of the direction of influence), we have proposed a theoretical model of the mutual effects of the studied indicators on each other. We assumed that a high level of PS leads to PB. Since the PB methodology does not have a general PB indicator, but consists of three scales, we consider the scale that showed the greatest severity and found the greatest number of links with indicators of parenting disorders and emotional and behavioral difficulties in children — “emotional exhaustion” (hereinafter — EE). At the same time, a high level of PS and EE contributes to the appearance of internal and external problems in preschoolers. High rates of PS and EE do not give mothers the opportunity to pay enough attention to their child, which leads to the use of a destructive parenting style such as hypoprotection. An additional influence on the appearance of external problems can be exerted by a parenting style based on “insufficient requirements, prohibitions and sanctions”. The parenting style that manifests itself in the “excess of requirements, prohibitions and sanctions”, contributes to an increase in the overall level of PS and EE of mothers.

Verification of the theoretical model by the path method in the AMOS software package (the use of this type of analysis meets the necessary requirements for the sample size) showed a good level of agreement between the model and the data: chi-squared = 15,859; df = 15; p = 0,391; CFI = 0,989; GFI = 0,946; RMSEA = 0,028; Pclose = 0,578. It has been revealed that the use of excessive demands, prohibitions and punishments by mothers and instability in their views on parenting lead them to develop PS, which provokes the appearance of EE, as a result of which mothers of preschoolers begin to reduce the measure of their care for the child, which as a result leads to the formation of a new parenting style such as hypoprotection. In turn, the appearance of external problems in preschoolers is provoked by the destructive style of maternal upbringing associated

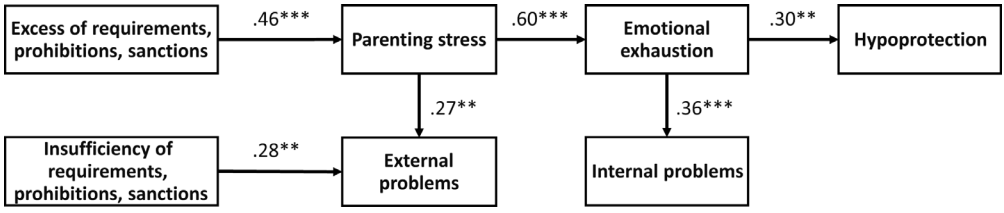

Fig. An empirical model of integral indicators of PS, emotional exhaustion (EE), and parenting style of mothers with emotional and behavioral difficulties in preschoolers

with excessive or insufficient requirements, responsibilities and sanctions. A parenting style based on insufficient requirements, prohibitions, and sanctions has a direct impact on the appearance of external difficulties in a preschooler. Whereas redundancy has an indirect effect on the external difficulties of the child, through the mother's PS. The reason for the appearance of internal problems of a preschooler is the direct influence of the mother's EE and the indirect influence of PS and a parenting style based on excessive demands, prohibitions and sanctions. The result of the empirical model is shown in the figure.

Discussion

The effect of PS on PB that we found may be due to the fact that prolonged exposure to PS over time, according to theories of stress, including parenting stress, can lead to resource depletion. In this case, since the load falls heavily on the emotional sphere, it leads to emotional exhaustion. This result is confirmed by a few modern foreign studies investigating the relationship between PS and PB (Mikolajczak, 2018; Ping et al., 2023; Yahya, 2024; Xu, Hanafi, Zhang, 2024). Moreover, special attention is paid to the impact of PS on the depletion of mothers' emotional resources and, to a lesser extent, to the mother's participation in caring for the child and changing her feelings towards him.

The study of the relationship between PS and EE with parenting disorders in this study revealed that the source of PS in preschool mothers is the parenting style used, namely, the redundancy of requirements, prohibitions and sanctions and the instability of their application in relation to their children. Thus, our results complement and concretize studies demonstrating that an increase in PS is due to an increase in dysfunctional parent-child interaction (Putnick, 2010). At the same time, the data obtained in our work indicate that PS is not only the result of the parenting style used by mothers, but is also capable of further disrupting the educational strategies of preschool mothers through the mother's EE. Mothers experiencing EE are unable to adequately regulate their parenting tactics, which leads to the use of additional negative parenting methods, manifested in the child's withdrawal from the focus of the mother's attention, retaining only the ability to perform formal child care. These results are consistent with the work of the authors who found a significant impact of PS and PB on parenting in both mothers and fathers (Woine, 2024; Qian, 2024; Crnic, 2005) and on the deterioration of child-parent relationships (Ponnet, 2012; Wang, 2019). Parents with high levels of PS are more likely to adopt authoritarian and neglectful parenting strategies (Ponnet, 2013) and are more likely to be less responsive and inconsistent in parenting (Wang, 2019). In addition, this

study demonstrated the influence of maternal parenting style through PS on the EE of mothers, which is also confirmed by work where it was revealed that parents using an authoritarian parenting style and negative parenting tactics most often experienced symptoms of parental burnout (Mikkonen, 2023; Ping, 2023).

The results of this work on the study of PS and EE with emotional and behavioral difficulties in children have demonstrated that the cause of the child's external problems is the direct influence of the maternal parenting style based on insufficient requirements, prohibitions and sanctions, and the indirect influence, through PS, of the style based on excessive requirements, prohibitions and sanctions. Thus, our data are close to the work of the second group of scientists who studied the relationship between PS and behavioral disorders in children, who report that PS predicts the appearance of external problems in a child in the future (Woine, 2024; Lee, Lee, 2024; Hu, Zhu et al., 2024; Zha et al., 2024; Zhu J. et al., 2024; Ward, 2020; Mackler, 2015; Benzies K.M., 2014) and do not confirm the results of studies that hold different views on the impact of negative child behavior on PS and their mutual influences (Williford, 2007; Neece et al., 2012; Paynter, 2024; T ljedal et al., 2025). This may be related, among other things, to the age of the children in the study sample (preschool age). The reason for the appearance of internal problems of preschoolers obtained in this work is the direct influence of mothers' EE and the indirect influence, through PS and EE, of a parenting style that imposes excessive demands on the child, which is partially consistent with the results of studies in which mothers' and fathers' EE can lead to increased external and internal problems (Guo, 2024; Ping, 2023; Chen, 2022; Beckmann, 2021; Tirfeneh, 2019). Due to the simultaneous consideration of PS and PB with behavioral and emotional problems of children, this study helped to identify that mothers experiencing PS are able to provoke external problems in the child (aggression, attention problems), while mothers in EE are able to provoke internal problems in the child (anxiety, isolation).

Thus, the maternal parenting style, PS, and EE of preschool mothers can cause external and internal difficulties for the child, as well as lead to detachment from the child. A distinctive feature of this study is that it affects 3 important family components: stress (PS and EE), parenting style, and assessment of the child's emotional and behavioral problems. Whereas previous studies have considered only two of these significant variables, and have also studied either PS or PB. This allowed us to examine the dynamic relationships between these parameters, including revealing that emotional and behavioral problems in preschoolers may be more a consequence of PS and EE than of the parenting style used.

Based on the data obtained, for psychoprophylaxis and correction of emotional and behavioral difficulties in children, it can be recommended to work on the prevention and reduction of PS and PB in modern mothers, as well as work on the formation of adequate parenting strategies for parents, since the factors of emotional and behavioral difficulties in children are redundancy and insufficiency of requirements, prohibitions and sanctions.

Conclusions

The overall PS level of the studied sample of preschool mothers is below av-

erage. The study of indicators of the PB level: EE — average; reduction of parental achievements — average; depersonalization (formality of relations) — low. PS is closely related to PB indicators.

PS and PB have the greatest number of connections with disorders in the parenting process: hypoprotection and ignoring the needs of the child.

Maternal PS and EE are associated with both external and internal emotional and behavioral difficulties in preschoolers.

A joint review of the indicators of PS, EE, maternal parenting style and emotional and behavioral difficulties in children revealed that the use of preschool parenting style by mothers based on excessive requirements, prohibitions and sanctions and the instability of their use provoke the appearance of PS, prolonged stay in which leads the mother to emotional exhaustion, as a result of which the mother may develop a style of hypoprotective parenting, and the child may have internal difficulties. While the parenting style, which defines insufficient requirements, prohibitions and sanctions, and mothers' PS provoke the appearance of external problems in preschoolers.

Thus, maternal PS and EE are both a consequence of the parenting styles used by mothers, and the cause of the appearance of a destructive parenting style and problems in preschool children (internal and external).

The present study has supplemented existing ideas about the mechanisms of development of maternal PS and PB. The hypotheses of the study were confirmed: the style of maternal upbringing has a differential effect on the manifestation of emotional and behavioral difficulties in preschoolers. Specifically, permissiveness and a lack of requirements/duties, prohibitions, and sanctions have a direct impact on externalizing problems in the child; whereas excessive demands/duties, prohibitions, and sanctions, along with instability of parenting style, have an indirect effect on externalizing problems in the child (through PS) and on internalizing problems in the child (through maternal EE). In turn, PS and EE provoke the appearance of hypoprotection.

Limitations. The limitations of this study include the small sample size. In addition, the sample included only mothers living in a large city. Furthermore, the assessment of children's emotional and behavioral indicators was carried out only by mothers, and not by other representatives of the child's social environment. Moreover, this study focused only on mothers of middle-aged and older preschool children, whereas the demands placed on parents vary across different age stages. In this regard, future research directions include: 1) expanding the sample to include (a) fathers; (b) mothers and fathers living in cities of different sizes; and (c) assessments of child functioning by fathers and preschool teachers; 2) comparing the indicators of parents of children from different age groups; and 3) conducting longitudinal studies to examine changes in the levels of PS, PB, and parenting tactics, as well as child characteristics, within the same families as the child grows older.

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Family and cultural factors in the development of autonomy

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Abstract

Context and relevance. The development of adolescent personal autonomy is essential for understanding the processes of psychological development in ontogenesis. Cultural differences may significantly influence the formation of autonomy within the family system. The theoretical foundation of the study is based on L.S. Vygotsky's cultural-historical theory, the activity-based approach, and the systemic approach to the analysis of the family. **Objective.** The aim is to examine the features of adolescent autonomy development within the family context and compare family-related factors influencing autonomy among adolescents from Moscow and Baku. **Hypothesis.** There are cultural differences in the development of adolescent autonomy. Adolescents from Baku are expected to demonstrate a higher level of emotional autonomy, while those from Moscow are expected to show higher levels of behavioral and general autonomy. Furthermore, there are differences in family systems — namely in achievement orientation, family organization, and control — resulting in variations in the nature of adolescent–parent relationships in Moscow and Baku. **Methods and materials**. Both quantitative and qualitative methods were employed, including the "Autonomy Questionnaire" (O.A. Karabanova, N.N. Poskrebysheva, 2011), the Family Environment Scale (FES, adapted by S.Yu. Kupriyanov, 1985), and an original "Incomplete Sentences" method. **The sample** consisted of 201 adolescents aged 13 to 18 years (102 from Baku and 99 from Moscow). The average age of the Moscow participants was 14,6 years (SD = 1,36), and for the Baku participants — 14,3 years (SD = 0,76). **Results**. Adolescents from Moscow demonstrated higher levels of behavioral and general autonomy, while those from Baku showed a greater degree of emotional autonomy. Family relationships in Moscow were characterized by lower parental control, whereas Baku families followed stricter rules. **Conclusion.** The results supported the hypothesis of cultural differences in the development of adolescent autonomy. Cultural differences in the family system are reflected in adolescents' perceptions of independence, the boundaries of autonomy, and preferred ways of seeking support.

Keywords: personal autonomy, adolescence, cross-cultural study, family relationships, emotional autonomy, behavioral autonomy, cognitive autonomy, value autonomy

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Семейные и культурные факторы развития автономии

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Резюме

Контекст и актуальность. Развитие автономии личности подростка важно для понимания процессов психологического развития в онтогенезе. Вместе с тем содержание процессов автономизации остается недостаточно раскрытым в контексте семейного и социокультурного влияния. Недостаточная разработанность соотношения личностных и семейных факторов затрудняет понимание механизмов формирования автономии подростков в различных культурных условиях. Теоретической основой исследования послужили культурно-историческая теория Л.С. Выготского, деятельностный и системный подходы к анализу семьи. **Цель.** Выявить особенности становления автономии личности подростков в контексте семейной системы и сравнить семейные факторы, влияющие на развитие автономии у подростков из Москвы и Баку. **Гипотеза.** Существуют различия в развитии автономии личности подростков в зависимости от культуры (Москва и Баку). Бакинские подростки демонстрируют больший уровень развития эмоциональной автономии, а московские — больший уровень развития поведенческой и общей автономии. Также существуют различия в семейной системе, а именно — в ориентации на достижения, семейной организации и контроле, что приводит к отличиям в характере семейных отношений подростков в Москве и Баку. **Методы и материалы.** В исследовании использовались количественные и качественные методики: Методика «Опросник автономии» (О.А. Карабанова, Н.Н. Поскребышева, 2011); Шкала семейного окружения (FES, адаптация С.Ю. Куприянова, 1985); Авторская методика «Незаконченные предложения». **Выборку** составили 201 подросток в возрасте от 13 до 18 лет (102 из Баку и 99 из Москвы). Средний возраст московских участников составил 14,6 лет (SD = 1,36), бакинских — 14,3 года (SD = 0,76). **Результаты.** Московские подростки показали более высокий уровень поведенческой и общей автономии, бакинские — более высокий уровень эмоциональной автономии. Семейные отношения в Москве характеризуются меньшим контролем, в Баку — более строгими правилами. **Выводы.** Результаты подтвердили гипотезу о различиях в развитии автономии подростков в зависимости от культурных особенностей. Различия в семейной системе, опосредованные культурным контекстом, находят отражение в представлениях подростков о самостоятельности, допустимых границах автономии и формах обращения за поддержкой.

Ключевые слова: автономия личности, подростковый возраст, кросс-культурное исследование, семейные отношения, эмоциональная автономия, поведенческая автономия, когнитивная автономия, ценностная автономия

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Introduction

The development of autonomy during adolescence represents one of the central issues in developmental psychology. This stage is associated with changes in the system of parent–child relationships, involving a redefinition of role positions, the establishment of new boundaries, and the search for a balance between dependence and independence. Within the context of contemporary sociocultural dynamics, autonomy is increasingly conceptualized as an indicator of personal maturity and a key condition for successful social adaptation (Kaliteevskaya, Leontiev, 2006; Dergacheva, 2005).

Empirical evidence supports the association between separation from parents and adolescents' subjective well-being (Korotkevich, Stepanenko, 2024). Family characteristics — such as support, emotional climate, and the consistency of parenting strategies — contribute to the formation of stable personal boundaries and facilitate the development of autonomy (Poskrebysheva, Babkina, 2020; Zhikhareva, Kolchik, 2024).

The study of adolescent autonomy within the context of family and cultural differences is essential for understanding the psychological mechanisms of maturation and the influence of sociocultural factors on processes of separation and self-determination, as well as for identifying both universal and culture-specific aspects of personal autonomy development.

Characteristics of family interaction

The family is a small social unit based on marital and kinship relationships, characterized by a stable structure and the performance of specific functions (Karabanova, 2005). Its development unfolds sequentially within the framework of the family life cycle. According to Evelyn Duvall's model (Duvall, 1957), the stage of raising an adolescent requires a reconfiguration of parental roles and the establishment of a balance between control and the granting of autonomy.

This stage may be accompanied by intrafamilial and personal difficulties, including a midlife crisis in parents. Such changes intensify emotional tension and may provoke adolescent withdrawal, oppositional behavior, and a decline in trust. The adolescent crisis often acts as a trigger for transformations within the parent–child system, and its successful resolution is associated with an atmosphere of respect, trust, and open dialogue (Lutsenko, 2024).

The parent–child subsystem exerts the most significant influence on the development of autonomy. Emotional involvement, the nature of control, and patterns of interaction play a key role (Poskrebysheva, 2018). Excessive control may hinder autonomy, while its absence may lead to maladjustment. Support, trust, and a positive emotional climate represent essential conditions for the development of personal autonomy

(Larina, 2025). International research also demonstrates that the combination of parental warmth and autonomy support is positively associated with adolescents' subjective well-being (Bülow et al., 2022).

In addition, it has been shown that the perception of autonomy may be mediated by the level of parental control aligned with social norms, highlighting the importance of culturally shaped monitoring strategies (Wehner, Strecker, Graf, 2021).

Emotional separation may lag behind behavioral separation (Dzukaeva, 2016), while the need for support remains. Harmonious separation occurs within a stable family environment, where relationships are transformed into a partnership model characterized as "adult–adult".

Cross-cultural aspect

Adolescent personality development takes place both within the family and under the influence of the broader cultural context. From an early age, children internalize norms, values, and social roles, thereby forming their social identity.

Two major types of cultural orientations are commonly distinguished: individualistic and collectivistic. The former emphasizes independence and personal autonomy, allowing for the open expression of emotions (Yakimova, 2012). The latter prioritizes respect for elders, obedience, and emotional restraint, which is often reflected in more authoritarian parenting styles.

The cultural context of Russia reflects a synthesis of collectivistic and individualistic tendencies. Parents tend to prioritize educational achievement, while personal development is often considered secondary (Polyvyannaya, Smirnova, 2018). According to Kirienko (2015), a high level of parental ethnic identity contributes to more favorable parent–child relationships. At the same time, a focus on personal development may reduce parental involvement, leading to earlier adolescent independence (Polivanova, 2018). Despite a general orientation toward Western models, traditional attitudes remain influential (Burina, Kudinova, 2020).

In Azerbaijan, where collectivistic orientations predominate, globalization has led to noticeable transformations, particularly in urban environments. Processes of democratization and the nuclearization of the family are becoming more pronounced in cities, while traditional norms remain prevalent in rural areas (Pankratova, Osin, Gasanova, 2017). The Azerbaijani family is grounded in respect, mutual support, and the preservation of social reputation. At the same time, a decline in paternal authority has led to a redistribution of family roles, increasing the burden on women.

Russian families demonstrate a tendency toward individualism, whereas Azerbaijani families retain stronger collectivistic features. Emotional experiences are expressed more openly in Russia, while in Azerbaijan they are more often restrained. In individualistic cultures, adolescents are more likely to make independent decisions, whereas in collectivistic cultures they are more oriented toward family opinion. At the same time, parental control in collectivistic contexts is more often perceived as care (Soenens, Beyers, 2024).

In Russia, the father is more often associated with demandingness, while the mother is associated with support. In Azerbaijan, both parents tend to maintain authority, and role differentiation is less pronounced (Savastenok, 2010). A study by Poskrebysheva and Yusifova (2018) showed that adolescents in Moscow tend to be more independent but also more critical of their parents, whereas adolescents in Baku display higher levels of conflict yet report overall satisfaction with family relationships. Thus, the present study addresses the existing gap in research on the relation-

ship between adolescent personality development and the family system within a cross-cultural context.

Characteristics of adolescent personal autonomy

There are several theoretical approaches to the concept of autonomy. Some consider it as a process of separation from parents (A. Freud, J. Bowlby, M. Mahler), while others view it as a key element of personality development (E. Erikson, L. Steinberg). E. Deci and R. Ryan emphasize self-determination, whereas R. Harré focuses on independence from external influence. In the Russian psychological tradition, autonomy is associated with adulthood, conscious choice, and initiative (L.S. Vygotsky, S.L. Rubinstein, D.B. Elkonin).

Contemporary research continues to develop these ideas. Kaliteevskaya (Kaliteevskaya, Leontiev, 2006) emphasizes the importance of freedom and responsibility as the basis of self-determined behavior. Dergacheva (2005) considers autonomy as a manifestation of intrinsic motivation that is independent of social expectations, linking it to the concept of free will, existential search, and self-realization. In her view, self-regulation is the result of conscious choice determined by personal attitudes and external context, while autonomy is closely related to life meaningfulness and goal setting.

In the study by Zhikhareva and Kolchik (2024), autonomy is associated with stable personal boundaries and the integrity of the self-concept. Dityuk (2015) interprets autonomy as a complex personality characteristic that includes cognitive-behavioral, emotional, and communicative components. In adolescence, the striving for independence is accompanied by a persistent need for parental support, which often becomes a source of internal contradictions.

According to A.S. Gilyano and V.A. Shuvalova, the stable development of autonomy requires a combination of emotional support and consistent demands. Excessive overprotection or inconsistency disrupts this balance (Gilyano, Shuvalova, 2024). This is especially critical in the context of separation, which requires not only distancing but also flexible parental support. Longitudinal analysis has shown that a combination of high parental autonomy support with low levels of control forms the most favorable profile, contributing to both academic achievement and psychological well-being of adolescents (Teuber et al., 2022). K.A. Korzun emphasizes the importance of parents' ability to "let go" of the child while maintaining emotional contact (Korzun, 2024). International studies also show that a high level of parental control is associated with lower adolescent confidence (Hare et al., 2014).

The development of autonomy in adolescence involves its manifestation through several key aspects:

- Cognitive autonomy — the ability to independently solve cognitive tasks, justify one's opinion, be aware of external influences, and form a personal position (Backert, 2007).
- Behavioral autonomy — the striving for independence in actions, which increases with parental support and authoritative, but not authoritarian, relationships (Peterson, Bush, 2007).
- Value autonomy — manifested in a conscious choice of beliefs; rejection of parental attitudes based on negativism may indicate dependence.
- Emotional autonomy — associated with overcoming emotional dependence on parents and the free expression of feelings; its high level contributes to social adaptation and reduces the tendency toward risky behavior (Tsaniah, Nurhudaya, Budiman, 2020; Ahmad, Rafeh, Rafique, 2018).

Thus, the conducted theoretical analysis confirms that the development of au-

tonomy in adolescence is based both on personal striving for independence and on the characteristics of family relationships. The influence of sociocultural differences on the content and structure of autonomy remains insufficiently studied. The scientific novelty of the study lies in obtaining empirical data that allow identifying the relationship between the development of adolescent autonomy and the characteristics of the family system in different sociocultural contexts. Particular attention is paid to family factors influencing the formation of emotional and behavioral independence, which expands the understanding of the mechanisms of maturation in conditions of cultural diversity.

The conducted theoretical analysis made it possible to clarify the research problem and determine the direction of empirical testing of the proposed assumptions.

Materials and methods

To empirically test the propositions formulated in the theoretical part, a comparative study was conducted aimed at analyzing the development of adolescent personal autonomy within the context of the family system under different cultural conditions.

The aim of the study was to identify the characteristics of adolescent autonomy development in the context of the family system and to compare family factors influencing autonomy development among adolescents from Moscow and Baku.

The research hypothesis was that differences exist in the development of adolescent personal autonomy depending on cultural context (Moscow and Baku). Adolescents from Baku were expected to demonstrate higher levels of emotional autonomy, whereas adolescents from Moscow were expected to show higher levels of behavioral and overall autonomy.

In accordance with the stated aim and hypothesis, the study was based on a combination of quantitative and qualitative approaches. Quantitative methods provided the opportunity to analyze the structure of autonomy and parameters of family functioning, allowing for the identification of relationships between personal and family characteristics. Qualitative analysis was used to explore adolescents' representations of independence and family support, enabling interpretation of the results within a cultural context.

The following instruments were used in the study:

1. "Autonomy Questionnaire" (Karabanova, Poskrebysheva, 2011) — aimed at assessing the overall level of autonomy as well as emotional, behavioral, value, and cognitive autonomy in older adolescents.

2. Family Environment Scale (FES) developed by Rudolf H. Moos, adapted by S.Yu. Kupriyanov (Kupriyanov, 1985) — used to assess the family microsocial climate and evaluate key components of family system functioning. The scale includes 10 subscales reflecting three domains: family relationships (cohesion, expressiveness, conflict), personal growth (independence, achievement orientation, intellectual-cultural orientation, active-recreational orientation, moral-religious emphasis), and system maintenance (organization, control).

3. A modified authorial version of the "Incomplete Sentences" technique — developed to examine adolescents' representations of their family and autonomy. Participants were asked to complete four sentence stems: "My family..."; "I feel independent when..."; "In my family, my achievements..."; "When I need help...". The resulting categories derived from the responses were evaluated by two experts; their comments and recommendations were taken into account during analysis. The experts agreed with the identified cat-

egories and the classification of adolescents' statements.

Statistical data analysis was conducted using SPSS Statistics. Descriptive statistics were calculated (means and standard deviations), the Mann–Whitney U test was applied to assess significant differences between samples, and Cohen's d coefficient was calculated to interpret the effect size. In addition, content analysis was used to process responses to the incomplete sentences and to identify semantic categories.

The sample consisted of 201 adolescents (102 from Baku and 99 from Moscow) aged 13 to 18 years. Among them, 82 were boys (40,8% of the sample; 42 from Moscow and 40 from Baku) and 119 were girls (59,2%; 57 from Moscow and 62 from Baku). The mean age of adolescents from Moscow was 14,6 years (SD = 1,36), and from Baku — 14,3 years (SD = 0,76). Adolescents in the Baku sample were aged 13 to 15 years, while those in the Moscow sample ranged from 13 to 18 years.

Participation in the study was voluntary. Adolescents from various general education schools in Moscow and Baku were invited to participate following preliminary oral briefing and **consent**. The sample was randomly formed among students of general education schools in both cities. All participants completed identical questionnaires and underwent the full set of assessment instruments.

Results

First, let us consider the results of the comparative analysis of different components of autonomy: emotional, behavioral, cognitive, and value autonomy, as well as overall autonomy.

The results of the study of personal autonomy in the Moscow sample are generally consistent with findings from previous research, although certain cultural specificity is observed.

The level of behavioral autonomy is higher among adolescents from Moscow: they demonstrate greater independence in their actions, whereas adolescents from Baku regulate their behavior to a lesser extent. This may be related to the characteristics of a collectivist culture, in which restraint in the expression of autonomy is supported by both parents and society.

Cognitive autonomy is also lower among adolescents from Baku, which may be associated with the need to take family opinions into account when making decisions. In contrast, adolescents from Moscow more actively express their own ideas and opinions.

With regard to overall autonomy, adolescents from Baku demonstrate lower average levels compared to their peers from Moscow. In collectivist cultures, control and consideration of family opinion play an important role, which may reduce the overall level of autonomy.

Table 1

Descriptive statistics and cultural differences in levels of personal autonomy components (N = 201)

Scale	Mean (Moscow)	Mean (Baku)	Mann–Whitney U Test	Cohen's d Coefficient
Cognitive autonomy	11,77	10,71	**0,001**	0,512
Behavioral autonomy	11,13	9,67	**0,000**	0,716
Emotional autonomy	9,77	9,34	0,352	0,186
Value autonomy	11,31	11,56	0,248	–0,118
General autonomy	44,03	41,27	**0,001**	0,487

Next, we consider the characteristics of family relationships among adolescents from Moscow and Baku (see Table 2).

The analysis showed that across four scales ("Independence," "Achievement Orientation," "Organization," "Control"), there are significant differences between the families of adolescents from Moscow and Baku ($p \leq 0{,}01$). In all cases, the scores are higher among adolescents from Baku.

In Moscow families, control and organization are less pronounced, and achievement motivation plays a less prominent role. In Baku families, a clear hierarchy, strict rules, and a high level of control are present. At the same time, the level of independence among adolescents from Baku is also higher, which may be associated with a transformation of traditional values in Azerbaijani culture, particularly in urban contexts.

To analyze adolescents' representations of their own independence and family relationships, four incomplete sentences were used ("My family..."; "In my family, my achievements..."; "I feel independent when..."; "When I need help..."). Responses were categorized and evaluated by two experts holding PhD degrees in psychology and having practical experience working with adolescents.

The analysis of responses to the sentence "My family..." made it possible to identify six categories: positive statements, negative statements, neutral statements, references to support and reliance, references to feelings of love, and ambivalent statements (see Table 3).

The largest number of responses in both groups fell into the category "positive statements about the family" (60 responses; 55%). In the category of "negative statements," adolescents from Moscow were more frequently represented (11,3% compared to 6,4% in Baku). Ambivalent state-

Table 2

Descriptive statistics and cultural differences in characteristics of family relationships (N = 201)

Scale	Mean (Moscow)	Mean (Baku)	Mann–Whitney U Test	Cohen's d Coefficient
Independence	4,94	5,56	0,01	–0,389
Achievement Orientation	4,82	6,02	0,000	–0,85
Organization	5,12	6,17	0,000	–0,529
Control	3,72	5,22	0,000	–0,998

Table 3

Percentage distribution of categories for the sentence stem "My family…"

Culture	Positive statements (% of the sample)	Negative statements (% of the sample)	Neutral statements (% of the Sample)	Support statements (% of the sample)	Expressions of love (% of the sample)	Ambivalent statements (% of the sample)
Total	55	9,2	9,2	8,3	9,2	2,2
Moscow	48,4	11,3	9,7	11,3	9,7	4,8
Baku	63,8	6,4	8,5	4,3	8,5	0

ments were observed only among adolescents from Moscow (3 responses; 4,8%).

The second sentence, “In my family, my achievements…,” included two categories: “value, respect, positive attitude” (64 responses, with 32 in each group) and “negative attitude” (18 responses, 12 in Moscow and 6 in Baku) (see Table 4).

The majority of adolescents (73,6%) indicate that their achievements in the family are perceived as significant and are accompanied by a respectful attitude from close others, whereas a negative attitude is reported in 20,7% of responses. In Moscow, the level of positive attitude is lower (47,8%) compared to Baku (58,2%), while the level of negative attitude in Moscow is higher.

The third sentence, “I feel independent when…”, included five categories: independent problem solving, physical solitude, independence from others, independence from parents, and the presence of others nearby (see Table 5).

The majority of adolescents (39,8%) associate independence with solving specific tasks, with adolescents from Moscow reporting this more frequently (50%) compared to those from Baku (28,9%). In Baku, a higher percentage of adolescents associate independence with physical solitude (31,1% compared to 18,8% in Moscow) and with the presence of others nearby (11,1% compared to 0%).

The analysis of the fourth sentence, “When I need help…”, identified five categories: reliance on oneself, help from family, help from friends, absence of a specified source of help, and absence of help (see Table 6).

Adolescents overall most frequently rely on help from the family (31,3%) or do not specify a particular source (33,3%), whereas independent problem solving is reported

Table 4

Percentage distribution of categories for the sentence stem “In my family my achievements…”

Culture	Valuation, respect, and positive regard (% of the sample)	Negative attitude (% of the sample)
Total	73,6	20,7
Moscow	47,8	17,9
Baku	58,2	10,9

able 5

Percentage distribution of categories for the sentence stem “I feel autonomous when…”

Culture	independent problem solving (% of the sample)	Physical solitude (% of the sample)	Independence from others (% of the sample)	Independence from parents (% of the Sample)	Others’ presence (% of the sample)
Total	39,8	24,7	17,2	6,5	3,2
Moscow	50	18,8	16,7	8,3	0
Baku	28,9	31,1	17,8	4,4	11,1

Table 6

Percentage distribution of categories for the sentence stem "When I need help…"

Culture	Self-reliance (% of the Sample)	Family support (% of the Sample)	Support from friends (% of the Sample)	Unspecified source of support (% of the Sample)	Lack of support (% of the Sample)
Total	12,3	31,3	15,6	33,3	5,2
Moscow	15,1	20,8	18,9	35,8	5,7
Baku	9,3	44,2	11,6	30,2	4,7

less often (12,3%). In Moscow, adolescents rely more on themselves (15,1%) and on friends (18,9%) compared to their peers from Baku, while in Baku reliance on the family is more strongly expressed.

Discussion

The results confirm the presence of differences in the components of adolescent autonomy associated with the sociocultural characteristics of their living conditions in Moscow and Baku. Adolescents from Moscow demonstrate higher levels of cognitive, behavioral, and overall autonomy compared to their peers from Baku.

Differences in cognitive autonomy may be related to cultural attitudes: in collectivist cultures, adolescents are more strongly oriented toward family opinion, whereas in individualistic cultures independence is encouraged. These findings are consistent with the results of Pankratova et al. (Pankratova, Osin, Gasanova, 2017), which emphasize the influence of cultural context on personal autonomy.

Family relationships also differ: in Baku families, levels of control, organization, and achievement orientation are higher, which is characteristic of collectivist cultures. At the same time, the relatively high independence of adolescents from Baku may reflect a transitional period in which traditional and modern norms coexist.

Among adolescents from Moscow, traits associated with an individualistic orientation are more frequently observed, which may be reflected in less rigid family rules and a more flexible development of autonomy. At the same time, adolescents from Baku demonstrate a combination of striving for independence with a pronounced orientation toward the family and the preservation of traditional forms of support, which may be related to the characteristics of a collectivist social structure.

The largest number of statements about the family in both groups were positive. Adolescents from Moscow more often referred to acceptance, care, and emotional support from the family (a total of 21% of responses in the categories "support" and "love", see Table 3), which reflects a higher degree of emotional closeness. This is consistent with findings on the greater expressiveness of Russian culture (Pankratova, Osin, Gasanova, 2017).

Negative statements were more frequent among adolescents from Moscow (11,3% compared to 6,4% in Baku), which may be related to the greater acceptability of criticism in individualistic cultures. The presence of ambivalent evaluations only among adolescents from Moscow may reflect a more differentiated perception of family relationships.

Differences in the perception of family attitudes toward achievements were less pronounced than expected. Despite the hypothesis that achievements would be more significant in Baku, differences between the groups were small. This may be related to the urbanized nature of the sample and the influence of globalization. Negative attitudes toward achievements were expressed by 20.7% of respondents, with a higher proportion in Moscow, which may be associated with a greater tendency to discuss family-related difficulties.

In responses regarding independence, adolescents most often associated it with the completion of specific tasks. Some respondents, particularly from Baku, mentioned physical isolation as an indicator of independence, which may reflect a striving for autonomy. At the same time, the category "independence from parents" was mentioned less frequently, indicating the continued importance of the family in adolescents' perception of their own independence. These findings are consistent with the conclusions of Poskrebysheva and Babkina (2020), who showed that adolescents perceive independence as a balance between autonomy and interaction.

The analysis of responses concerning help showed that most adolescents tend to turn to parents or friends; however, some, particularly in Moscow, avoid seeking help, possibly due to a desire for independence or fear of dependence. Adolescents from Baku more often emphasize the importance of family support.

The obtained results can be interpreted within the theoretical frameworks outlined in the introduction. In particular, they are consistent with the principles of self-determination theory by Deci and Ryan, according to which autonomy is considered a key component of psychological development and a condition for personal well-being. The findings also support the cultural-historical approach of Vygotsky, which emphasizes that personality development is determined by the specifics of the sociocultural environment. The importance of family factors identified in the study corresponds to the systemic approach to the family (Karabanova, 2005) and is supported by contemporary research on the role of parent–child relationships in the development of adolescent autonomy (Poskrebysheva, Babkina, 2020; Zhikhareva, Kolchik, 2024). Thus, the study extends existing understanding of autonomy development by linking individual and cultural characteristics with patterns of family interaction.

Thus, adolescents from both cultural contexts perceive the family as an important source of support. Adolescents from Moscow demonstrate a more differentiated perception of family relationships, more often emphasizing their emotional aspects (such as support, care, and acceptance), whereas such references are less frequent in the responses of adolescents from Baku. This may indicate greater emotional restraint reflected in their representations of the family. The identified differences reflect cultural characteristics of autonomy development while also indicating shared representations of family and independence.

Conclusions

The study analyzed the role of the family in the development of adolescent autonomy across different cultures. The results showed that the family system and culture exert an interconnected influence on the formation of autonomy.

The hypotheses were partially confirmed: adolescents from Moscow demonstrated higher levels of behavioral, cognitive, and overall autonomy. At the same time, adolescents from Baku more often reported higher levels of organization and control in family life.

It was found that representations of independence are formed differently in the

two cultural contexts. For adolescents from Moscow, independence is more often associated with making one's own decisions and acting without external assistance, while emotional support from the family remains significant. Adolescents from Baku more often associate independence with physical isolation and, in situations requiring support, rely more on help from close others, primarily the family.

Differences in family relationships were also confirmed: in Baku, there is a stronger orientation toward achievement, stricter rules, and greater organization; in Moscow, lower levels of control and greater adolescent independence are observed.

Adolescents from both cultural contexts perceive the family as an important source of support. At the same time, the nature of describing family relationships differs: adolescents from Moscow more often emphasize emotional aspects, including support, care, and acceptance, whereas such references are less frequent in the responses of adolescents from Baku. These differences reflect the characteristics of the cultural context and make it possible to уточнить the role of the family system in the development of adolescent autonomy.

Limitations. This study has limitations related to the sample size and the focus on only two major cities — Moscow and Baku — which limits the generalizability of the findings. Additionally, the Azerbaijani sample included Russian-speaking adolescents, which may have influenced the formation of their social context.

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Alexandra Yu. Babkina — application of statistical, mathematical or other methods for data analysis; conducting the experiment; data collection and analysis; visualization of research results; writing and design of the manuscript.

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Psychophysiological indicators of adaptation to the academic load in first-graders with different functional states of polymodal perception

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Abstract

Context and relevance. The adaptation process with the beginning of schooling requires the mobilization of the child's reserve forces. Not all first-graders adapt to schooling as normal, within 5–6 weeks. The timing of the formation of compensatory-adaptive mechanisms to the academic load depends on various factors, including sufficient maturation of organs and systems of the body, among which the functional state of polymodal perception, which is the basis for the development of all higher cognitive functions, is of great importance. **Objective.** The aim is to study psychophysiological indicators of adaptation in first-graders and to identify the influence of the functional state of polymodal perception on the level of formation of compensatory-adaptive mechanisms to the academic load. **Hypothesis.** A harmonious functional profile of polymodal perception has a positive effect, while disharmonious profiles have a negative effect on the degree of neuropsychic stress, which is an indicator of the level of formation of compensatory-adaptive mechanisms to the academic load of first-graders. **Methods and materials.** The study involved 94 first-graders (47 boys and 47 girls) from comprehensive schools. The average age was 7,38 ± 0,16 years. The functional profile of polymodal perception was established using the technique of I.Yu. Murashova. The level of emotional and somatic tension in the academic load was studied, firstly, by recording the electrical activity of the skin in acupuncture (at the control measurement point related to the peripheral and central nervous system in the meridian of nervous degeneration "Nd-1b" according to the atlas of the topography of BAT R. Voll) using the certified hardware and software complex "Acceptor 6K-2024", made in the Russian Federation (hereinafter referred to as the APK). Secondly, by the method of body thermometry, which was carried out using the AND DN-635 contact thermometer, certified in the Russian Federation, made in Japan. The level of cognitive activity in the academic load was studied by recording sensorimotor reactions: reactions to a moving object, simple and complex visual-motor reactions, these measurements were also made using the APC. Based on the collected information on emotional-somatic tension and cognitive activity, the degree of neuropsychic stress was revealed, indicating the level of formation of compensatory-adaptive mechanisms to the academic load. **Results.** It was established that a harmonious PV profile is a predictor of the optimal level of compensatory-adaptive mechanisms to the academic load, while disharmonious

profiles are a predictor of a low level of compensatory-adaptive mechanisms to the academic load. Conclusions. It is shown that studying and psychoregulation of the functional state of polymodal perception in first-graders, on the one hand, will increase the possibilities of assimilation of program material, on the other hand, it will improve the adaptive mechanisms to the academic load. To improve the psychophysiological indicators of adaptation to the academic load with first-graders who have disharmonious profiles of polymodal perception, the school psychologist is recommended to conduct targeted work on the psychoregulation of their functional disharmonious states: directly, with children in psychocorrectional classes, and also indirectly, with teachers.

Keywords: adaptation, first-graders, emotional-somatic tension, cognitive activity, nervous and mental stress, polymodal perception

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Психофизиологические показатели адаптации к учебной нагрузке у первоклассников с разным функциональным состоянием полимодального восприятия

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Резюме

Контекст и актуальность. Адаптационный процесс с началом обучения в школе требует мобилизации резервных сил ребенка. Не у всех первоклассников адаптация к школьному обучению протекает по норме, в течение 5–6 недель. Сроки формирования компенсаторно-приспособительных механизмов к учебной нагрузке зависят от различных факторов, в том числе от достаточного созревания органов и систем организма. Среди них важное значение имеет функциональное состояние полимодального восприятия (ПВ), являющегося основой развития всех высших когнитивных функций. **Цель**. Определить особенности психофизиологических показателей адаптации у первоклассников и изучить связь между функциональным состоянием полимодального восприятия и уровнем сформированности компенсаторно-приспособительных механизмов к учебной нагрузке. **Методы и материалы**. В исследовании приняли участие 94 первоклассника (47 мальчиков и 47 девочек) из общеобразова-

тельных школ. Средний возраст составил 7,38 ± 0,16 лет. Функциональный профиль полимодального восприятия устанавливался с помощью методики И.Ю. Мурашовой. Уровень эмоционально-соматической напряженности в учебной нагрузке изучался, во-первых, методом регистрации электрической активности кожи в акупунктуре (в контрольной точке измерения, относящейся к периферической и центральной нервной системе в меридиане нервной дегенерации «Нд-1b» по атласу топографии БАТ Р. Фолля) с использованием сертифицированного аппаратурно-программного комплекса «Акцептор 6К-2024» производства РФ (далее — АПК). Во-вторых, методом телесной термометрии, которая проводилась с применением сертифицированного в РФ контактного термометра AND DN-635 производства Японии. Уровень когнитивной активности в учебной нагрузке исследовался методом регистрации сенсомоторных реакций: реакции на движущийся объект, простой и сложной зрительно-моторных реакций, данные измерения также происходили с применением АПК. По собранным сведениям об эмоционально-соматической напряженности и о когнитивной активности выявлялась степень нервно-психического напряжения, указывающая на уровень сформированности компенсаторно-приспособительных механизмов к учебной нагрузке. **Результаты.** Установлено, что гармоничный профиль ПВ является предиктором оптимального уровня компенсаторно-приспособительных механизмов к учебной нагрузке, тогда как дисгармоничные профили являются предиктором низкого уровня компенсаторно-приспособительных механизмов к учебной нагрузке. **Выводы**. Показано, что психорегуляция функционального состояния полимодального восприятия у первоклассников, с одной стороны, позволит повысить возможности усвоения программного материала, с другой — улучшить адаптационные механизмы к учебной нагрузке. Для улучшения психофизиологических показателей адаптации к учебной нагрузке с первоклассниками, имеющими дисгармоничные профили полимодального восприятия, школьному психологу рекомендовано проводить целенаправленную работу по психорегуляции его функциональных дисгармоничных состояний: непосредственно, с детьми на психокоррекционных занятиях, а также опосредованно, с педагогами.

Ключевые слова: адаптация, первоклассники, эмоционально-соматическая напряженность, когнитивная активность, нервно-психическое напряжение, полимодальное восприятие

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Introduction

The adaptation process with the start of school requires the mobilization of the child's body's reserve resources. Adaptation to the academic load involves the activation of the compensatory-adaptive mechanisms (CAM) system to the new conditions of organized learning. Normal-

ly, adaptation to school lasts 5–6 weeks and occurs in three stages. During the first stage — the orientation stage — a low level of CAM development is observed, accompanied by a lack of cognitive activity, which can occur against a background of strong or, conversely, weak emotional and somatic stress. Cognitive activity is characterized by low performance and fatigue. During the second stage, unstable adaptation is observed, when in some cases the body finds acceptable solutions in response to external stimuli, while in others it does not. At stage 3 — stable adaptation — the child's cognitive systems find optimal responses to stimuli (Kozhushko, 2008; Meshcheryakov, Zinchenko, 2006; Abdullajonova, Jurayeva, 2023; Cokuk, Kozikoğlu, 2020; Marcineková, Borbélyová, Tirpáková, 2020; Juralovich, 2023; Sonkin et al., 2024).

At the same time, numerous studies have shown that not all students adapt to learning smoothly and within the prescribed 5–6 weeks. Due to the influence of various factors, this period can be prolonged. Three groups of first-graders are distinguished based on the adaptation time: 1) normal, within 5–6 weeks; 2) from 2 to 4 months; 3) until the end of the first grade and even in the second grade (Antropova, 1983; Kozhushko, 2008; Kazakova, Sokolova, 2019; Filshtinskaya, Aborina, 2020; Thi, Quoc, Quang, 2025; Rajabova, 2025; Teleková et al., 2023).

An indicator of the state of adaptation processes to the academic workload is the degree of neuropsychic stress during educational activities, which, in turn, depends on the level of psychoemotional and somatic tension and the level of cognitive activity (Antropova, 1983; Tleuzhanova, Ishanov, Mehmet, 2025).

Many factors have been identified that hinder adaptation to school. Along with disruptions to the daily routine and excessive demands, the body's readiness to begin systematic learning, i.e., sufficient maturation of organs and systems to a level that ensures the ability to optimally respond to the challenges of the educational environment. The latter may include the state of multimodal perception (hereinafter PM) as a basic cognitive process (Alhamdan, Murphy, Crewther, 2023; Hong, Lu, Zhu, 2022; Tleubayeva, Rashat, 2024). PM is considered as a neuropsychophysiological process of integrating sensory modalities during perception, one of which, being dominant, interacting with the subdominant ones, creates a holistic image (Ayres, 2017; Bandurka, 2005; Bandler, McDonald, 2004; Luria, 2003; Murashova, 2024).

An analysis of studies of adaptation mechanisms under various loads showed that many studies noted the importance of measuring the quality of emotional-somatic tension using various psychophysiological methods, including recording skin electrical activity (SEA) in acupuncture and thermometry (Anisimova, 2007; Fischer et al., 2024; Gafarov, 2021; Hempen, Hummelsberger, 2025; Hidaka et al., 2023; Hong, 2016; Kim et al., 2020; Oliveira, 2016; Osilla, Marsidi, 2025). The state of cognitive activity during a workload reflecting performance, that is, the ability to complete educational tasks within a set time and within a given performance parameter, has been effectively determined in a number of studies using the method of recording sensorimotor reactions (Nekhoroshkova, Gribanov, Deputat, 2015; Polevshchikov, Dorogova, Rozhentsov, 2017; Bektaş, Ercan, 2023; Efimova et al., 2023; Wang et al., 2024).

The results of an analysis of studies on the development of cognitive function and its role in learning showed that, by the end of preschool age, cognitive function is normally characterized by an individual way of receiving and processing information. Not only the absence of physical defects in the analytical systems but also the development of sensory integration during ontogenesis ensures the harmonious functional state of cognitive function by the beginning of school age. Based on the conditions and pace of a child's development, even in the absence of sensory and neurological defects, the activity of sensory integration in the perceived information flow may be reduced. Disharmonies in the PV of primary school students predetermine difficulties in assimilating the educational information presented (Desal, 2021; Dzyatkovskaya, 1998; Hong, Lu, Zhu, 2022). Moreover, verbal communication is traditionally the primary method of delivering educational information, and difficulties in perceiving the teacher's speech can play a negative role in the development of adaptation.

Unfortunately, we have not found any studies examining the psychophysiological indicators of adaptation to academic workload in first-graders in relation to the functional profile of the cognitive process, which must be taken into account in the educational process. However, all the scientific studies reviewed are useful, informative, and can serve as a basis for new relevant research. Identifying psychophysiological indicators of adaptation in relation to manifestations of multimodal perception in first-graders will help determine the potential for mastering curriculum

Materials and methods

The study was conducted at the beginning of the school year (at the end of the first term) at schools in Angarsk, Irkutsk Region. Ninety-four students (47 boys and 47 girls) participated. The average age was 7,38 ± 0,16 years. No sensory or intellectual disabilities were detected in any of the children. Objective: To study the psychophysiological indicators of adaptation in first-graders and to identify the influence of the functional state of the non-dominant modality on the development of compensatory and adaptive mechanisms to academic workload.

To diagnose non-dominant modality, a method was used that determines the dominant modality from three primary modalities (tactile-kinesthetic, auditory, and visual) and the activity level of the non-dominant modalities. The child's non-dominant modality profile was determined by the presence of inactive (covered and closed) non-dominant modalities (NLM) (Murashova, 2020).

1) Harmonious profile (HP) — in the absence of inactive perceptual modalities, when one of the three modalities was identified as the dominant one, two neuromuscular modalities were open, i.e., fairly active. In this case, approximately half (50–60%) of the information is perceived through the dominant channel, and the other half is perceived jointly by both neuromuscular modalities.

2) Accentuated profile (AP) — in the presence of closed neuromuscular modalities, i.e., inactive ones with weak integrative activity. More than half of the information is perceived by the dominant modality, and only about a third by the subdominant ones (39–29%). In this profile, the perceptual perception is accentuated in favor of the dominant modality.

3) Stuck profile (SP) — when inactive closed neuromuscular modalities are identified in the perceptual perception

structure. Closed modalities are inert, as they are even more inactive than closed ones; in them, accentuation on the dominant modality tends to become stuck. About a quarter or less (28–12%) of information is perceived by the NvM, with the primary reception occurring through the dominant channel.

The psychophysiological study was conducted using the following methods.

1) The method of recording the EAC in acupuncture at one control measurement point (CMP) related to the peripheral and central nervous system in the meridian of nervous degeneration ("Nd-1b" according to the Voll atlas), as an indicator of psychoemotional stress. The CMP "Nd-1b" is located on the second finger of the right hand, the dorso-ulnar surface of the middle phalanx in the zone of transition of the bone to the base (Voll, 1993). The EAC measurements were carried out using the domestic certified hardware and software complex (HSC) "Activation Meter" AC 6K-2024, manufactured by JSC "International Scientific and Production Association "Aktseptor" (Kazan) with a connected HUAWEI MCLG-XX laptop, Microsoft Windows 11. According to the recorded readings recommended by the manufacturer, 3 states of psychoemotional tension were identified: from 19 conventional units to 18 conventional units. Units and below — hypofunction of psychoemotional tension; from 20 to 30 conventional units — normal psychoemotional tension; from 31 conventional units and above — hyperfunction, overstrain.

2) Somatic tension was studied using thermometry, which allows for a simple and informative assessment of the state of thermal balance fluctuations during the day. A Japanese (certified in the Russian Federation) contact infrared thermometer for measuring body temperature on the forehead AND DN-635 was used. The following values were used: 1) ≤ 35,9 degrees Celsius — low temperature, reduced somatic tension; 2) 36,0–36,9 degrees — normal temperature, normal course of neuropsychic processes, sufficient somatic tension; 3) ≥ 37,0 degrees — elevated temperature, somatic overstrain.

Acupuncture measurements (AM) and temperature measurements (TM) were recorded twice daily: before the first lesson, i.e., before the start of the educational activity (EA), and after the third lesson, i.e., after the academic workload. The difference between the recorded AM and TM values was used to determine the level of emotional-somatic tension (EST) during the academic workload:

— high, in the absence of normal values after EA: identified hyperfunction in acupuncture, with a shift of 10 or more conventional units and with an upward temperature shift of ≥ 0,5 degrees (the indicator should not be lower than 36,8 degrees);

— moderate, with minor acupuncture and temperature shifts (EST norm);

— low, in the absence of normal values after EA: recorded hypofunction with a shift of 10 or more conventional units. and a temperature shift downwards by ≥ 0,5 degrees (the indicator is not higher than 36,0 degrees).

3) The method of recording sensorimotor reactions was used to study cognitive activity during the educational process. The following reactions were recorded: to a moving object (RMO); simple visual-motor reaction (SVMR); complex visual-motor reaction (CVMR). Diagnostics took place during educational activities (once), but on days free from

research, acupuncture and temperature measurements took place after the 1st lesson (during the 2nd-3rd lessons). The study was carried out using the software of a hardware and software complex that makes it possible to evaluate the reaction to a moving object (as a variant of computer testing) and to study a simple and complex visual-motor reaction (based on the built-in automated diagnostics of a simple and complex choice reaction). Each of the 3 types of sensorimotor reactions was assessed according to 5 criteria of their quality: very high (5 points), high (4 points), average (3 points), below average (2 points), low (1 point). Based on the obtained indicators, the level of cognitive activity was determined:

— sufficient, in the absence of low values in the indicators, when the values of "very high," "high," or "average" response are recorded (11–15 points);

— conditionally sufficient, if the values of "below average" response are recorded (6-10 points);

— insufficient, if the values of "low" response are recorded (< 5 points).

In total, based on the levels of emotional-somatic tension and cognitive activity, 4 degrees of neuropsychic stress in academic activity were determined as an indicator of the level of compensatory-adaptive mechanism to the academic workload:

— pronounced, an indicator of a low level of compensatory-adaptive mechanism: with an insufficient level of cognitive activity and a high level of emotional-somatic tension;

— pronounced, an indicator of a reduced level of the compensatory-adaptive mechanism: with a conditionally sufficient or insufficient level of cognitive activity and a high level of emotional-somatic tension;

Optimal, an indicator of an optimal level of compensatory-adaptive mechanisms to academic workload: with a sufficient level of cognitive activity and a moderate level of emotional-somatic tension;

— Weak, an indicator of a low level of compensatory-adaptive mechanisms to academic workload: with an insufficient level of cognitive activity and a low level of emotional-somatic tension.

Psychophysiological indicators were compared with the PV diagnostic data.

Statistical analysis was performed using the SPSS 27.0 package. Descriptive statistics were used, including comparison of means using the t-test for paired (dependent) samples, comparison of participant frequency proportions using the Pearson chi-square (χ^2) test, Pearson correlation analysis, and analysis of variance (ANOVA): a two-way MANOVA.

Results

The PV diagnostic results showed that the harmonious profile (HP) was found in 12 (12,77%) children; accentuated profile (AP) — in 44 (46,81%) students; stuck profile (LP) — in 38 (40,42%) first-grade students.

A t-test comparison of the average number of subjects with the recorded EAC values before and after the educational activity (Table 1) revealed that the average frequency of children significantly decreases with hypofunction and normal indicators, and significantly increases with hyperfunction indicators after the educational load. The significance of differences in the average number is always at the $p < 0,001$ level, and the magnitude of the Cohen's d effect differs: for hypofunction, the effect size is 0,393, which is interpreted as below average. For normal (1,057) and hyperfunction (–1667), a larger effect size is

Table1

Comparison of the average number of children according to the values of acupuncture and temperature measurements before and after educational activities (N = 94)

Acupuncture and temperature values average	Medium before UD	Medium after UD	Difference	t	d-Cohen
Cohen's t hypofunction of acupuncture	0,2660	0,1277	0,1383	3,863***	0,393
Measurements normal acupuncture	0,7021	0,2340	0,4681	6,227***	1,057
Measurements hyperfunction of acupuncture	0,0319	0,6383	–0,6064	–11,970***	–1,667
Measurements decreased t°C	0,2234	0,0851	0,1383	3,863***	0,388
Normal t°C	0,7553	0,3191	0,4362	5,596***	0,968
Elevated t°C	0,0213	0,5957	–0,5744	–10,341***	–1,580

*Note. **** — significance at the level of p < 0,001; UD — educational activities.

noted. Comparisons by the number of participants in temperature values also revealed a reliable decrease in the average frequency of occurrence of children with low and normal t°C and a significant increase in their number with elevated values after the educational load at the p < 0,001 level. The Cohen's d effect size at low t°C was below average (0,388), while it was large at normal and elevated temperatures (0,968 and –1,580), 95% CI.

Table 2 shows the results of the two-way multivariate ANOVA test for the effect of PT profile and time on acupuncture and temperature measurements. We can see that the individual effects of PT profile, time, and their interaction significantly impact acupuncture and temperature measurements at p < 0,001 (95% CI) with a large effect size. Subsequent post-hoc analysis confirmed the significant effect of PT profile, time, and their interaction on acupuncture and temperature measurements (at p < 0,001; 95% CI; partial eta-squared > 0,16).

The level of emotional-somatic tension was calculated based on the data obtained from acupuncture and temperature measurements. Analysis of contingency tables by χ^2 showed that only 8,33% of first-graders with a harmonious profile had a high level, characterized by overstrain, which is significantly less than with AP (70,45%) and with ZP (78,95%), at p < 0,001. Differences in the number of children with AP and ZP are not significant. Reliably more children with GP (91,67%) had an average, favorable level than with AP (22,73%), at p < 0,001. No children with ZP with an average level were found. Only children with AP (6,82%) and with ZP (21,05%) had a low level, and the number of children with ZP was significantly more than with AP, at p < 0,02 (Table 3).

Table 2

Results of the analysis of variance for acupuncture and temperature measurements

Effect	λ	F	p	Partial eta-square	Power
Profile of polymodal perception	0,844	7,763	0,001	0,181	0,998
Time	0,506	17,886	0,001	0,289	0,998
Profile of polymodal perception * Time	0,595	13065	0,001	0,329	1,000

Table 3

Distribution of children aged 7–8 years with different functional profiles of PV by the level of emotional-somatic tension in the academic workload (N = 94)

Profile of polymodal perception	Number of participants with different levels of emotional and somatic tension, %		
	High	High	Low
Harmonic (n = 12)	8,33	91,67	0
Accentuated (n = 44)	70,45	22,73	6,82
Stuck (n = 38)	78,95	0	21,05

Table 4

Comparison of the average number of children by the values of SMR registrations during the academic workload (N = 94)

SVMR/CVMR values	Medium SVMR	Medium CVMR	Difference	t	d-Cohen
Very high	0,0745	0,0213	0,0532	2,286*	0,236
High	0,0745	0,0426	0,0319	0,904	0,093
Middle	0,2340	0,0957	0,1383	2,586**	0,266
Below average	0,4574	0,5957	–0,1383	–2,315*	–0,239
Low	0,1596	0,2447	–0,0851	–2,180*	–0,225
RMO/SVMR values	**Medium RMO**	**Medium SVMR**	**Difference**	**t**	**d-Cohen**
Very high	0,0319	0,0745	–0,0426	–2,033	–0,210
High	0,0532	0,0745	–0,0213	–0,630	–0,209
Middle	0,1596	0,2340	–0,0744	–1,620	–0,167
Below average	0,3298	0,4574	–0,1276	–1977	–0,204
Low	0,4574	0,1596	0,2978	5,498***	0,667
RMO/ CVMR values	**Medium RMO**	**Medium CVMR**	**Difference**	**t**	**d-Cohen**
Very high	0,0319	0,0213	0,0106	1,000	0,103
High	0,0532	0,0426	1,0106	0,575	0,059
Middle	0,1596	0,0957	0,0639	1,924	0,198
Below average	0,3298	0,5957	–0,2659	–4,844***	–0,590
Low	0,4574	0,2447	0,2127	3,777***	0,500

Note: * — significance at the level of p < 0,05; ** — significance at the level of p < 0,01; *** — significance at the level of p < 0,001. RMO — reaction to a moving object; SVMR — simple visual-motor reaction; CVMR — complex visual-motor reaction.

The results of the correlation analysis revealed a statistically significant relationship between the recorded values of sensorimotor reactions during the training load for three pairs: “values of the reaction to a moving object — values of a simple visual-motor reaction”, “values of a simple visual-motor reaction — values of a complex visual-motor reaction”, “values of the reaction to a moving object — values of a complex visual-motor reaction”, at p < 0,001 (Table 5).

The level of cognitive activity was determined based on the registration of sensorimotor reactions. A frequency analysis of

Table 5

Correlation matrix between the values of different sensorimotor reactions in 7–8 year old subjects during the study load (N = 94)

Variables	Pearson's Correlation Coefficient		
	RMO	SVMR	CVMR
RMO	1	0,63***	0,71***
SVMR	0,63***	1	0,79***
CVMR	0,71***	0,79***	1

Note. *** — significant correlations at the p < 0,001 level.

the participants (Table 6) using χ^2 showed that significantly more children with a harmonious profile (83,33%) achieved a sufficient level than those with an accentuated profile (6,82%), at p < 0,001. Not a single child with a stuck profile achieved a sufficient level of cognitive activity. No significant differences were observed between the percentage of students with a harmonious profile (16,67%), an AP (22,72%), and a stuck profile (21,05%) with a conditionally sufficient level. There were no children with a harmonious profile with an insufficient level, and the number of students with an accentuated profile (70,46%) was not significantly lower than that of those with a stuck profile (78,95%).

The analysis of distribution of children with different profiles of polymodal perception by the degree of expression of neuropsychic stress in the academic workload according to χ^2 allowed to establish that a pronounced degree, which is an indicator of a low level of adaptation to the academic workload, is not found among students with a harmonious profile, and with an accentuated profile (15,91%) it is detected reliably less often than with a stuck profile (47,37), at p < 0,001. A pronounced degree (as an indicator of a reduced level of adaptation to the academic workload) is significantly less common among participants with a harmonious profile (8,33%) than with an accentuated profile (56,82%) and with ZP (28,95%), at p < 0,001. Significant differences are also determined between the number of children with disharmonious profiles of polymodal perception: the accentuated profile of students is reliably greater than with a stuck profile, at p < 0,001. The optimal degree of expression, as an indicator of an optimal level of adaptation to the academic workload, is observed in the overwhelming majority of students with a harmonious profile (91,17%), which is significantly more frequent than those with an accentuated profile (20,45%) and those with a stuck profile

Table 6

Distribution of children aged 7–8 years with different functional profiles of PV by the level of cognitive activity (N = 94)

Profile of polymodal perception	Number of participants with different levels of cognitive activity, %		
	Sufficient	Conditionally sufficient	Insufficient
Harmonic (n = 12)	83,33	16,67	0
Accentuated (n = 44)	6,82	22,72	70,46
Stuck (n = 38)	0	21,05	78,95

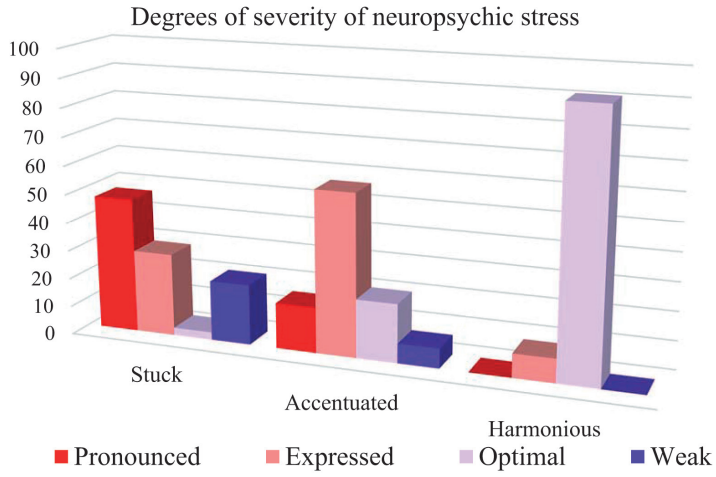

Fig. Distribution of 7–8 year old children with different profiles of polymodal perception by the degree of expression of neuropsychic stress in the academic workload, %

(2,63%), at $p < 0,001$. It was noted that the number of children with an accentuated profile who exhibit an optimal degree is significantly greater than that of those with a stuck profile. A weak degree (an indicator of a low level of adaptation to the academic workload) was not recorded in any student with a harmonious profile, while it is significantly more frequent among those with a stuck profile than those with an accentuated profile, at $p < 0,03$ (see Figure).

Discussion of results

The results of the polymodal perception assessment revealed variability in its functional states among first-graders. This confirms scientific data indicating that the state of polymodal perception depends on conditions, individual characteristics, and the pace of development.

It was established that the polymodal perception profile and time, individually and in combination, have a significant impact on the variability of acupuncture and temperature values, which determine the level of emotional and somatic tension during the adaptation process. First, before educational activities, the number of children with normal acupuncture and temperature values is higher than after, across all polymodal perception profiles. Second, the number of children with normal values, regardless of time, is higher with a harmonious profile, while the more disharmonious the polymodal perception profile, the fewer such children are. Third, after educational activities, students with normal acupuncture and temperature values are more common with a harmonious profile than with disharmonious ones. A significant correlation was found between the sensorimotor response indicators, establishing their importance in assessing cognitive activity during learning.

Correlating the distribution of participants by levels of emotional-somatic tension and cognitive activity, as well as degrees of neuropsychic stress, with the results of the PV diagnostics revealed that a harmonious PV profile predicts an

optimal level of compensatory-adaptive mechanisms to academic workload, while disharmonious profiles predict a low level of compensatory-adaptive mechanisms to academic workload.

To improve the psychophysiological adaptation of first-graders with disharmonious PV profiles to the academic workload, it is important to conduct targeted psychological work on psychoregulation. Psychoregulation involves the school psychologist's efforts to create a special informational and educational environment in all classes and lessons in two areas. First, it involves working with children during psychocorrectional sessions, taking into account the individual PV structure being studied. New educational information is presented through the dominant channel, while its reinforcement and monitoring are carried out through non-dominant channels. Second, it involves working with teachers: all teachers, under the guidance of a psychologist, are required to deliver educational information using a multisensory method, that is, using three modalities simultaneously, where each teacher's word is reinforced by the visual and tactile-kinesthetic channels. This, on the one hand, will increase the potential for assimilating curriculum material, and on the other, will improve first-graders' adaptation mechanisms to the academic workload.

Conclusions

The materials from our study presented here allowed us to identify the characteristics of psychophysiological indicators of adaptation in first-graders and establish the nature of the relationship between the functional state of polymodal perception and the level of development of compensatory mechanisms for adapting to academic workload. It was established that the individual structure of the PV has a significant impact on psychophysiological indicators: the more disharmonious the functional state of the PV, the higher the degree of neuropsychological stress during academic workload.

Therefore, to improve psychophysiological indicators of adaptation to academic workload, it is necessary to conduct targeted psychological work on the psychoregulation of PV with first-graders who do not have harmonious profiles.

Specialized activities on the psychoregulation of PV should be carried out by a school psychologist in two ways: directly with children during psychocorrectional classes and indirectly, through work with teachers.

Limitations. The study was conducted on a sample of students from educational institutions in one city of the Irkutsk region.

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Научная статья | Original paper

Age-related changes in optimistic attributional style and self-efficacy: online vs. offline learning

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Abstract

Context and relevance. Modern educational technologies are actively transforming the learning process, influencing adolescents' psychological characteristics, including their optimistic attributional style and self-efficacy. However, the question of how these characteristics change depending on the learning format (online or offline) and students' age remains insufficiently studied. **Objective.** The aim is to determine the impact of learning format (online vs. offline) and age-related factors on adolescents' optimistic attributional style and self-efficacy. **Hypothesis.** It was hypothesized that adolescents engaged in online learning would demonstrate higher levels of optimistic attributional style and self-efficacy compared to their offline-learning peers. Additionally, it was expected that these indicators would increase with age. **Methods and materials.** The study included 1490 students aged 10 to 18 years, with 616 in online learning and 874 in offline learning. The STOUN-P questionnaire (Optimistic Attributional Style) and the General Self-Efficacy Scale by Schwarzer and Jerusalem were used as diagnostic tools. Data were analyzed using multivariate analysis of variance in Statistica 12. **Results.** Adolescents in online learning demonstrated significantly higher scores in the "control", "success situation", "achievement domain", "interpersonal domain" and overall optimism index compared to offline students. Self-efficacy was not significantly dependent on the learning format but showed significant age-related differences — older adolescents (16–18 years) exhibited higher self-efficacy levels than younger age groups. Additionally, a general trend of increasing optimistic attributional style with age was observed. **Conclusions.** The findings confirm the hypothesis that adolescents in online learning exhibit a more pronounced optimistic attributional style and that self-efficacy develops with age. These results can be useful for developing educational programs in a digital learning environment.

Keywords: optimistic attributional style, self-efficacy, age-related changes, online learning, offline learning, digital educational environment, adolescents

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Возрастные изменения оптимистического атрибутивного стиля и самоэффективности: онлайн- vs офлайн-обучение

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Резюме

Контекст и актуальность. Современные образовательные технологии активно трансформируют процесс обучения, что оказывает влияние на психологические характеристики подростков, включая их оптимистический атрибутивный стиль и самоэффективность. Однако остается недостаточно изученным вопрос о том, как данные характеристики изменяются в зависимости от формы обучения (онлайн или офлайн) и возраста учащихся. **Цель**. Определить, каким образом форма обучения (онлайн или офлайн) и возраст подростков связаны с выраженностью их оптимистического атрибутивного стиля и самоэффективности. **Гипотеза**. Предполагалось, что подростки, обучающиеся онлайн, будут демонстрировать более выраженные показатели оптимистического атрибутивного стиля и самоэффективности по сравнению с их сверстниками, обучающимися в традиционном (офлайн) формате. Также ожидалось, что данные показатели будут возрастать с увеличением возраста подростков. **Методы и материалы**. В исследовании приняли участие 1490 учеников в возрасте от 10 до 18 лет, из которых 616 обучались онлайн, а 874 — офлайн. В качестве методик использовались опросник оптимистического атрибутивного стиля (СТОУН-П) и шкала общей самоэффективности Р. Шварцера и М. Ерусалема. Данные анализировались с помощью многомерного дисперсионного анализа в программе Statistica 12. **Результаты.** Выявлено, что подростки, обучающиеся онлайн, демонстрируют более высокие показатели по субшкалам «контроль», «ситуация успеха», «сфера достижений», «межличностная сфера» и интегральному показателю оптимизма. Самоэффективность в целом не зависела от формы обучения, но возрастные различия оказались значимыми — у подростков 16–18 лет уровень самоэффективности выше, чем у младших возрастных групп. Также отмечена общая тенденция роста оптимистического атрибутивного стиля с возрастом. **Выводы**. Полученные результаты показали, что у подростков, обучающихся в онлайн-формате, более выражен оптимистический атрибутивный стиль по ряду показателей. Самоэффективность не показала статистически значимой связи с формой обучения, однако по этому показателю выявлены статистически значимые возрастные различия: у подростков 14–15 и 16–18 лет ее уровень выше, чем у подростков 10–13 лет. Возрастные различия обнаружены также по ряду показателей оптимистического атрибутивного стиля, включая интегральный показатель оптимизма.

Ключевые слова: оптимистический атрибутивный стиль, самоэффективность, возрастные изменения, онлайн-обучение, офлайн-обучение, цифровая образовательная среда, подростки

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Introduction

Modern educational technologies are transforming the learning process and shaping students' cognitive and motivational characteristics. Optimistic attributional style and self-efficacy are among the key psychological factors associated with academic success because they influence how students interpret academic events and evaluate their own capabilities (Seligman, 1991; Bandura, 1997; Peterson, Steen, 2002; Elliot, Dweck, 2005; Schunk, DiBenedetto, 2020). These characteristics are positively associated with achievement motivation, academic persistence, and psychological well-being (Güçlü et al., 2024; Dweck, Leggett, 1988; Marsh et al., 2012; Titova Grandchamp et al., 2021).

The digital educational environment is increasingly regarded as a context that may shape the development of these characteristics (Klimenskikh et al., 2020). Adolescents' adaptation to online learning formats is associated with higher online self-efficacy and academic achievement (Martin et al., 2021), whereas digital optimism and academic resilience are positively related to learning outcomes (Zhang et al., 2024). In addition, social presence has been shown to mediate the association between online self-efficacy and engagement (Wu, 2023). Meta-analytic evidence further suggests that confidence in one's ability to learn successfully online supports academic persistence (Lakhal et al., 2021) and is directly associated with higher academic achievement (Talsma et al., 2021).

At the same time, the roles of learning format and age in the development of these characteristics remain insufficiently understood. On the one hand, online learning may promote the development of autonomy and self-regulation (Richardson et al., 2006; Sun, Rueda, 2012; Hodges et al., 2024). On the other hand, it may intensify feelings of isolation and undermine self-confidence when opportunities for communication are limited (Chaleila et al., 2024; Grebennikova, 2024; Bowers, Kumar, 2015; Wu, 2024). Studies have also shown that low self-efficacy in adolescence is associated with an increased risk of maladjustment and aggression (Rean et al., 2024). At the same time, available evidence suggests that students in digital learning environments may be less prone to self-blame, which may help preserve self-efficacy (Soldatova, Rasskazova, 2023).

Educational support may compensate for some of the limitations of online formats. High teacher ICT self-efficacy, in combination with institutional support, contributes to successful adaptation to distance learning (Howard et al., 2020), whereas a diminished sense of achievement is associated with lower pedagogical self-efficacy among teachers (Koneva et al., 2024). Positive feedback and individualized instructional practices may strengthen adolescents' confidence in their own abilities. In addition, adapting teaching methods through gamification, interactive assignments, and project-based learning has been shown to enhance motivation and academic self-efficacy (Triana-Vera, López-Vargas, 2025; Pozdnyak et al., 2021).

The online environment places substantial demands on self-regulation and

autonomy, which may contribute to the development of more stable learning strategies. Even brief interventions aimed at structuring activity can enhance students' confidence in performing complex tasks (Allagui, 2024). High web self-efficacy predicts engagement through academic hardiness (Kuo et al., 2021), technological self-efficacy is associated with stronger motivation and greater learning satisfaction (Mekheimer, 2025), and mindfulness together with digital academic resilience exerts an indirect effect on academic self-efficacy (Aldbyani et al., 2024; Li et al., 2022). Low academic self-efficacy, combined with reduced academic engagement, is associated with higher procrastination (Cutipa-Flores et al., 2025). In this context, digital competence may be viewed as an important predictor of confidence in one's success in learning (Javier-Aliaga et al., 2024). A three-factor model comprising academic, procedural, and social components has also been proposed for the analysis of online self-efficacy (Otto et al., 2024).

Comparable patterns have been reported in Russian samples. The digital environment appears to exert an ambivalent influence on motivation: although it may strengthen personal autonomy, it may also contribute to superficial learning under conditions of fragmented stimulation (Karpova, 2024). Domestic studies have shown that optimistic attributional style mediates the relationship between the digital context and academic well-being (Titova Grandchamp et al., 2021). In addition, self-realization values and systems of life-meaning orientations contribute to the development of academic self-efficacy, whereas forms of adolescents' social identity indirectly shape confidence in their learning capabilities through value-based regulation (Gritsenko et al., 2024).

The basic theoretical propositions concerning the role of attributional style and self-efficacy as stable determinants of motivation and academic behavior were formulated in the works of Seligman (1991), Bandura (1997), and Peterson and Steen (2002). Contemporary studies further support their relevance for adolescents in digital learning environments (Marsh et al., 2012; Komarraju, Nadler, 2013; Schunk, DiBenedetto, 2020). Recent reviews also indicate that support for basic psychological needs and parenting style may mediate the association between self-efficacy and academic resilience (Basileo et al., 2024; Qi, 2025; Khan et al., 2024).

Nevertheless, most previous studies have examined self-efficacy and attributional style separately. The present study extends this literature by examining how age and learning format jointly relate to the manifestation of these characteristics in adolescence.

The aim of the study was to examine how learning format (online vs. offline) and age are related to adolescents' optimistic attributional style and self-efficacy. The study tested the following hypotheses. First, given comparable curricula without specialized tracks, adolescents studying online would demonstrate higher levels of optimistic attributional style and general self-efficacy than their peers studying offline. This assumption is based on evidence that the digital educational environment, by increasing autonomy and opportunities for self-regulation, may contribute to the development of optimistic explanatory strategies and confidence in one's own abilities (Zimmerman, Schunk, 2001; Sun, Rueda, 2012). In addition, a meta-analysis of distance education programs (Means et al., 2013) and subsequent studies (Bow-

ers, Kumar, 2015; Wu, 2023) have shown that learning format retains an independent effect on motivational and personal characteristics even when course content and school resources are taken into account. This makes it possible to interpret differences between the online and offline groups as reflecting the influence of educational format rather than institutional characteristics. Second, optimistic attributional style and self-efficacy would increase with age regardless of learning format. Third, the effect of learning format on these characteristics would differ across age groups.

Materials and methods

Participants. The study included 1490 students (494 boys, 33,2%, and 996 girls, 66,8%) aged 10 to 18 years (M = 14,2, SD = 1,7, Mdn = 15). The sample was divided into two groups according to learning format.

The online group (n = 616, 41,3%) consisted of students enrolled at the private Foxford Home School, which follows the federal basic educational curriculum without specialized or advanced tracks. The educational process was organized in three formats: online webinars that allowed students to ask questions and receive teacher feedback, mini-classes of up to 15 students involving interactive participation and work "at the board," and recorded lessons with no opportunity for interaction. After each lesson, students were assigned homework consisting of required and optional components. Upon completion of thematic units, students completed quizzes, and during assessment periods they took tests; grades were assigned only for test performance. Gamification elements were used to enhance motivation. Participants in the online group ranged in age from 10 to 18 years (M = 14,0, SD = 1,8, Mdn = 14).

The offline group (n = 874, 58,7%) consisted of students attending 15 public schools in the Moscow Region. All schools followed the same federal curriculum and did not offer specialized tracks. E-learning and distance technologies were used only occasionally (e.g., electronic diaries and presentation materials), which created a clear contrast with the fully online format implemented at Foxford. Participants in the offline group ranged in age from 10 to 18 years (M = 14,4, SD = 1,7, Mdn = 15).

To examine age-related differences, the full sample was divided into three age subgroups: 10-13 years (464 students, 31,1%), 14-15 years (665 students, 44,6%), and 16-18 years (361 students, 24,2%).

Procedure. The study was conducted in the middle of the academic year, from November to January. Data were collected electronically and anonymously using Google Forms after informed parental consent had been obtained.

Measures. The study used the STONE-P questionnaire, developed by T.O. Gordeeva, E.N. Osin, and V.Yu. Shevyakhova, to assess aspects of optimistic attributional style (Gordeeva et al., 2008), as well as the Russian adaptation of the General Self-Efficacy Scale developed by R. Schwarzer and M. Jerusalem (Schwarzer et al., 1996).

Statistical analysis. Statistical analyses were conducted in Statistica 12. The effects of the study factors on the dependent variables were examined using a two-way multivariate analysis of variance (MANOVA). Wilks's lambda was used as the multivariate test statistic. Effect sizes were reported as eta-squared values. Duncan's test was used for post hoc comparisons. The level of statistical significance was set at $p < 0,05$.

Results

Descriptive statistics for the total sample and for the individual adolescent groups are presented in Tables 1 and 2. Examination of the descriptive statistics indicated that the online learning group had higher mean scores than the offline group on the following STONE-P subscales: Control, Success Situation, Achievement Domain, and Interpersonal Domain, as well as on the overall optimism index. The remaining STONE-P subscales, as well as self-efficacy, were at comparable levels across learning formats. In addition, scores on Globality, Success Situation, Interpersonal Domain, and the overall optimistic attributional style index tended to increase with age (see Table 1).

Descriptive statistics for the study variables across levels of the interacting factors are presented in Table 2.

To identify statistically significant effects, a multivariate analysis of variance (MANOVA) was conducted using Wilks's lambda. The analysis showed that the combined scores on the STONE-P questionnaire and the General Self-Efficacy Scale developed by R. Schwarzer and M. Jerusalem differed significantly as a function of learning format, $F(7, 1490) = 10{,}20$, $p < 0{,}001$, $\eta^2 = 0{,}046$, and age, $F(14, 1490) = 5{,}04$, $p < 0{,}001$, $\eta^2 = 0{,}023$. Thus, learning format accounted for 4,6% of the variance, whereas age accounted for 2,3%. A statistically significant interaction effect between the predictors was also found, $F(14, 1490) = 3{,}19$, $p < 0{,}001$, $\eta^2 = 0{,}015$ (see Table 3).

Hypothesis testing. The results of the statistical analyses made it possible to evaluate each of the hypotheses. Hypothesis 1, which predicted that adolescents studying online would demonstrate higher levels of

Table 1

Descriptive statistics (mean ± standard deviation) and internal consistency indices of the scales depending on various factor categories

Sample	Stability	Globality	Control	Overall optimism index	Success situation	Failure situation	Achievement domain	Interpersonal domain	Self-efficacy
Total sample	59,16± 10,88	65,18± 11,71	66,51± 15,50	190,84± 27,08	76,77± 17,00	114,07± 20,35	96,99± 11,88	77,66± 8,66	29,14± 6,66
Offline learning	59,35± 11,04	64,73± 11,50	65,28± 16,96	189,36± 26,98	74,65± 18,34	114,71± 20,26	96,11± 12,89	76,82± 8,62	28,93± 7,19
Online learning	58,89± 10,66	65,80± 11,99	68,24± 12,99	192,93± 27,11	79,76± 14,38	113,17± 20,45	98,23± 10,18	78,83± 8,58	29,45± 5,82
10–13 years old	59,73± 11,44	65,05± 11,99	64,77± 16,83	189,55± 29,07	74,08± 18,19	115,48± 20,97	96,53± 12,54	76,79± 8,66	28,25± 7,08
14–15 years old	58,63± 10,55	64,05± 11,48	66,90± 14,83	189,58± 25,75	77,10± 16,39	112,48± 19,95	97,54± 11,57	77,36± 8,74	29,45± 6,37
16–18 years old	59,44± 10,76	67,31± 11,47	67,94± 14,76	194,69± 26,51	79,50± 16,02	115,19± 20,14	96,53± 11,63	79,31± 8,29	29,69± 6,51

Table 2

Descriptive statistics (mean ± standard deviation) of optimistic attributional style and self-efficacy indicators depending on factor categories

Indicators	10–13 лет / 10–13 years old		14–15 лет / 14–15 years old		16–18 лет / 16–18 years old	
	Offline learning	Online learning	Offline learning	Online learning	Offline learning	Online learning
Stability	59,55± 11,66	59,91± 11,23	58,97± 10,81	58,11± 10,15	59,79± 10,80	58,78± 10,71
Globality	63,50± 11,50	66,69± 12,30	63,70± 11,24	64,58± 11,84	67,74± 11,45	66,51± 11,51
Control	62,16± 19,43	67,52± 13,05	65,61± 15,72	68,86± 13,16	67,89± 15,83	68,06± 12,57
Overall optimism index	185,21± 28,82	194,13± 28,70	188,28± 25,27	191,55± 26,39	195,42± 26,96	193,34± 25,70
Success situation	68,45± 19,79	80,00± 14,13	75,55± 17,05	79,46± 15,06	79,40± 17,29	79,69± 13,39
Failure situation	116,76± 20,72	114,12± 21,19	112,74± 19,61	112,08± 20,48	116,02± 20,64	113,65± 19,18
Achievement domain	95,45± 14,39	97,68± 10,15	96,72± 12,56	98,79± 9,76	95,75± 11,80	97,99± 11,18
Межличностная сфера / Interpersonal domain	74,82± 8,32	78,86± 8,56	76,57± 8,52	78,56± 8,94	79,29± 8,53	79,35± 7,86
Самоэффективность / Self-efficacy	27,74± 8,14	28,78± 5,71	29,18± 6,69	29,86± 5,84	29,70± 6,86	29,67± 5,84

Table 3

Results of multivariate analysis of variance (MANOVA) assessing the impact of factors on optimistic attributional style and self-efficacy indicators

Effect	F	p	η2
Age	5,047	0,0001	0,023
Learning format	10,200	0,0001	0,046
Age * Learning format	3,193	0,0001	0,015

optimistic attributional style and self-efficacy, was partially supported. Significant differences were found for four attributional-style subscales, $\eta^2 = 0{,}046$, $p < 0{,}001$, whereas general self-efficacy did not vary as a function of learning format, $p = 0{,}119$. Thus, the part of the hypothesis concerning self-efficacy was not supported. One possible explanation is that self-efficacy may represent a relatively stable personal construct that is less sensitive to short-term influences of the educational environment. Another possible explanation involves self-selection: adolescents who choose online learning may differ from their peers in self-efficacy even before entering that learning format. These issues warrant further investigation. Hypothesis 2, which predicted an age-related increase in these indicators, was

supported, $\eta^2 = 0{,}023$, $p < 0{,}001$. Hypothesis 3, concerning the interaction between age and learning format, was also supported: the largest differences between learning formats were observed among older adolescents, $\eta^2 = 0{,}015$, $p < 0{,}001$.

Below, the effects of the predictors on the individual variables assessed by the instruments are considered.

The statistical analysis showed that Control varied as a function of age, $F(2, 1490) = 4{,}88$, $p < 0{,}01$, $\eta^2 < 0{,}01$, and learning format, $F(1, 1490) = 12{,}02$, $p < 0{,}001$, $\eta^2 < 0{,}01$. However, the interaction effect did not reach statistical significance, $F(2, 1490) = 2{,}74$, $p = 0{,}065$, $\eta^2 < 0{,}01$. Students in the online learning group had significantly higher Control scores than students in the offline group. Post hoc analyses showed that Control was higher among adolescents aged 16–18 than among those aged 10-13, $p = 0{,}013$. Thus, with age, adolescents increasingly perceive the events in their lives as being under their own control and subject to their influence. At the same time, this characteristic was more pronounced in the online learning group.

The Success Situation indicator varied as a function of age, $F(2, 1490) = 10{,}68$, $p < 0{,}001$, $\eta^2 = 0{,}014$, and learning format, $F(1, 1490) = 33{,}52$, $p < 0{,}001$, $\eta^2 = 0{,}022$. The interaction between age and learning format was also statistically significant, $F(2, 1490) = 12{,}57$, $p < 0{,}001$, $\eta^2 = 0{,}017$. Adolescents in the online learning group had higher scores on this indicator than those in the offline group. Post hoc analyses across the three age groups showed that Success Situation scores were lower among adolescents aged 10–13 than among those aged 16–18, $p < 0{,}001$, and 14–15, $p = 0{,}010$. Thus, students in the online learning group were more likely to interpret favorable life situations optimistically and to attribute success to their own efforts.

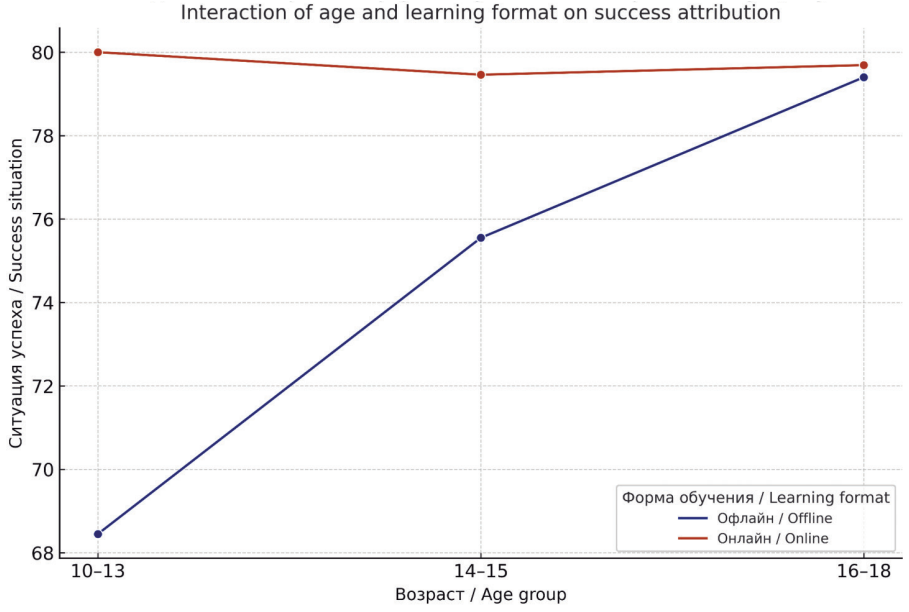

Fig. 1. Perception of achievement-success situations as a function of the Age × Learning-Format interaction

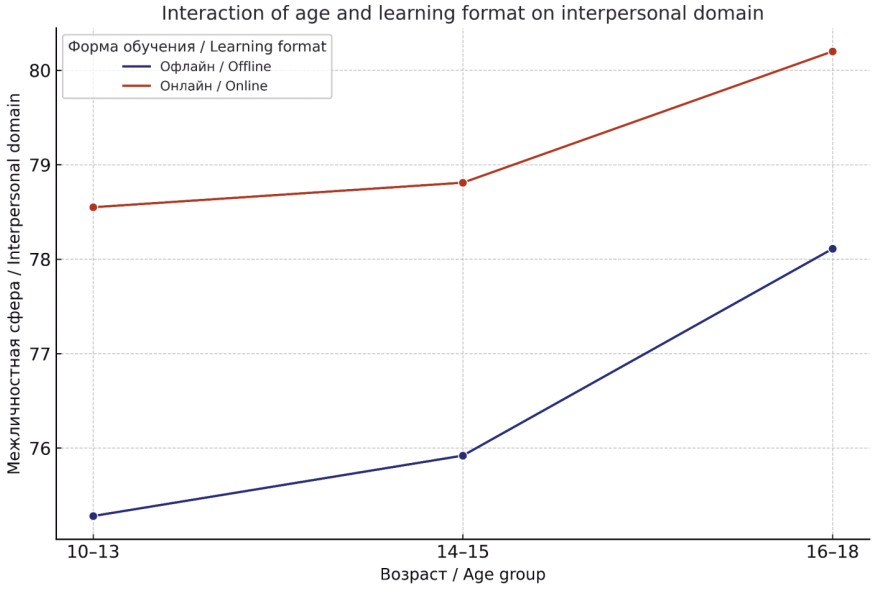

Fig. 2. Perception of interpersonal situations as a function of the Age × Learning-Format interaction

The Interpersonal Domain indicator varied significantly as a function of age, $F(2, 1490) = 8{,}36$, $p < 0{,}001$, $\eta^2 = 0{,}011$, and learning format, $F(1, 1490) = 18{,}89$, $p < 0{,}001$, $\eta^2 = 0{,}013$. The interaction between age and learning format was also statistically significant, $F(2, 1490) = 5{,}33$, $p < 0{,}01$, $\eta^2 < 0{,}01$. Adolescents in the online learning group had higher Interpersonal Domain scores than those in the offline group. In addition, this indicator was higher among adolescents aged 16–18 than among those aged 10–13, $p < 0{,}001$, and 14–15, $p < 0{,}01$. In other words, students in the online learning group were more likely to interpret interpersonal situations optimistically, viewing conflicts as temporary and manageable. This tendency also increased with age.

The overall optimism index varied as a function of learning format, $F(1, 1490) = 5{,}21$, $p < 0{,}05$, $\eta^2 < 0{,}01$, and age, $F(2, 1490) = 3{,}66$, $p < 0{,}05$, $\eta^2 < 0{,}01$. The interaction between age and learning format also reached statistical significance, $F(2, 1490) = 4{,}09$, $p < 0{,}05$, $\eta^2 < 0{,}01$. Adolescents in the online learning group had significantly higher overall optimism scores than those in the offline group. In addition, students aged 16–18 scored higher on this scale than participants aged 10–13, $p = 0{,}025$, and 14–15, $p = 0{,}015$. Thus, students in the online learning group were more likely to explain their behavior and life events in optimistic terms, viewing failures as temporary, accidental, and situation-specific, while perceiving positive events as more stable and attributing success to themselves. This tendency also became more pronounced with age.

The Failure Situation subscale varied as a function of age, $F(2, 1490) = 3{,}39$, $p < 0{,}05$, $\eta^2 < 0{,}01$, but not learning format, $F(1, 1490) = 2{,}85$, $p = 0{,}091$, $\eta^2 < 0{,}01$.

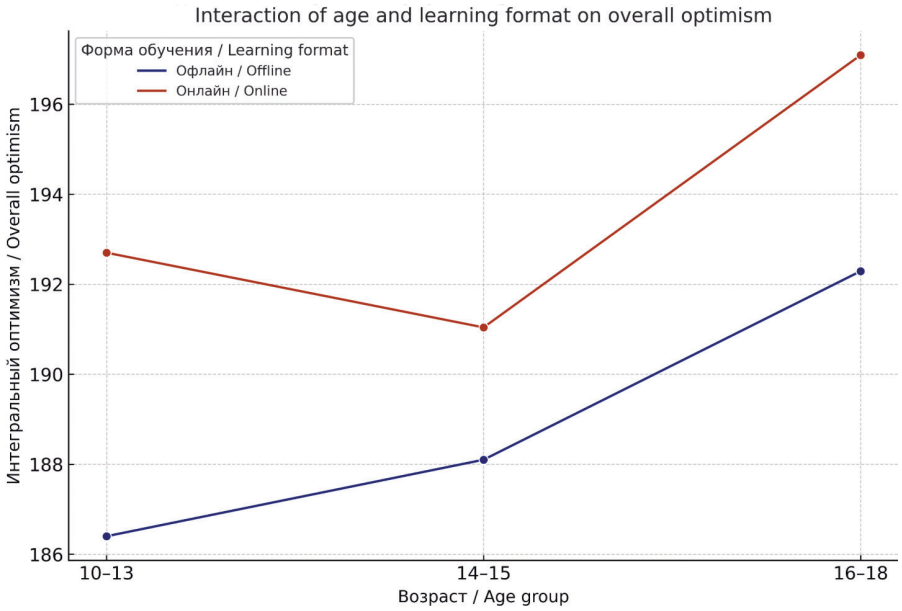

Fig. 3. Overall optimism as a function of the Age × Learning-Format interaction

No interaction effect was found, $F(2, 1490) = 0{,}37$, $p = 0{,}685$, $\eta^2 < 0{,}001$. However, post hoc analyses did not reveal statistically significant differences between the age groups.

Achievement Domain varied as a function of learning format, $F(1, 1490) = 11{,}25$, $p < 0{,}001$, $\eta^2 < 0{,}01$, but not age, $F(2, 1490) = 1{,}49$, $p = 0{,}225$, $\eta^2 < 0{,}01$. The interaction effect was also not statistically significant, $F(2, 1490) = 0{,}00$, $p = 0{,}992$, $\eta^2 < 0{,}001$. Thus, adolescents in the online learning group showed higher optimism in achievement-related situations than those in the offline group. In other words, students learning online were more likely to interpret achievement situations optimistically, viewing achievements as stable and attributable to their own efforts.

Globality varied as a function of age, $F(2, 1490) = 7{,}16$, $p < 0{,}001$, $\eta^2 < 0{,}01$, but not learning format, $F(1, 1490) = 2{,}22$, $p = 0{,}136$, $\eta^2 < 0{,}001$. At the same time, the interaction between the factors was statistically significant, $F(2, 1490) = 3{,}57$, $p < 0{,}05$, $\eta^2 < 0{,}01$. Students aged 16–18 showed higher values on this indicator than students aged 10–13, $p = 0{,}022$, and 14–15, $p < 0{,}001$. Thus, with age, adolescents appeared to develop more differentiated and situation-specific causal explanations.

The Stability subscale did not vary significantly as a function of age, $F(2, 1490) = 1{,}66$, $p = 0{,}189$, $\eta^2 < 0{,}01$, or learning format, $F(1, 1490) = 0{,}71$, $p = 0{,}399$, $\eta^2 < 0{,}001$. The interaction effect was also not statistically significant, $F(2, 1490) = 0{,}54$, $p = 0{,}583$, $\eta^2 < 0{,}001$.

Self-efficacy varied as a function of age, $F(2, 1490) = 6{,}26$, $p < 0{,}01$, $\eta^2 < 0{,}01$, but not learning format, $F(1, 1490) = 2{,}44$, $p = 0{,}119$, $\eta^2 < 0{,}01$. The interaction effect was not statistically significant, $F(2, 1490 = 0{,}63$, $p = 0{,}528$, $\eta^2 < 0{,}001$. Post

hoc analyses showed that self-efficacy was higher among students aged 16–18, p = 0,008, and 14–15, p = 0,011, than among adolescents aged 10,13. Thus, with age, students' beliefs in the effectiveness of their own actions increased, and they were more likely to expect success even under difficult or less favorable circumstances.

Discussion

The results of the study indicate that learning format and adolescents' age are associated with indicators of optimistic attributional style, whereas self-efficacy appears to be determined to a greater extent by age-related factors. As expected, adolescents studying online demonstrated higher levels of optimism with respect to Control, Success Situation, Achievement Domain, and Interpersonal Domain. These findings are consistent with previous studies showing that digital learning environments may foster autonomy and self-regulation (Zimmerman, Schunk, 2001; Sun, Rueda, 2012; Titova Grandchamp et al., 2021).

The observed increase in Control scores across the older age groups points to age-related changes in adolescents' subjective sense of causality and personal agency. This finding is consistent with Bandura's (1997) theory of self-efficacy, according to which beliefs about one's ability to influence events strengthen with maturation and accumulated experience. The difference by learning format is also noteworthy: adolescents studying online were more likely to associate success with their own efforts. This pattern may be related to the greater degree of independence required in online learning, which places stronger demands on self-regulation and initiative (Hodges et al., 2024).

The Success Situation indicator was sensitive to both age and learning format, with a pronounced interaction effect. This may suggest that, particularly in online learning, older adolescents are more likely to attribute success to internal and relatively stable causes, thereby supporting academic motivation (Weiner, 2010). These findings point to a potentially positive role of the digital environment in the interpretation of achievement-related experiences during later adolescence, when cognitive maturity is more advanced.

Similarly, higher scores on the Interpersonal Domain scale among older adolescents and among students in the online group may reflect the development of a more stable optimistic view of social interactions. This pattern may indicate compensatory mechanisms emerging under conditions of reduced face-to-face communication in digital environments (Bowers, Kumar, 2015), as well as the influence of educational support, particularly in the upper grades (Fomin, 2022).

The overall optimism index showed an upward trend both with age and in online learning conditions. This finding is consistent with the conceptualization of optimistic attributional style as a relatively stable cognitive construct that develops during adolescence and may be strengthened under conditions that support personal autonomy (Seligman, 1991; Titova Grandchamp et al., 2021). Although the interaction effect was modest, it was statistically significant, underscoring the complex nature of the association between learning format and adolescents' cognitive functioning.

Several scales did not show dependence on learning format, including Failure Situation, Stability, and self-efficacy. These findings require further interpretation. The absence of differences on Failure Situation may indicate that adolescents' perceptions of failure are less sensitive to external con-

ditions and are shaped to a greater extent by personal dispositions (Peterson, Steen, 2002). The Stability indicator also did not show statistically significant differences by age or learning format. This may suggest that perceptions of the stability of causes represent one of the more rigid components of attributional style and are therefore less sensitive to external changes in the educational environment. According to models of optimistic attributional style (Peterson, Steen, 2002), beliefs about the stability of causes may develop relatively early and be maintained by enduring personal attitudes. From this perspective, Stability may be viewed as a comparatively invariant cognitive characteristic that is less susceptible to short-term pedagogical conditions or age-related fluctuations during adolescence.

As expected, self-efficacy increased with age but did not vary as a function of learning format. This finding is consistent with previous evidence on developmental changes in confidence in one's own capabilities (Pajares, 2002; Schunk, DiBenedetto, 2020). It is possible that self-efficacy, as a generalized belief about one's competence, is less sensitive to short-term contextual influences than more situation-specific aspects of attribution. At the same time, the tendency toward higher mean scores in the online group may point to differences that warrant further investigation. The absence of significant differences in self-efficacy between online and offline students may reflect the relatively stable nature of this construct. Within Bandura's (1997) theory, beliefs about one's own capabilities are formed on the basis of accumulated experience rather than short-term situational influences. In addition, self-efficacy is often associated with individual characteristics such as conscientiousness, academic anxiety, and motivational orientation, none of which were controlled in the present study. A latent self-selection effect also cannot be ruled out: students with higher initial self-confidence may have been more likely to choose online learning, thereby reducing the sensitivity of this indicator to the educational environment. These assumptions should be examined in future longitudinal or quasi-experimental research.

Particular attention should be paid to the Globality scale, for which significant age differences and an interaction effect with learning format were found. The increase in this indicator among older adolescents may be associated with the development of a greater capacity for complex interpretations of causal relationships. At the same time, the difference between the online and offline groups may reflect specific features of information processing in digital environments, where students may be more inclined to generalize conclusions and rely on personally derived patterns of experience (Pozdnyak et al., 2021).

Overall, the findings suggest that optimistic attributional style is characterized both by situational sensitivity, reflected in the association with learning format, and by developmental change across adolescence. In contrast, self-efficacy appears to show a more stable age-related trajectory and less dependence on the educational environment. These results underscore the importance of adapting educational strategies to students' developmental characteristics and to the specific features of the learning format.

Conclusions

The aim of the study was to examine how learning format (online vs. offline) and age are related to adolescents' optimistic attributional style and self-efficacy. The

findings largely supported the proposed hypotheses and provided further insight into the psychological constructs under consideration.

First, adolescents studying online demonstrated a more pronounced optimistic attributional style on several subscales, including Control, Success Situation, Achievement Domain, and Interpersonal Domain. This finding points to the potential role of the digital educational environment in shaping more positive cognitive interpretations of academic and interpersonal experiences.

Second, age-related differences were observed for both attributional style and self-efficacy: adolescents in the older age group (16–18 years) showed higher scores on these indicators. This pattern is consistent with theoretical accounts of personal and cognitive development during adolescence.

Third, self-efficacy did not vary as a function of learning format, although it increased steadily with age. This finding suggests that self-efficacy may represent a more stable psychological construct that is less sensitive to external educational conditions than attributional style.

Overall, the present study extends current understanding of the psychological correlates of online learning and identifies age as an important predictor of personal characteristics in adolescence. These findings are relevant to educational psychology because they highlight the importance of age-sensitive and individualized support for students, particularly in digital learning environments.

The practical significance of the study lies in the potential application of these findings to the design of digital educational platforms aimed at promoting self-regulation, confidence, and more adaptive interpretations of success and failure.

Future research may benefit from longitudinal designs that would allow researchers to trace the developmental trajectories of attributional style and self-efficacy across different educational environments, as well as from comparative analyses of synchronous and asynchronous models of online learning.

Limitations. Despite the significance of the findings, several limitations should be acknowledged.

Self-report measures. The use of questionnaires may involve subjective bias: adolescents might over- or underestimate their characteristics.

Cross-sectional design. As a one-time assessment, the study does not capture developmental dynamics. Longitudinal studies are recommended.

Instructional variability. Although all students followed the same federal curriculum, variations in teaching methods, resources, and teacher qualifications were not controlled.

Self-selection bias. Enrollment in online learning is voluntary and may reflect pre-existing differences (e.g., autonomy, digital competence, anxiety), affecting cognitive-motivational outcomes. Future research should apply longitudinal designs or statistical controls (e.g., ANCOVA, structural modeling).

Learning duration. The length of time spent in online or offline formats was not recorded, though it may impact the studied variables.

Geographic diversity. Offline schools were located in the Moscow Region, whereas online students lived in various Russian regions and abroad. Regional sociocultural and economic factors were not accounted.

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Validation and adaptation of the Child and Youth Resilience Measure among sample of Russian youth

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Abstract

Context and relevance. Resilience is the foundation of positive human adaptation. The relevance of the study is determined by the need to study the factors influencing the development of resilience. For these purposes, a quantitative instrument for assessing the resilience of children and youth was developed. This instrument is one of the few that have undergone cross-cultural validation in more than two dozen countries and, accordingly, languages. The test is based on the ecological model of development by U. Bronfenbrenner. **Hypothesis**. Adaptation and validation of the Child and Youth Resilience Measure (CYRM-28) (Ungar, Liebenberg, 2011) will provide a reliable instrument for measuring resilience characteristics in Russian children and youth. **Objective**. This study focuses on validation and adaptation of the Russian version of the CYRM-28 on a sample of Russian youth. **Methods and materials**. The study involved young people aged 13 to 21 years (n = 1707; mean = 18,62 years, standard deviation = 2,05). Among them, there were 834 boys (mean = 18,31 years, standard deviation = 2,04) and 873 girls (mean = 18,90 years, standard deviation = 2,02). In the process of adaptation and validation of the CYRM on the Russian sample, the following was performed: linguistic adaptation of the test; the procedure for checking test-retest reliability and comparison of two versions (Russian and English); checking the convergent validity of the test by analyzing the correlations between the CYRM scales and the Social and Psychological Adjustment Scale of C. Rogers, R. Diamond (Tolstykh, Prikhozhan, 2017). **Results**. The Children and Youth Resilience Measure has been shown to have structural (three-factor, as in the original version) and convergent validity, confirmed by a positive correlation with socio-psychological adaptation, positive self-esteem, internal locus of control, and emotional regulation. The results of test validation support the use of the Russian version of the CYRM in research and practice as a reliable diagnostic measure. **Conclusions**. The Russian version of the CYRM, adapted to a cohort sample, has demonstrated good psychometric results and can be recommended for assessing resilience in adolescence and young adulthood (13-21 years).

Keywords: resilience, children, youth, validation, CYRM, reliability, psychometric testing, factorial validity of the test

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Валидизация и адаптация теста «Жизнеспособность детей и молодежи» на выборке российской молодежи

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Резюме

Контекст и актуальность. Жизнеспособность лежит в основе позитивной адаптации человека. Актуальность исследования определяется необходимостью изучения факторов, влияющих на развитие жизнеспособности. Для этих целей был разработан количественный инструмент для оценки жизнеспособности детей и молодежи, который является одним из немногих, прошедших кросс-культурную валидизацию более чем в двух десятках стран. В основу теста положена экологическая модель развития Ю. Бронфенбреннера. **Цель**. Валидизация и адаптация русской версии теста CYRM-28: «Жизнеспособность детей и молодежи» (ЖДМ) на выборке российской молодежи. **Гипотеза**. Адаптация и валидизация теста «Жизнеспособность детей и молодежи» (Child and Youth Resilience Measure, CYRM-28) (Ungar, Liebenberg, 2011) позволит получить надежный инструментарий, измеряющий характеристики жизнеспособности у российских детей и молодежи. **Методы и материалы**. В исследовании приняли участие молодые люди в возрасте от 13 до 21 года (n = 1707; среднее — 18,62 лет, ст. откл. — 2,05). Среди них 834 юноши (среднее — 18,31 лет, ст. откл. — 2,04) и 873 девушки (среднее — 18,90 лет, ст. откл. — 2,02). В ходе адаптации и валидизации теста ЖДМ на российской выборке были выполнены: лингвистическая адаптация теста; процедура проверки тест-ретестовой надежности и сравнение двух версий (русской и английской); проверка конвергентной валидности теста путем анализа корреляционных связей между шкалами теста и Шкалой социально-психологической приспособленности К. Роджерса, Р. Даймонд (Толстых, Прихожан, 2017). **Результаты**. Показано, что тест «Жизнеспособность детей и молодежи» имеет структурную (трехфакторную, как и в оригинальной версии) и конвергентную валидность, подтвержденную положительной связью с социально-психологической адаптацией, положительной самооценкой, внутренним локусом контроля и уровнем эмоциональной регуляции. Результаты валидизации теста позволяют использовать в исследованиях и практике русскую версию теста CYRM как надежную психодиагностическую методику. **Выводы**. Русскоязычная версия теста CYRM («Жизнеспособность детей и молодежи»), адаптированная на когортной выборке, имеет хорошие психометрические результаты и может быть рекомендована для диагностики жизнеспособности в подростковом и юношеском возрасте (13–21 год).

***Ключевые слова*:** жизнеспособность, дети, молодежь, валидизация, CYRM, надежность, психометрическая проверка, факторная валидность теста

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Introduction

To date, there is no single definition of the concept of "human resilience" that is universally accepted by all researchers of this phenomenon. Most often, the term is associated with a person's ability to overcome adversity and continue their normal development. Resilience is a multidimensional theoretical construct, according to which individuals, facing the adverse impact of complex sociocultural factors that threaten their well-being, acquire experience in coping with them. Consequently, while conceptualizing the concept of "human resilience," researchers have begun to turn to the study of psychological, socio-psychological, and sociocultural resources that form an individual's resilience and strengthen their overall psychological well-being. Traditionally, the following factors of human resilience are identified: individual characteristics (Laktionova, 2025; Handbook of Resilience in Children, 2023); support from family and friends (Nikitina, 2023; Odintsova et al., 2023; Kharlamenkova et al., 2024; Eagle, Sheridan, 2023); context and culture (Baeva et al., 2023; Odintsova et al., 2023; Postylyakova, 2024; Nagpal, Radliff, 2024; Renbarger et al., 2020; Smrke et al., 2025; Ungar et al., 2008). It has been shown that an individual's immersion in the broad cultural context of their people is a protective factor and strengthens their resilience (Makhnach et al., 2024; Collado-Soler et al., 2023). Many researchers also consider religious beliefs and practices to be resilience factors that help people reframe difficult situations (Makhnach et al., 2024). For instance, a study by I.A. Baeva and colleagues showed that "the ability to use social resources, seek support and reinforcement in cultural works, religious practices, existing folk and cultural traditions contributes to the psychological adaptation of students" (Baeva et al., 2023, p. 14).

In line with this understanding of resilience, a group of experts developed the "Child and Youth Resilience Measure" (CYRM-28), which is based on U. Bronfenbrenner's ecological model of development (Bronfenbrenner, 1979). According to this model, a person is viewed as an open system influenced by surrounding systems (family, society, school, work, etc.). The measure includes three scales: "Individual Characteristics" — assesses an individual's resilience resources; "Family Support" — the respondent's perception of physical and psychological family support; "Context" — social resources of an individual's resilience. The sum of the scores on these three scales constitutes the measure's integral indicator — "Total Resilience Score".

Adaptation and validation of the Child and Youth Resilience Measure worldwide

The creation and validation of the Child and Youth Resilience Measure has

a 20-year history. The first version of the measure was developed between 2002 and 2005 by a group of scientists from 14 research institutions across 11 countries on 5 continents, who united to study the phenomenology of resilience and develop a measure assessing culturally determined factors of positive development in children and youth facing adversity. During the work on the international project "Methodological and Contextual Challenges in Child and Adolescent Resilience Research: An International Collaboration to Develop a Measure of Health among At-Risk Children and Adolescents" (Ungar et al., 2008), the first version of the CYRM, consisting of 58 items, was created. Psychometric testing showed that it provides a reliable measurement of individual and socio-personal characteristics determining the resilience of children and youth living in different social and cultural contexts, attributed to both Western and non-Western cultures (Ungar et al., 2008).

Russia was represented in the project to develop the CYRM by the authors of this article. After the creation of the English version of the measure, its cross-cultural adaptation began. For this purpose, we engaged five experts — specialists in developmental and social psychology. In selecting the experts, we followed the requirements of the International Test Commission (2017).

At the initial stage of validation, the experts analyzed and discussed the measure's items. Based on their comments, changes were made to the final version of the measure. After several years of using the measure, the content of some items was reviewed and the measure was shortened to 28 items (Liebenberg et al., 2012), with its validity tested on several national samples. Furthermore, the resulting three-factor model demonstrates statistically significant differences ($p < 0,001$) between comparison groups (Ungar et al., 2008). Consequently, a quantitative tool for assessing child and youth resilience was developed, which is one of the few that has undergone cross-cultural validation (Renbarger et al., 2020; Wood et al., 2020).

Over the years, adaptation and validation of this measure have been conducted in many countries. The main conclusion regarding the use of the CYRM to study the resilience of children and youth living in different countries and socio-economic conditions is as follows: the reliability and validity of the three-factor structure of the original scale are confirmed on respondent samples from Canada (Liebenberg et al., 2012), Nicaragua (Stumpf, Chang, 2021), Peru (Bullock et al., 2021), India (Singh et al., 2022), Iran (Aghebati et al., 2023), and Spain (Artuch-Garde et al., 2022).

However, some studies on national samples have noted differences in the obtained factor structures from the original. For example, a psychometric study of the CYRM-28 in New Zealand showed that a four-factor model explains the empirical data better than the original three-factor model (Sanders et al., 2017). The original factor structure was also not fully replicated on Australian (Langham et al., 2018) and Spanish data (Llistosella et al., 2019). Several studies have reported differences in the number of items within a three-factor solution. For instance, in the Iranian version of the measure, despite its confirmed three-factor structure, only 11 items were informative, and the rest were excluded (Kazerooni Zand et al., 2017); a 24-item measure better fit the resilience structure of South African youth (Govender et al., 2017). Another Spanish study, using confirmatory factor analysis (CFA), also confirmed the three factors of

the original CYRM-28, with high reliability values for the scales: “Family Support” — 0,79, “Context” — 0,72, “Individual Characteristics” — 0,78. However, 4 items were excluded from the original measure, 5 items with very low factor loadings were reworded, and 6 items were added, resulting in a 32-item scale (Llistosella et al., 2019). A systematic review of CYRM psychometric studies and multilevel confirmatory factor analysis of data (n = 6232) from 6 countries (Ghana, Costa Rica, Russia, USA, Czech Republic, South Africa) showed significant variability in the contextual applicability of the CYRM, indicating difficulties in comparing resilience among children and adolescents living in different conditions. Normative data for the measure’s scales, depending on age and gender of adolescents, were also obtained from the cohort sample (Renbarger et al., 2020).

Thus, the validation of the CYRM-28 conducted in several countries shows that the identified differences in the structure and number of items require further research. Despite ongoing work on validating the measure on national samples, it remains the most frequently used tool in cross-cultural studies of child and youth resilience.

Organization and methods of the study

In Russia, the use of the Child and Youth Resilience Measure (CYRM) began for research purposes in our works (Laktionova, Makhnach, 2007), as well as in the works of other authors (Guseva, 2018; Rylskaya, 2008).

Procedure. During the adaptation and validation of the CYRM on the Russian sample, adhering to the standard procedure of forward and backward translation, the following sequence of actions was implemented.

1. Linguistic adaptation of the measure. This stage involved translating and adjusting the vocabulary and grammar of the measure to the age and educational characteristics of the sample, considering the connotative meaning of linguistic units and categories. Therefore, the sociocultural features of the Russian language were considered, and equivalents for concepts and definitions accepted in Russian culture were sought. Translation and linguistic adaptation were carried out by university English language instructors and professional translators proficient in English. They were asked to answer the measure’s questions in English — one month after completing the Russian version of the measure. During testing, respondents in this group were asked to mark items in the Russian version that were inaccurate or did not align well with our sociocultural reality. After comparing expert assessments of the correspondence of the Russian translation to the original, we made changes to the Russian translation of the measure.

2. The test-retest reliability procedure and comparison of the two versions (Russian and English) were conducted based on the testing results of a sample of 24 individuals. Re-testing using the measure was carried out five months after the first test.

3. Convergent validity of the measure was assessed based on data from a sample of 232 individuals. They were asked to answer the measure’s questions and then complete the Social-Psychological Adjustment Scale by C. Rogers and R. Diamond (adapted by T.V. Snegireva, version by A.M. Prikhozhan) (Tolstykh, Prikhozhan, 2017).

4. Verification or re-standardization of test norms. In accordance with test reliability requirements, the following were calculated: arithmetic mean, standard deviation, skewness, and kurtosis; normality

of distribution was checked; the stability of the obtained distribution of test scores to sample splitting was checked. The obtained evidence of data distribution stability serves as proof of the representativeness of the test norms.

Analytical strategy. Structural (factorial) validity of the measure was tested using confirmatory factor analysis (CFA). Given that responses to questions were provided using an ordinal scale (Likert), a CFA method designed for ordinal scales and applicable to non-parametric data distribution was used. The diagonally weighted least squares (DWLS) method, which accounts for this data characteristic, was used, applying adjusted estimates of standard errors and fit indices. Model fit was assessed using the following coefficients and criteria: Root Mean Square Error of Approximation (RMSEA — model is considered good if RMSEA < 0,080), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI — values > 0,900 are considered good) (Hu, Bentler, 1999). Scale reliability was assessed using Cronbach's α coefficient, with values corresponding to good internal consistency indicators.

Comparison of scale scores between men and women was performed using Student's t-test with Welch's correction for unequal variances. The correlation of scale scores with age was assessed using Pearson's correlation coefficient.

Test-retest reliability and comparison of the two versions (Russian and English) of the measure were conducted considering small sample sizes using nonparametric statistics — Spearman's rank correlation coefficient.

Statistical analysis was performed in RStudio (version 2024.09.0) using functions from the `psych` package (version 2.4.6.26) (Revelle, 2024); `R package` (version 2.4.12), `tidyverse` (version 2.0.0) (Wickham et al., 2019); `lavaan` (version 0.6.19) (Rosseel, 2019), as well as functions from the R standard library (version 4.3.3).

Participants. The total sample consisted of young people (n = 1707) aged 13–21 years (mean age — 18,62 years, SD — 2,05). Among them were 834 males (mean — 18,31 years, SD — 2,04) and 873 females (mean — 18,90 years, SD — 2,02). During the test-retest reliability procedure, the group consisted of 24 individuals (mean — 20,25 years, SD — 1,59).

Results

To assess the reliability (internal consistency) of the scales on the empirical sample, Cronbach's α coefficient was calculated. The results are presented in Table 1 (Sample 1). This table also presents the test's reliability data according to Cronbach's α coefficient for samples from South Africa (Govender et al., 2017), Canada (Daigneault et al., 2013), Spain (Llistosella et al., 2019), and Iran (Kazerooni Zand et al., 2017).

Table 1

Values of the reliability coefficients of the α-Cronbach's alpha of the CYRM scales in the samples: 1. Russian sample (n = 1707); 2. Govender et al., 2017 (n = 1854, South Africa); 3. Daigneault et al., 2017 (n = 589, Canada); 4. Llistosella et al., 2019 (n = 432, Spain); 5. Kazerooni Zand et al., 2017 (n = 353, Iran)

Scales	1 sample	2 sample	3 sample	4 sample	5 sample
Individual characteristics	0,837	0,82	0,84	0,78	0,82
Family support	0,847	0,71	0,78	0,79	0,70
Context	0,745	0,70	0,64	0,72	0,72

Comparing the Cronbach's α reliability coefficients across the samples in Table 1, we note that the question of what constitutes an acceptable level of reliability-consistency remains unresolved. Currently, the most common convention is that internal consistency from 0,5 to 0,6 is considered poor, from 0,6 to 0,7 is questionable, from 0,7 to 0,8 is acceptable, and above 0,8 is good reliability. Thus, the "Individual Characteristics" and "Family Support" scales prove to be quite reliable, while the reliability of the "Context" scale is somewhat reduced but still quite good. The reliability coefficient of the latter scale in other samples mentioned in the table is also reduced, yet it still demonstrates sufficient consistency of scale items: between 0,7 and 0,8.

When comparing the scale scores of the CYRM across gender groups in the total sample (n = 1707), no statistically significant differences were found (see Table 2).

The correlations between age and the scores on the test scales are low, but they are significant for the "Family Support" and "Context" scales, which can be explained by the large sample size (see Table 3).

To assess the structural validity of the measure, a confirmatory factor analysis (CFA) was conducted. The model specified three factors, corresponding to the three scales, which loaded onto the respective items. The model also included possible correlations between factors. The DWLS estimation method was used; the model fit indices were quite good, although a somewhat high RMSEA coefficient can be noted: $\chi^2(342) = 4076$, RMSEA = 0,080, CFI = 0,967, TLI = 0,963, which are entirely acceptable estimates for the model. The factor structure is depicted in Figure 1.

Given the obtained RMSEA value, additional error covariances were included in the model for the following item pairs: 10–28; 22–9; 26-27; 5-6; 14–18. These items, belonging to different scales — for example, No. 26 ("I like my family's cultural and family traditions," Family Support scale) and No. 27 ("I like my community's traditions," Context scale) — may be similar in form but differ in content. Conversely, items No. 5 ("My family cares for me throughout my life") and No. 6 ("My family knows almost everything about me") belong to the same scale (Family Support)

Table 2

Values of the indicators for the CYRM scales in groups: boys (n = 834) and girls (n = 873); m ± SD

Scale	Boys	Girls	Comparison results (t-test)
Individual characteristics	4,054 (0,615)	4,042 (0,609)	t(1699) = 0,407, p = 0,684
Family support	3,908 (0,812)	3,874 (0,846)	t(1704,9) = 0,843, p = 0,399
Context	3,529 (0,641)	3,521 (0,622)	t(1695,5) = 0,248, p = 0,804

Table 3

Correlations between the indicator "age" and the CYRM scales

Scales	r	p
Individual characteristics	–0,007	0,758
Family support	0,067	0,006
Context	–0,079	0,001

but have different content. This correlation of items beyond the factors was done because they are linked both by a common theme and by similarity in wording. The factor structure of the resulting model is shown in the figure.

The correlations between the factors in the model are quite high: “Individual Characteristics” — “Family Support”: r = 0,673, “Individual Characteristics” — “Context”: r = 0,963, “Family Support” — “Context”: r = 0,785. This indicates that the scales may be poorly differentiated; however, the aim of the study was to demonstrate the possibility of retaining the original structure of the questionnaire, which is why the three-factor

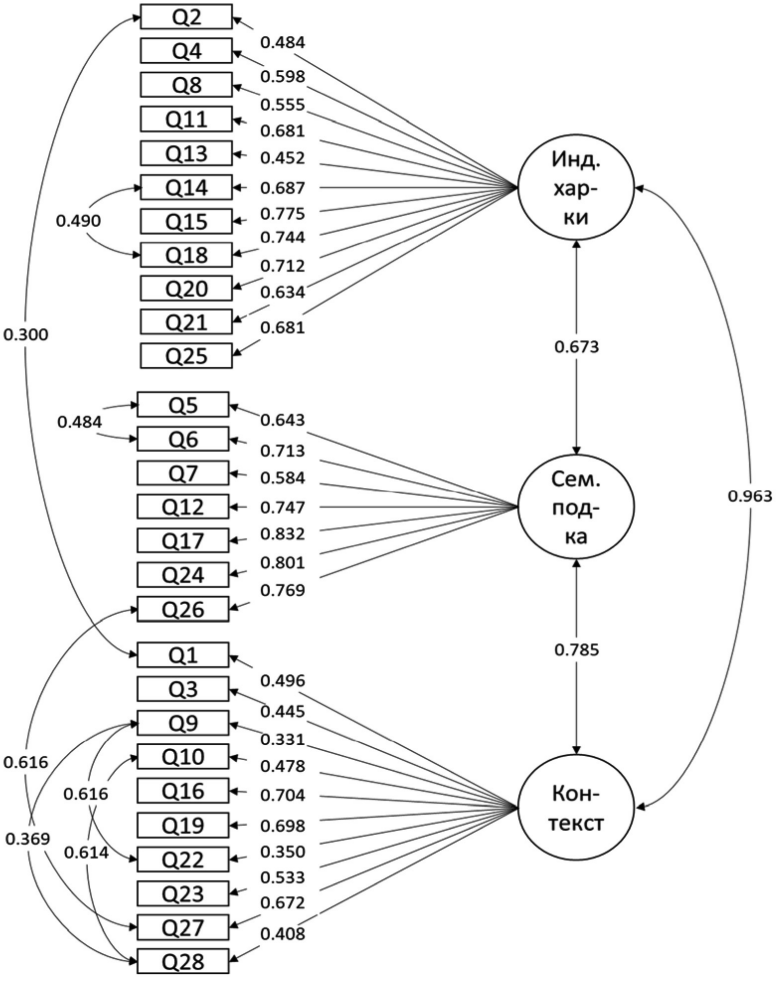

Fig. Factor model of the test. Standardized factor loadings and correlations are shown, all coefficients are significant at the p < 0,001

model was tested and proved to be consistent with the original. The two-factor model is not published in the article but showed nearly identical fit indices: $\chi^2(342) = 3882$, RMSEA = 0,078, CFI = 0,969, TLI = 0,965. Based on the results, both models fit the data approximately equally well. The three-factor model was chosen, first, because it aligns with the original structure of the measure, and second, because the empirical correlations between the scales are not as high as those in the model (Table 4), a point also noted by Dutch researchers (Jonkman et al., 2022).

The error correlations added to the model improved it and were as follows: for item pair 10-28, the coefficient was 0,614; for 9-22 — 0,616; for 26-27 — 0,616; for 5–6 — 0,484; for 14–18 — 0,49; for 9–28 — 0,369; for 2–1 — 0,300.

Comparison of the two language versions of the test

To assess the consistency between the Russian and English versions of the test, the results of 24 respondents were used, each of whom completed both the Russian and English versions of the test.

The analysis showed fairly high consistency of total scores across all scales. For the “Individual Characteristics” scale, the correlation coefficient was r = 0,777; for the “Family Support” scale — r = 0,869; for the “Context” scale — r = 0,845; and for the “Total scale” — r = 0,781 (in all cases, correlations were significant at $p < 0,001$).

Test-retest reliability

To check the test-retest reliability of the CYRM, the results of the test completed by respondents with a five-month interval were compared. Twenty-four individuals participated in this part of the study. Given the small sample size, the consistency of results across the test scales was assessed using the nonparametric Spearman’s rank correlation coefficient.

The analysis showed fairly high consistency of total scores across all scales in the two measurements: “Individual Characteristics” (r = 0,789; p = 0,011), “Family Support” (r = 0,848; p = 0,004), “Context” (r = 0,950; $p < 0,001$), and “Total scale” (r = 0,883; p = 0,002). Thus, the test demonstrated high test-retest reliability (Spearman’s r ranging from 0,789 to 0,950).

Convergent validity

The convergent validity of the CYRM was tested by analyzing the correlations between the test scales and scales from other tests validated on Russian samples that assess ontologically related concepts. In particular, indicators measuring resilience are positively associated with several indicators of the Social-Psychological Adjustment Scale by C. Rogers and R. Diamond (Tolstykh, Prikhozhan, 2017). Given

Table 4

Values of the indicators for the scales of the CYRM; Pearson correlation coefficient (n = 1707)

Scale	Individual characteristics	Family support	Context
Individual characteristics			
Family support	0,57		
Context	0,67	0,58	

Note. All coefficients are significant at the $p < 0,001$.

the nonparametric distribution of the scales, Spearman's rank correlation coefficient was used in the analysis (see Table 5).

Given the fairly large sample size (n = 232), it is worth noting not only the high significance of the correlations but also the absolute values of the correlation coefficients. Thus, we see strong correlations between all resilience indicators and the "Social-Psychological Adjustment Coefficient". Strong correlations are also observed between the "Individual Resilience" indicator and "Self-Acceptance" (0,632), "Emotional Comfort" (0,622); between the "Total Resilience" indicator and "Self-Acceptance" (0,665), "Internal Locus of Control" (0,61), "Emotional Comfort" (0,665). This aligns with a number of studies showing that positive self-esteem, internal locus of control, and a level of emotional regulation that reduces emotional tension are protective factors of human resilience associated with social adaptation (Laktionova, 2025; Collado-Soler et al., 2023; Handbook of Resilience in Children, 2023).

Conclusions

The Russian-language version of the CYRM ("Child and Youth Resilience Measure"), adapted on a cohort sample, has good psychometric properties and can be recommended for assessing resilience in adolescence and young adulthood (ages 13–21). Future research perspectives include continuing psychometric procedures, working on a shortened version of the measure (CYRM-12), as well as studying the resilience of adolescents and young people in different regions of Russia belonging to different social groups.

Table 5

Correlations between the scales of the CYRM (1) and the "Social-Psychological Adjustment Scale" by C. Rogers, R. Diamond (2)

1 / 2	IR	FR	CR	GR
CoefSPA	0,745**	0,677**	0,668**	0,780**
CoefSPM	–0,590**	–0,537**	–0,504**	–0,611**
SA	0,632**	0,586**	0,577**	0,665**
SR	–0,544**	–0,500**	–0,485**	–0,569**
AO	0,525**	0,422**	0,490**	0,549**
CwO	–0,371**	–0,299**	–0,334**	–0,383**
ILC	0,598**	0,529**	0,513**	0,612**
ELC	–0,442**	–0,385**	–0,345**	–0,441**
EC	0,622**	0,568**	0,575**	0,665**
ED	–0,520**	–0,463**	–0,458**	–0,535**
Dom	0,427**	0,442**	0,363**	0,457**
Dep	–0,279**	–0,335**	–0,236**	–0,309**
APS	–0,369**	–0,305**	–0,283**	–0,362**

Note: ** — Correlations are significant at the p < 0,001. Scales legend: CoefSPA — Coefficient of Social and Psychological Adaptation; CoefSPM — Coefficient of Social and Psychological Maladaptation; SA — Self-Acceptance; SR — Self-Rejection; AO — Acceptance of Others; CwO — Conflict with Others; IntrLC — Internal Locus of Control; ExtrLC — External Locus of Control; EC — Emotional Comfort; ED — Emotional Discomfort; D — Dominance; D — Dependence; APS — Aversion to Problem Solving; IR — Individual Resilience; FR — Family Resilience; CR– Contextual Resilience; GR — General Resilience.

The CYRM adapted for the Russian sample will help Russian researchers compare their results with data obtained in other cultures. Given that we live in a multicultural and multilingual society, test adaptation and cross-cultural comparisons of data obtained using these tests represent a relevant scientific task.

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Appendix

Тест «Жизнеспособность детей и молодежи»

Инструкция: ниже перечислены вопросы о Вас, Ваших семье, окружении и о Ваших отношениях с людьми.

Пожалуйста, оцените их по 5-балльной шкале от 1 («Совсем нет») до 5 («В очень большой степени») и отметьте ту **цифру справа, которая наиболее точно отражает ваше мнение:**

1 — Совсем нет
2 — Немного
3 — В некоторой степени
4 — В значительной степени
5 — В очень большой степени

	В какой мере…	**1**	**2**	**3**	**4**	**5**
1	Есть люди, которых я уважаю	1	2	3	4	5
2	Я сотрудничаю с окружающими	1	2	3	4	5
3	Мне важно получить образование	1	2	3	4	5
4	Я знаю, как вести себя в различных ситуациях	1	2	3	4	5
5	Мои(й) родители(ь) следят за каждым моим шагом	1	2	3	4	5
6	Мои(й) родитель(и) много знают обо мне	1	2	3	4	5
7	Если я голоден, мне обычно удается есть досыта	1	2	3	4	5
8	Я стремлюсь закончить дело, которое начал	1	2	3	4	5
9	Религиозные верования или духовность являются источниками силы для меня	1	2	3	4	5
10	Я горжусь моим национальным происхождением	1	2	3	4	5
11	Люди считают, что со мной интересно	1	2	3	4	5
12	Я разговариваю о своих чувствах с членами моей семьи	1	2	3	4	5
13	Я способен решать свои проблемы без нанесения вреда себе или другим (например, используя алкоголь, наркотики и/или насилие)	1	2	3	4	5
14	Я чувствую, что друзья меня поддерживают	1	2	3	4	5
15	Я знаю, куда могу обратиться в своем окружении, чтобы получить помощь	1	2	3	4	5
16	Я чувствую себя «своим» в школе/университете	1	2	3	4	5
17	Моя семья поддерживает меня в трудных ситуациях	1	2	3	4	5
18	Мои друзья поддерживают меня в трудных ситуациях	1	2	3	4	5
19	Со мной обращаются справедливо в моем окружении	1	2	3	4	5
20	У меня есть возможности показать другим, что я становлюсь взрослым	1	2	3	4	5
21	Я знаю свои сильные стороны	1	2	3	4	5
22	Я участвую в организованной религиозной жизни	1	2	3	4	5
23	Я считаю, что важно поддерживать близких мне по духу людей	1	2	3	4	5
24	Я чувствую себя в безопасности в своей семье	1	2	3	4	5
25	У меня есть возможности освоить навыки, которые пригодятся мне в жизни (навыки работать или заботиться о других)	1	2	3	4	5
26	Мне нравятся культурные и семейные традиции моей семьи	1	2	3	4	5
27	Мне нравятся традиции моего окружения	1	2	3	4	5
28	Я горжусь тем, что я — россиянин	1	2	3	4	5

Ключи и обработка данных (номера вопросов)

1. Шкала «Индивидуальные характеристики»

Субшкала: «Индивидуальные навыки»: 2, 8, 11, 13, 21

Субшкала: «Индивидуальная поддержка (друзья)»: 14, 18

Субшкала: «Индивидуально-социальные навыки»: 4, 15, 20, 25

2. Шкала «Семейная поддержка»

Субшкала: «Физическая забота»: 5, 7

Субшкала: «Психологическая забота»: 6, 12, 17, 24, 26

3. Шкала «Контекст»

Субшкала: «Духовность»: 9, 22, 23

Субшкала: «Образование»; 3, 16

Субшкала: «Культура»: 1, 10, 19, 27, 28

Обработка данных. Для получения показателя по шкале необходимо сложить баллы по каждой субшкале отдельно. Затем сложить сумму баллов по субшкалам в общий показатель шкалы.

Перевод сырых баллов в стены

1. Шкала «Индивидуальные характеристики»: Сумма баллов ответов на все вопросы делится на 11 (количество вопросов в шкале).

2. Шкала «Семейная поддержка»: Сумма баллов ответов на все вопросы делится на 7 (количество вопросов в шкале).

3. Шкала «Контекст»: Сумма баллов ответов на все вопросы делится на 10 (количество вопросов в шкале).

Шкала «Общая жизнеспособность: Сумма баллов по ответам на все вопросы теста по трем шкалам делится на 28.

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Alexander V. Makhnach — research ideas; annotation, writing and design of the manuscript; research planning; research supervision.

Anna I. Laktionova — conducting the empirical research; data collection and analysis; writing and design of the manuscript, visualization of the research results. All authors took part in the discussion of the results and agreed on the final text of the manuscript.

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Conflict of interest

The authors declare no conflict of interest.

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Unlocking flourishing through future orientation: the connection with meaning in life among Chinese undergraduates

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Abstract

Context and relevance. Flourishing, which integrates both hedonic and eudaimonic well-being, signifies an individual's ability to function effectively and experience life satisfaction. The mechanism of promoting flourishing is the key to improving the overall well-being of an individual. While existing research acknowledges the association between meaning in life, future orientation, and flourishing, the interactions among these three variables remain largely unexplored. **Objective.** This study addresses this gap by investigating the direct and indirect effects of meaning in life and future orientation on the flourishing of undergraduates in China. **Hypothesis.** It was hypothesized that: (1) meaning in life and future orientation positively and significantly predict flourishing; (2) meaning in life positively and significantly predicts future orientation; and (3) future orientation significantly mediates the relationship between meaning in life and flourishing. **Methods and materials.** This was a cross-sectional study employing a quantitative correlational research design. Multistage cluster sampling and convenience sampling were used to collect data through questionnaires. **Results.** The findings revealed compelling insights into 445 students from six public universities across China. Both future orientation and meaning in life significantly predicted flourishing ($B = 0,19$, $SE = 0,06$, $p < 0,01$; $B = 0,68$, $SE = 0,06$, $p < 0,001$). Crucially, future orientation was not only positively influenced by meaning in life ($B = 0,68$, $SE = 0,03$, $p < 0,001$) but also significantly mediated the relationship between meaning in life and flourishing, although to a lesser extent ($B = 0,13$, $SE = 0,05$, 95% CI [0,0377; 0,2217]). **Conclusion.** The results suggest that future orientation amplifies undergraduates' flourishing by enriching their sense of meaning in life. This study underscores the necessity of integrating future goal setting with the cultivation of meaning in life in interventions aimed at student well-being within the Chinese cultural context.

Keywords: positive psychology, meaning in life, future orientation, flourishing, mediation, bootstrapping

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Достижение жизненного успеха через ориентацию на будущее: связь с осмысленностью жизни у китайских студентов

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Резюме

Контекст и актуальность. Жизненный успех, который включает в себя как гедоническое, так и эудоническое благополучие, означает способность человека эффективно функционировать и испытывать удовлетворение от жизни. Механизм к достижению жизненного успеха является ключом к улучшению общего уровня благополучия человека. Хотя существующие исследования признают связь между смыслом жизни, ориентированностью на будущее и благополучием, взаимосвязи между этими тремя переменными остаются в значительной степени недостаточно изученными. **Цель.** Данное исследование устраняет обозначенный пробел, изучая прямое и косвенное влияние смысла жизни и ориентации на будущее на жизненный успех китайских студентов бакалавриата. **Гипотеза.** Были выдвинуты гипотезы: (1) смысл жизни и ориентация на будущее положительно и существенно предсказывают жизненный успех; (2) смысл жизни положительно и существенно предсказывает ориентацию на будущее; (3) ориентация на будущее существенно опосредует связь между смыслом жизни и жизненным успехом. **Методы и материалы.** В нашем поперечном исследовании был использован корреляционный дизайн. Для сбора данных использовались многомасштабная кластерная выборка и выборка с помощью анкет. **Результаты.** Результаты привели к убедительным выводам относительно 445 студентов из шести государственных университетов на всей территории Китая. Как ориентация на будущее, так и смысл жизни значительно влияли на жизненный успех ($B = 0,19$, $SE = 0,06$, $p < 0,01$; $B = 0,68$, $SE = 0,06$, $p < 0,001$). Важно отметить, что ориентация на будущее не только положительно повышалась благодаря влиянию смысла жизни ($B = 0,68$, $SE = 0,03$, $p < 0,001$), но и значительно опосредовала связь между смыслом жизни и жизненным успехом, хотя и в меньшей степени ($B = 0,13$, $SE = 0,05$, 95% доверительный интервал [0,0377; 0,2217]). **Выводы.** Результаты свидетельствуют о том, что ориентация на будущее увеличивает жизненный успех студентов, обогащая их ощущение смысла жизни. Настоящее исследование подчеркивает необходимость интеграции постановки будущих целей с развитием смысла жизни в рамках мероприятий, направленных на благополучие студентов в китайском культурном контексте.

Ключевые слова: позитивная психология, смысл жизни, ориентация на будущее, жизненный успех, опосредование, бутстрэппинг

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Introduction

The emergence of positive psychology has redirected research attention from focusing on deficits to emphasizing strengths. A key concept from this change is "flourishing," which represents a state of optimal well-being and human potential (Kern et al., 2020). Flourishing is defined as the synergistic combination of hedonic well-being (e.g., experiencing positive emotions) and eudaimonic well-being (e.g., having a sense of purpose and mastery). It goes beyond the mere absence of mental illness, reflecting the full realization of an individual's potential (Waigel, Lemos, 2023). This shift is critically needed in Chinese higher education, where 21,48% of undergraduates exhibit symptoms of depression and 45,28% are at risk of anxiety (Guo et al., 2022). Although the field has evolved, intervention strategies are still predominantly shaped by pathological models of human functioning (Liu et al., 2019).

Central to this discussion is the meaning in life (MIL), a multidimensional construct that integrates purpose, coherence, and a sense of existential significance (Steger, 2012). As a central element of Seligman's (2011a) PERMA model, MIL not only protects against psychological distress but also fosters goal-directed behavior through its motivational functions (King, Hicks, 2021). However, the pathways by which existential purpose fosters holistic flourishing remain obscured by three key limitations. First, flourishing research has largely emerged from Western, individualistic contexts (Shdaifat et al., 2024), disregarding the distinctive cultural dynamics of China, where collectivist values and intense academic pressures distinctly influence Chinese students' well-being. Second, while MIL features prominently in China's mental health education reforms (MOE, 2021), its conceptualization frequently omits the temporal processes by which present meanings inform future aspirations. Third, although future orientation (FO), defined as cognitive-emotional engagement with future goals (Nurmi, 1991), is theoretically connected to both MIL (via Self-Determination Theory; Ryan, Deci, 2023) and flourishing (via expectancy-value models; Wigfield, 1994), its mediating role remains largely unexplored.

Emerging evidence indicates that future orientation (FO) may serve as a critical conduit between existential purpose and holistic well-being. Grounded in Markus and Nurius (1986) possible selves theory, FO enables individuals to translate abstract notions of meaning into concrete behavioral strategies, fostering resilience during key developmental transitions. This temporal mechanism aligns with Frankl's (1984) assertion that meaning intrinsically propels individuals toward future-oriented action; however, empirical validation of this relationship within the Chinese context remains limited. The sociocultural environment in China, shaped by intense academic pressures and the legacy of the one-child policy, may influence these psychological processes in ways that challenge the assumptions of Western theoretical models. For instance, in Confucian-influenced societies, collective FO often redirects individual meaning in life toward family-oriented goals, thereby shaping distinct trajectories to flourishing (Lui et al., 2022).

The present study aims to address these gaps through two interrelated objectives: (1) to examine the relationship between meaning in life (MIL) and flourishing within China's unique cultural context, and (2) to investigate future orientation (FO) as a mediator of this relationship. Specifically, the study proposes the following hypotheses: H1: MIL positively predicts flourishing among Chinese undergraduates; H2: MIL positively predicts FO among Chinese undergraduates; H3: FO positively predicts flourishing among Chinese undergraduates; and H4: FO mediates the relationship between MIL and flourishing among Chinese undergraduates. The conceptual framework underpinning these hypotheses is presented below (see Fig.).

This investigation contributes to the development of positive psychology through three theoretical innovations. First, it introduces a temporal dimension to meaning-flourishing research, addressing the field's longstanding neglect of time perspectives. Second, it integrates Eastern cul-

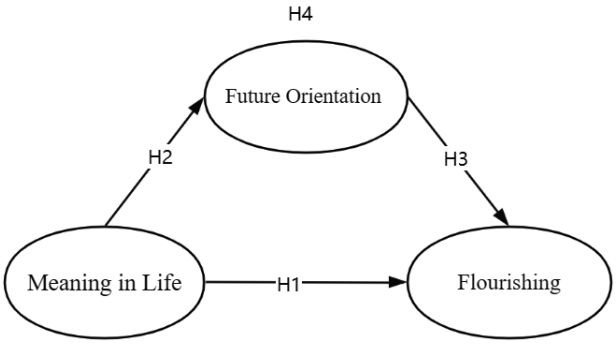

Fig. Conceptual framework of MIL, FO, and flourishing

tural perspectives on interconnectedness with Western models of well-being. Third, it identifies malleable intervention targets (i.e., MIL-FO pathways) for culturally adapted programs, which is a critical need given the escalating student mental health challenges among Chinese students. By bridging conceptual and cultural divides, this study offers a framework for understanding how existential purpose, when coupled with future time perspectives, can unlock flourishing in high-stress developmental contexts.

Method and materials

The research employed a quantitative correlational design to investigate the predictive relationships among MIL, FO, and flourishing. Furthermore, this study explored both the direct and indirect relationships between MIL and flourishing from a mediation perspective. The study targeted undergraduates across China, requiring participants to be (1) active and registered at a university in mainland China, (2) above 18 years old, and (3) Chinese nationals. Based on Krejcie and Morgan's (1970) formula, a population of 19,6 million registered undergraduates (Yao, 2023) requires at least 384 participants for the sample. To ensure validity, 480 responses were collected. Using multistage cluster sampling, six universities from different regions of China were selected, and 12 classes were conveniently sampled. After excluding invalid data, there were 445 participants (82,3% female; age range 18-24 years; Mean = 20,39; SD = 1,42). Class levels were represented as follows: freshmen (23,4%), sophomores (43,4%), juniors (24,9%), and seniors (8,3%). Regional distribution spanned East (18%), North (17,7%), Southwest (17,3%), South Central (16,1%), Northeast (15,9%), and Northwest China (15%). Online questionnaires created on Wenjuanxing were shared by class lecturers, who briefed students on the study and invited them to voluntarily participate. Participants provided informed consent, completed the survey, and received the researcher's contact information for follow-up.

The current study utilized the PERMA-Profiler (Butler, Kern, 2016), Meaningful Life Measure-Chinese Revised (Xiao et al., 2017), and Future Orientation Questionnaire for Adolescents (Liu et al., 2011). All three measurements used validated Chinese versions.

PERMA-profiler

The level of flourishing was measured using the PERMA-Profiler (Butler, Kern, 2016), which was developed based on M.E. Seligman's (2011b) PERMA model. The 15-item scale comprised five dimensions: positive emotion, engagement, positive relationships, meaning, and accomplishment. Each question was rated on an 11-point Likert scale. Previous research has demonstrated that the PERMA-Profiler is a useful tool among Chinese EFL university students (Yang, Saad Mohd, 2021). The Cronbach's alpha value in the current study was 0,944, reflecting good internal consistency.

Meaningful life measure-Chinese revised

The Meaningful Life Measure-Chinese Revised (MLM-CR) (Xiao et al., 2017) was used to measure the level of understanding that undergraduate students had about their life's purpose, the value of their existence or their significance. The scale consisted of 23 items, covering five dimensions, including exciting life, accomplished life, principled life, purposeful life, and valued life. The total MIL score was the sum of scores across all five dimensions (Xiao et al., 2017). Item scores ranged from 1 to 7, with "1" representing "strongly disagree" and "7" representing "strongly agree". The MLM-CR demonstrates good psychometric qualities for a comprehensive evaluation of the personal MIL of Chinese university students. In the current study, Cronbach's alpha value for internal consistency was 0,929.

Future orientation questionnaire for adolescents

The current study used the Future Orientation Questionnaire for Adolescents (Liu et al., 2011) to measure undergraduates' cognitive preferences and action tendencies as well as their subjective emotional experiences towards future time. It contained 31 items within three domains, including perception about the future, emotion about the future, and will to execute a plan. The five-point scale ranged from "1 = completely disagree" to "5 = completely agree". In the current study, the internal consistency had a Cronbach's alpha value of 0,919.

SPSS was adopted to analyze the descriptive data and correlations among the variables. Prior to the data analysis, tests for linearity, normality, and multicollinearity were conducted, and all assumptions were confirmed. Pearson correlation analysis was applied to determine the key variables' correlation coefficients (Faizi, Alvi, 2023). To test the mediating effect of FO on the relationship between MIL and flourishing, the model of the study was run through the SPSS PROCESS macro (Sürücü et al., 2023), and Bootstrap samples were set at 5000.

Result

Level of the variables

The mean score of MIL was 110,75 (SD = 18,43), which fell within the 25th and 75th percentiles on the distribution of scores, indicating that most undergraduates had a moderate level of MIL. Similarly, most undergraduates in China had moderate levels of FO and flourishing, with mean scores of 104,57 (SD = 15,71) and 113,33 (SD = 19,86), respectively. Additionally, the results support the notion that well-being ratings are usually skewed towards the positive end, with a median of about 6,5 to 7,5 (Butler, Kern, 2016). On the other hand, the results of the t-test and one-way ANOVA showed no significant differences in MIL, FO, and flourishing based on gender, year of study, and university location.

Correlations between the variables

Based on the result of the Pearson correlation, all the variables (MIL, FO, and flourishing), were significantly correlated, ranging from 0,652 to 0,793 ($p < 0,01$). Based on the psychology field (Faizi, Alvi, 2023), these results suggest that there are significant, strong relationships between FO and MIL, and between MIL and flourishing, while there is a significant but moderate relationship between FO and flourishing. The correlation coefficients are presented in Table 1.

Table 1

Correlations of the three variables

	1	2
MIL		
FO	0,793**	
FI	0,75^{0**}	0,652**

Note: **$p < 0,01$, *MIL* = Meaning in Life, *FO* = Future Orientation, *FI* = Flourishing.

Regression and mediation analysis

The study utilized PROCESS macro in SPSS to conduct regression and mediation analysis. The results revealed that MIL significantly predicted FO ($B = 0,68$, $SE = 0,02$, $p < 0,001$), which in turn significantly predicted

flourishing (B = 0,19, SE = 0,06, p < 0,01), while MIL also directly predicted flourishing (B = 0,68, SE = 0,06, p < 0,001). The total effect of MIL on flourishing was significant (B = 0,81, SE = 0,03), confirming that both direct and indirect pathways contributed to the relationship. The indirect effect of MIL on flourishing through FO was significant (B = 0,13, SE = 0,05, 95% CI [0,038; 0,222]), indicating a partial mediation (see Table 3).

The ratio of the indirect to total effect was 0,1622, suggesting that 16,22% of MIL's impact on flourishing was mediated by FO, while MIL maintained a substantial direct effect. Additionally, the R^2 mediation effect size was 0,4164, indicating that 41,64% of the variance in flourishing was explained by the indirect pathway. The model's explanatory power was strong, with R^2 values of 0,57 for MIL → flourishing, 0,63 for MIL → FO, and 0,57 for FO → flourishing (see Table 2). These findings confirm that FO plays a mediating role in the relationship between MIL and flourishing, with MIL also exerting a direct influence on flourishing. This highlights the complexity and significance of this psychological mechanism. As a result, all the hypotheses in the current study were verified.

Discussion

From the results, there are several interpretations worth discussing. The results demonstrated that MIL exerted both direct and indirect influences on flourishing through FO among Chinese undergraduates through culturally distinct mechanisms. First, the robust direct pathway confirms MIL's intrinsic role as the cornerstone of flourishing across cultures. This result is in line with findings among Western and Eastern counterparts (Fischer et al., 2021; Noordzij et al., 2024), which may reflect that both collective and individualistic cultural scripts can transfer meaning and purpose in life to well-being, especially among late adolescents.

Second, the path from MIL to FO was significant and substantial, indicating that people who believe their lives are purposeful are more likely to have an optimistic and goal-oriented attitude towards the future. The finding aligns with several theoretical frameworks within positive psychology and developmental psychology. For example, meaning in life fosters a forward-looking perspective, which is essential for motivation and goal setting (Batthyány, 2024). This result is also consistent with past empirical studies. Miao et al. (2021) suggested that meaning in life activates a future-oriented coping function. Additionally, people with a strong sense of meaning are more resilient and optimistic, which translates into proactive future-oriented behaviors (Miconi et al., 2022).

Table 2

Path analysis

Hypothesis	B	SE	T	p	R^2	LLCI	ULCI	Decision
H1: MIL → FI	0,68	0,06	12,03	<0,001	0,57	0,569	0,786	Accept
H2: MIL → FO	0,68	0,03	27,39	<0,001	0,63	0,627	0,724	Accept
H3: FO → FI	0,19	0,06	3,00	<0,01	0,57	0,067	0,321	Accept

Note: MIL = Meaning in Life, FI = Flourishing, FO = Future Orientation.

Table 3

Mediation analysis

Model	B	SE	LLCI	ULCI	Decision
Total effect of MIL on FI	0,81	0,03	0,742	0,875	Accept
Direct effect of MIL on FI	0,68	0,06	0,569	0,7866	Accept
Indirect effect (H4: MIL → FO → FI)	0,13	0,05	0,038	0,222	Accept

Note: MIL = Meaning in Life, FI = Flourishing, FO = Future Orientation.

Third, FO's small but significant indirect effect on the relationship between MIL and flourishing suggests a nuanced mediating mechanism. While MIL encourages future planning and goal setting, where the processes aligned with previous findings that FO enhances well-being (Felaco, Parola, 2022), its modest explanatory power implies that FO acts as a secondary pathway rather than a dominant driver. However, this does not negate FO's relevance but contextualizes it: MIL's broader influence on flourishing likely operates through multiple unmeasured channels, such as emotional regulation, social connectedness, or existential security (Van Tongeren, Showalter Van Tongeren, 2021). The limited mediation effect may also reflect cultural specificity. For Chinese undergraduates, FO is often shaped by China's high-pressure educational environment, where future goals are frequently tied to academic competition and familial obligations rather than personal autonomy (Chen et al., 2023). This contrasts with Western contexts that emphasize self-directed, aspirational future orientations (Seginer, 2009). Consequently, FO's mediating potential may be attenuated when students perceive future planning as a source of stress rather than hope, which is a critical boundary condition for applying Western theoretical models in collectivist settings.

Conclusion

This study reveals that MIL enhances flourishing primarily by fostering FO, which involves proactive planning and goal setting. The mediation analysis demonstrates a clear pathway: individuals who perceive their lives as meaningful are more likely to develop a positive outlook, which in turn contributes to their overall well-being. This finding extends the PERMA well-being model by emphasizing the role of FO as a bridge between existential meaning and holistic flourishing. Importantly, while the direct effect of MIL on flourishing remains strong, the identified indirect effect through FO suggests that interventions targeting future planning may amplify the benefits of meaning-centered practices. These results highlight the necessity of integrating temporal dimensions into frameworks of well-being, particularly for populations like undergraduates who are navigating both identity and life goals. Future research should explore whether this mechanism holds across diverse cultural contexts or life stages, and investigate additional psychological processes (e.g., resilience, self-efficacy) that may further explain how MIL translates into flourishing.

From a practical perspective, this study underscores the importance of interventions and strategies aimed at promoting both MIL and FO to enhance undergraduates' well-being. Therapeutic approaches such as logotherapy (Wimberly, 2024), which focus on helping individuals find meaning in their lives, could be complemented by interventions designed to foster future-oriented thinking and goal setting. For example, therapists could incorporate techniques such as visualization exercises (Mertens et al., 2022), goal-setting activities, and action planning (Ingebrigtsen, 2022) to help clients develop a sense of purpose and direction for the future. Similarly, educational programs and workshops could emphasize the significance of meaningful goal pursuit and future planning in promoting personal growth and flourishing.

Additionally, future-oriented interventions should be implemented among undergraduates. Such interventions promote future-oriented thinking by enhancing future self-identification (Mertens et al., 2022), increasing future-oriented coping (Huang et al., 2021), and improving positive emotions related to the future, foresee their future in a cheerful and optimistic way, such as through the Best Possible Self intervention (Heekerens, Eid, 2021). Meanwhile, the modest role of FO mirrors studies showing that excessive future focus in China may actually exacerbate anxiety, suggesting that FO interventions must be culturally adapted to mitigate stress. Interventions aiming to enhance flourishing should prioritize cultivating MIL directly, while supplementing FO-focused strategies rather than relying on FO alone as an intermediary.

Recommendations for future research

Future studies could extend the present findings in several important directions. First, as this study employed a solely quantitative research design, incorporating qualitative methods or adopting a mixed-methods approach would provide more comprehensive insights. Additionally, the cross-sectional design limits causal interpretations, given that data were collected at a single point in time. Although meaningful associations were observed, temporal or causal relationships remain uncertain. Consequently, longitudinal research is recommended to more rigorously test the causality among these variables. Second, future studies should consider other potential variables that may influence relationships within the proposed mediation model. By controlling for these variables or examining their moderating roles, researchers could gain a better understanding of the underlying mechanisms linking meaning in life, future orientation, and flourishing. Finally, the reliance on self-report measures may have introduced social desirability bias, as respondents may not always provide truthful answers. These measures are also inherently subjective, relying on individual perceptions that may vary significantly. Thus, employing a broader arrange of assessment methods, including behavioral observations or third-party ratings, could address these concerns and strengthen the validity of future research outcomes.

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Psychological aspects of digital device use in children: research landscape based on a bibliometric analysis

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Abstract

Context and relevance. Contradictory evidence on how digital devices affect child development — both positively and negatively — calls for a systematic review of existing studies and identification of research gaps. Bibliometric analysis offers an effective way to address this need by identifying key trends in the field. **Objective.** To identify major trends in research on the psychological aspects of children's use of digital devices and to outline promising avenues for future study. **Methods and Materials.** We conducted a bibliometric analysis of the OpenAlex database of scientific publications and then used VOSviewer to construct bibliometric maps. The analysis drew on 4,017 papers published between 1974 and 2025. **Results.** The bibliometric analysis revealed seven clusters, three of which were central: computer science, medical sciences, and a unifying cluster of psychological and pedagogical research. **Conclusions.** The analysis of the leading clusters highlights a shift in scientific inquiry from studying measurable effects toward analyzing the psychological consequences of digital device and technology use. Psychological and pedagogical research continues to be in high demand, as reflected in its substantial citation counts despite the relative novelty of the field. However, there is a shortage of longitudinal studies on how technology affects child development, as well as a lack of research accounting for cultural differences in digital practices.

Keywords: bibliometric analysis, children, mental development, digital devices, OpenAlex, VOSviewer

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Психологические аспекты использования цифровых устройств детьми: карта исследований на основе библиометрического анализа

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Резюме

Контекст и актуальность. Противоречивые данные о позитивном и негативном влиянии цифровых устройств на развитие ребенка требуют систематизации существующих исследований и выявления пробелов. Эффективным инструментом в этом процессе выступает библиометрический анализ, позволяющий выявить ключевые тенденции в исследованиях. **Цель**. Выявление основных тенденций в исследовании психологических аспектов использования цифровых устройств детьми и определение перспективных направлений исследований. **Методы и материалы**. Библиометрический анализ базы данных научных работ OpenAlex с последующим построением библиометрических карт с использованием средства визуализации данных VOSviewer. Использованы данные 4017 публикаций с 1974 по 2025 год. **Результаты.** Библиометрический анализ выявил семь кластеров, при этом ключевыми выступают три: компьютерные науки, медицинские науки и объединяющий их кластер психолого-педагогических исследований. **Выводы**. Анализ ведущих кластеров показывает развитие научных исследований от изучения измеримых эффектов к анализу психологических последствий применения цифровых устройств и технологий. Психолого-педагогическое направление демонстрирует высокую востребованность, что подтверждается значительным числом цитирований, несмотря на относительную новизну исследований. При этом отмечается дефицит лонгитюдных исследований влияния технологий на развитие детей и работ, учитывающих культурные различия в цифровых практиках.

Ключевые слова: библиометрический анализ, дети, психическое развитие, цифровые устройства, OpenAlex, VOSviewer

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Introduction

The digital space has become integral to modern children's lives and development. As children increasingly engage with digital technologies and the proportion of children using them daily continues to rise

(Veraksa et al., 2020; Kalabina, Progackaya, 2021; Nikolaeva, Isachenkova, 2022), nearly every study reports that children exceed the WHO-recommended screen time (Ljubomirović, Grujicic, 2019; Islam, Biswas, Khanam, 2020). At the same time, evidence is growing on both the positive and negative effects of digital technologies on child development (Nikolaeva et al., 2023).

These contradictory findings reflect the complexity of the field, which involves numerous interrelated factors. Further analysis is needed to determine where results converge, which interdisciplinary directions are emerging from new data, and where gaps or contradictions persist, signaling a need for further research. Bibliometric analysis is one tool well suited to this task. It enables the quantitative assessment of scientific communication, the identification of research trends, and the mapping of the research landscape (Rubtsov et al., 2019; Amalou, 2023). The aim of the present study was therefore to identify major trends in research on the psychological aspects of children's use of digital devices and to outline promising directions for future work.

Materials and methods

To achieve this aim, we applied bibliometric analysis methods to the OpenAlex scientific paper database and then constructed bibliometric maps using VOSviewer software. The OpenAlex platform was chosen for its openness, as it provides access to scientific publication metadata without commercial restrictions — an approach that aligns with the principles of open science (Priem et al., 2022). Because OpenAlex has no paid subscriptions and aggregates data from Crossref, PubMed, arXiv, MAG, and other sources, it enables the analysis of current research trends. VOSviewer, meanwhile, is widely used to identify and visualize relationships in academic publications, including co-authorship networks and terminological clusters (Williams, 2020).

The study employed bibliometric analysis of keywords and was aimed at identifying, systematizing, and substantively analyzing the most frequent terminological combinations and their contextual analysis within publications by specific authors and in scientific journals. Metadata analysis of scientific papers allows researchers to determine the thematic profile of a research field (Maltseva, 2020).

We searched OpenAlex using the query "children AND digital device" and then constructed keyword maps in VOSviewer based on the retrieved publications.

Results

Our query returned 4,075 publications from OpenAlex, spanning the years 1957 to 2025. We then screened these sources to assess their relevance to our research topic. The final list included only those publications in which digital technologies or devices were used by or for children in the contexts of education, development, or health. Our inclusion criteria were: (a) participants or research focus — children under 18 years of age; and (b) nature of digital device or technology use — learning, communication, play, health management, or use as a diagnostic tool, rehabilitation aid, or means of monitoring a child's condition by professionals working with children. This process yielded a total of 4,017 publications, covering the period from 1974 to 2025. As shown in Fig. 1, studies were rare before the 2000s, with gradual growth in the following decade. The largest number of publications (2020–2024) coincides with the period when digital technologies became actively integrated into children's lives during and after the pandemic. Data

for 2025 are incomplete, as the final retrieval was conducted on July 1, 2025.

According to OpenAlex algorithmic analysis, the publications cover 200 themes at the intersection of technology, health, education, information and communication technology, and social aspects — including digital competence, cybersecurity, and many others. Four leading research avenues emerged: child development and digital technologies (831 publications), teaching methods (118 publications), the impact of technologies on adolescents (100 publications), and ophthalmology and visual impairment (72 publications).

Then we constructed a keyword cluster map using VOSviewer (Fig. 2). To ensure the map was both representative and readable, we set a minimum keyword occurrence threshold of 15, which was determined empirically. Lower threshold values resulted in overcrowded maps that made it difficult to analyze and identify major trends, while higher values risked excluding important research directions. In total, 4,099 unique keywords were identified across the uploaded articles, of which 363 words met the occurrence threshold of 15.

The platform's algorithmic analysis identified seven clusters that group terms according to scientific field. The largest cluster (110 terms) is associated with computer science and includes terms such as "artificial intelligence," "human-computer interaction," "multimedia," "computer security," and "machine learning." The second largest (107 terms) covers advanced medical research, including modern assistive devices for children with disabilities and digital healthcare. Its keywords feature "healthcare," "pathology," "psychiatry," "pediatrics," "clinical psychology," "obesity," "mental health," "ophthalmology," and "COVID-19." The third cluster (58 terms) brings together research on psychology and learning, focusing on the impact of technology on education. Key terms here are "psychology," "developmental psychology," "cognitive psychology," "education," "pedagogy," "literacy," "preschool education," "digital learning," "social networks," "neuroscience," and "communication." The fourth cluster (32 terms) reflects research on economic and social processes related to the impact of the pandemic and digitalization, with terms such as "economics,"

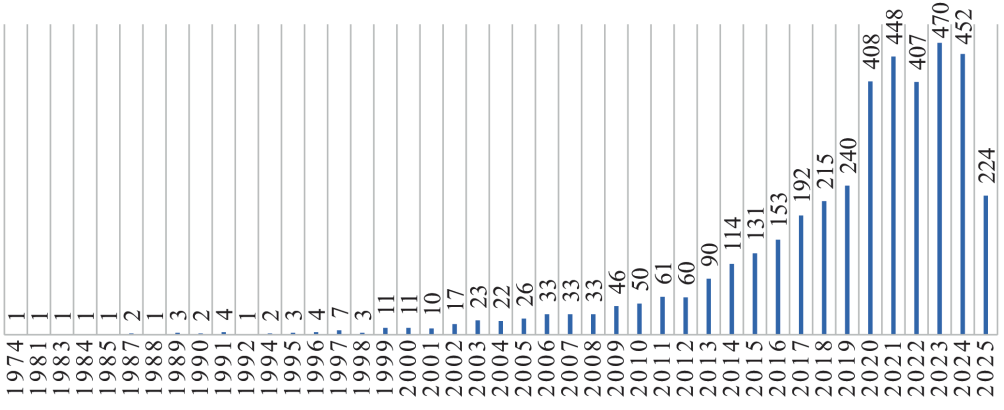

Fig. 1. Distribution of publications by year

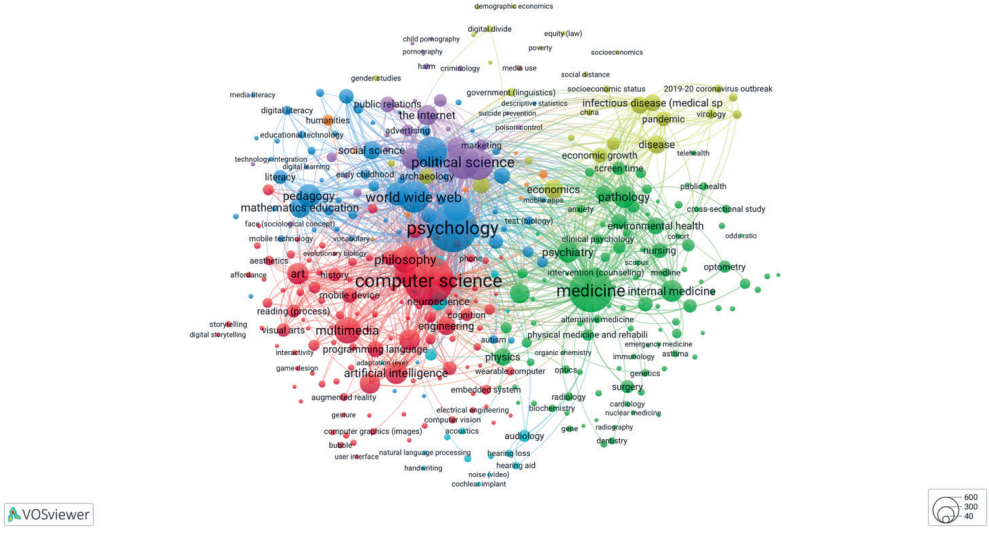

Fig. 2. Keyword clusters

“demography,” “economic growth,” “political science,” “inequality,” “poverty,” “pandemic,” and “digital divide” among others.

The fifth cluster (27 terms) addresses legal and political aspects of modern technologies, including “public relations,” “internet,” “online privacy,” “legislation,” “pornography,” and “harm.” The sixth cluster (20 terms) has a narrowly specialized focus on interdisciplinary research into hearing, speech processes, and language technologies, covering both medical and technological aspects. Its keywords include, for instance, “acoustics,” “linguistics,” “communication,” “audiology,” “adaptation,” “speech recognition,” and “writing”. Finally, the seventh cluster (9 terms) encompasses new and interdisciplinary research related to digital culture, with terms such as “gadget,” “media use,” “curiosity,” “popularity,” “addiction”, etc.

The temporal map of keyword clusters (Fig. 3) reveals a shift in thematic trends: from the study of social and educational aspects of children’s technology use in 2017–2019 — a period of active technology development in education and communication — toward health-related research after 2020, driven by the COVID-19 pandemic and increased screen time.

Among all the identified clusters, the third one is of greatest interest to us, as it brings together research at the intersection of psychology, pedagogy, and digital technologies. Studies in this cluster focus on how the digital environment affects children’s learning, development, and behavior. This cluster serves as a hub connecting the humanities and the exact sciences (Fig. 4). The most pronounced links are with the first cluster — research on digital technologies and education — and with the second cluster — which addresses mental health and neuroscience.

The connections of the core terminology of this cluster revolve around developmental psychology and pedagogy (Fig. 5). Within publications related to developmental psychology, the primary focus is on

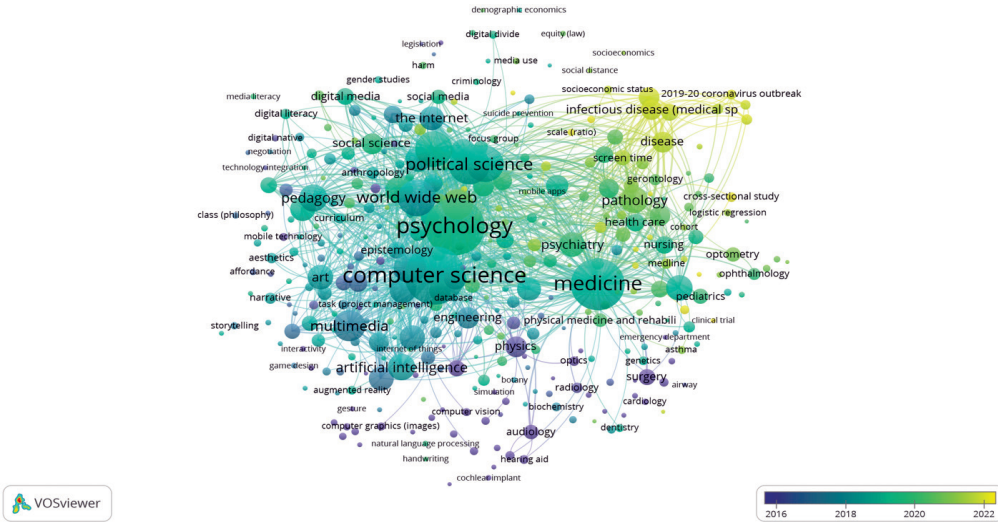

Fig. 3. Temporal map of keyword clusters

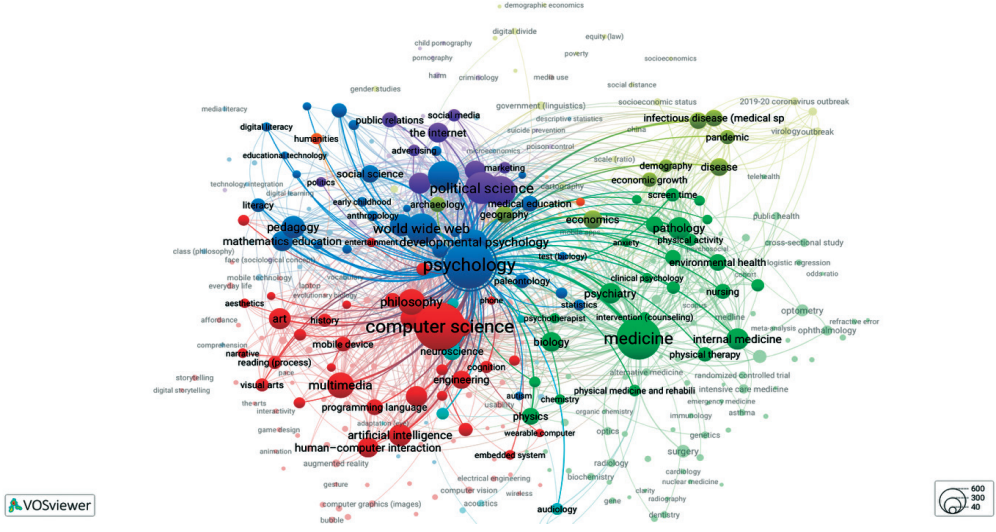

Fig. 4. Visualization of the third cluster key words group of interdisciplinary research on the psychological and pedagogical aspects of digitalization

children's cognitive and emotional development in the digital age. The demand for this research area is reflected in an average citation rate of 10.37, despite the relatively recent nature of the work — the average publication year is 2020.66.

High interest is also reflected in the metrics for research on digital technologies in

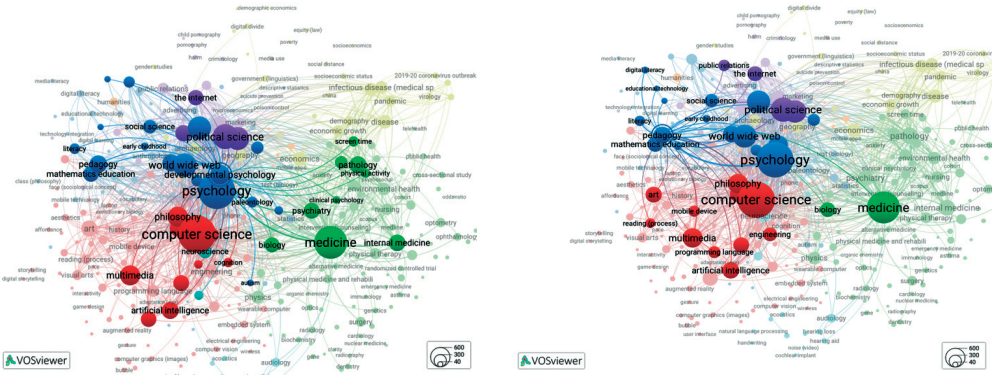

Fig. 5. Visualization of the relationship between key words of interdisciplinary research on the psychological and pedagogical aspects of digitalization

education and digital literacy, which have an average citation rate of 15.07.

Although the term “screen time” is traditionally associated with psychological and pedagogical research, in our retrieval results it was assigned to the medical research cluster. An analysis of the most cited publications containing this keyword showed a clear connection with the mental health cluster. Modern research views screen time not only as a pedagogical issue but also as a biomedical problem linked to neurological and emotional disorders, including sleep disturbances, increased risk of myopia, anxiety, depression, hyperactivity, and age-dependent medical recommendations for screen time limits (Lanca, Saw, 2020; Lanningham-Foster et al., 2006; Nagata, Magid, Gabriel, 2020).

Next, we analyzed the citation map. When constructing it, we set a citation threshold of 15, chosen as a compromise between broad coverage and selecting the most significant publications. This allowed us to identify papers that have had a substantial impact on the research field. In total, 616 articles met the threshold, of which 161 had connections (Fig. 6).

The main themes and trends emerging from the selected publications can be grouped into the following five areas:

1) Impact of digital devices on children’s mental development: digital addiction and effects on children’s behavior (Domoff, Borgen, Radesky, 2020; Hawi, Samaha, Griffiths, 2019); social and emotional development (Cerniglia, Cimino, Ammaniti, 2020; Konok, 2021; Lai et al., 2028; Limon, Toto, 2021; Limon, Toto, 2022); and cognitive development and executive functions (Messer et al., 2018; Shanmugasundaram, Tamilarasu, 2023).

2) Parental mediation and the role of the family in children’s digital practices (Danet et al., 2022; Konok, Bunford, Mikl si, 2019; Radesky et al., 2016; Veraksa et al., 2021; Wood et al., 2016; Wu et al., 2014).

3) Digital devices and technologies in children’s education (Fleer, 2018; Lieberman, Bates, So, 2009; Papadakis, Kalogiannakis, 2017; Zaranis, Kalogiannakis, Papadakis, 2013).

4) Health issues related to screen use (Alvarez-Peregina et al., 2020; Foreman et al., 2020; Lanca, Saw, 2020).

5) Ethical aspects of children’s use of digital devices and digital privacy (Lupton,

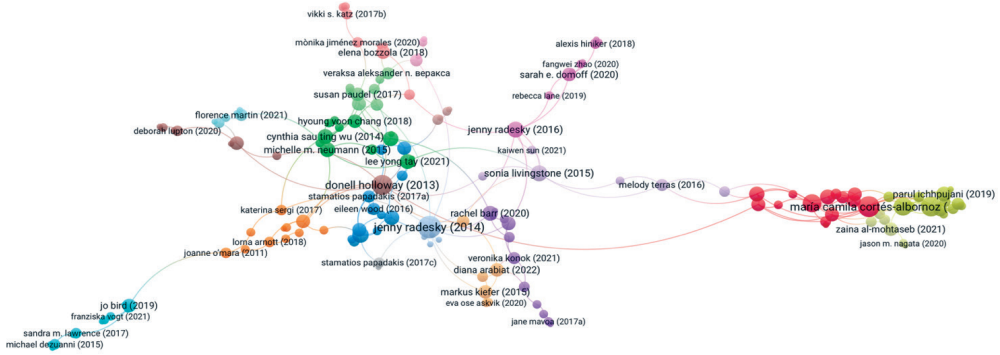

Fig. 6. Visualization of citations by publications

Williamson, 2017; Martin et al., 2021; Sukk, Siibak, 2021; Zhao et al., 2020).

Among the most significant and most cited publications is the study by Radesky, Schumacher, and Zuckerman (2014) on the use of mobile and interactive media by young children.

This research field is characterized by a high degree of international collaboration (Fig. 7). A notable increase in Russian re-

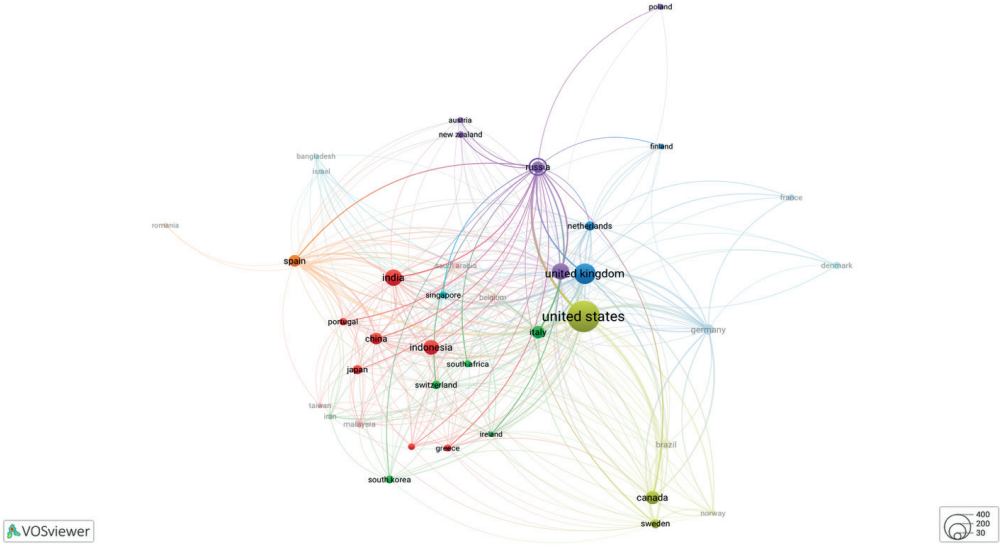

Fig. 7. Network visualization of scientific collaboration and citations between countries

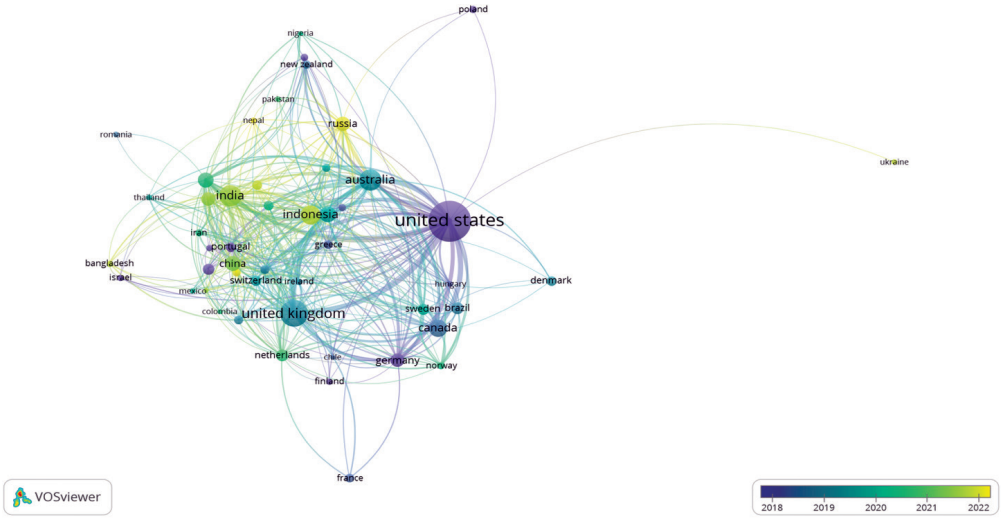

Fig. 8. Temporal network visualization of scientific collaboration and citations between countries

search has also been observed in recent years (Fig. 8). The most cited Russian studies on the impact of digital technologies on children's mental development belong precisely to the psychological and pedagogical research category and focus predominantly on development. (Veraksa et al., 2021a; Veraksa et al., 2021b; Smirnova, Smirnova, Sheina, 2021; Soldatova, Vishneva, 2019; Veraksa et al., 2021).

Discussion

The bibliometric analysis we conducted allowed us to identify key trends in research on the psychological aspects of children's use of digital devices. Although the largest keyword clusters are associated with computer and medical sciences, the unifying cluster is the one focused on psychological and pedagogical research. The high representation of technological and medical research can be explained by the nature of the studied processes. On the one hand, medical and technological research operates with more unambiguous data; on the other hand, it may also reflect a response to obvious threats — namely, the massive transition to online activities across many fields and the impact of the pandemic. Psychological effects (changes in cognitive development, social skills, and emotional regulation) are less visible, delayed over time, and require more complex, longer-term studies to be identified. Furthermore, the impact of digital devices on a child's psyche is almost always mediated by multiple factors, including family socioeconomic status, parenting style, parental education level, content quality among others (Veraksa, Rodova, 2025; Smirnova, Klopotova, 2023; Taruntaev, 2023; Brauchli et al., 2024; Maeneja, Rato, Ferreira, 2025).

The psychological and pedagogical research cluster demonstrates high citation rates and growing integration with neuroscience. At the same time, the proportion of longitudinal studies remains small, which prevents reliable conclusions about long-

term effects. This limitation is largely due to the resource intensity and complexity of organizing longitudinal research.

Research on the impact of digital devices on child development also appears in adjacent interdisciplinary clusters related to digital culture and the social aspects of digital technology use.

The identified thematic clusters and trends point to several interrelated approaches for studying the psychological aspects of children's use of digital devices: cognitive and affective consequences, social and environmental dimensions of digital socialization, and child vulnerability in the digital environment.

One of the remaining gaps in this field is the study of cultural differences in children's digital practices. The most cited works predominantly reflect the Western cultural context, which limits the identification of culturally specific factors shaping digital technology use and its impact on child development. An example of how cultural context influences children's digital practices and the development of 21st-century skills is provided by a study conducted in Cameroon (Ngyah-Etchutambe, 2025). This issue becomes particularly relevant in the context of the growing digital divide, where unequal access to technologies exacerbates global social and educational inequality among children (UNICEF, 2017). Access to technology is an important condition for the well-being of modern young people, which underscores the importance of digital equality (Soldatova, Chigarkova, Ilyukhina, 2025).

The results of our analysis are consistent with the conclusions of a methodologically similar 2024 study on the impact of the digital environment on children's cognitive functions and mental health. That study also notes the dominance of mental health research over the study of the cognitive sphere, a pronounced geographical imbalance in favor of developed countries, and methodological challenges associated with investigating the impact of the digital environment on children (Xiao et al., 2024).

Conclusion

Our study identified major trends in research on the psychological aspects of children's use of digital devices and highlighted promising directions for future work. The bibliometric approach we chose allowed us to determine established, quantitatively measurable trends. However, it did not fully capture still-emerging research areas. A significant proportion of medical and technological publications reflects the natural development of scientific research: first, the obvious, measurable, and socially significant aspects of a phenomenon are studied. Then, as data accumulate, attention shifts to the psychological consequences of children's use of digital technologies — a more complex phenomenon. The high citation rate of psychological and pedagogical research attests to both its relevance and its potential.

The gaps identified through our bibliometric analysis — namely, the lack of longitudinal research on how technologies affect child development and the scarcity of studies accounting for cultural differences in digital practices — allow us to propose several promising directions for future research:

— conducting longitudinal studies from preschool through adolescence to establish causal relationships between children's use of digital devices and technologies and their psychological outcomes;

— conducting comparative cross-cultural studies that include countries and regions underrepresented in current research;

— developing validated metrics and assessment tools to evaluate the psychological consequences of children's digital device and technology use at different developmental stages.

Limitations. Our analysis relied on quantitative metrics. We used only the open-access OpenAlex database, which may offer less comprehensive journal coverage than commercial alternatives. The study also has a methodological limitation related to the threshold values set for keyword occurrence and citation rates. While necessary to ensure the representativeness of the maps, this threshold led to the exclusion of some works: recent studies that had not yet accumulated the required number of citations due to the time factor, and niche studies with low mention frequency.

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PSYCHOLOGY OF EDUCATION
ПСИХОЛОГИЯ ОБРАЗОВАНИЯ

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A study of the experience of organizing practical training of future teachers in pedagogical universities

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Abstract

Context and relevance. The relevance of the study of the practical training of future teachers in the current situation of the modernization of pedagogical education is dictated by the need to understand the opinions of stakeholders in the organization of the process of forming the personality of a teacher ready to carry out pedagogical activity in real working conditions in accordance with the needs of the educational system**. Objective.** The aim of the study is to obtain and analyze empirical data on the ideas of stakeholders in the educational process about the established and promising forms of practical training of future teachers. **The hypothesis** of the study lies in the following interrelated assumptions: the forms of practical training established in pedagogical universities correspond to the concept of development of pedagogical education in the Russian Federation; the ideas about the most popular forms of practical training of future teachers differ among different participants and stakeholders; these different ideas can be used as a basis for the development of conceptual foundations and promising directions of practical training of future teachers in pedagogical universities. **Methods and materials.** In the course of the work, the following theoretical research methods were used: analysis and systematization of publications in the field of organization of practical training of teachers, analysis of current regulatory and legal documentation; Empirical survey methods (questionnaires) were used among four groups of educational process participants (1198 people from five federal districts): 180 university management, 348 faculty, 444 students, and 226 employer representatives. **The results** of the study reflected the perceptions of various educational process participants (management, faculty, students, and employer representatives) regarding the organization of practical training. The study revealed similarities and differences in the understanding of the content of practical training among all survey participants and identified the main forms of organizing practical training for students. The analysis revealed insufficient attention to extracurricular activities in the practical training of future teachers, as well as to the use of digital technologies and online platforms. Based on suggestions for improving practical training from students and employers, the study identified

areas for developing the process of developing future teachers' readiness for real-world educational practice. **Conclusions.** The study revealed the need to improve the content of practical training for future teachers, actively include extracurricular activities in the practical part of the program, strengthen cooperation with educational partner organizations, and expand the range of methods and tools for practical training.

Keywords: higher pedagogical education, future teacher, practice-oriented education, practical training of a future teacher, professional readiness of a future teacher

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Исследование опыта организации практической подготовки будущих учителей в педагогических вузах

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Резюме

Контекст и актуальность. Актуальность исследования практической подготовки будущих учителей в современной ситуации модернизации педагогического образования продиктована необходимостью осмысления мнений заинтересованных участников организации процесса формирования личности педагога, готового к осуществлению педагогической деятельности в реальных условиях труда в соответствии с потребностями образовательной системы. **Цель.** Определить представления управленческого состава, преподавателей вузов, студентов и представителей работодателей о сложившихся и перспективных формах практической подготовки будущих учителей. **Гипотеза исследования** заключается в следующих взаимосвязанных предположениях: сложившиеся в педагогических университетах формы практической подготовки соответствуют концепции развития педагогического образования в Российской Федерации; представления о наиболее востребованных формах практической подготовки будущих учителей у различных участников образовательного

процесса отличаются; эти отличающиеся представления могут быть положены в основу развития концептуальных основ и перспективных направлений практической подготовки будущих учителей в педагогических вузах. **Методы и материалы**. В ходе работы были применены методы теоретического исследования: анализ и систематизация публикаций в области организации практической подготовки педагогов, анализ актуальной нормативно-правовой документации; эмпирические опросные методы (анкетирование) четырех групп участников образовательного процесса (1198 человек из 5 федеральных округов): управленческий состав вузов — 180 человек, преподаватели — 348, студенты — 444, представители работодателя — 226. **Результаты** работы отразили представления об организации практической подготовки различных участников образовательного процесса (управленческий состав, преподаватели, студенты, представители работодателей). Исследование выявило сходства и отличия понимания содержания практической подготовки у всех участников опроса и выявило основные формы организации практического обучения студентов. Результаты анализа показали недостаточное внимание к внеучебной деятельности в процессе практической подготовки будущих учителей, к применению цифровых технологий и онлайн-платформ. На основе предложений по совершенствованию практической подготовки от студентов и работодателей в работе выявлены направления развития процесса формирования готовности будущего педагога к реальной образовательной практике. **Выводы**. Исследование указало на необходимость совершенствования содержания практической подготовки будущих педагогов, активного включения в практическую часть программы внеучебной деятельности, усиления сотрудничества с партнерами-образовательными организациями, расширения спектра методов и инструментов практической подготовки.

Ключевые слова: высшее педагогическое образование, будущий учитель, практико-ориентированное образование, практическая подготовка будущего учителя, профессиональная готовность будущего учителя

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Introduction

Strengthening the practical orientation of future teacher training programs has traditionally been a priority direction for modernizing the system of higher pedagogical education. The relevance of this direction is currently also due to the regulatory approval of the concept of “practical training,” which includes not only internships and is one of the key elements of pedagogical educational programs. The following factors determine the transformation of the practical component of pedagogical education:

A practice-oriented approach to teacher training focuses the learning process on developing specific practical skills for solving professional tasks.

Modern conditions define new principles for program design, creating the need to align the content of training and educational outcomes with the current requirements of educational reality.

The renewal of university infrastructure creates a modern environment for organizing practical training.

In this regard, the goal of the research presented here was to determine the perceptions of management, university faculty, students, and employer representatives regarding existing and prospective forms of practical training for future teachers.

The research hypothesis is based on the following interconnected assumptions: the current forms of practical training in pedagogical universities align with the concept of pedagogical education development in the Russian Federation; the perceptions of the most in-demand forms of practical training for future teachers differ among various stakeholders; and these perceptions can serve as a foundation for developing conceptual frameworks and promising directions for practical training of future teachers in pedagogical universities.

Pedagogical education has undergone profound changes in recent years in accordance with state requirements and the demands of educational practice. It is worth noting the Comprehensive Project for Modernizing Pedagogical Education in the Russian Federation (2014–2017), which aimed to develop new approaches to modular design of core professional educational programs for teacher training based on activity-based and practice-oriented approaches. This project emphasizes the need to foster professional competencies in students that align with current professional demands. Within this approach, the creation of a new model of cooperation between universities and schools becomes important, highlighting the significance of practical experience in real educational settings (Margolis, Safronova, 2018). Today's agenda provides new impetus for the development of pedagogical education. The Concept for Teacher Training until 2030, approved by the Government of the Russian Federation, aims to establish unified approaches to designing educational programs focused on developing the practical readiness of future teachers (Basyuk, 2022; Lubsky, 2022).

In accordance with the regulating normative document, the understanding of practical training is presented as «a form of organizing educational activities during the mastering of an educational program under conditions where students perform certain types of work related to their future professional activity and aimed at forming, consolidating, and developing practical skills and competencies in the profile of the corresponding educational program»[1].

It is important to note that practical training and internship (or "practice" in

[1] Order of the Ministry of Education and Science of Russia and the Ministry of Education of August 5, 2020 No. 885/390 «On the practical training of students» http://publication.pravo.gov.ru/Document/View/0001202009110053?ysclid=melbp39fxv258678294

the Russian context) are not identical concepts, despite the similarity of their characteristics. In accordance with the Federal Law "On Education in the Russian Federation," practical training is "a form of organizing educational activities...", while internship is defined as a component of the educational program[2]. Thus, the design of practical training is possible both during an internship and within the framework of disciplines (modules), specifically in the part of performing tasks for mastering practical skills of future professional activity.

The competency-based approach in education focuses the learning process on the formation of specific practical skills for solving professional problems (Khutorskoy, 2017). Researchers' attention is directed towards studying the features and defining the main guidelines for developing program content, and proposing forms for implementing practical training. These works aim to identify the essence of the phenomenon of "practical training" (Elizarova et al., 2024; Vishnyakova, 1999), define the key characteristics of the process (Kopyeva, Pityukova, 2012), determine methodological approaches to implementing practical training (Platonova, Neverkovich, Parfenov, 2016), develop content in accordance with current requirements, including the development of modern models of practical training (Frolova, 2020; Zemlyanskaya, Bezborodova, 2021), organizational and technological features of implementing pedagogical practice (Sharipova, 2013), and define strategic directions in the development of practical training in pedagogical education (Makarova, Chernenko, 2020; Kostyunina, 2016). An important component of the learning process is the assessment of practical training results. Today, the procedure of a demonstration exam is actively used in the practice of pedagogical universities as a modern tool for assessing the readiness of graduates of pedagogical fields of study for professional activity in conditions close to real ones (Voevodskaya, 2025; Svetonosova, 2025).

Research by B. Radulovic, M. Dzinovic, G. Miscevic (Radulovic, Dzinovic, Miscevic, 2024), Caslav Stoiljkovic, T. Kompirovic, D. Popovic (Stoiljkovic, Kompirovic, Popovic, 2024), and I. Corbacho-Cuello & A. Munoz-Losa (Corbacho-Cuello, Munoz-Losa, 2025) also highlights the importance of practical training for teachers in solving professional tasks. Studies aimed at finding effective pedagogical strategies for the practical preparation of future teachers convincingly demonstrate the significance of using practice-oriented teaching tools (Mansfield, 2022; Altun, Kuduz, Akkan, 2025). It is worth noting that foreign scholars' research is also directed towards identifying modern approaches to implementing practical training for future educators and forming professional readiness for real educational practice (De Smet Cindy, 2024; Kotulakova, 2024; Wheeler, Oyewola, Longhurst, 2025; Birot-Gautron, Kohout, Deyrich, 2025; von Hagen et al., 2025), including the use of digital platforms and

[2] Federal Law «On Education in the Russian Federation» dated December 29, 2012 No. 273-FZ

VR technologies (Cujd kova, Vankus, 2023; Yeflach-Wishkerman, 2024; Long, Zhang, Zeng, 2025).

Within the scope of this study, following a number of scholars (Elizarova et al., 2024; Zemlyanskaya, Bezborodova, 2021; Frolova, 2020; Guruzhapov, 2017; Baiborodova, 2015), the practical training of future teachers is considered a key component of teacher training programs, shaping their readiness for independent professional practice in contemporary conditions.

Despite the active research by scholars into the practical training of future educators, the opinions of university administrators and faculty, students, and employers, who are involved in assessing graduates' readiness for pedagogical work, remain insufficiently explored. In this regard, analyzing the opinions of educational process participants on the forms, content, and outcomes of practical training is crucial for enhancing the quality of teacher education.

Materials and methods

In the logic of a practice-oriented approach to the training of pedagogical personnel, the theoretical basis of the work was formed by the works of V.A. Baiborodova (Baiborodova, 2015), S.G. Guruzhapov (Guruzhapov, 2017), S.G. Kopyeva, V.Yu. Pityukov (Kopyeva, Pityukov, 2012), E.R. Sharipova (Sharipova, 2013), and others.

To develop the theoretical framework of the study, an analysis of publications on research problems, regulatory legal documents regulating the process of practical training in higher education institutions was conducted.

To analyze the experience of implementing practical training for future teachers based on the aforementioned research positions, a questionnaire was developed for surveying 4 groups of participants in the educational process: university management, faculty, students, and employer representatives (see Appendix 1).

The questionnaire included questions aimed at studying perceptions of the forms of organizing practical training for future teachers, the specifics of implementing practical training in universities, including identifying key and promising forms of organization, assessment, and mechanisms for organizing interaction in the process of practical training. Data collection was carried out from June 5, 2025, to June 23, 2025. The study participants were higher education organizations subordinate to the Ministry of Education of Russia, training students in educational programs of UGSN 44.00.00 "Education and Pedagogical Sciences," and partner organizations involved in socio-educational interaction. A total of 1198 people from 5 federal districts participated in the survey:

University management (vice-rectors, deans, heads of departments, heads of educational and methodological units) — 180 people (15%),

University faculty (teachers implementing the content of training within the framework of practical training for future teachers) — 348 people (29%),

University students (3rd-5th year students of pedagogical universities studying pedagogical bachelor's degree programs) — 444 people (37%),

Employer representatives (pedagogical staff of educational organizations participating in the implementation of pedagogical bachelor's degree programs) — 226 people (19%).

The research sample, stratified with cluster selection, is representative, with a margin of error of 3.5% and a confidence interval of 98%. The study was implemented on the principles of anonymity and voluntariness, with participants recruited based on their willingness to participate.

Based on the information obtained from the survey, descriptive statistics methods were used to analyze data on the features of practical training organization in pedagogical universities for each category of study participants and for each section of the questionnaire.

Results

Within the framework of this study, an investigation was conducted to identify both current and prospective forms of organizing practical training for students of pedagogical universities. During the theoretical analysis, key structural-content and administrative-managerial aspects of organizing practical training were identified. These aspects characterize the process of practical training for future teachers from the perspectives of content design and implementation. They reflect the features of practical training in universities and the ongoing changes driven by current demands of educational practice and existing regulatory documents.

To examine existing practices of organizing practical training for future teachers, a questionnaire was developed for four groups of educational process participants: university administrators, faculty members, students, and employer representatives (see Appendix 1). The summarized results of the analysis of information obtained during the study are presented in Table.

Table

Results of the analysis of the information received on the organization of practical training for future teachers at pedagogical universities

	Management staff	Academic staff	Students	Representatives of employers
General questions for all survey participants				
What do you think is included in the system of practical training of future teachers at your university (%)?				
various practices	100%	100%	85%	81%
practical classes, workshops at school/preschool	100%	90%	73%	85%
lectures, practical classes, workshops at the university	100%	88%	71%	81%
organization and/or participation in public and socially significant events	60%	85%	71%	70%
other	10%	10%	4%	0%

	Management staff	Academic staff	Students	Representatives of employers
What forms of practical training are used in your university/ which ones do you consider important (for students and employers), %?				
organization of practice in schools/preschool institutions	100%	85%	92%	92%
organization of practical classes and workshops on the basis of schools/ preschool institutions	95%	43%	69%	81%
organization of practical classes and workshops at the university	100%	83%	88%	67%
organization of project activities on the basis of schools/ preschool institutions	90%	40%	67%	70%
organization of educational events on the basis of schools/preschool institutions	80%	68%	67%	63%
organization of practical training on virtual platforms using simulators, simulators, etc.	25%	8%	25%	30%
other	4%	3%	0%	4%
What forms of intermediate and final attestation are implemented in the system of practical training of future teachers at your university? / In what forms of exams and tests for future teachers have you participated, % ?				
interdisciplinary examination (credit)	95%	73%	92%	59%
project protection	95%	73%	75%	67%
demonstration exam	100%	85%	88%	70%
certification in the format of round tables, conferences, simulation games, etc.	50%	40%	25%	30%
Is the professional and student community involved in the procedure of making proposals to the content of work programs for practical training of future teachers, % ?				
Yes	100%	93%	27%	33%
No	0%	7%	73%	67%
Are there feedback mechanisms for organizing the practical training of future teachers at your university, %?				
Yes	100%	90%	13%	30%
No	0%	10%	87%	70%
Questions for a specific group of participants				
Respondents are university management staff				
What changes were made to the OPOP based on the order of the Ministry of Education and Science of the Russian Federation and the Ministry of Education of the Russian Federation dated August 5, 2020 No. 885/390 «On practical training of students» (attach the file with the curriculum, RAP, competence map as an example), % ?				
the content of work programs of disciplines (modules) and practices has been adjusted				80%
the amount of hours for practical training of future teachers has been increased.				100%
the competence map/ technological competence map has been adjusted				65%
The respondents are university professors				
Have you participated in the process of making changes to the OPOP based on the order of the Ministry of Education and Science of the Russian Federation and the Ministry of Education of the Russian Federation dated August 5, 2020 No. 885/390 «On practical training of students», %?				
in developing the content of work programs of disciplines and practices				63%
in developing a project to change the complexity of the practical training of future teachers				28%
in the development of the competence map/ technological competence map				30%
The respondents are university students				

	Management staff	Academic staff	Students	Representatives of employers
Is your practical readiness for the real working conditions in school/ kindergarten sufficiently formed» , % ?				
Enough				92%
Not quite enough				8%
Not enough				0%
8% of respondents would like to make suggestions to the content of their education in terms of — ΦFormation of competencies in maintaining school documentation, in particular, an electronic journal; — Developing communicative competencies with participants in the educational process; — УReduce the number of practices outside of school, go to all types of practices in school; — Increase in the number of hours in core subjects in the 1st year, allowing you to repeat the school curriculum				
The respondents are representatives of employers				
Are you ready to make suggestions on the content of practical training for future teachers, %?				
Yes				33%
No				67%
33% of the respondents wanted to make suggestions to the content of the training of future teachers in terms of: — Adding hours to the main profile of the discipline; — Cooperation of the student scientific society with gifted schoolchildren, holding Festivals of experimental science; — Strengthening the theoretical and practical training of students in the formation of communicative competencies with different participants in the educational process (parents, teaching staff); — Provide for the possibility for students to obtain additional qualifications (mentoring, tutoring, methods of organizing and conducting “Important Conversations” at school); — Strengthening the digital component of student training; — Focus on the formation of universal competencies in the field of research and project activities; — Increasing the number of weeks for teaching internships at schools, strengthening the mentoring component with working students.				

The survey results illustrate the organization of practical training from the perspectives of The survey results demonstrate the organization of practical training from the perspectives of various participants in the educational process. It should be noted that the opinions of university representatives reflect official approaches to the implementation of the educational process. The responses of students and employers, who are the focus of pedagogical education, provide an opportunity to gain a holistic understanding of the practical training process and to comprehend the expectations from learning outcomes. The analysis of the survey materials revealed that all participants in the study are united in their understanding of the content of practical training for future teachers, and unanimously emphasize the importance of this component in shaping the professional readiness of graduating teachers for independent work.

The research identified that the main forms of organizing practical training are internships and the organization of practical classes and workshops based

at general education organizations and university sites. This format implies close collaboration with experienced mentors, providing students with opportunities for independent planning and conducting classes and events, which contributes to gaining practical experience and developing readiness for real-world practice conditions. Thus, the research confirmed the first tenet of the hypothesis, which states that the forms of practical training established in pedagogical universities align with the Concept for Training Pedagogical Personnel for the Education System of the Russian Federation for the period up to 2030.

The survey results present diverse views on the processes of updating practical training programs. The university administration, possessing an overarching vision of the educational process, provides comprehensive information regarding program adjustments within the university. Faculty members, responsible for their specific program components, are not always involved in content update processes, often functioning as implementers. However, more than half of the survey participants are engaged in the processes of improving educational programs.

The majority of surveyed students and future employers consider practical training sufficient for subsequent pedagogical activity. A smaller portion of responses, highlighting deficiencies, suggests directions for improving teacher training programs.

It should be noted that differences were identified in the assessment of the potential of extracurricular activities in the implementation of practical training for future educators between the management staff and other respondent groups. Students also noted insufficient attention to the application of digital technologies and online platforms in the practical training of future teachers. Students and employer representatives point out insufficient development of skills in preparing school documents, as well as skills for effective interaction with colleagues, students, parents, and administration. Both groups of respondents express interest in increasing the workload of training at educational institutions to gain practical experience.

Thus, the study confirmed the second hypothesis's assumption that perceptions of the most in-demand forms of practical training for future teachers differ among various participants in the educational process. A comprehensive analysis of these opinions allows for a systemic view of the strengths and challenges of current practical training for future teachers and reveals its promising directions.

The suggestion from students and employers to revise the volume of practical training based in general education organizations deserves close attention. It is possible that the current format involves an excessive amount of time spent at the university in conditions that do not always fully reflect the specifics of school work, or perhaps these practices are not always effectively structured to achieve maximum benefit.

Employers' proposals for integrating modern technologies, digital educational platforms, and interactive teaching methods into practical training programs are valuable for increasing the relevance and effectiveness of future educators' preparation.

Therefore, the third assumption of the study's hypothesis, stating that differing perceptions can form the basis for developing conceptual foundations and promising directions for the practical training of future teachers in pedagogical universities, also found its confirmation.

Conclusion

The research yielded the following data:

1. The most common formats for organizing practical training are internships and the organization of practical classes and workshops at educational institutions and university sites, involving close interaction with experienced instructors.

2. An identical understanding of the content of practical training forms was recorded among participants in the educational process, as well as the importance of the practical component in shaping the professional readiness of future teachers.

3. Differences were noted in perceptions of practical training formats, particularly extracurricular activities, and the resources of digital tools, which characterize modern and in-demand approaches to organizing practical student learning.

4. The majority of responding employers and students are satisfied with the results of their practical training.

5. Students and employer representatives equally note a deficit in competencies related to managing school documentation and communication skills with all participants in the educational process. They also suggest reducing the number of internships conducted outside of educational institutions.

Thus, the novelty of the obtained data lies primarily in the conceptual approach to the research, which allows for a systemic view of existing forms and challenges in practical training by correlating the opinions and demands of the main stakeholders involved in the practical training of future teachers, in order to address the tasks of developing pedagogical education. The practical significance of the research lies in the fact that the obtained data can be used by pedagogical education professionals to improve the forms of practical training for future teachers.

Limitations arise from the fact that the study focuses on the experience of organizing practical training for future teachers at pedagogical universities under the jurisdiction of the Russian Ministry of Education. However, the study's sample spans five federal districts, allowing us to identify general trends and specific aspects of practical training for future teachers.

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Appendix

Appendix A. A study of the experience of organizing practical training of future teachers in pedagogical universities. https://doi.org/10.17759/pse.2026000004

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Accuracy of learning goals and academic achievement: a panel study in an online course

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Abstract

Goal setting is widely used in online education and is considered a factor contributing to student motivation and academic performance. However, existing research often overlooks how accurately students formulate their goals and how this accuracy relates to prior learning experience. This study investigates the relationship between goal-setting accuracy and academic performance, as well as the factors associated with setting realistic or unrealistic goals. The analysis draws on panel data from an online preparatory course (N = 426), where students set grade goals before each test. The theoretical framework combines Goal-Setting Theory and Calibration Theory. Random effects panel logistic regression models were used in the analysis. Results show that students who formulate specific grade goals tend to perform better on average. Goal accuracy is positively associated with academic outcomes, while overestimated goals are linked to lower performance and underestimated goals to higher scores. The analysis also reveals that prior knowledge and active course engagement are associated with a lower likelihood of goal overestimation. The paper concludes by emphasizing the need to consider goal accuracy in instructional design and in fostering students' academic self-regulation.

Keywords: goal setting, accuracy of goals, academic performance, calibration, online education

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Точность учебных целей и академическая успешность: панельное исследование на онлайн-курсе

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Резюме

Постановка учебных целей является распространенной практикой в онлайн-обучении и рассматривается как один из факторов, способствующих учебной мотивации и успешности. Однако в существующих исследованиях нередко остаются вне внимания такие аспекты, как точность формулируемых целей и ее связь с предшествующим опытом обучающегося. В статье приводятся результаты исследования, направленного на установление характера взаимосвязи между точностью постановки обучающимися учебных целей и их академической успешностью, а также факторами, ассоциированными с формированием реалистичных или нереалистичных целей. Представлены панельные данные, собранные в рамках онлайн-курса (N = 426), где обучающимся предлагалось формулировать цели в виде ожидаемых баллов перед каждым тестом. Теоретической рамкой послужили теория постановки целей и теория калибровки, в анализе использовались панельные регрессионные модели со случайными эффектами и бинарная логистическая регрессия. Результаты показывают, что обучающиеся, формулирующие цели в балльной форме, в среднем демонстрируют более высокие тестовые результаты. Точность целей положительно связана с академической успешностью, тогда как переоценка — с ее снижением, а недооценка — с более высокими результатами. Выявлена также связь между точностью целеполагания и предшествующим опытом: более высокая учебная активность и уровень знаний по претесту ассоциированы с меньшей вероятностью переоценки. Сделаны выводы о необходимости учитывать точность целей в педагогическом дизайне и развитии учебной самостоятельности обучающихся.

Ключевые слова: целеполагание, точность целей, академическая успешность, калибровка, онлайн-обучение

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Introduction

Learners in online environments face a number of challenges that are less typical of traditional education (Broadbent, 2017; Lee et al., 2019), including decreased motivation and difficulties with self-regulation (Hew, Cheung, 2014; Wong et al., 2019). This makes it important to identify methods for supporting learning activity, with goal-setting practice emerging as one of the promising approaches (Beckman et al., 2021; Clark et al., 2020). According to Goal-Setting Theory (GST), formulating specific and sufficiently challenging goals enhances motivation, focuses effort, and promotes the adoption of effective learning strategies (Locke, Latham, 2002, 2013). The effectiveness of this practice has been confirmed by a number of studies demonstrating its positive impact on academic outcomes (Alessandri et al., 2020; Dekker et al., 2024; Morisano et al., 2010).

Goal setting as a psychological phenomenon is analyzed within different theoretical frameworks. Self-Determination Theory (Deci, Ryan, 2000), self-regulation theory (Zimmerman, 2000), and Expectancy-Value Theory (Wigfield, Eccles, 2000) emphasize the importance of motivational and cognitive factors but pay less attention to the formal characteristics of the goal itself — its specificity, difficulty, and realism. In Russian psychology, goal setting is considered a conscious and metacognitive process (Galperin, 2002; Rubinstein, 2002; Talyzina, 1998); however, these approaches do not provide operational tools for empirical analysis of goals. In this context, Goal-Setting Theory is the most applicable, as it directly links goal parameters with learners' performance outcomes.

According to GST, a goal is a conscious representation of a desired outcome that directs behavior and mobilizes effort (Locke, Latham, 2013). Specific, measurable, and sufficiently challenging goals are considered effective because they activate sustained learning motivation and goal-directed actions (Dobronyi et al., 2019; Morisano, 2013; Van Lent, Souverijn, 2020). Specific goals (e.g., "score 85 points" instead of "prepare for the exam") help learners focus on relevant actions and optimize effort (Clark et al., 2020). Optimally challenging goals stimulate overcoming difficulties, whereas goals that are too easy do not increase motivation, and excessively difficult ones induce anxiety and undermine productivity (Morisano et al., 2010). Goals may be set by the teacher, the learner, or collaboratively (Wood, Locke, 1987); however, research shows that self-set goals have the strongest effect, as they are more closely linked to intrinsic motivation and effort regulation (Bipp et al., 2015; Saks, 2024).

The theory distinguishes different types of goals: task goals, process goals, and score-based goals (Morisano, 2013; Heintalu et al., 2025). The first two types help structure behavior and foster stable learning habits (Clark et al., 2020; Li et al., 2024); however, in the context of this study, score-based goals are of greatest interest, as they are specific, easily comparable with outcomes, and well measurable. According to a meta-analysis by Richardson et al. (2012), setting such goals is one of the most reliable predictors of academic success among non-cognitive factors.

Despite the proven effectiveness of goal-setting practices, a number of interventions show that their impact varies across groups of learners. Possible reasons include differences in motivation (Van Lent, Souverijn, 2020), prior prepara-

tion (Islam et al., 2020; Islam et al., 2024), and environmental conditions (Morisano, 2013). One of the key yet insufficiently studied explanations appears to be variability in metacognitive skills, particularly the ability for accurate goal setting.

Calibration Theory (Calibration Theory; Bol, Hacker, 2012; Winne, Jamieson-Noel, 2002) explains such differences through the degree of correspondence between subjective judgments of knowledge and objective performance. Learners with high metacognitive calibration accuracy (alignment between perceived and actual knowledge levels) are aware of their strengths and weaknesses, which helps them formulate realistic goals and use effective strategies (Hadwin, Webster, 2013; Stone, 2000). Insufficient metacognitive calibration leads to inadequate preparation, poor task selection, and lower academic performance (Dunlosky, Rawson, 2012). Overconfidence or underestimation may hinder appropriate goal setting, reducing the effectiveness of goal-setting practices.

Importantly, metacognitive calibration is not a fixed personality trait but a dynamic characteristic shaped by learning experience and feedback (Hacker et al., 2008; Osterhage et al., 2019). Thus, prior performance and activity (e.g., watching lectures) may contribute to more accurate self-assessment and, consequently, improve goal-setting accuracy (Knight et al., 2022). A well-calibrated learner is able to formulate goals that match task difficulty, leading to higher performance (Hadwin, Webster, 2013).

This study integrates the principles of Goal-Setting Theory (Locke, Latham, 2013) and Metacognitive Calibration Theory (Bol, Hacker, 2012). The former emphasizes the importance of specific and attainable goals for learning success, while the latter highlights the role of accurate self-assessment as a condition for formulating such goals. Combining these approaches makes it possible to consider score-based goal setting as a behavioral indicator of learning self-regulation, and goal setting accuracy as an operationalized measure of metacognitive calibration.

The focus of this study is the relationship between goal setting accuracy, academic performance, and learners' prior learning experience. Based on the integrated theoretical framework, it is assumed that goal accuracy is associated with test performance, while its formation depends on prior achievement and learning activity. Thus, goal setting is conceptualized as a dynamic process embedded in a sequence of learning actions and feedback.

Analyzing such relationships requires a research design that accounts for changes in the behavior of the same learner over time and the influence of prior experience on subsequent decisions and outcomes. Accordingly, this study uses panel data, which makes it possible to track the dynamics of goal setting and its accuracy across tests. The aim of this study is to examine the relationship between goal setting accuracy and academic performance, as well as the factors associated with the formation of realistic or unrealistic goals. The study addresses the following research questions:

- How is the act of setting a score-based goal for a test related to the results of the current test?
- How is goal setting accuracy in score-based goals related to the results of the current test?
- How are prior test results and instances of goal setting related to goal setting accuracy in score-based goals?

The next section presents the research design and analytical strategy used to address these questions.

Materials and methods

Research design. Metacognitive calibration is understood as the degree of correspondence between subjective judgments of knowledge and actual performance (Bol, Hacker, 2012). In this study, goal setting accuracy is operationalized as the difference between the score-based goal and the actual test result. The smaller this difference, the higher the accuracy, reflecting realistic self-assessment. Large deviations, either overestimation or underestimation, are interpreted as indicators of low metacognitive calibration.

Score-based goals represent a narrow but precise metric that allows for quantitative comparison between intentions and outcomes (Bipp et al., 2015; Moeller et al., 2012). This type of goal is widely used in online courses (Clark et al., 2020; Wong et al., 2019; Wong et al., 2021) and enables a focus on the measurable aspect of goal setting.

To analyze the relationship between prior behavior and goal setting accuracy, panel data collected in five waves were used. At each stage, learners set a goal for an upcoming test, then participated in learning activities over the course of a month (webinars, assignments), after which they completed the test.

Course description. The study was conducted in a six-month online course preparing students for the Unified State Exam in literature. The course was fee-based and took place outside the formal school curriculum. It included 67 webinars (three per week) covering key exam topics.

Goal setting was implemented as follows: after completing each practice test, learners were prompted to set a target score they aimed to achieve on the next test. This prompt appeared in their personal account within the Learning Management System (LMS) as an automated notification: “What goal would you like to set for the next test?” The learner independently entered a numerical value from 0 to 100, which was stored in the system and displayed upon subsequent logins until the next test was taken. Thus, the set goal remained constantly visible and could serve as a reference point during preparation.

Goal setting was not mandatory: learners could choose not to set a goal without any penalties or reminders. Course instructors deliberately did not intervene in this process — they did not provide recommendations on setting realistic or ambitious goals and did not comment on the chosen values. The entire procedure was designed to ensure maximum learner autonomy, eliminating external pressure or adjustment to perceived instructor expectations. This approach made it possible to collect data on spontaneous, uninstructed goal setting, reflecting individual strategies and subjective self-assessment.

The goal was recorded once between two tests and could not be changed after submission. This ensured measurement stability and eliminated the effect of “retrospective adjustment”. All goals were automatically stored in the LMS database alongside test scores and other learning activities.

Sample. The study included 426 learners enrolled in the online course. The sample consisted of 92% female and 8% male participants. Learners’ ages ranged from 16 to 18 years. Upon enrollment, all participants signed a consent form allowing their LMS data to be used for analysis and publication within the study and were

included in the sample. The data were anonymized and structured in panel format with five waves of observation, corresponding to five completed tests and the preceding preparation periods.

Variables. Academic performance was measured by test score (0–100), and initial proficiency by a pretest score. Goal-setting behavior was a binary variable ("yes" / "no"). Goal setting accuracy was defined as a categorical variable with three values: "accurate" (within ±10 points of the actual score); "underestimation" (goal < result by more than 10 points); "overestimation" (goal > result by more than 10 points). This approach preserved the direction of error, which is not possible when using the absolute value of the difference. A single participant could fall into different categories across waves. Prior behavioral variables included: previous test score, goal-setting on the previous test, and the percentage of webinars watched (calculated as the proportion of viewed webinars out of those available between two tests). Descriptive statistics for the variables used in the study are presented in Table 1.

Analytical strategy. Since the study focuses on the dynamics of goal-setting practices and their relationship with prior learner behavior, the primary method of analysis is panel regression with random effects. This model was chosen because it allows for the simultaneous consideration of between-individual differences (differences across learners) and within-individual changes (changes within the same learner across observation waves). This is critically important when studying variables such as goal setting and its accuracy, which may vary for the same learner from test to test (Baltagi, 2021; Hacker et al., 2008).

Random-effects models allow for correct estimation of relationships between key variables in the presence of unobserved individual heterogeneity — stable characteristics such as self-regulation tendencies, overall motivation level, thinking style, etc., which could bias results in standard regression models. Unlike fixed-effects models, random-effects models allow for generalization to the population level and retain between-participant variation (Hsiao, 2007). The analysis was organized in three stages corresponding to the three research questions.

To address the first research question — whether the act of goal setting is asso-

Table 1

Descriptive statistics

Numerical variables	N	Mean	St. dev.	Min.	Max.
Current test score	1198	45,4	23,5	0	100
Pretest	1745	33,7	19,6	0	85
Percentage of viewed webinars	1704	45,8	41,0	0	100
Categorial variables	**N**	**Share of total observations, %**			
Goal setting: yes	1026	48			
Goal setting: no	1104	52			
Goal setting accuracy: underestimated	237	28			
Goal setting accuracy: estimated correctly	267	31			
Goal setting accuracy: overestimated	357	41			

ciated with current test performance — a linear random-effects regression model was used:

• *Current test score (0–100) ~ goal-setting (yes/no) + pretest score (0–100) + percentage of webinars viewed (0–100%)*

This model allows coefficients to be interpreted both as differences between learners who tend to set goals and those who do not, and as within-individual changes in performance when the same learner starts or stops setting goals.

The second model tests the hypothesis that goal setting accuracy is associated with performance. A linear random-effects regression was also used, with goal setting accuracy as the key predictor:

• *Current test score (0–100) ~ goal setting accuracy (accurate — reference category, overestimation, underestimation) + previous test score (0–100) + prior goal-setting (yes/no) + pretest score (0–100) + percentage of webinars viewed (0–100%)*

This specification accounts for prior performance and activity, which may be related both to goal setting and subsequent outcomes.

The third research question examines the reverse direction: whether prior experience (performance, activity, goal setting) is associated with how accurately learners formulate subsequent goals. Since the dependent variable (goal setting accuracy) is categorical with three values, two separate binary logistic random-effects models were estimated:

• *Goal setting accuracy (probability of overestimation vs. accurate) ~ previous test score (0–100) + prior goal-setting (yes/no) + percentage of webinars viewed (0–100%) + pretest score (0–100)*

• *Goal setting accuracy (probability of underestimation vs. accurate) ~ previous test score + prior goal-setting + percentage of webinars viewed (0–100%) + pretest score (0–100)*

This approach allows each type of deviation to be analyzed separately, which is important because overestimation and underestimation may have different psychological origins and consequences for learning behavior and motivation (Dunning et al., 2003; Ng, Earl, 2008). Splitting the analysis into two models enables precise interpretation of which behavioral or performance-related factors are associated with each type of goal-setting error, avoiding information loss inherent in a single multinomial model with a common baseline category. This analytical approach makes it possible not only to identify stable relationships between variables but also to clarify the direction of these relationships: from behavior to goals and from goals to outcomes. This provides a deeper understanding of the mechanisms through which goal setting may both facilitate and hinder academic success.

Thus, the analytical strategy is directly aligned with the logic of the research questions: first, the relationship between goal-setting behavior and performance is assessed; second, the role of goal setting accuracy is examined; and finally, the reverse relationship is analyzed — the influence of prior experience on the formation of goal accuracy. The next section presents the results of the sequential testing of these models.

Results

How is participation in goal-setting practice related to current test performance?

The results of the first stage of analysis showed that the act of setting a score-based goal is a significant predictor of the current

test score (Table 2). Specifically, participation in goal-setting practice was associated with an average increase of 6,55 points in test performance ($p < 0,001$). In addition, a one-point increase in the pretest score was associated with a 0,39-point increase in the current test score ($p < 0,001$). Finally, a one-percentage-point increase in the share of viewed webinars was associated with a 0,18-point increase in the current test score ($p < 0,001$). Importantly, these results hold both for comparisons between groups of learners (those who set goals vs. those who did not, on average) and for within-individual comparisons across observation waves.

How is goal setting accuracy in score-based goals related to current test performance?

The second stage of analysis showed that goal setting accuracy is a significant predictor of the current test score (Table 3). Compared to the reference group of learners who accurately assessed their expected results, those who tended to overestimate their goals scored on average 19,26 points lower ($p < 0,001$). Conversely, learners who tended to underestimate themselves scored on average 16,50 points higher than the reference group ($p < 0,001$). Learners' prior knowledge and course activity also played an important role. A one-point increase in the pretest score was associated with a 0,25-point increase in the current test score ($p < 0,001$). Similarly, a one-percentage-point increase in webinar viewing was associated with a 0,07-point increase in the test score ($p < 0,001$). Prior behavior also mattered: a one-point increase in the previous test score was associated with a 0,22-point increase in the current test score ($p < 0,001$). In addition, learners who set a score-based goal for the previous test achieved significantly higher results, scoring on average 2,82 points higher on the current test than those who did not set a goal in the previous wave ($p < 0,05$). These results are also consistent both across groups and within individuals across observation waves.

How are prior test result and goal-setting behavior related to goal setting accuracy in score-based goals?

For learners who either overestimated their goals or assessed them accurately, the previous test score was a significant predictor of goal setting accuracy, whereas prior goal-setting behavior was not (Table 4). A one-point increase in the previous

Table 2

Estimates of a linear random effects regression model of the relationship between fact of goal setting and current test scores

Dependent variable — current test score		
Variable	**Estimate**	**Standard errors**
Goal setting: yes	6,55***	(1,56)
Pretest	0,39***	(0,04)
Percentage of viewed webinars	0,18***	(0,02)
Estimate	12,43***	(2,18)
Скорректированный R^2 / Adjusted R^2	0,157	

Note: *** — *p*-value < 0,001.

Table 3

Estimates of a linear random effects regression model of the relationship between goal setting accuracy and current test scores

Dependent variable — current test score		
Variable	**Estimate**	**Standard errors**
Goal setting accuracy: overestimated	–19,26***	(1,29)
Goal setting accuracy: underestimated	16,50***	(1,38)
ПPretest	0,25***	(0,03)
Percentage of viewed webinars	0,07***	(0,02)
Previous goal setting: yes	2,82*	(1,11)
Previous test score	0,22***	(0,22)
Intercept	25,19***	(2,15)
Adjusted R^2	0,531	

Note: *** — *p*-value < 0,001; * — *p*-value < 0,05.

test score was associated with an increase of 0,018 in the log-odds of overestimating the goal (compared to accurate estimation) (p < 0,001). Prior knowledge and learning activity also played an important role. A one-point increase in the pretest score was associated with a decrease of 0,020 in the log-odds of overestimation (compared to accurate estimation) (p < 0,001), and a one-percentage-point increase in webinar viewing was associated with a decrease of 0,012 in the log-odds of overestimation (p < 0,001).

At the same time, for learners who either underestimated their goals or assessed them accurately, neither prior goal-setting behavior nor the previous test score were significant predictors of goal setting accuracy. The only statistically significant independent variable associated with goal

Table 4

Estimates of a linear random effects regression model of the relationship between prior learning behavior and goal setting accuracy

Dependent variable — goal setting accuracy		
Variable	**Model 1. Estimated accurately VS overestimated**	**Model 2. Estimated accurately VS underestimated**
Previous goal setting: yes	–0,349	–0,170
	(0,222)	(0,227)
Previous test score	0,018***	0,001
	(0,007)	(0,006)
Pretest	–0,020***	–0,002
	(0,008)	(0,007)
Percentage of viewed webinars	–0,012***	0,008*
	(0,003)	(0,004)
Intercept	1,397***	–0,564
	(0,405)	(0,442)

Note: standard errors are shown in brackets; *** — *p*-value < 0,001; * — *p*-value < 0,05.

setting accuracy was the share of viewed webinars. On average, a one-percentage-point increase in webinar viewing increased the log-odds of underestimation by 0,008 ($p < 0,05$).

The presented results confirm that goal setting accuracy plays an independent role in academic performance and is shaped by prior experience. For a deeper understanding of the observed patterns, it is necessary to consider them in the context of Goal-Setting Theory and Metacognitive Calibration Theory, as well as to compare them with findings from previous research.

Discussion

The analysis showed that learners who formulate specific score-based goals demonstrate higher performance both in current and subsequent tests. These findings are consistent with the propositions of Goal-Setting Theory, which emphasizes the importance of specific, measurable, and optimally challenging goals (Locke, Latham, 2013; Moeller et al., 2012). From the perspective of the cultural-historical and activity-based paradigm, this finding can be explained by the fact that setting a specific goal facilitates the internalization of the learning task and the formation of personal meaning in action (Galperin, 2002; Talyzina, 1998), which increases the intentionality and effectiveness of learning behavior. Thus, the goal-setting practice implemented in the course is indeed associated with academic success.

The relationship between overestimation of goals and lower performance appears logical and aligns well with calibration theory, which posits that inaccurate calibration may lead to overestimation of one's abilities and result in poorer outcomes due to the selection of inappropriate learning strategies (Alexander, 2013; Hattie, 2013; Winne, Jamieson-Noel, 2002). Our data confirm that this mechanism extends to goal-setting practices: learners who overestimate their abilities tend to set overly ambitious goals that not only fail to enhance motivation but also prove unattainable, negatively affecting their performance (Dunlosky, Rawson, 2012; Hadwin, Webster, 2013; Karaca et al., 2023; Muis et al., 2016). The observed relationship between accuracy and performance is consistent with the idea that calibration has a distinct metacognitive basis influencing strategy selection and effort allocation, rather than being reducible to "general ability" or motivation (Behrendt et al., 2024). From the perspective of the theory of step-by-step formation of mental actions, such overestimation may indicate an underdeveloped orienting basis, where the learner lacks a complete understanding of the task and the conditions for its successful completion (Galperin, 1985; Podolsky, 2017; Talyzina, 1998). In this case, the goal is not supported by an adequate internal plan, which undermines the effectiveness of action.

At the same time, the observed positive relationship between goal underestimation and higher performance raises more questions and requires a more nuanced explanation. According to classical views within calibration theory, underestimation should lead to lower academic performance (Hattie, 2013). One possible explanation is that underestimation reflects a mature metacognitive stance characterized by caution and self-monitoring. This is consistent both with international research emphasizing the compensatory nature of underestimation (Hadwin, Webster, 2013) and with Russian perspectives that view developed reflexivity as a condition for

voluntary regulation (Glazunov, Sidorov, 2017; Rubinstein, 2002). Moreover, in line with the ideas of Tikhomirov and Rubinstein, moderate underestimation may reflect a reflective control orientation, in which the individual does not rely on intuitive judgments but actively monitors both the process and the outcome of actions, thereby ensuring their reliability.

It is important to note that a common practice in the instructional design of online courses is to encourage learners to set ambitious and high goals in order to increase motivation and academic achievement (Lent, 2019; Morisano et al., 2010; Van Jaarsveld et al., 2025). However, the results of this study suggest that such an approach may not meet expectations and may even be counterproductive for some learners. The formation of an adequate goal requires engaging the learner in full-fledged learning activity, where the goal is not externally imposed but emerges as an internally appropriated motive (Leontiev, 2001; Talyzina, 1998). Therefore, simply adopting "high" goals without proper awareness of one's capabilities cannot be effective. These findings highlight the importance of developing and implementing interventions aimed at fostering accurate self-assessment and appropriate calibration of goals, as well as teaching effective goal-setting strategies.

The relationship between learners' prior behavior and goal setting accuracy was also analyzed. The model in which the dependent variable was goal setting accuracy with the categories "accurate" and "overestimation" produced results substantially different from the model comparing "accurate" and "underestimation." Specifically, the first model shows that a high score on the previous test increases the likelihood of goal overestimation, whereas course activity (measured by webinar viewing) and a high level of prior knowledge (pretest score) reduce this likelihood. At the same time, the fact of having set a goal for the previous test was not a significant predictor of overestimation. This pattern may reflect a disruption of reflective control following situational success. According to Talyzina (1998), excessive confidence combined with insufficient awareness may distort the internal model of the task and lead to inadequate goal setting.

These results suggest that past success may generate unwarranted confidence, which can lead to insufficient preparation for subsequent tests (Hattie, 2013; Ng, Earl, 2008). However, the mitigating effect of prior knowledge and course activity on goal overestimation indicates that active engagement in learning and a higher level of prior knowledge can help counteract the tendency to overestimate goals. This suggests that even learners with high academic performance benefit from actively monitoring their learning process and adjusting their expectations based on concrete evidence (Dinsmore, Parkinson, 2013).

In contrast, the model estimating the probability of goal underestimation compared to accurate goal setting did not reveal significant relationships with prior learner behavior or pretest performance. The only significant predictor of underestimation was the proportion of webinars viewed, which may indicate that active engagement in the learning process contributes to a more conservative and possibly more cautious assessment of one's abilities.

This result for the underestimation model can be explained within calibration theory as follows: underestimation of one's abilities is not necessarily related to the ob-

jective level of knowledge or prior success but may reflect a self-regulation strategy aimed at reducing anxiety and maintaining motivation by setting more attainable goals (Muis et al., 2016). Active participation in learning activities, such as watching webinars, may contribute to the development of a more realistic and possibly more critical self-assessment, leading to lower but more pragmatic goal setting (Hacker et al., 2008). Thus, underestimation may function as an adaptive mechanism that allows learners to maintain motivation and avoid disappointment, even if it is not directly linked to objective indicators of their prior academic performance.

Conclusions

The present study established relationships between goal setting accuracy, learners' prior experience, and their academic performance. The findings confirmed that goal setting accuracy is a significant predictor of academic achievement: overestimation of one's abilities and the setting of excessively ambitious goals are associated with a substantial decrease in test performance. At the same time, learners' prior experience influenced the likelihood of goal overestimation but was not a significant factor associated with the tendency to underestimate goals. These findings are relevant both for researchers in the field of goal-setting theory and practice, highlighting the importance of accurate calibration of one's abilities in the goal-setting process, and for educators and designers of educational interventions aimed at improving the effectiveness of learning.

Limitations. It's important to acknowledge the limitations of this study. Firstly, the research was conducted within the context of a single literature course. While the subject-matter specifics are not expected to significantly impact the goal-setting process within the context of this study, this fact limits the generalizability of the results, and their interpretation should be undertaken with a degree of caution.

Secondly, the sample predominantly consists of female students. This is due to the fact that girls more frequently choose to take the Unified State Exam (EGE) in Literature and, consequently, more often attend preparation courses for this exam (Zamyatnina, 2017). Given the evidence suggesting potential gender differences in goal-setting processes, the obtained results may reflect the specific characteristics of the female student group (Brandts et al., 2021). This imposes limitations on the possibility of generalizing them to a broader context. In light of this, verifying the identified relationships on a more gender-balanced sample represents a promising avenue for future research.

Finally, the study did not consider important psychological factors such as student motivation and self-efficacy, which are traditionally associated with the goal-setting process and can influence its dynamics (Saks, 2024). The decision to forgo the use of survey methods and observations to measure these constructs was a conscious choice, aimed at expanding the sample size and ensuring a robust panel design. That said, the panel regression with random effects accounts for the heterogeneity of unobserved variables, allowing us to omit motivation and self-efficacy in this analysis (Baltagi, 2021). Nevertheless, including these factors in future research could enhance the completeness of our understanding of goal-setting processes.

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Conflict of interest

The authors declare no conflict of interest.

Конфликт интересов

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Ethics statement

This research is based solely on the analysis of users' digital footprints, i.e., non-reactive information collected automatically. No personal data was collected in the course of the study, and all analyzed information was fully anonymized. In accordance with the internal regulations of HSE University, research that relies exclusively on non-reactive, anonymized data does not require mandatory ethical review.

Декларация об этике

Данное исследование основано исключительно на анализе цифровых следов пользователей, то есть нереактивной информации, собранной в автоматическом режиме. В рамках работы не осуществлялся сбор каких-либо персональных данных, и вся анализируемая информация была полностью анонимизирована. В соответствии с внутренними нормативными документами НИУ ВШЭ исследования, работающие исключительно с нереактивными, анонимизированными данными, не требуют обязательной этической оценки.

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Научная статья | Original paper

The diagnostics of learning activity in the digital gaming environment

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Abstract

Context and relevance. Digital gaming environments are widely used for diagnostics and development of students and their specific abilities, for example, S. Papert's approach of teaching programming. The important feature of game environments is the students' autonomy in setting learning tasks. Therefore, games have great potential for the development of generalized ways of actions while solving practical problems. **Objective.** This study, based on the approach of V.V. Davydov, L.V. Bercfai, V.V. Rubtsov, A.M. Medvedev and Y.V. Gromyko, is dedicated to the diagnostics of learning activity of middle school students when working in digital game environment created for learning programming. **Hypothesis.** The work forms a hypothesis about the possible levels of learning activity in the digital game environment, which allows combining direct operations on objects represented in the game with the program control of these objects with the help of the special visual language. **Methods and materials.** The diagnostics was based on the educational game «Apiary Defence», developed in the framework of the National Cyberphysical Platform «Berloga». The study involved 189 students (163 males, 26 females) in grades 4–7, mean age 12,2 (SD = 1,04). **Results.** The diagnostic results showed that independent individual progress of students in a digital game environment does not allow them to reach high levels of learning activity, including overcoming the sign naturalization of the visual tools of the game. This result is not related to the students' class. **Conclusions.** The further study of the psychological mechanisms underlying the transition from the mastering of individual operations to the formation of generalized ways of problem solving is related with the conduct of a forming experiment, which can be based on joint collective activity of students.

Keywords: digital game environments, learning activity, modeling, notional machine, programming, sign naturalization

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Диагностика учебной деятельности в игровой цифровой среде

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Резюме

Контекст и актуальность. В настоящее время широкое распространение получили цифровые игровые среды, продолжающие идеи С. Пайперта и направленные на развитие учащихся и формирование у них способностей, связанных с программированием. Такие среды провоцируют самостоятельные действия учащихся в постановке ими учебных задач, тем самым имеют потенциал формирования учащимися обобщенных способов действия при решении практических задач. **Цель**. Данное исследование, развивающее подход В.В. Давыдова, Л.В. Берцфаи, В.В. Рубцова, А.М. Медведева и Ю.В. Громыко, направлено на выявление психологических условий и механизмов освоения учебной деятельности учащимися средней школы при работе в цифровой игровой среде, созданной для изучения программирования. **Гипотеза**. В работе формулируется гипотеза о наличии нескольких уровней освоения учебной деятельности — от освоения отдельных операций над объектами до формирования обобщенных способов действия в цифровой игровой среде, которая позволяет сочетать операции над представленными в игре объектами с программным управлением данными объектами с помощью визуального языка. **Методы и материалы**. В диагностике использовались результаты прохождения образовательной игры «Защита пасеки», разработанной в рамках Национальной киберфизической платформы «Берлога». В исследовании приняли участие 189 учащихся (163 мальчика, 26 девочек) 4–7 классов, средний возраст — 12,2 лет (стандартное отклонение — 1,04). **Результаты.** Результаты диагностики показали, что индивидуальный опыт учащихся в игровой цифровой среде не позволяет выйти на высокие уровни освоения учебной деятельности, в т.ч. преодолеть знаковую натурализацию визуальных инструментов игры. Достигаемый учащимися уровень не связан с классом обучающегося. **Выводы**. Для последующего изучения психологических механизмов, лежащих в основании перехода от освоения отдельных операций к формированию обобщенных способов решения задач, необходимо провести формирующий эксперимент, в основе которого может лежать совместная коллективно-распределенная деятельность учащихся.

Ключевые слова: знаковая натурализация, игровые цифровые среды, идеальный компьютер, моделирование, программирование, учебная деятельность

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Introduction

Currently, digital environments are widely used in teaching and diagnosing the development of schoolchildren, including specially designed forms of organizing educational material in accordance with educational goals. A special place among such training and diagnostic environments is occupied by digital games. At the same time, a wide range of positions can be found in domestic and foreign literature regarding the use of digital games in working with preschoolers and primary and secondary school students (Rubtsov et al., 1987; Rubtsov, 2024; Salomatova et al., 2024; Fedoseev et al., 2025). When considering digital gaming environments, the high degree of independence of students' learning actions in the game is of particular interest, which is reflected in the emergence of theories that continue the ideas of J. Piaget, such as the constructionism of S. Papert, which formed the basis for teaching programming to schoolchildren (LaPrade, Lassiter, 2023).

Within the framework of the tradition of cultural-historical psychology, a special role is played by considering *learning activity* aimed at identifying and mastering generalized methods of action by students. Within the framework of the concept of developmental teaching, V.V. Davydov distinguished *the learning task*, which, through the implementation of learning actions, restores the initial relation of the studied system of concepts underlying the generalized methods of action (Davydov, 1996). Creating an environment for students to independently set learning tasks and provide pedagogical support for the process of mastering the activity content of education is a key challenge in the context of digitalization of modern life and schools (Loksa et al., 2022; Gromyko, 2023). Therefore, the issue of adequate use of digital gaming environments for diagnosing the psychological development of schoolchildren becomes particularly relevant.

This article discusses approaches to the diagnosis of learning activity based on specially organized digital environments within the tradition of V.V. Davydov, V.V. Rubtsov and Y.V. Gromyko. The proposed diagnostics of educational activities in a digital gaming environment continues the work of L.V. Bertsfai and A.M. Medvedev on the study of the processes of mastering generalized methods of action by schoolchildren.

Research of learning activity in gaming and digital environments

Diagnostics of learning activity in the context of solving learning problems involves the use of a genetic modeling method aimed at studying mental functions in the course of their formation, in specially organized experimental conditions (Medvedev, 2010). This method allows us to study the development of children in unity with the processes of their education and development (Gromyko, Davydov, 1994). Within the framework of a *formative experiment* implemented in this way, the elements of pedagogical influence are introduced into the very structure of the experiment, so that the researcher actively intervenes in the processes under study. "Its implementation involves designing and modeling the content of new psychical functions, the means and ways of their formation, it allows us to study the conditions and patterns of their origin" (Gromyko, Davydov, 1994, p. 32). Similar work was done by V.V. Davydov when forming the concept of a number in younger schoolchildren, and for secondary school students this method was applied

by A.A. Ustilovskaya to form the concept of a geometric object (Ustilovskaya, 2008). This method is also associated with the study of the mechanisms *of sign naturalization* in solving educational and practical problems (Ustilovskaya, 2008; Medvedev, 2010), that is, operating signs without restoring their original content.

When implementing the genetic modeling method, electronic and digital media were repeatedly used to diagnose new psychical functions in the educational activities of primary and secondary school students (Medvedev, 2010). In this regard, we can single out the experiment of L.V. Bertsfai, aimed at diagnosing the acceptance of a learning task by younger schoolchildren in the framework of solving a practical problem (Bertsfai, 1981). For diagnostics, a special electronic device was designed in which students had to move a figurine using several control buttons (see Fig. 1-a). If the subject had difficulties, the experimenter put him in a situation of *self-learning* the control logic in a given system to understand how the buttons and the movement of the figurine on a "clean" platform relate. After that, the task became more complicated, and the functionality of the buttons changed imperceptibly for the subject. The authors were able to demonstrate that students of the experimental class, when confronted with a modified problem, solved it in a theoretical way due to the fact that during the execution of mental research work, they identified the general principle of communication between the movement of the figurine and the buttons on the remote control. Actually, the participants *reconstructed* the connection laid down in the system by the organizers (Davydov, 1996, pp. 189–191).

A subsequent review of the Bertsfai experiment raised the question of what was the genetically initial attitude of the organization of this movement system that the subjects identified and mastered (Medvedev, 2010). If the original relation is a subject of modeling, then in what abstraction (concept, model) was it recorded by them? Isn't this experiment just a detection of *the construction process of an indicative basis for practical action* without identifying the most genetically original relationship in the sign-symbolic plan? Developing the line given by L.V. Bertsfai, A. M. Medvedev proposed an experiment based on the computer technique "Square" (see Fig. 1-b). The subjects were given the practical task of converting a square from its initial state to its final state taking into account the positions of the elements of the square, while performing consecutive "shift" actions. As in

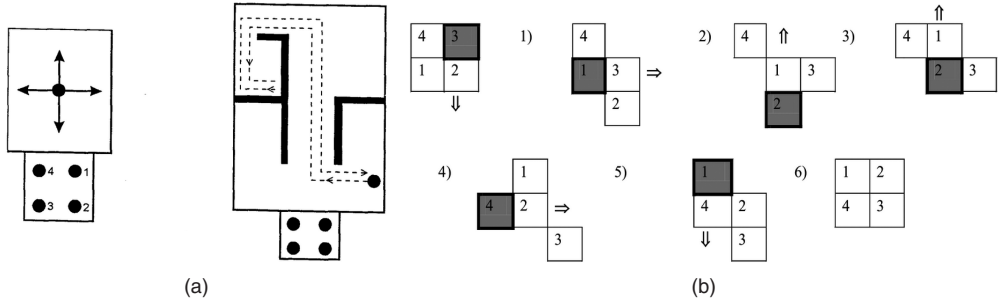

Fig. 1. The diagnostics of learning tasks set by schoolchildren

the experiment of L.V. Bertsfai, participants had to distract themselves from a particular practical problem and go out to find a general way — to transform the original square into *any* other, for which it was no longer enough to perform elementary operations and keystrokes, it was necessary to enter their own sign mediation (model). In the course of working with the test students of the 5th grade, A.M. Medvedev managed to identify separate phases of the formation of a generalized method: natural operation (describing what is happening in the language of "clicks"), direct transformations (establishing the boundaries of possible and expedient transformations) and sign mediation (constructing a solution in sign-symbolic means, for example, "a circle movement").

This paper continues the logic of subjects' orientation to mastering the generalized method set in the experiments of L.V. Bertsfai and A.M. Medvedev. We suggest a step towards constructing an experimental scheme based on controlling the virtual digital environment both by direct operations on objects and by programming using a special sign system. If, summarizing the results of the considered experiments, we imagine a virtual digital environment as a combination of two sign environments: a) objects that are controlled by the subject; b) actions and operations that are available to him and are represented in different signs — one can select a relationship or model that connects these environments. Otherwise, if one does not restore the presence of both sign environments and the relationships between them, the user of the digital environment finds himself in a situation of sign naturalization, when operations do not restore the original relationships.

In accordance with this theoretical approach, the subject while solving a practical problem should first be put in the situation of trying to act using the proposed operations of the game environment. This step is accompanied by a sign naturalization of his work in the system. On the second step the subject should overcome the sign naturalization by restoring the original relationship from the game environment system according to *ideal computer* (notional machine) of the system (Grover, Pea, 2013; Munasinghe, 2023; Tenenberg, 2024), which defines all possible variants of the game dynamics.

This type of models probably is the most fundamental and important for secondary school students, since it allows them to answer the question of the value of using computer-based systems as a kind of sign-dynamic *model for organizing and regulating the processes of the physical world*. By mastering the relationship between a dynamic process within a digital environment and the computational model embedded in its device, a computer-based computing system as a model can become a method of organizing student activities. To do this, the student must learn to identify the relationship between the dynamic process of the digital environment and the computational model, describe it in signs that do not coincide with the signs of the digital environment itself. Such an action will mean overcoming the sign naturalization of the programming environment, reaching the relation of the dynamic process of the system and the computational model, its initial abstraction or the "germ cell".

The diagnostic environment based on the educational video game "Berloga: Apiary Defence" was used to diagnose the development of learning activities as the first stage in the design of this formative experiment.

Digital game environment “Berloga: Apiary Defence”

New opportunities for diagnosing the development of students’ learning activities are offered by the digital game environment — the video game “Berloga: Apiary Defence”[1], created within the framework of the National Cyber-physical Platform “Berloga”[2]. The video game was aimed at introducing students in grades 5–7 to the basics of programming. “Berloga: Apiary Defence” is not just an educational simulator with gamification elements, but a full-fledged strategy video game, which at the same time has a built-in programming capability. A player must protect an apiary from the invasion of hostile drones controlled by artificial intelligence, using protective drones, performing simple operations: placing them for the upcoming battle and directly giving them commands (see Fig. 2). In fact, the game is a virtual control environment, and the described part of the game forms *a plan for operational management* of objects-drones in the game.

The game contains two co-organized plans — the gameplay of a strategic game and the programming actions to change the automatically performed functions the drones. The second plan is an activity upon the activity of a strategic video game, which determines the processes of setting a learning task and finding a common way to solve it (Konokotin, 2021).

Fig. 2. The main screen of the video-game “Apiary Defence” which allows to perform operations on objects

[1] The educational video game “Berloga: Apiary Defence” — https://platform.kruzhok.org/apiary
[2] The National Cyber-physical Platform “Berloga” — https://platform.kruzhok.org/mission

At any given time, a player can “look under the hood” of their drones and see what algorithm determines their operation, as well as modify or construct the logic of the drone’s actions from scratch. The game uses the visual programming language of extended hierarchical state machines, which is unusual for a modern schoolchild, and is the de facto industry standard for programming autonomous systems (Voevodin et al., 2024; The Preliminary National Standard..., 2024). It is specially adapted for beginners[3]. Drone programs are edited in a separate window, forming an alternative action plan for a player — *a sign substitution of the object control actions* using the programming language. A player gets the opportunity to operate with signs that turn out to be “collapsed” particular actions of the drone in the game (Fig. 3). This aspect of the game will be discussed in more detail in the next section of this article.

This digital gaming environment has a great potential for conducting psychological and pedagogical research due to its popularity and the ability to analyze data on player actions. So, by the beginning of 2025, the game was downloaded and installed 25 thousand times, and the results of more than 8,5 thousand players became available for analysis. Game statistics are collected anonymously, but players are given the opportunity to connect the game to the digital platform

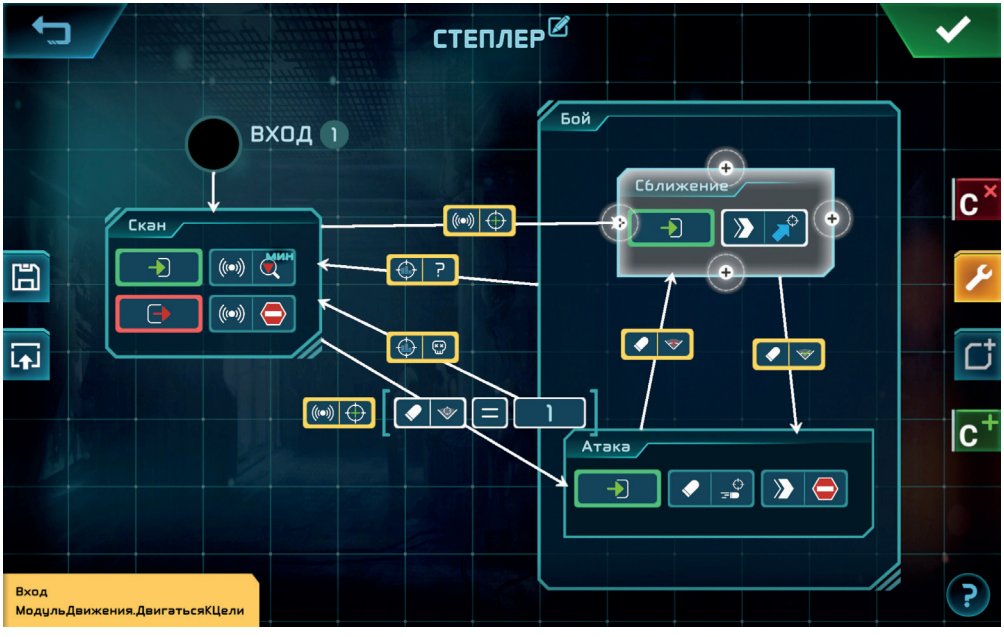

Fig. 3. The program editing screen with a hierarchical extended state machine of a drone from the game

[3] Programming in Berloga: the learning materials — https://platform.kruzhok.org/programming

"Talent"[4] of the NTI Kruzhok Movement, thereby linking game achievements to personal data of the student (age, grade, etc.) The game is included in the implementation of extended education programs based on organizations in the Republic of Bashkortostan (more than 100 organizations), the Novosibirsk region, St. Petersburg and other regions.

The game allows researchers to conduct comprehensive research, including long-term studies on mastering programming and related abilities, such as modeling, construction, etc. Statistics of game sessions allow one to get a general idea of the nature of the game and the resulting gaming experience. Thus, when considering the typical scenario of a novice player (game time no more than 3 days, etc.) for the years 2022-2024, we can select a subset of 5,5 thousand players. For such players, the following fact is typical: only a quarter of them have ever turned to programming in the game. The graph shows the distribution of such players by the number of their own programs created for drones (Fig. 4).

Analysis of game statistics, as well as comparison of quantitative measurements with the results of qualitative research, including observations of game sessions and discussion with subjects of the experience gained in the game, allows us to take the first step towards exploring the psychological mechanisms of setting students' learning tasks and overcoming their sign natu-

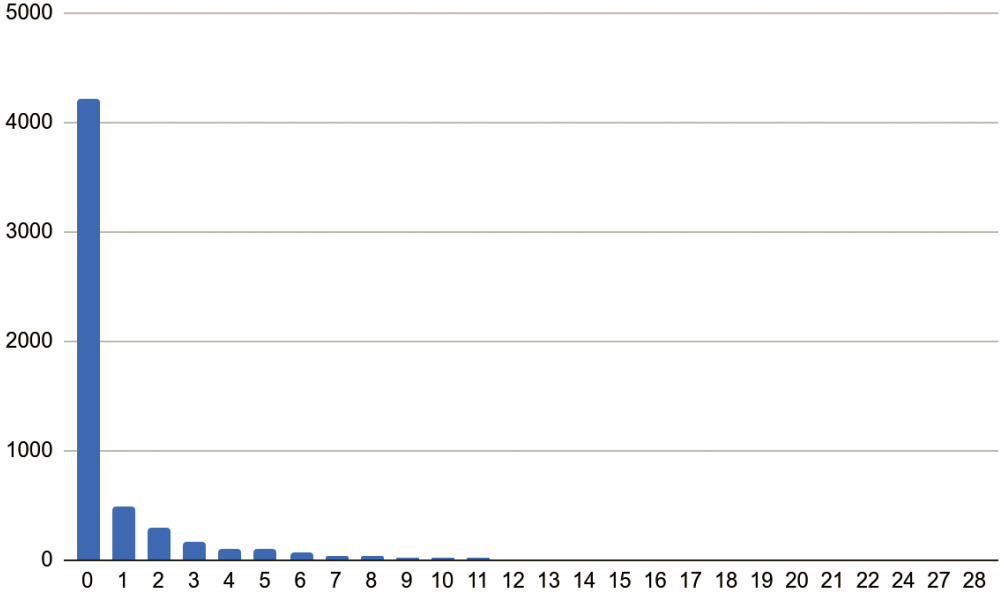

Fig. 4. The distribution of novice players of the video-game "Apiary Defence" by the scope of programming in the game (the number of created programs)

[4] The digital portfolio platform "Talent" of the NTI Kruzhok Movement — https://talent.kruzhok.org

ralization when working in digital gaming environments. In the previous section, the principal theoretical grounds for conducting such a diagnosis were presented. Consider in more detail the proposed hypothesis about the levels of learning activity that can be detected in the framework of diagnostics based on individual experience of playing “Berloga: Apiary Defence”.

Hypothesis about the levels of development of educational activities in the game “Berloga: Apiary Defence”

As part of the educational game “Berloga: Apiary Defence”, a player needs to consistently solve a number of practical tasks for managing a group of drones in an increasingly complex virtual environment (more opponents, more complex and dangerous behavior). Solving such a practical problem is impossible without mastering the operational level of the drone control action and is difficult to implement without using a special programming language that includes control commands.

Level 1: *mastering individual operations on objects*. A player independently learned how to select controlled objects (drones) and operate them, directly issuing commands that complement their basic logic. A player did not learn how to use programming effectively, and did not use sign representations from programs in speech.

Level 1: *mastering individual operations on objects*. A player independently learned how to select controlled objects (drones) and operate them, directly issuing commands that complement the drones’ basic logic. A player did not learn how to use programming effectively and did not use sign representations from programs in their own speech.

Level 2: *mastering the system of operations on objects and programming elements within the control system*. A player experimented with control techniques that involved tactical planning on the field. A player identified the limitations and capabilities of drones, as well as tactical schemes. The use of programming was not systematic, and progress in the game was not related to programming. A player’s speech reflects the context of control activity (tactics, control heuristics).

Level 3: *mastering programming as a generalized sign representation of individual control operations*. A player achieved success in solving a practical problem, including through the use of programming capabilities in terms of modifying the available default drone programs — he/she carried out software control over the operations of drones at the level of individual automated actions and their combinations. While working with the programming interface, a player discovered a link between individual control operations and their sign representations in the programming language. This allows a player to create simple programs through trial and error aimed at overcoming the identified limitations of manual control of drones. A player did not offer programs based on the underlying models of the controlled system, using signs without identifying the original relationships and models that formed the basis of the system.

Level 4: *Overcoming the sign naturalization that occurs when programming in the game by highlighting the limitations of the managed system model that are embedded in the default programs*. This level implies that a player overcame the perception of program elements as iconic signs without restoring their content and the link with the programmed system. A player

was able to identify the proposed model and discover its limitations. At this level, a player experimented with the link between the program and the objects controlled by it in the game, and used special tools to restore this link (for example, using the drone LED indicator to highlight the current state of the program). A player created original programs. In a player's speech, one can find generalized descriptions of the management process, in an attempt to offer their own sign-symbolic tools, which are not enough in the default programs — a step towards overcoming sign naturalization and identifying the limitations of the management model used.

Level 5: *identifying the genesis of the program as a model of the relationship between the management activity (the sign environment of actions on objects) and the activity of a controlled drone system (the sign environment of control objects)*. A player is ready to draw (schematize) how the computer system works — a model of an ideal computer (notional machine) built into the game as a special operator for changing the actions of drones. A player can determine the purpose of the computing system itself and the conditions for its reconfiguration. In fact, a player has reconstructed the original relation laid down in the game by the developers and can offer their own modification of the game.

Testing this hypothesis allows us to take the first step in organizing the formative experiment, namely, to determine the starting level of mastering the subjects' educational activities as a type of educational tasks that they independently formulate when they encounter difficulties in solving a practical problem. The following sections present the methodology and results of diagnostics aimed at testing this hypothesis.

Research methodology

The stages of this study were: 1) conducting an introductory study of the work of schoolchildren in the game "Berloga: Apiary Defence"; 2) identifying two groups of subjects different in the context of using the game — specially trained and independently acting in the game; 3) conducting a comparative analysis of the nature of their playing; 4) highlighting the presence of levels of development of educational activities among players in both groups.

In this study, the individual experience of a player was considered to determine the level of development of learning activity. Diagnostics of the player's learning activity was carried out by analyzing game behavior (stored in the digital artifacts). Following the results of the practical part of the diagnosis, the subject was asked questions aimed at reflecting on the method of solving a practical problem and the proposed solutions during the game, the difficulties that the subject encountered.

The diagnosis was aimed at students in grades 4–7. This range of students was chosen due to the special interest in the situation of transition from primary education to general education, which was already mentioned in the previous sections, as well as the lack of knowledge about programming among students of this period formed within the framework of the "Informatics" lessons.

The first group of subjects (Group A) was composed of students who had experience interacting with the game on a school computer as part of extracurricular activities and extended programming education. Participants of Group A took specially organized individual tests: they completed the same task (pass level 1 of the game) without the help of a teacher, without us-

ing hints or previously created programs. Subjects were allowed to start the test from the beginning, without limiting the number of attempts. One hour of working time was allocated for diagnostics.

The second group (Group B) included students who were not in Group A but played the game independently outside of school or clubs, using personal mobile phones and computers.

Based on the results of individual tests of Group A participants, the gameplay data (Fedoseev, 2025) were analyzed to detect the attributes given in the previous section (for level 1 — the absence of programmed drones, the intermittent nature of game sessions; for level 2 — the combination of drones of different types, the use of their tactical capabilities, etc.). These data were compared with the analysis of students' responses in their reflection with teachers. For the participants of Group B, an analysis of their gameplay was conducted to identify the signs indicating the levels of mastering learning activity.

Statistical methods were used to analyze the data obtained, including Pearson's chi-square test.

Results of diagnostics of students' learning activity development

The first group of subjects (Group A) was formed from 42 students of the Republic of Bashkortostan. The second group (Group B) included 147 students from 26 regions of Russia. A total of 189 subjects participated in the study, including 163 boys (86%) and 26 girls (14%). Subjects are enrolled in grades 4-7, with an average age of 12,2 years (standard deviation — 1,04). Table 1 shows the detailed composition of both groups of subjects.

The game statistics obtained in the course of the study were published in the RusPsyDATA database (Fedoseev, 2025). When determining the level of learning activity, the analysis of statistical data was compared with the answers of the subjects to the questions of the diagnostician. Here are some examples of the subjects' characteristic quotes for each of the levels.

At level 1 (mastering individual operations on objects), the subjects noted difficulties during gameplay without trying to identify the system of actions and their relationships with objects ("There are too many units and enemies, I don't have time to follow them", "I don't understand how to make the drone do what I want"), formulated specific tasks and then added a list of them. They did not generalize ideas about how to solve a practical problem ("This time my drone was killed, but last time it survived") and did not connect pro-

Table 1

Characteristics of the testing group A (N1 = 42) and B (N2 = 147)

Parameters	Group A	Group B
1. Number of students	42	147
2. Students' sex	40 м. / 2 д.	123 м. / 24 д.
3. Students' class	4 кл. — 5, 5 кл. — 16, 6 кл. — 6, 7 кл. — 15	4 кл. — 9, 5 кл. — 28, 6 кл. — 34, 7 кл. — 76
4. Students' origin	Республика Башкортостан (с. Большеустьикинское, Ишимбай, Стерлитамак, Туймазы, г. Уфа)	26 регионов Российской Федерации, в т.ч. из Новосибирской области (46), Республики Башкортостан (27), Санкт-Петербурга (18)

gramming with control operations (“I did not understand how to program; it is very difficult”).

At level 2 (mastering the system of operations within the control system), the subjects noted difficulties associated with the tactical features of friendly and enemy drones (“Smoker hits his own, I didn’t understand how to avoid it”, “Bombardier beetle destroys all my Staplers”) or with coordinating the control of many objects (“I got tired of constantly clicking on ‘pause’ to turn on the special ability of all units in turn”). The difficulties associated with programming were not related to control (“I tried programming, but I didn’t understand the arrows”, “I tried adding new states, but nothing happened”).

At level 3 (mastering programming as a generalized symbolic representation of individual control operations), the subjects operated with signs from a graphical programming language without restoring the distinction between actions in the controlled system and their model representation in a program or an ideal computer (“When I added Overdrive to the Attack, it did not work every time”, “I taught the drone to retreat from the enemy, but it did so belatedly”).

At level 4 (overcoming sign naturalization), it was possible to identify only three subjects who were able to go beyond the proposed default programs: they programmed original tactics, named states in the program in accordance with their logic of operation (“It was necessary to program the drone so that it retreated at low health. To do this, it was required not to return to the Scan state to avoid searching for a new enemy”, “My Autoborders retreated to the base when they reached half health and returned back after repairing, but I was able to do this only when the timer event condition was correct”).During the diagnosis, no subjects who reached level 5 were identified.

The distribution of subjects by levels of learning activity development in accordance with the proposed hypothesis is presented in Table 2.

We will test the statistical hypothesis about the independence of the revealed level of mastery of learning activities from the subjects’ grade. Since the number of subjects from the 4th grade and the number of subjects who have reached the 4th level are small, we exclude these values from the sample under study. To test the hypothesis, we will create contingency tables for two groups of subjects: reduced group B (N=136) and group C, which combines students from both reduced groups A and B (N=173). To evaluate the independence

Table 2

The distribution of students by the level of learning activity (N1 = 42, N2 = 147)

Parameters	Group A	Group B
Level 1	14 (33%)	91 (62%)
Level 2	12 (29%)	32 (22%)
Level 3	16 (38%)	21 (14%)
Level 4	0	3* (2%)
Level 5	0	0

*Note.** — the subjects showed the evidence of going beyond sign naturalization when programming in the game.

of values, we use the Pearson chi-square test. The results of calculating the statistical criterion at the significance level $p < 0,05$ are presented in Table 3.

Since the values of the obtained statistics fall within the confidence interval at the significance level $p < 0,05$, it can be concluded that during the diagnosis it was possible to find the independence of the revealed level of mastering learning activity from the grade of the subject.

Conclusions

Based on the results of the diagnostics of learning activity in the game "Berloga: Apiary Defence", the following conclusions can be drawn:

1. The proposed hypothesis about the presence of levels of development of learning activity in the game is confirmed when diagnosing students in grades 4–7.

2. In the independent individual game mode, only three participants out of 189 subjects demonstrated high levels of mastering learning activity related to generalized methods of action and working with models.

The identified levels of learning activity do not depend on the grade of subjects.

Limitations. The limitations of this study include the difference in the context of groups of subjects A (organized learning) and B (independent play). The diagnostic format did not allow to take into account the previous experience of students, which makes it difficult to interpret the results.

Discussion

The diagnostic results show that the transition from the level of mastering individual operations on objects in the game to more complex levels of learning activity is difficult within the framework of an individual game. These results can be explained by the fact that the subjects do not have support either in the game itself or in the development environment specially organized by the teacher to reach generalized modes of action, in particular, the subjects do not have the means to overcome the sign naturalization of the visual programming language.

It remains unclear whether students set a detailed learning task while playing or continue spontaneous manipulative actions. The answer to the question of what determines the transition to the formulation of a learning task will require further special research.

The independence of the level of development of learning activity from the grade of the subject may be due to the fact that generalized methods of activity in the field of programming, modeling and management are not the subject of development by students in the course of studying academic disciplines of a general education school. For this purpose, as shown in the works of V.V. Davydov, it is necessary to design a new type of educational subjects,

Table 3

The criteria for testing a statistical hypothesis

The sample under study	Chi-squared test	The critical value from the chi-squared distribution
Reduced group B	1,98	9,49
Reduced groups A & B	2,64	9,49

which was later devoted to the fundamental works of V.V. Rubtsov and Y.V. Gromyko on the development of educational subjects that form the basis of the meta-subject content of secondary schools.

The results obtained allow us to speak about the limitations of digital game learning environments that claim to master theoretical content with independent actions of students, including their independent setting of learning tasks. At the same time, it is of particular interest to identify the psychological mechanisms of the transition from mastering individual operations to operating with signs without restoring their internal theoretical content, and then to identifying internal patterns and initial content — genetic relationships that make it possible to reach generalized ways of solving problems through programming. Therefore, the next step in the development of the use of digital gaming environments for diagnosing and ensuring the psychological development of schoolchildren can be the implementation of a formative experiment aimed at overcoming the sign naturalization when programming in a game (moving from level 3 to levels 4 and 5).

Of particular interest is the transition from individual to joint activities of schoolchildren. This aspect is reflected in a number of studies on the development of schoolchildren based on technical and digital game systems (Guzman, 1980; Konokotin, 2021; Margolis et al., 2022). The presence of a situation of discussion of actions performed and their corresponding signs has great potential in terms of building common sign-symbolic methods while solving problems.

The method of diagnostics considered in the article for mastering the learning activity of secondary school students in a digital game environment continues the theoretical works of V.V. Davydov, V.V. Rubtsov, L.V. Bertsfai, A.M. Medvedev, and Y.V. Gromyko. This method shows the potential of developing special pedagogical methods and requirements for building developing digital game environments aimed at secondary school students.

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Научная статья | Original paper

Impact of school-based social support: a literature review on student well-being and educational outcomes

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Abstract

Context and relevance. Socio-educational support is of paramount importance in the educational context, especially for adolescents. **Objective.** Our aim is to take stock of the available knowledge in this field, while highlighting the challenges it faces. **Method.** The article presents a narrative literature review, a state of the art of research, based on a total of 24 articles published between 2001 and 2025. **Results.** Despite the multiple issues identified, it has been established that socio-educational support has a significant impact on the mental health of learners, particularly adolescents, thus influencing their academic performance and the school's overall profitability.

Keywords: social support, school social work, well-being, school performance

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Влияние социальной поддержки в школе: обзор литературы о благополучии и результатах обучения

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Резюме

Контекст и актуальность. Социально-образовательная поддержка имеет первостепенное значение в образовательном контексте, особенно для подростков. **Цель.** Наша цель — подвести итог существующих знаний в

этой области, одновременно выделяя возникающие перед ней проблемы. **Метод.** Статья представляет собой обзор существующей литературы в формате нарративного обзора, основанный на 24 статьях, опубликованных в период с 2001 по 2025 годы. **Результаты.** Несмотря на выявленные многочисленные проблемы, было установлено, что социально-образовательная поддержка оказывает значительное влияние на психическое здоровье обучающихся, особенно подростков, а также влияет на их учебную успеваемость и общую эффективность школьного образования.

Ключевые слова: социальная поддержка, социальная работа в школе, благополучие, учебная успеваемость

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Introduction

The social component plays a crucial role in any educational system. Numerous research studies have highlighted the magnitude of the positive impact of social support on students, particularly children and adolescents, whether it be for school engagement, success, development or otherwise (Ahmed et al., 2010; Lauzier et al., 2015; Kelly, Berzin, et al., 2010; Brioux, Oubrayrie-Roussel, 2017; R.W. et al., 2000).

Indeed, their well-being both inside and outside school has a major influence on their academic performance and commitment to education (Bacro et al., s.d.).

Moreover, students in distress find refuge with school social workers, particularly in mental health (Kelly, Berzin et al., 2010; McManama O'Brien et al., 2011a). In fact, "school social workers are the main service providers for child and family mental health problems, which are the most difficult to resolve in the communities they serve" (Kelly, Berzin et al., 2010).

The results of the study by (McManama O'Brien et al., 2011a) in turn demonstrate that social workers play a crucial role within schools, and that their roles go beyond "simple child-centered service responsibilities" especially for students who are already being followed by therapeutic professionals outside school.

However, despite the long-established importance of the functions of school social workers, a glaring lack of studies of "social support" and "student-perceived social support" has been highlighted.

In the literature reviewed, we noted the scarcity of data concerning social work and the functions of social workers (Van Sittert, Wilson, 2018; Stanley, 2021). This shortage of studies leads to a lack of clarity in school social work, a poor understanding of it and little use of its services (Kelly et al., 2016).

It was also observed that emotional intelligence was absent from the social work literature (Stanley, 2021). Moreover, some researchers have pointed to the lack of research on the implementation of social justice in psychology (Moy et al., 2014).

This is why the acquisition of recent data on the practice of these professionals in the school environment is urgently required (Kelly, Berzin et al., 2010). Beyond the significant lack of data and research on social work in educational settings, another major gap lies in the conceptual ambiguity of the term "social support." The literature reveals persistent confusion, as no coherent or widely accepted definition has been established since its emergence. Numerous studies confirm this lack of clarity, as highlighted by the conclusions of (Barrera, 1986).There is also confusion between the terms social support, social networks and social integration. They "refer to three different perspectives on the resources that can be found in the personal communities we inhabit. Unfortunately, these three terms are

often confused because they overlap and influence each other" (Gottlieb, Bergen, 2010).

This conceptual indeterminacy also results in a lack of clarity regarding the roles of social work professionals, naturally leading to a lack of understanding of social workers' practices (Kelly et al., 2016). The conceptual ambiguity found in the literature extends to terminology. This article adopts "social support" as an umbrella term for various forms of student assistance, while distinguishing it from "psychosocial support" and "socio-pedagogical support". Despite these clarifications, few studies address the practical roles and flexibility of school social workers, leaving their concrete practices largely underexplored (Kelly, Frey et al., 2010) as well as their diversifications, especially concerning the mental health practice exercised by the latter (McManama O'Brien et al., 2011a). Research has yet to determine if mental health practices vary between students primarily supported by school social workers and those accessing external counseling (McManama O'Brien et al., 2011b).

Another striking deficiency has been noted regarding reliable measurement tools to assess the effectiveness of social workers' interventions (Lauzier et al., 2015). It has been shown that the few tools devoted to the perception of social support in children or adolescents, such as Social Support Scale for Children (SSSC) (Harter, 1985a) and Student Social Support Scale (SSSS) (Nolten, 1994) by (Kerres, Kilpatrick, 2002), have shortcomings and are not totally reliable (Kerres, Kilpatrick, 2002). Added to this is the fact that no current instrument for measuring support focuses specifically on aspects associated with anxiety disorders (St-Jean-Trudel et al., 2006). In addition, it is pointed out that there is a lack of studies devoted to the evaluation of mental health and education. Indeed, only 24 studies, conducted as randomized clinical trials, explored these areas between 1990 and 2006 (Franklin et al., 2009)

That said, social support measurement scales are in short supply, and none of the existing ones can specifically measure the different dimensions of social work (Lauzier et al., 2015; Kerres, Kilpatrick, 2002; St-Jean-Trudel et al., 2006).

Another challenge in social support is considering the broader ecological and environmental context, which significantly impacts adolescents' mental health. A clear gap exists between adolescents' needs and what their environment provides, leading to heightened social and academic pressure, particularly when adequate guidance and support are lacking (Syed, Awang, 2011).

Some researchers have pointed to the lack of cooperation and prevention with teachers (Berzin et al., 2011). Others pointed to the lack of clarity in the role of school social support in relation to various important contexts, such as family and peers (Vieno et al., 2007).

The perception of social support and its impact on schooling also remain insufficiently studied.

Indeed, there is an "absence of studies on the effect of the interrelationship between perceived social support and cognitive distortions of success and dependence on depressive symptoms in adolescents during the primary-secondary transition" (Lanson, Marcotte, 2012). There is also a lack of data on the relationship between "social support, school-related stress and school burnout (Meylan et al., 2016), and a paucity of examination "of the mechanisms by which social support exerts its influence" (Ahmed et al., 2010).

There is also a concerning lack of research on coping strategies and resilience in social support, especially for youth struggling with cannabis dependence (Dorard et al., 2013). There is also a lack of studies linking social support and post-traumatic resilience (Özdemir et al., 2022).

In conclusion, many studies stress the crucial role of social support in adolescent well-being, noting that its absence can lead to demotivation and school dropout (Brioux, Oubrayrie-Roussel, 2017).

As highlighted in the (Turning Points, 1990) the lack of support places millions of youths at risk of unfulfilled and unproductive lives.

While some schools have integrated psychological services, many rely on external providers. This review focuses on schools without internal services to analyze the specific challenges of this model. Its goal is to map existing research on social support in diverse educational contexts, providing a foundation to deepen understanding and improve the roles of socio-educational workers.

Methods and materials

This study is based on a narrative literature review. Articles were searched in scientific databases (Scopus, OpenEdition Journals, Elsevier, Érudit, Cairn, SAGE, Wiley) using French and English keywords like school social work, social support, and socio-educational support. No relevant results were found on Scopus, Elsevier, and OpenEdition for terms such as socio-educational literature review or social support in schools. Inclusion criteria were: (1) keywords in title or abstract and (2) educational relevance. From 70 initially selected articles, 24 were rigorously analyzed after three screening phases. Additionally, 27 other sources were consulted to enrich reflections on psychological and emotional support for adolescents in schools.

These articles cover different methodologies: action research, comparative, descriptive, cross-sectional, causal, exploratory, quantitative and consensual qualitative. The studies (2001–2025) total a sample of 39859 participants, conducted in various countries: USA, France, Quebec, India, Turkey, Italy, etc.

Four articles in particular identified the use of six measurement tools within this literature review, namely:

— Social support (Lauzier et al., 2015, 2015); Evaluates the perception of social support in different dimensions, such as emotional, material and informative support.

— Questionnaire sur les comportements de soutien en situation d'Anxiété (QCSA) (Guay & al., 2003); Evaluates perceived social support during moments of anxiety, focusing on emotional, social and informative support behaviors.

— Child and Adolescent Social Support Scale (CASSS), (Malecki et al., 1999); Measures perceived social support in children and adolescents. It assesses different types of support, notably emotional and material, based on relationships with family, friends and school.

— Satisfaction With Life Scale (Diener, Emmons, Larsen, Griffier, 1985); Measures a person's overall life satisfaction and subjective well-being.

— Inventory of socially supportive Behaviors. ISSB (Cohen, Mermelstein, Kamarck, Hoberman, 1985); Evaluates the social support behaviors perceived by the individual in various situations.

— Social Provisions Scale (ESSI) (Cohen, Willis, 1985); Measures an individual's perception of support in terms of affection, validation, material support, etc.

This rigorous, albeit complex, selection process has enabled us to focus on articles directly related to our topic: social support for teenagers at school. This orientation gives our magazine an original and specific scope in the field of education.

Psychosocial disorders of schoolchildren (epidemiological review)

Preserving the mental health of every individual is of crucial importance, yet healthcare systems are facing significant precariousness, particularly in the mental field (OMS, 2022b). According to the World Health Organization (WHO), one billion people suffer from psychological disorders, a figure that has risen by 25%, illustrating in particular the rise in cases of depression and anxiety since the start of the COVID-19 pandemic, making the situation even worse (OMS, 2022a).

In one of its recent studies, "World Mental Health Report: Transforming mental health for all. Overview" carried out in 2022, the WHO advocates the promotion and improvement of mental health, emphasizing that the absence of pathology does not automatically guarantee psychological well-being. Indeed, "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (Constitution de l'OMS 1946, s.d.) Consequently, "anything less than optimal mental health is associated with a reduced level of functioning, whether or not the person suffers from a mental disorder" (Doré, Caron, 2017).

Despite its importance and the calls for its promotion and awareness, individual mental health remains constantly at risk and the educational context is no exception.

School can sometimes be a source of "specific suffering" and "school stress" (Romano, 2016), an environment where students, especially ado-

lescents, are particularly affected by psychological and psychosocial disorders (Levy, 2022).

The Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM IV) confirms that psychosocial disorders emerge primarily from the environmental context, where the individual's living environment exerts a significant influence in both their emergence and resolution (Crocq, Guelfi, 2015). It classifies them into 8 categories: problems with the social support group, problems linked to the social environment, educational problems, professional problems, housing problems, problems accessing health services, problems in relation to legal institutions, and other psychosocial and environmental problems, including; lack of social services, and conflicts with external supports such as social workers, counselors (Crocq, Guelfi, 2015).

Thus, the environment in which the student evolves can lead to psychic alterations and favor the emergence of psychosocial disorders such as anxiety, mood disorders, depressive disorders, suicidal thoughts, disruptive behaviors, thought disorders or psychosis and eating disorders. (Levy, 2022) This has an impact on students' "school life" and "schooling", on their "psychological health" and "somatic health", and creates tensions between those involved in education, students, families and work teams (Romano, 2016).

It has been shown that students globally suffer from psychological disorders and that these have a great impact on them (Asima Mehaboob Khan et al., 2023). Indeed, the psychological disorders they suffer from are diverse; including: behavioral problems (Al-Adawi et al., 2023; Asima Mehaboob Khan et al., 2023), lack of self-confidence (Asima Mehaboob Khan et al., 2023; Physical Therapist, Neighborhood Physical therapy PC, New City, NY, USA & Baladaniya, 2024; Sofologi et al., 2022), anxiety, depression, stress (Asima Mehaboob Khan et al., 2023; Jörns-Presentati et al., 2021), post-traumatic stress disorders (Asima Mehaboob Khan et al., 2023; Jörns-Presentati et al., 2021; Li et al., 2020), suicidal ideation (Asima Mehaboob Khan et al., 2023), suicidal behavior (Jörns-Presentati et al., 2021), ADHD (Al-Adawi et al., 2023; Messias et al., 2022), ASD/TSA(Al-Adawi et al., 2023; Messias et al., 2022; Tiley, Kyriakopoulos, 2021), OCD (Tiley, Kyriakopoulos, 2021) and much more. They have cognitive, emotional and social deficits of between 9 and 13% overall (Al-Adawi et al., 2023).

In addition, preventive initiatives for schoolchildren, orchestrated by medical, psychosocial and other professionals, include psychological assistance with the participation of family and friends (Romano, 2016).

We can conclude that the high prevalence of psychosocial disorders in schools is largely due to insufficient support resources. Young and vulnerable students are especially sensitive to stress, affecting their personal, social, and academic lives. This highlights the urgent need for tailored preventive and supportive approaches to promote a school environment that safeguards students' mental well-being (Romano, 2016; Beri et al., 2025).

Results

1- *Results of studies into the well-being of learners in the school environment and the alleviation of learner disorders and negative behaviours*

Schools are key places for supporting and preserving adolescents' mental well-being (R.W. et al., 2000). Indeed, "The social context is important, and schools are a central context that affects the development of adolescents" (R.W. et al., 2000). However, certain studies have highlighted "a deficit, both in terms of personal resources and in the subjective perception of environmental resources" (Dorard et al., 2013) in schools.

Furthermore, the observation of the increase in students' psychosocial problems within schools as mentioned in the study by (Van Sittert, Wilson, 2018) underlines the importance of finding appropriate solutions to this challenge. This need is reinforced by (Green et al., 2013), which highlights the importance of developing and supporting appropriate school resources to encourage students' use of mental health services. Thus, research suggests that school resources, particularly those related to early identification, facilitate access to mental health services and influence the treatment trajectory of young people suffering from DSM disorders (Green et al., 2013).

St-Jean-Trudel et al. (2006) found a significant correlation between mental well-being and perceived social support, underscoring the vital role of social support for students' mental health.

As numerous authors have shown, social support at school is crucial for students (Dorard et al., 2013; St-Jean-Trudel et al., 2006; Franklin et al., 2009; Meylan et al., 2016; Özdemir et al., 2022). Perceived social support, along with other factors such as coping strategies and self-esteem, not only enable "adjustment to the environment", but also provide "protection from the multiple risks associated with adolescent development, including substance use" (Dorard et al., 2013).

Its impact has also been demonstrated on "internalized disorders" such as anxiety, depression and self-concept (Franklin et al., 2009) disorders that are widespread in the school environment due to a number of factors, but essentially those linked to school demands, which represent a permanent burden and stress for students. Social support reduces this stress (McLean et al., 2023) and helps prevent school burnout (Meylan et al., 2016).

All the more so since it is seen as a support for people exposed to trauma who need it (Maloney et al., 2024) by providing them with a high level of self-compassion and stable, consistent post-traumatic development over time (zdemir et al., 2022).

Its role is therefore to protect, improve, promote and maintain the mental health and well-being of students in the school context (Brioux, Oubrayrie-Roussel, 2017).

Indeed, "School social workers help support student learning and well-being through direct services, service coordination and advocacy in a school setting (Franklin et al., 2009).

It has recently been confirmed that "There is an urgent need to support the social and emotional well-being of adolescents with experiences of adversity and trauma" (Maloney et al., 2024). There is therefore an urgent need to support the social and emotional well-being of adolescents with experiences of adversity and trauma.

That said, the meta-analysis carried out by this study demonstrated small to moderate treatment effects of school-based social work practice. The conclusions state that medium-sized effects are observed for inferiorization problems (d = 40), while small effects are found for externalization problems (d = 0,23) (Franklin et al., 2009).

It states that the best results "seemed to come from school-based interventions that used targeted mental health and educational interventions to change student behaviors" (Franklin et al., 2009).

Thus, school social support not only helps maintain and foster students' well-being, but also contributes to behavior modification when needed. Overall, the findings highlight the positive impact of social workers, with effects varying depending on the issue addressed emotional, mental health, behavioral, or academic.

Green et al. (2013) reveals interesting results regarding this perspective, it states that "Adolescents with behavioral disorders are more likely to receive services than those with fear, distress or substance use disorders". Negative behaviors are therefore easier to detect, and therefore more likely to be effectively supervised, unlike adolescents suffering from internalized disorders. "Early identification" (Green et al., 2013) in this case, is the key to successful care. Indeed, results from the same study show that "youth with mild to moderate mental and behavioral disorders are more likely to use services in schools with more early identification resources". These resources are presented as "the extent to which schools provide services designed to identify and/or refer students for maltreatment or emotional problems" (Green et al., 2013).

This runs counter to the results of the meta-analysis carried out by (Franklin et al., 2009) which states that school-based social work practice seems to be more effective in the case of internalization.

School-based social work seems to be more effective for internalized disorders: anxiety, depression, self-image than for externalized disorders: aggression, conduct disorder, hyperactivity. This finding is not surprising, given that internalized disorders are in many cases more sensitive to psychosocial intervention than externalized disorders (Franklin et al., 2009).

In addition to early identification, "targeted interventions" are necessary for better behavior change outcomes; "the best results seemed to come from school-based interventions that used targeted men-

tal health and education interventions to change student behaviors" (Franklin et al., 2009).

2- ***Results of studies on the impact of social support on improving school performance and the overall cost-effectiveness of the school and education system***

There are many sources of social support in the educational context of adolescents. Indeed, the entire educational network contributes to it. It has been shown that "Social support's impact is determined by combinations of various support sources, age, and gender" (Chan et al., 2022). In addition to social workers, teachers, classmates and, more broadly, the entire educational setting play a crucial role in this dimension.

The impact and importance of this network's support has been widely demonstrated and highlighted by various studies over the years (Brioux, Oubrayrie-Roussel, 2017; Ahmed et al., 2010; Vieno et al., 2007; Meylan et al., 2016; McManama O'Brien et al., 2011b; Azpiazu et al., 2024; Vargas-Madriz, Konishi, 2021).

All these research studies agree on one fundamental point: social support, as perceived by students, contributes significantly to academic success. Hence the importance of paying particular attention to this aspect: "Knowing more about students' perceptions of social support can lead to interventions aimed at improving the support students receive from important people in their lives" (Kerres, Kilpatrick, 2002).

Social support as perceived by students contributes significantly to "academic engagement" (Brioux, Oubrayrie-Roussel, 2017) "cognitive engagement", "academic effectiveness" (Syed, Awang, 2011) as well as "pursuit of higher education" through unconditional teacher support (Lauzier et al., 2015). In this way, it becomes possible to adopt "motivational and affective behaviors" that contribute to academic success (Ahmed et al., 2010; Zhang, Qian, 2024; Wu et al., 2023).

In addition, this kind of support helps prevent "school burnout" and "school stress" (Meylan et al., 2016), as well as, and above all, "suicide prevention" (Vieno et al., 2007), the prevalence of which is increasing in the school environment.

In short, although impact rates vary from one actor to another and from one situation to another, the complementarity of the latter's academic and emotional social support remains essential. This enables "psychosocial adaptation", and consequently, a "sense of belonging to a community" that supports them unconditionally, which will naturally have a positive impact on their "self-efficacy" (Vieno et al., 2007; Zhang, Qian, 2024) and "well-being" (Vieno et al., 2007).

Conclusions

It's true that school social work continues to develop as a social field despite the challenges it faces. However, in many communities, social workers intervene as part of the mental health service (Kelly, Berzin et al., 2010).

So "understanding school social work practice and the needs at the level of education policy and research will help us arm future social workers with the best interventions to serve students" (Kelly, Berzin et al., 2010).

This literature review reveals a significant lack of in-depth research in the field while underscoring the essential role of psychosocial support provided by social workers and educational actors in preserving and improving students' mental health and academic performance. It highlights the prevalence of psychosocial disorders among adolescents, who are especially sensitive to stress, impacting their well-being and demonstrating the clear need for preventive measures. Beyond maintaining well-being, social support can help change negative behaviors and enhance school outcomes, thereby contributing positively to the school's overall effectiveness and productivity. Despite the proven importance of social workers in schools, some studies express concern about the professionals and settings dedicated to this "treatment" (McManama O'Brien et al., 2011b).

Indeed, concerns have been raised about the way schools handle students' emotional and behavioral issues, as well as doubts regarding the appropriateness of assigning such responsibilities to social workers (McManama O'Brien et al., 2011b).

They imply that school may not be the best place and that social workers are not the most qualified to deal with such cases. They propose

and call on researchers to examine "whether it is more effective to contract out specific therapeutic services or to have a school social worker address the mental health needs of students at all levels of the system" (McManama O'Brien et al., 2011b).

Further research along these lines will help to clarify the grey areas and clarify the ambiguities. The literature review we have carried out can therefore serve as a foundation for this work. This will enable us to "create an agenda for future research into practice and policy orientations" (Kelly, Berzin et al., 2010).

Limitations. The main limitation of this research lies in the scarcity of data available for analysis, particularly regarding social support in educational settings for adolescents. Difficulty in finding studies focused solely on adolescent social support with a wellness perspective limits this review and prevents definitive conclusions. Data collection might have been more thorough if conducted by a more diverse research team, allowing integration of varied perspectives for a broader analysis. Another limitation concerns the uneven availability of integrated psychological services in schools; while some have in-house services, many rely on external organizations. This review focused on schools without integrated services to analyze specific challenges, often constrained by human and financial resources, highlighting the need for further research.

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The authors declare no conflict of interest.

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Научная статья | Original paper

The role of leadership styles in shaping school climate: A qualitative analysis of principals' interpretations

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Abstract

Context and relevance. Positive school climate is central to learning and the overall well-being of students. It encourages a meaningful interaction among all stakeholders of the school. The school principal plays a key role in this regard. **Objective.** To identify the leadership styles of principals and specifically explore which style is more responsive to a positive school climate across Pakistani schools. **Methods and materials.** It was an exploratory qualitative study. The principals of 20 schools were selected through purposive sampling. Data were collected through semi-structured interviews, followed by analysis using hybrid thematic analysis. The codes were categorized under various leadership theories, including transformational, transactional, and laissez-faire leadership styles. The frequency of the codes was also calculated to quantify the qualitative data. **Results.** The results showed that transformational leadership was the most commonly used style among principals, accounting for about 78% of the total codes. These leaders appeared to be more responsive to promoting a positive school climate in areas such as school management, decision-making, teachers' professional development, and student counseling and support. Meanwhile, transactional and laissez-faire styles had minimal impact on the school climate, constituting 18% and 2%, respectively. **Conclusion.** It is concluded that the leadership styles of the principals influence the creation and maintenance of a positive school climate. This study has implications for school principals and policymakers, highlighting the importance of encouraging transformational leadership to effectively manage schools.

Keywords: school climate, leadership styles, transformational leadership, transactional leadership, laissez-fair leadership

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Роль стилей руководства в формировании школьного климата: качественный анализ мнений директоров школ

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Резюме

Контекст и релевантность. Позитивный школьный климат имеет решающее значение для обучения и общего благополучия учащихся. Он способствует конструктивному взаимодействию между всеми заинтересованными сторонами в школе. Директор школы играет в этом отношении ключевую роль. **Цель**. Выявить стили руководства директоров и определить, какой стиль в большей степени способствует созданию позитивного школьного климата в пакистанских школах. **Материалы и методы**. Исследование проводилось в качестве поискового качественного исследования. 20 директоров школ были отобраны методом целенаправленной выборки. Данные собирались с помощью полуструктурированных интервью, после чего анализировались с использованием гибридного тематического анализа. Коды были классифицированы по различным теориям лидерства, включая трансформационный, транзакционный и либеральный стили лидерства. Также была рассчитана частота встречаемости кодов для количественной оценки качественных данных. **Результаты.** Результаты показали, что наиболее распространенным стилем лидерства среди директоров школ является трансформационный, составляющий около 78% от общего числа кодов. Эти руководители, по-видимому, более восприимчивы к содействию позитивному школьному климату в таких областях, как управление школой, принятие решений, профессиональное развитие учителей, а также консультирование и поддержка учащихся. В то же время транзакционный и либеральный стили оказали минимальное влияние на школьный климат, составив 18% и 2% соответственно. **Заключение**. Сделан вывод о том, что стили лидерства директоров школ влияют на создание и поддержание позитивного школьного климата. Данное исследование имеет значение для директоров школ и политиков, подчеркивая важность поощрения трансформационного лидерства для эффективного управления школами.

Ключевые слова: школьный климат, стили лидерства, трансформационное лидерство, транзакционное лидерство, лидерство, основанное на принципе невмешательства

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Introduction

A positive school climate (PSC) is the meaningful combination of physical and psychological dimensions that results in the academic and psychological well-being of the school. Different elements play their role in developing a PSC. The role of school principals has become central in this regard (Haque et al., 2021). The principal is considered the gatekeeper of the school. They significantly influence school values and overall climate. Leadership styles can be defined as the manner, behavior, skills, and actions of the person who chooses to lead and interact with the followers. These styles and theories emerged in the 1970s with the main focus on the principal's role as instructional leader in shaping and improving the instructional strategies in school. According to Hallinger (2003), instructional leadership focuses on the establishment of school goals, communication of goals to the staff, and monitoring the teaching-learning process. With the passage of time, the focus of leadership was shifted from instruction to learning. The principals share their responsibilities with the stakeholders of the school as distributed leaders. Bass and Avolio (1995) proposed a combination of other leadership styles, such as transformational leadership, transactional leadership, and laissez-faire leadership.

Transformational leadership has arisen as an effective style of principalship for making changes and improving the performance of all stakeholders of the school. These leaders are visionary and inspire their followers through their work and performance. The transactional leadership style focuses on clear rules and principles and is based on the concept of attaining goals through reward and punishment. It refers to motivating students and teachers by reinforcing positive and desirable behavior in terms of incentives or awards and punishing undesirable behavior (Jameel, 2021). This style contributes to the positive school climate by ensuring that both teachers and students are accountable for their tasks (Dong, 2023). The laissez-faire leadership, also referred to as detached leadership and the "hands-off" approach, is the least interfering form of leadership (Young et al., 2021). These leaders provide minimal guidance to the staff and give them autonomy to lead and control their classes. The teachers working under these leaders consider themselves more independent. When it is not necessary, leaders with this leadership style never interfere with their teachers' work.

The relationship between principal leadership styles and school climate has become a key area of research in Pakistan. The findings from this research can benefit schools in Pakistan and other countries with similar education systems. This study seeks to address gaps in the literature by exploring the combined effects of transformational, transactional, and laissez-faire leadership styles. The study has the following research questions.

1. How do the principals interpret their leadership role?

2. What leadership styles do the selected school principals possess?

3. Which leadership style contributes most significantly to fostering a positive school climate?

Literature review

School principals are responsible for creating a positive school climate through different leadership strategies and styles. Their role is vital in facilitating the staff, encouraging them, and sharing innovative ideas (Haque et al., 2021). They play an essential role in ensuring academic progress, staff welfare, and improving the teaching-learning process. This includes boosting their self-confidence by reinforcing their efforts and guiding them to identify students' behavioral problems (Wahyudi et al., 2024). Therefore, examining the various leadership styles, such as transformational, transactional, and

laissez-faire, and their characteristics and roles in developing and maintaining a positive school climate is imperative.

The transformational leadership style has gained prominence in education since 2005 (Leithwood, 2021). This leadership style has been considered to change and transform the system of the educational organization with the recent advances and time to achieve the desired goals (Leithwood, 2021). For example, during the COVID-19 pandemic, schools were closed. The school principals faced many challenges in changing their mode of education and transferring it from in-person to online (Jogezai et al., 2021). Transformational leaders are recognized for accepting change at any time. They manage the school system and motivate and inspire the staff.

In educational settings, transformational leadership is recognized for its potential to develop and maintain care, respect, and trust among the staff and students (Leithwood et al., 2020). These leaders demonstrate empathy and pay close attention to the problems of their staff. They care for their psychological and emotional well-being (Kareem et al., 2023). They are always open to providing guidance and counselling, and focus on collective responsibility and teamwork among staff and students. They are involved not only with their staff and students but also with the opinions of their parents and families (Heenan et al., 2024).

These leaders work for the professional development of their teachers and encourage their professional autonomy. For example, in schools, the curriculum is fixed, and the teachers are bound to complete the curriculum in a specific sequence and within a particular period, allowing them to change the sequence can strengthen their professional satisfaction. Similarly, actively involving teachers in decision-making, curriculum development, and policy formulation can develop a sense of ownership. These characteristics encourage teachers to innovate their skills and practices instead of strictly following the directives (Leithwood et al., 2020). They can help others to learn new skills and look for opportunities to grow the educational organization. This style has some advantages and disadvantages. They work together and inform all the staff about their goals and objectives, motivate, inspire, and facilitate (Hoque, 2025). On the other hand, this style does not work in all situations; it can be time-consuming, and it depends on the leader's sense of work (Kareem, 2023).

Transactional leaders focus on short-term goals and performance-based rewards. It is a top-down management approach. These principals set clear rules and expectations for their students and staff, monitor their performance and progress, supervise their activities, and enforce strict discipline (Mastul et al., 2024). It relies on praise or rewards for achieving targets and disciplinary actions for not meeting goals. Conversely, if short-term goals are not met, disciplinary measures are implemented (Lynch et al., 2025).

This leadership style is effective when basic needs are met and staff are skilled and well-versed in school principles. The characteristics of performance-based rewards make this style more advantageous. However, contingent rewards are the only aspect of transactional leadership effectively used with both students and teachers. This style includes some disadvantages, such as rewards and punishments not being suitable for every situation (Mastul et al., 2024). It works for individual motivation but is limited in fostering creativity and innovation (Hoque, 2021). These leaders do not leave space for others to voice their experiences, emotions, or ideas.

Laissez-faire leadership is a style in which principals interact minimally with staff. It allows individuals to exercise autonomy and encourages teachers to make independent decisions regarding classroom activities. This approach can positively affect workplace climate by increasing feelings of independence and trust among staff. By relying on self-motivation and individual initiative, laissez-faire leadership offers distinct advantages. It also provides teachers the freedom to set clear objectives and deliver lessons independently (Hoque, 2025). Teachers can explore and apply diverse teaching strategies, fostering creativity in the classroom. These benefits extend to students as well, as implementing this leadership style can enhance critical thinking skills and promote self-directed learning, which

positively influences both academic achievement and overall school climate.

Despite these advantages, laissez-faire leadership is less practical than transformational or transactional approaches. It is considered a passive style, with minimal supervision from principals (Young et al., 2021), and is effective only when clear guidelines exist, students are mature, and teachers are skilled. In such contexts, principals step back, allowing teachers to manage curriculum delivery and other educational activities independently.

Within the framework of school climate, the principal's influence can be both direct and indirect. In school settings, especially regarding student learning, we argue that the principal's influence is primarily indirect, though still significant (Leithwood et al., 2020). However, in the case of teachers, they directly influence their performance. Through subtle leadership, principals use their leadership role to create and sustain a positive school climate where everyone feels valued, trusted, and comfortable. Elements of school climate, such as physical, social, emotional, and psychological factors, are influenced directly or indirectly by the principal's leadership. Therefore, understanding the unique attributes of the three leadership styles is essential for fostering a positive school climate.

Theoretical framework

This study is based on Bass and Avolio's full-range leadership theories (1994). This theory categorizes leadership styles into three main styles: transformational, transactional, and laissez-faire. This theory provides a comprehensive model that captures many leader behaviors, from highly engaged and visionary to passive and hands-off. Initially, these theories were used in business and organizational management. As the educational landscape evolved, scholars began adapting these leadership concepts to the field of education. Likewise, the school leaders are responsible for sharing their vision, inspiring staff, and working together to achieve the predefined goals. Transformational leadership gained recognition for its focus on shared vision, motivation, and innovation factors aligned with educational reform and school improvement efforts (Hallinger, 2003). Transactional leadership is managerial and has been widely used in education. It works on the principle of an exchange and reward system. It is based on clear rules and expectations, performance monitoring, and accountability essential for school operations (Bass, 1990). Laissez-faire leadership is less common in the field of education. However, it plays a positive role for fostering creativity and innovation and helping the staff to make independent decisions.

Within this framework, we assume that each leadership style may contribute to school climate in different ways: transformational leadership may promote collegiality and trust; transactional leadership may reinforce order, rules, and regulations; and laissez-faire leadership may influence perceptions of autonomy and role clarity. These assumptions provide an analytical framework for interpreting principals' narratives, rather than prescriptive evaluations of effectiveness.

Thus, the theoretical framework of this study posits that leadership style is a central driver of school climate and seeks to explore how each of the three styles plays a role in creating and maintaining a positive school climate and its various dimensions.

Materials and methods

This study employs a qualitative exploratory research design, a type of qualitative research that enables the researcher to thoroughly investigate the research problem. The approach is chosen because this research aims to explore the lived experiences of school principals and their role in fostering a positive school climate. Purposive sampling was used to select principals from different schools (Cresswell, 2013). The sample consisted of 20 principals from schools in the Baluchistan province of Pakistan, each with at least three years of experience as a principal and a willingness to participate in the study.

Baluchistan is a multicultural, multilingual, and multi-ethnic province. Schools in this region are culturally diverse, with students and teachers from various backgrounds, working together within the same institutions. The schools in the

region include both government-run (public) and private institutions. This study was conducted in government schools across Baluchistan. School sizes and staffing vary across the region, reflecting the typical educational environment where resources are limited and teachers manage large student groups. Class sizes typically range from 70 to 80 students, often divided into multiple sections to facilitate instruction. The student populations come from diverse socio-economic backgrounds, providing a broad perspective on how leadership approaches influence school climate. These contextual characteristics help frame the interpretation of principals' experiences within each school setting.

In preparation for the interviews, we obtained written consent from all participants. Before collecting data, all participants were informed about the purpose of the study, their rights and responsibilities as research subjects, the confidentiality of the data, and their anonymity. All data were anonymized, with participants' real names replaced by coded identifiers.

Data collection

We employed semi-structured interviews as a data collection tool, which allowed us to interact with the participants and ask probing questions to ensure clarity. To achieve this aim, we proposed an interview guide and developed the interview protocols. It consists of a few questions. These questions were related to the school principals' leadership styles, approaches, management practices, and school climate. An expert in qualitative research, educational leadership, and school climate validated the interview guide. Some probing questions were also used to clarify their opinion, and the interviews were conducted.

Data analysis

The data were analyzed using a hybrid thematic coding approach based on Saldana's method. Hybrid thematic coding, also known as abductive coding, is a qualitative data analysis method that combines both deductive and inductive approaches. It enables researchers to start with deductive coding to identify the leadership styles of the principals and then use inductive coding to explore how these styles relate to the principals' roles in developing and maintaining a positive school climate, allowing themes to naturally emerge from the data.

Deductive thematic analysis for identifying the leadership styles of the principals

A deductive thematic analysis approach is a qualitative data analysis method that begins with a predefined conceptual or theoretical framework to identify themes. For this, Saldana's (2016) coding method was applied. It begins with the familiarization of data and the generation of initial codes. These codes were labeled according to predefined categories including transformational, transactional, and laissez-faire leadership styles, along with their specific attributes. After initial coding, all the codes were quantified to assess their frequency. This helped determine which leadership style appeared more often in the data.

Inductive thematic analysis approach for emphasizing the role of leadership styles in school climate

We also used an inductive thematic analysis approach by Saldana (2016). It involves several steps, starting with familiarizing ourselves with the data. During this phase, various codes were generated that shared a common point of reference. We then grouped similar codes to generate themes. In the next step, the themes were carefully examined and renamed where necessary to align with the study's objectives.

Results

This section presents findings based on both deductive and inductive thematic analysis approaches. It covers the identification of principals' leadership styles. The number of codes from the three leadership styles was 259, with 204 for transformational leadership, 49 for transactional leadership, and only 6 for laissez-faire leadership. The analysis showed that transformational leadership accounted for 78,7% of the total codes, transactional leadership for 18,9%, and laissez-faire leadership for 2%.

Results based on the inductive thematic analysis approach:

The results also showed the participants' interpretations of leadership, their roles in school management and decision-making, teacher motivation, student guidance, and emotional support. The themes that emerged from the data, related to different styles of leadership for developing and maintaining a positive school climate, are described below.

Transformational leadership: is the most common leadership style used by principals, accounting for 78,7% of all leadership styles. Principals with this style are visionary. They play a key role in creating and maintaining a positive school climate. One of the principals explained:

"We always used to say to our teachers that you must have a vision of the next 15 to 20 years. We must prepare our students for the world of 2040 and beyond. (P-1)

The analysis revealed that these leaders collaborate with their staff to achieve the defined goals. They show mutual respect and care, take responsibility, and maintain discipline. They encourage their teachers to treat their students well. One of the principals stated:

"I believe that we can bring changes in the behavior of the students and teachers through care and respect". (P-4)

Encouragement and motivation are the prominent characteristics of the leaders. The transformational leaders encourage their staff to apply innovative teaching methods and explore new ideas. They motivate them throughout their teaching and provide them with help. One of the principals explained:

"I do not want my teachers to work only with traditional teaching methods. I want them to apply innovative strategies and practice new ideas". (P-13)

Transformational leadership style and school climate

- **Principal's interpretation of school climate:**

The analysis of the study revealed that transformational leaders represent the school climate in various ways. Some believe that the school climate refers to the physical and social environment of the school, but others argue that safety and emotional attachments are also key elements of school climate. One of the participants stated that:

"School climate is the physical and social environment inside a school's boundary. The basic elements of the school climate are the relationships among students and teachers and the physical appearance of the school". (P-2)

They associated safety with maintaining discipline and preventing conflicts among students. The goal of these leaders is not only to impart knowledge to the students but also to create an environment where everyone feels comfortable and connected. One of them explained:

"Students need to feel comfortable, and there is a need for a sense of ownership. An ideal school climate is one where individuals develop emotional attachments with each other." (P-4)

- **School management and decision making**

The transformative leaders avoid working in isolation. Instead, they actively involve all stakeholders in decision-making and school improvement initiatives. They prefer to work collaboratively, foster ownership, and encourage their contribution and suggestions. As one participant noted:

"The school can be managed effectively by the collective efforts of teachers, students, and other administrative staff". (P-16)

These leaders follow the bottom-up leadership style. They arrange meetings and sessions with their staff. They share their goals and involve them in developing school improvement plans and decision-making. A participant highlighted:

"I always ask my staff for suggestions before taking any final decision. Their involvement helps me make better decisions for school improvement". (P-20)

Such practices not only enhance the credibility of the decisions but also help teachers feel valued and appreciated. Similarly, involving the administrative staff and students in management processes enhances their interest in improving the school climate. One of the principals shared:

"We have made small committees and have distributed tasks among the students and teachers. All of them work enthusiastically with interest". (P-10)

Distributing responsibilities among students and teachers is necessary for improving the overall school environment.

- **Teachers' motivation and professional growth**

These leaders encourage, inspire, and motivate others to actively contribute to improving school climate. They support and facilitate teachers by providing autonomy to implement innovative teaching methods and offering continuous encouragement. As one participant stated:

"I think teachers can do everything. Giving them some autonomy and a chance to work for the students and the school's betterment will lead to the school climate improvement". (P-4)

Inspiration and motivation, therefore, serve as the driving force behind higher achievement. The principal role is not limited to overseeing progress and celebrating achievement; it also involves inspiring and motivating the staff, boosting their morale, and encouraging their efforts. One of the participants emphasized:

"The principal leadership style really matters. I suggest that every principal should have training on leadership and how to manage and control the school." (P-1)

- **Emotional support and counseling:**

Transformational leaders demonstrate a strong concern for all their stakeholders. They are consistently available to provide support, facilitation, and guidance. They adopt various measures to resolve emerging issues. As one of the participants explained:

"I really care for the psychological state of the students and teachers". (P-8)

These leaders believe that many challenges can be effectively addressed by paying close attention to the emotional and psychological needs of staff and students. As further emphasized:

"Through guidance and counseling, I think while paying attention to their problems, we can resolve their issues". (P-12)

- **Student guidance and discipline**

The ability to offer guidance and counselling is necessary for principals aspiring to be effective leaders. Participants emphasized that many school-related problems can be resolved simply through active listening and engagement. One of the participants explained the importance of direct interactions with the students.

"I personally call the student and try to talk with them and understand their problem". (P-7)

These principals believed that their availability and accessibility enable their students to improve their behavior and make them more disciplined. Another principal described their practice of daily connection with their students.

"We give 10–15 minute lectures daily on behavior, and I have seen positive results". (P-19)

Their daily interactions not only improve their behaviors but also help students feel easy, valued, and comfortable.

Transactional leadership

The findings also highlighted the role of transactional leaders, though to a lesser extent. Participants who emphasized this leadership style focused on the attributes of the exchange and reward system. One of the principal illustrations:

"For the smooth running of the school, we have to announce some rewards for the staff. If they meet the expectations, then they will be rewarded, but if they fail to achieve the desired goals, then they will be asked to change their behavior". (P-11)

They emphasize that positive behaviors should be reinforced to promote their continuation. Conversely, the negative behaviors should be addressed through disciplinary measures to discourage them. As one of the principals stated:

"For those students who are active in school, we award them with a small prize, we motivate them and, appreciate their efforts. The same is done with the teachers". (P-15)

These leaders supervise their staff, recognize their efforts, and facilitate them. They work to maintain discipline in the school. Another principal stated:

"I strictly supervise and monitor the staff performance. I recognize their efforts, which they do, and motivate them. I appreciate their work". (P-9)

These leaders emphasize the importance of strict discipline in ensuring that all the stakeholders follow the rules and achieve the objectives. According to one participant:

"The head of the school should be strict so that all staff follow them". (P-11)

Transactional leadership and school climate

- **Principal's interpretation of school climate**

These principals have different interpretations of school climate. Analysis showed that the transactional leaders interpret school climate as the overall school environment. One of them illustrated:

"*School climate is the overall environment of the classrooms and schools. It includes the building, resources, and materials that assist in the process of teaching and learning*". *(P-11)*

They stated that there are also other elements that can fall under the category of school climate. One of them demonstrated that:

"*The school's physical appearance, social relationship between the stakeholders, and psychological environment*". *(P-9)*

- **School management and decision-making**

Principals set clear rules, monitor the performance of their students and teachers, supervise their activities, and make judgments regarding the roles of both. They consistently enforce these rules. One of the participants stated:

"By establishing and following clear rules for all of the instructors and students, we can maintain a disciplined and positive school climate". *(P-11)*

These principals do not involve their staff and students in the decision-making process. They make all the decisions on their own while following the rules. One of the principals illustrated:

"I do not want the teachers to interfere in my decisions. The way I analyze the situation as a principal is different. I can do better for my school and students". *(P-15)*

These leaders are not collaborative; they are less open to staff feedback and suggestions.

Teachers' motivation and professional growth

The transactional leaders use rewards to recognize the efforts of their staff, enhance their interest in their jobs, and motivate them. They use different forms of rewards as elaborated by the principals:

"Those teachers who are active and regular and perform their duties sincerely, we acknowledge their efforts". (P-18)

One other principal stated:

We appreciate the efforts of our teachers while organizing a small event. At the end of every month, we announce an appreciation award for the "Teacher of the Month". (P-11)

If teachers do not fulfill their duties properly. And in case they do not follow the pre-defined rules and regulations. They are asked about their irresponsible behavior. A principal explained:

"Sometimes the teachers are asked for careless behavior. The purpose behind this is not to demotivate them, but just a reminder that you will be asked if you show laziness in their job". (P-15)

Emotional support and counseling

Analysis showed that the reward system has improved the behavior of the teachers. However, on the other hand, there are some barriers, such as stress and household problems, that hinder teachers from performing effectively in their workplace. And if, in that case, they do not follow the rule, they are asked to provide an explanation. This is demotivating to them. One principal also explained:

"I am supporting the reward system, but on the other hand, I am afraid of the consequences for asking my teachers for explanations. Because I know the situation of the teachers and the environment from where they are coming to their jobs". (P-9)

Other than that, these leaders do not help their teachers with their emotional support.

- **Student guidance and discipline**

From the first day, students become aware of the school rules and the consequences of breaking them. The discipline is considered non-negotiable; they ensure it at every cost. A principal stated:

"I cannot compromise on discipline because I think a student without discipline is said to be uneducated". (P-15)

They continuously monitor and supervise students and teachers, ensuring adherence to established rules and regulations. Their focus is not on individual circumstances but on enforcing the laws themselves. Teachers, too, are held accountable to these regulations. As one principal stated:

"We try to maintain a peaceful climate in the school. If students' behavior is negative, we deal with them through school management and established rules". (P-11)

Analysis showed that only a few principals follow this leadership style. So it is considered less important in the context where the study is conducted.

Laissez-faire leadership

The analysis showed that the laissez-faire leadership style accounts for only 1,8% of the total leadership styles. Within the sample, only one participant reported favoring this approach. They allowed their staff to work independently and play their role in improving the school climate. A participant stated:

"We need to let our teachers teach the way they want to teach and work for improving the school climate". (P-17)

The laissez-faire leadership style is effective only when the staff is competent, motivated, and capable of taking initiative and making independent decisions. As expressed by another participant:

"I believe that my teachers can solve their problems on their own". (P-17)

Laissez-faire leadership and school climate

Laissez-faire leadership has its own distinct characteristics. The principals interpret the school climate as the environment of the school where teachers have freedom, and the principals do not show concern for the school. A principal explained:

"School climate is the environment of the school where all the individuals are responsible for their own tasks and activities". (P-17)

This is considered passive leadership. These leaders do not interfere in any tasks related to the school, teachers, or students. They show minimal interference in their teachers' professional growth and development. There is no clear evidence from the analysis on how these principals demonstrate their role in school management and decision-making, teacher motivation, emotional support, and student guidance and discipline.

Discussion

The study yielded valuable findings in response to our three research questions, which focused on principals' leadership styles and their roles in managing the school, making decisions for the development of PSC, facilitating teachers' professional development, and providing student counseling. Our findings indicate that the most prominent leadership style, as interpreted by the principals in schools across Baluchistan, is transformational leadership. Principals employ this style by sharing the school's vision, collaborating with others, and demonstrating care and respect for all stakeholders. They communicate their plans to all members of the school community to achieve set objectives. Transformational leaders take care of and respect all stakeholders, including students, teachers, and administrators. As noted by Leithwood et al. (2020), transformational leaders in educational settings are particularly distinguished by their demonstration of care and respect. Encouragement and motivation are among the most prominent characteristics of these leaders, who also inspire staff to apply innovative teaching methods and explore new ideas. These findings are consistent with the study of Heenan (2023).

According to our findings, the principals perceived transformational leaders as those who interpret the school climate as the physical, social, and psychological environment of the school, where all stakeholders feel respected and cared for. This supports the conclusion drawn by Cohen (2017), who viewed positive school climate as a multifaceted concept that encompasses the physical environment and resources of the school, the teaching-learning process, student engagement and safety, as well as rules, regulations, and teacher support.

The findings also revealed different characteristics, including school management and decision-making, teacher motivation and professional growth, emotional support for both teachers and students, and students' guidance and discipline. The principals were reported to prefer working collaboratively, listening to students' problems, and encouraging their contributions and suggestions as stated in the literature (Leithwood et al., 2020). Furthermore, the findings highlighted in this study are also reflected in the characteristics of the educational environment demonstrated by Yasvin (2019). Such practices also help teachers feel valued and respected. These findings are consistent with the earlier research of Kılınç et al. (2024).

The study's findings suggest that elements of other leadership styles, such as transactional leadership and laissez-faire, coexisted alongside the dominant leadership style. The role of laissez-faire leadership, however, is observed to be minimal in maintaining the school climate. Transactional leaders also play a role in school management. They focus on performance-based rewards, making decisions for school improvement, and strictly follow the rules and regulations. Our findings demonstrate that the reward system is effective for both teachers and students. Whether it is the teacher's professional growth or their emotional state of mind, these leaders motivate them through appreciation and rewards. Similar results were reported by Chan (2020). These leaders supervise their staff, recognize their efforts, and facilitate them. They work to maintain discipline in the school, as the literature also shows (Mastul et al., 2024). These findings resonate with those of leaders who do not compromise on the predefined rules and regulations. Breaking the rule is not acceptable in any circumstances. These observations uphold the claims made by Lynch et al. (2022). These observation and findings suggest that school leadership is not confined to only one style. The previous research also indicates that the school leaders often combine participatory practices depending on situational and contextual needs (Leithwood et al., 2020; Heenan, 2023).

The present study is grounded in Bass and Avolio's full-range leadership theory, which encompasses three different leadership styles and exhibits partial correspondence with the classical leadership styles of Kurt Lewin. According to Northouse (2021), Kurt Lewin proposed three leadership styles, democratic, authoritarian, and liberal, which share characteristics closely aligned with those in Bass and Avolio's framework. This indicates that although the terminologies are different, the core meaning and their influence on developing and maintaining a school climate exhibit a significant conceptual overlap.

Conclusion

This study focused on the three different leadership styles of principals and their role in creating a positive school climate. 20 school principals were selected through a purposive sampling technique. The data was gathered through semi-structured interviews followed by hybrid thematic coding. Deductive coding was employed to identify the leadership styles of the school principals, while inductive coding was used to identify the principals' roles in developing and maintaining a positive school climate. The data also showed the principal's role in developing and maintaining a positive school climate. The findings explained that principal's perceived, transformational and transactional leadership as contributing more to school management and decision-making, teachers' motivation and professional growth, emotional support, counselling, and students' guidance, as compared to the laissez-faire leadership style.

Limitations. This study was limited only to the principals' perceptions of their leadership styles. No other stakeholders of the school, such as students and teachers, are involved in this study. Which the future research may take into consideration.

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Factors promoting and hindering inclusive education for learners with disabilities in low- and lower-middle-income countries: a comparative review

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Abstract

Context and relevance. The article discusses the lack of scientific knowledge about the barriers and factors of systemic failure in adapting inclusive education models to the ethnolinguistic diversity and acute resource constraints characteristic of low- and middle-income countries (LMICs). **Objective.** The aim is to identify key factors that promote and hinder the implementation of inclusive education for students with SEN in low- and lower-middle-income countries and to develop practical recommendations for inclusive vocational education. **Research questions.** What are the main factors that promote and hinder the implementation of inclusive education for students with SEN in low- and lower-middle-income countries? What effective strategies can be used to implement inclusive education in these countries? **Methods and materials.** A systematic review of the literature on interventions and practices that contribute to the development of policies and programs in the field of inclusive education for children with SEN in low- and lower-middle-income countries. The search for sources was conducted in the Scopus, Web of Science, ERIC, and Google Scholar and covered peer-reviewed publications in English from 2000 to 2024 (a total of 58 articles were selected for analysis). Students with SEN refers to children with dyslexia, dyscalculia, dysgraphia, and dyspraxia. **Results and conclusions.** The main obstacles to the implementation of inclusive education are a lack of resources, weak policy implementation, and negative attitudes in society toward children with SEN, which increases the risk of their marginalization. Factors contributing to the solution of this problem include targeted teacher training, allocation of resources, and support for community engagement initiatives.

Keywords: inclusive education, learning disabilities (LD), inclusive pedagogy, vocational and vocational-professional education, educational policy

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Факторы, способствующие и препятствующие инклюзивному образованию учащихся с ограниченными возможностями обучения в странах с низким и ниже среднего уровнем дохода: сравнительный обзор

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Резюме

Контекст и актуальность. В статье обсуждается проблема дефицита научных знаний о барьерах и факторах системного сбоя в адаптации моделей инклюзивного образования к этнолингвистическому разнообразию и острой нехватке ресурсов, характерным для стран с низким и ниже среднего уровнем дохода (СНСД). **Цель.** Выявить ключевые факторы, способствующие и препятствующие внедрению инклюзивного образования для учащихся с ООП в странах с низким и ниже среднего уровнем дохода, и разработать практические рекомендации для инклюзивного профессионального образования. **Вопросы исследования.** Каковы основные факторы, способствующие и препятствующие внедрению инклюзивного образования для учащихся с ООП в странах с низким и ниже среднего уровнем дохода? Какие эффективные стратегии можно использовать для внедрения инклюзивного образования в этих странах? **Методы и материалы.** Систематический обзор литературы по вмешательствам и практикам, которые способствуют разработке политики и программ в области инклюзивного образования для детей с ООП в СНСД. Поиск источников проводился в базах данных Scopus, Web of Science, ERIC и Google Scholar и охватывал рецензируемые публикации на английском языке с 2000 по 2024 год (всего для анализа было отобрано 58 статей). Учащиеся с ООП — это дети с дислексией, дискалькулией, дисграфией, диспраксией. **Результаты и выводы.** Основными препятствиями для внедрения инклюзивного образования являются нехватка ресурсов, слабая реализация политики и негативное отношение общества к детям с ООП, что увеличивает риск их маргинализации. Факторы, способствующие решению этой проблемы: целевая подготовка учителей, выделение ресурсов и поддержка инициатив по вовлечению сообществ.

Ключевые слова: инклюзивное образование, нарушения обучаемости (НО), инклюзивная педагогика, профессиональное и профессионально-техническое образование, образовательная политика

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Introduction

Inclusive education (IE), which aims to remove barriers and ensure the participation of all children in the learning process, regardless of their abilities or health status, has become a global priority enshrined in international documents such as the UN Convention on the Rights of Persons with Disabilities (2006) and the Sustainable Development Goals (UN, 2015). Despite the ratification of the Convention by 164 states and the recognition of IE as a fundamental right (Artiles, Kozleski, 2016), its implementation remains a complex challenge, particularly in low- and lower-middle-income countries (LLMICs), where a gap persists between policy and practice (Amor et al., 2019; Adetoro, 2014).

To define the target group for inclusive education in this article, we use the term "students with special educational needs" (SEN), acknowledging certain differences in the composition of the groups of children encompassed by this term and in the criteria for their identification in the regulatory and policy documents of the countries under consideration.

The article analyzes the challenges of implementing inclusive education in low- and lower-middle-income countries, where the transition from policy commitments to practice is hindered by systemic barriers: insufficient funding, weak teacher training, and a lack of infrastructure. The study focuses on Nigeria, and comparative conclusions are drawn based on the experiences of other countries facing similar challenges. Country selection was based on the World Bank's income classification (low/lower-middle) and common challenges in implementing IE, such as limited resources and the gap between policy and practice (World Bank, 2024). India, despite its economic growth, is included due to persistent regional disparities in access to digital infrastructure, reflecting trends in other LLMICs (Bandyopadhyay, Dhara, 2021; Hossain, 2021).

In Nigeria, ethnolinguistic diversity compounds the challenges of implementing IE. Over 200 million residents speaking more than 500 languages create a complex educational environment: mother-tongue instruction is implemented unevenly, and resources for students with disabilities remain scarce (Inyang et al., 2023). Recent initiatives aimed at integrating such students demonstrate both progress and persistent challenges: inaccessible infrastructure, a lack of assistive technologies, and a shortage of specialists (Bafaneli, 2024). Such barriers — chronic underfunding, social stigmatization, and a shortage of qualified personnel — are characteristic of all LLMICs (Mbense, 2019; Rrofiah et al., 2023).

Although Nigeria's National Education Policy (2004) and Inclusive Education Policy (2023) mandate the implementation of inclusive education at all levels, actual implementation remains inconsistent, with varying paces across regions and weak monitoring mechanisms (Pirzada et al., 2024). Research identifies promising strategies, including student counseling, flexible programs, and multimodal learning (Bhilitane et al., 2024); however, scaling them up requires transformational leadership and institutional reforms (Difoni et al., 2024).

Research questions:

1. What are the key factors that facilitate and hinder the implementation of inclusive education for students with special educational needs in Nigeria?

2. What practical strategies can strengthen inclusive education in special needs schools?

This study develops the theory of inclusive pedagogy in resource-constrained settings, proposing culturally adapted ap-

proaches applicable to school education. In line with the social model of disability, it demonstrates how institutional constraints and community engagement influence the outcomes of inclusive education, which is particularly important for policymakers developing programs where students with SEN (e.g., dyslexia, dyscalculia) are often excluded from the education system after primary school.

Barriers to the implementation of inclusive education

Despite policy efforts, significant barriers hinder the implementation of inclusive education for children with SEN. Kuper et al. (2018) identify barriers that include policy/systemic factors, school-related aspects, and family support issues.

The following specific barriers are identified:

Social and cultural barriers. Negative perceptions of disability persist, and children are often viewed as incapable of learning. Research indicates sociocultural stigma toward individuals with disabilities in Nigeria (Uba, Nwoga, 2016), which hinders school enrollment and limits awareness of learning difficulties (Nampijja et al., 2023).

Insufficient funding. The living conditions of people with disabilities in developing countries highlight the challenges of achieving inclusive education (Eide et al., 2011). Poverty and stigma are critical barriers affecting children with disabilities in contexts such as Uganda (Bannink et al., 2016, 2019). Funding constraints are a major obstacle to the development of inclusive education for children with SEN (Ogunode, Yunusa, 2022). Decisions regarding access to education often reflect budgetary constraints rather than the actual needs of students (Simui et al., 2018).

Infrastructure deficiencies and lack of materials. Many students with SEN cannot enroll in special or mainstream schools due to insufficient capacity to provide specialized accommodations (Adebisi et al., 2014). Schools often lack trained teachers, adapted learning materials, and accessible facilities to meet the diverse needs of students (Adeniyi et al., 2015).

Gaps in policy implementation. Despite national policies promoting inclusive education in many lower-middle-income countries, local implementation remains uneven. Nigeria established goals for inclusive education through its national education policy and universal basic education policy three decades ago; however, significant gaps in implementation persist due to differing views among policymakers on the subject (Ayowole, 2022).

Materials and methods

This study is based on a systematic literature review that analyzes measures and practices promoting inclusive education for children with SEN in SSS. The analytical framework was based on the key principles of inclusivity outlined in the United Nations Toolkit on Inclusive Education in Africa (United Nations, 2024): accessibility, non-discrimination, physical accessibility, acceptability, and adaptability.

A comprehensive search was conducted in the Scopus, Web of Science, ERIC, and Google Scholar databases, focusing on peer-reviewed English-language publications from 2000 to 2024. Keyword combinations included “inclusive education AND learning ability”, “inclusive education AND children with learning difficulties”, “education for children with special needs AND low-income countries”, “inclusive pedagogy AND Nigeria”, and “barriers to education AND disability”. “Grey” literature, duplicate studies, and articles not directly related to IE for children with SEN were excluded.

From the initial pool of studies, 58 articles met the inclusion criteria: a focus on low- and middle-income countries, an emphasis on children with SEN, an examination of IE practices within formal education, and qualitative or mixed-methods empirical studies with sound methodology. Initially, 11 countries were considered, but only eight fully met the inclusion criteria and were subjected to in-depth analysis. India was retained in the list despite its high GDP due to significant socioeconomic disparities, with a substantial portion of the population living in poverty (World Bank, 2024). Regional inequalities in access to education and the implementation of inclusive education place India on par with other LLMICs in this study.

Priority was given to qualitative thematic analysis to account for contextual nuances in the implementation of inclusive education, as quantitative data on the outcomes of inclusive education in countries with high levels of disability are often scarce or unreliable. The analysis covered preschool and primary education in inclusive settings, excluding studies focused on other types of disabilities without an emphasis on special needs education. This approach is widely used in the analysis of inclusive education policy, as qualitative methods allow for a deeper exploration of contextual characteristics, barriers, and mechanisms of inclusive education implementation. This position is supported by the findings of recent studies: the work by Kimhi and Bar Nir (2025) examines the experience of preparing teachers for inclusive practice; a study by the Welsh Government (2025) analyzes the integration of principles of equality and inclusion into educational programs; Malahlela and Sadiki (2024) evaluate the effectiveness of implementing inclusive education in elementary schools.

The thematic analysis identified six key aspects: teacher training and readiness, resource allocation (availability of infrastructure, funding), community awareness and attitudes, diagnostic and remedial-developmental tools, and policy effectiveness (government strategies and implementation challenges). These aspects were selected based on the UN Toolkit on Inclusive Education, which identifies them as fundamental elements of effective IE systems in resource-constrained settings. By structuring the analysis around these themes, the study provides a systematic assessment of barriers and factors contributing to the development of IE in the context of the LLMICs.

Results

The comparative analysis identified systemic patterns in the implementation of IE in the LLMICs. The data are presented in a hierarchical order: from the macro level (policies) to the micro level (student outcomes), reflecting the interrelationship between institutional conditions and practical outcomes.

Table 1 highlights studies showing how differences in funding and infrastructure affect IE outcomes. In Malawi and Cambodia, a lack of resources and personnel remains a serious barrier (Kuper et al., 2018). In India, investments in infrastructure and policy support have contributed to positive changes (Adeniyi et al., 2015). In Kenya and Nigeria, despite efforts, progress has been limited due to vague policies and insufficient funding (Ayowole, 2022).

Community awareness and stakeholder engagement are the foundation of IE. Table 2 notes that Pakistan and Cambodia use qualitative methods such as focus groups and interviews to assess and engage communities. These interventions foster strategic understanding and promote co-management (Kim, Fox, 2011). In contrast, Nigeria

Table 1

Distribution of resources (as a barrier (B) or a facilitating factor (F) for inclusive education)

Country	Results of the study
Malawi *(B)*	Many children between the ages of three and five were unable to perform even the most basic tasks, such as holding a book properly. Very few community children's centers had access to any reading materials.
Cambodia *(B)*	A need for significant investment in inclusive education was identified, including teacher training, policy development, and infrastructure improvements.
India *(F)*	Teachers had a positive attitude toward the inclusion of students with SEN thanks to policy changes, improved school infrastructure, and the provision of institutional resources.
Kenya *(B)*	Identified challenges included a lack of resources, teacher training, and negative attitudes.
Nigeria (F/B)	Initiatives such as teacher professional development and awareness campaigns were implemented. However, vague language in policy documents and weak enforceability limit the sustainability of these measures, particularly in resource-constrained regions.

Table 2

Community Awareness

Country	Study aim & metod	Result
Malawi	Development of a curriculum-based assessment scale based on the Early Learning and Development Standards (ELDS) developed by the United Nations Children's Fund (UNICEF) and the Ministry of Gender, Children, Disability, and Social Welfare in Malawi (2015).	The developed assessment scale demonstrated good validity and reliability in measuring key areas of early learning corresponding to the national ELDS. It effectively identified variations in children's development across different Community Child Development Centers (CCDCs).
Camodia	Conducting focus groups and interviews with parents and community members to understand the experiences and perspectives of teachers and parents regarding inclusive education.	It was important to institutionalize investments in inclusive education, including teacher training, policy development, and improvements to educational infrastructure.
Pakistan	Conducting focus groups and surveys of parents, teachers, and community members to understand parental and community participation and its various aspects in the context of inclusive education.	It is important for policymakers and education practitioners to jointly develop and implement educational plans through collaboration with schools, communities, and parents.
Nigeria	Surveys and interviews with parents and school staff to assess awareness of inclusive practices.	Limited awareness and weak institutional communication hinder community participation. In rural areas, parents often lack access to information about inclusive education opportunities.

and Malawi report low levels of community understanding of inclusive practices, particularly in rural areas, which limits their participation in the implementation of inclusive initiatives (Uba, Nwoga, 2016).

Table 3 highlights the insufficient development of systematic diagnostic and developmental tools for early childhood education (ECE) in the LLMICs. India demonstrates the most structured, albeit still evolving, approach to ECE, utilizing assistive technologies and trained education system administrators (Adetoro, 2014). Nigeria and Malawi rely heavily on piecemeal resource allocation and teacher training initiatives for IE, with a lack of standardized

Таблица 3 / Table 3

Diagnostics and support services

Country	Type of intervention
Malawi	School readiness testing in rural and urban schools.
India	Use of assistive technologies, trained education system leaders, and implementation of government policies to facilitate “intervention” in schools. Despite diagnostic resources, the type of intervention is unclear and underdeveloped.
Uganda	Does not implement any specific program, training, or type of intervention. Focuses on assessing existing relationships and readiness.
Nigeria	Advocacy, resource allocation, and teacher professional development.

diagnostic and remedial-developmental tools (Ayowole, 2022). Uganda remains in the early stages, with no clearly defined measures for IE development (Bannink et al., 2016, 2019).

Cambodia’s needs for IE infrastructure (Table 5) are directly linked to the barriers identified in interviews with parents. Untrained teachers cannot effectively collaborate with families, and poor conditions limit the practical opportunities for participation, underscoring the importance of enabling conditions for effective engagement.

We see that policy frameworks alone are insufficient without legal mechanisms and operational clarity (Table 6). India demonstrates a relatively successful implementation of special education policy, supported by administrative infrastructure (Adetoro, 2014). Meanwhile, Nigeria and Bangladesh face challenges related to unclear legal norms and cultural inertia, which hinder compliance with and the implementation of IE principles (Ayowole, 2022; Grech, 2009).

Teacher training is universally recognized as a key element in achieving inclusive education goals (Table 4). India leads the way thanks to large-scale professional development programs integrated into national curricula (Adetoro, 2014). Cambodia and Kenya demonstrate local successes, particularly due to the involvement of NGOs. Nigeria’s initiatives remain incon-

Table 4

Teacher training

Country	Teacher training initiatives	Result
Cambodia	Conducting training sessions and incorporating inclusive modules into pre-service teacher training programs.	The need for deep integration into the formal teacher training system has been recognized.
India	Implementation of professional development programs and the incorporation of inclusive methods into training courses.	Improving teachers’ attitudes toward inclusion and increasing support for students with special needs.
Kenya	Training programs supported by NGOs and local education authorities.	Positive impact in the areas where they are implemented, but challenges remain regarding scale and consistency.
Nigeria	Teacher training is mandated by policy and supported by the government and international partners.	Efforts to train teachers in inclusive practices have been made, but irregularity and a lack of systematic support, especially in rural areas, limit their effectiveness.

Table 5

Parental involvement

Country	Research metod	Result
Cambodia	Conducting focus groups and interviews with parents and community members to understand the experiences and perspectives of teachers and parents regarding inclusive education.	The need for greater investment in inclusive education was identified, including teacher training, policy development, and infrastructure improvements.
Kenya	Conducting interviews with teachers, parents, and administrators to further understand the factors influencing the implementation of inclusive education.	Identified challenges included a lack of resources, teacher training, and negative attitudes.
Pakistan	Focus groups and questionnaires administered to parents, teachers, and community members.	Parents and communities were not sufficiently involved in the development of school plans for students.
Nigeria	Interviews and surveys with parents, teachers, and other stakeholders.	Parental participation varies by region. Where information support is provided, engagement increases; however, institutional barriers and poor communication limit systematic participation.

Table 6

Policy effectiveness

Country	National educational policy	Policy outcome
Cambodia	Education for All. National Action Plan (2009–2014).	It was found that the policy was not adequately supported by implementation resources that address needs such as teacher training and infrastructure improvements.
India	National Education Policy (NEP 2020). Department of School Education and Literacy, India.	Teachers had a positive attitude toward the inclusion of students with special needs thanks to policy changes, improved school infrastructure, and the provision of institutional resources.
Bangladesh	National Education Policy (2010).	Despite government policy, Bangladesh's economic structure and historical practices hinder inclusive education. We need an approach to inclusion that emphasizes mutual respect (from the National Policy), but achieving this requires a fundamental shift in societal values.
Nigeria	National Policy on Education (NPE) (2004). Universal Basic Education (UBE) Act (2004).	Some aspects of the national policy were ambiguous and difficult to interpret for implementation. The lack of a legal mandate for the NPE meant that noncompliance with the policy and failure to account for special needs did not result in sanctions.

sistent, often failing to reach rural teachers and ensuring the sustainability of IE programs (Oladele et al., 2016).

Discussion of results

This study confirms that, despite growing attention to IE in the LLMICs, the effectiveness of its implementation varies significantly depending on the national context (Amor et al., 2018; Kim, Fox, 2011). As our data demonstrate, these differences are driven by the complex interplay of four key factors: (1) clarity of policy direction, (2) sustainability of funding, (3) quality

of teacher training, and (4) depth of local community engagement.

Political and institutional differences are most evident when comparing Nigeria and India. Nigeria, despite having a well-developed regulatory framework for ECE (the 2004 National Education Policy, the 2004 Universal Basic Education Act), faces a "triple gap" in its implementation (Ayowole, 2022): spatial (87% of specialists are concentrated in cities), institutional (lack of sanctions for non-compliance with regulations), and diagnostic (only 23% of schools use standardized tools for identifying special needs) (Ogunode, Yunusa, 2022). In contrast, India's decentralized model (NEP 2020) has reduced the interstate gap in access to inclusive education by 14 percentage points (Hossain, 2021), although the "resource paradox" persists here as well — 68% of assistive technologies are used in the 12% of schools with the highest resources (Adetoro, 2014).

Sociocultural factors create additional challenges. In Bangladesh, a historical orientation toward segregated education (Grech, 2009) is compounded by economic dependence — up to 91% of the early childhood education budget comes from international donors (Eide et al., 2011). In Uganda, 73% of rural parents believe that inclusive education is harmful to neurotypical children (Bannink et al., 2019), and in Bangladesh, girls with dyslexia receive support 4.2 times less often than boys. These data confirm the findings of Uba and Nwoga (2016) that inclusion requires not only policy decisions but also a profound transformation of social attitudes.

Promising strategies for implementing IE policies identified in the study include: (1) "cascade" teacher training (20% of "lead tutors" in India and Kenya achieve 3,8 times higher reach than standard programs), (2) micro-adaptation of infrastructure (for example, repurposing church halls in Nigeria increased accessibility by 31%), (3) engagement of cultural intermediaries (religious leaders in Pakistan increased IE adoption by 31–48%). These approaches, as shown by Oladele et al. (2016) and Pirzada et al. (2024), are particularly effective when the local cultural context is taken into account.

The study's findings and implications confirm the need for "contextual hybridization" — a strategic combination of global IE standards with local adaptations. As the experiences of Nigeria (Ayowole, 2022) and Cambodia (Chinengundu, Hondonga, 2024), sustainable inclusion requires: (1) monitoring of policy implementation, (2) investment in changing public perception, (3) development of culturally sensitive assessment tools (Saran et al., 2020).

Conclusion

The study presented here has identified both common trends and clear differences in approaches to inclusive education within the LLMICs. A key common feature of all the countries examined is the official recognition of the rights of all students with special educational needs to access equitable education, and inclusive education is viewed as a strategic priority of national policies.

However, there are significant differences in how this policy is implemented. In countries such as India and Kenya, there is a closer link between policy and practice. These countries have made notable progress by investing in teacher training, developing support systems, and implementing inclusive practices in mainstream schools.

Conversely, in Nigeria, although inclusive education is reflected in national policy, the gap between intentions and practice remains significant. Challenges include limited infrastructure, inconsistent

implementation, underdeveloped monitoring systems, and minimal coverage of rural areas. Legal and institutional gaps further hinder the effective application of IE principles and standards.

In India, teachers' attitudes and self-efficacy remain key barriers, limiting the implementation of inclusive practices on the ground (Bala, 2021; Bandyopadhyay, Dhara, 2021).

Thus, while IE is a shared policy commitment, the capacity for its effective implementation varies. Sustainable progress requires not only well-designed policies but also concrete operational strategies, sufficient resources, and the active participation of stakeholders at all levels of the education system, including targeted teacher training programs, as highlighted by research in the Indian context (Bandyopadhyay, Dhara, 2021).

Furthermore, the study's findings highlight a number of effective strategies that contribute to the successful implementation of inclusive education: targeted teacher professional development programs with an emphasis on inclusive practices; conducting culturally sensitive awareness campaigns to raise community awareness; the implementation of mechanisms to monitor and evaluate policy implementation; the development of adapted diagnostic tools; and the targeted allocation of resources. These approaches can serve as practical recommendations for policymakers and educators seeking to remove barriers and enhance the effectiveness of inclusive practices in resource-constrained settings.

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The relationship between TPACK mastery and self-esteem: a pathway to strengthening teacher career commitment

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Abstract

Context and relevance. The Technological Pedagogical Content Knowledge (TPACK) framework serves as a vital foundation for understanding teachers' ability to integrate technology into modern education. While numerous studies have highlighted the role of TPACK in enhancing teachers' confidence and capacity to navigate digital education and complex pedagogical demands, empirical evidence on its impact on Teacher Career Commitment (TCC) remains scarce, especially in developing contexts like Vietnam. **Objective.** This study explored the relationship between TPACK and TCC, focusing on the mediating role of Teacher Professional Self-Esteem (TPSE). **Methods and materials.** A cross-sectional study involving 413 Vietnamese school teachers was conducted. **Results.** Results from SEM analysis revealed that TPACK positively impacts TCC, with TPSE acting as a full mediator in this relationship. **Conclusions.** These findings suggest that fostering TPACK in Vietnamese teachers within the context of digital transformation in education could support teacher retention. Additionally, enhancing professional self-esteem may amplify the effectiveness of TPACK development programs.

Keywords: TPACK, Teacher Career Commitment, Teacher Professional Self-Esteem, digital education, Vietnam

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Отношение между владением технологическим педагогическим контент-знанием и самоуважением: путь к укреплению профессиональной приверженности учителей

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Резюме

Контекст и актуальность. Концепция технологического педагогического контент-знания (ТПКЗ) служит важной основой для понимания способности учителей интегрировать технологии в современное образование. В то время как многочисленные исследования подчеркивают роль ТПКЗ в повышении уверенности учителей и их возможностей ориентироваться в цифровом образовании и сложных педагогических требованиях, эмпирических данных о его воздействии на профессиональную приверженность учителей (ППУ) остается немного, особенно в развивающихся странах, таких как Вьетнам. **Цель.** В данном исследовании рассматривалась связь между ТПКЗ и ППУ, уделяя особое внимание посреднической роли профессиональной самооценки учителя (ПСУ). **Методы и материалы.** Проведено поперечное исследование, в котором участвовали 413 вьетнамских школьных учителей. **Результаты.** Результаты анализа с помощью метода моделирования структурных уравнений (SEM) показали, что ТПКЗ положительно влияет на ППУ, при этом ПСУ выступает в роли полного посредника в этой связи. **Выводы.** Полученные результаты позволяют предположить, что развитие ТПКЗ у вьетнамских учителей в условиях цифровой трансформации образования может помочь им остаться в профессии. Кроме того, повышение профессиональной самооценки может усилить эффективность программ по развитию ТПКЗ.

Ключевые слова: ТПКЗ, профессиональная приверженность учителей, профессиональная самооценка учителя, цифровое образование, Вьетнам

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Introduction

The rapid advancement of digital technology has fundamentally reshaped the educational landscape. This change presents both opportunities and challenges for teachers worldwide. To meet the requirements of educational tasks in this con-

text, educators must move beyond traditional pedagogical practices and develop an understanding of how to integrate technology effectively. These demands can create stress and anxiety for teachers, which can undermine their quality of life and professional commitment (Klassen, Chiu, 2011; Pham et al., 2023; Uyun, 2024). The Technological Pedagogical Content Knowledge (TPACK) framework provides a comprehensive model for addressing this problem. This framework emphasizes the interplay between technological, pedagogical, and content knowledge required to create meaningful and effective learning environments (Mishra, Koehler, 2006). While extensive research has highlighted the positive impact of TPACK on teaching practices and student outcomes (Almaiah et al., 2022; Tseng et al., 2022; Zhang, Junhong, 2021), less attention has been directed toward its role in promoting long-term commitment to teaching in teachers. Teacher career commitment (TCC) is important in the teaching profession, where high stress, evolving expectations, and rapid technological changes often lead to burnout or attrition (Califf, Brooks, 2020; Nguyen et al., 2020). To strengthen TCC, considering teachers' self-esteem is important. Teacher Professional Self-Esteem (TPSE) can be defined as teacher's attitude of their professional competence, effectiveness, and worth within the educational system (Carmel, 1997). Several studies have shown that TPACK can significantly enhance teachers' self-efficacy (Abd Rahman, 2022; Joshi, 2023), which has a positive relationship with self-esteem (Pignault et al., 2023). Meanwhile, self-efficacy is an important contributor to TCC (Uyun, 2024; Zhu et al., 2024). This suggests that TPSE may play a pivotal role in linking TPACK to TCC. Despite its significance, there is limited understanding of these relationships in specific educational contexts such as Vietnam, where the integration of technology in classrooms is still developing. Therefore, we want to examine the role of TPSE in the relationship between TPACK and TCC.

Technological pedagogical content knowledge

Building on concept of Shulman (1986) of Pedagogical Content Knowledge (PCK), the TPACK framework was developed to address the growing influence of technology on education. First introduced by Mishra and Koehler (2006), TPACK integrates three core domains of teacher knowledge: Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). At the intersections of these domains, subdomains such as Technological Pedagogical Knowledge (TPK) and Pedagogical Content Knowledge (PCK) emerge, reflecting the complex interplay required for technology-enhanced teaching. TPACK represents the integrated knowledge that teachers need to effectively design and deliver technology-supported pedagogy in specific subject areas. This model has gained widespread adoption, serving as a guide for teacher training and professional development programs globally (Polyakova, de Ros Cócera, 2022). Tessema and Belihu (2023) emphasized the effectiveness of TPACK in supporting teachers to create innovative lesson designs. Koh and Chai (2014) found that teachers with strong TPACK reported higher confidence and competence in using technology for teaching. Similarly, Aktaş and Özmen (2022) have shown that teacher education programs incorporating TPACK significantly enhance preservice teachers' technology integration skills. Elmaadaway and Abouelenein (2023) have shown that teachers who utilize TPACK can design more interactive and effective learning environments. Additionally, Jen et al. (2016) have indicated that teachers with high TPACK are better able to adapt to diverse learner needs and emerging educational technologies. These studies have validated the TPACK framework as a valuable tool for understanding and improving teachers' ability to integrate technology into their teaching practices.

Despite its strengths, TPACK faces criticism and challenges, particularly in operationalization and assessment. Brantley-Dias and Ertmer (2013) argued that the overlapping nature of the framework's components makes it challenging to measure. Other researchers, such as Harris and Hofer (2011) noted that the framework requires substantial professional development and institutional support to be effectively implemented. Moreover, in low-resource settings, such as rural schools or developing countries, teachers

often struggle with limited access to digital tools and training, which inhibits the development of TPACK (Rehman et al., 2021). These challenges highlight the importance of contextualizing TPACK research and applications to fit the specific needs of diverse educational settings.

Teacher career commitment

TCC refers to teachers' attitudes toward their teaching profession (Blau, 1985). Previous studies suggested that committed teachers are more likely to demonstrate resilience, innovation, and consistent professional development efforts, all of which are essential in addressing the challenges of modern classrooms (Caena, Vuorikari, 2022; Yang et al., 2023). Klassen and Chiu (2011) found that teachers with higher self-efficacy are more committed to their careers, as they feel capable of overcoming challenges. Similarly, working conditions, such as manageable workloads, supportive leadership, and access to resources, are critical predictors of TCC (Mohammad, Borkoski, 2024).

In Vietnam, empirical studies examining TCC are limited. Existing research often focuses on general teacher retention issues or satisfaction but lacks a detailed exploration of the underlying factors driving TCC. Some studies have noted that Vietnamese teachers face significant challenges, including heavy workloads and low salaries (Nguyen et al., 2024; Truong, Nguyen, 2024), which may negatively impact their long-term commitment. However, these studies have not systematically employed constructs such as effective or normative commitment to analyze TCC in depth. Moreover, the Vietnamese education system's ongoing digital transformation presents new opportunities to examine how technological integration, professional development, and workplace support influence TCC.

The relationship between TPACK and teacher career commitment: role of teacher professional self-esteem

Self-Determination Theory, introduced by Ryan and Deci (2000), suggests that human motivation is influenced by the fulfillment of three core psychological needs: competence, autonomy, and relatedness. According to this theory, when these needs are met, they will have greater intrinsic motivation (Ryan, Deci, 2020). In the current study, Self-Determination Theory may help explain how teachers' mastery of TPACK can enhance their career commitment. Research supports the idea that teachers who have high TPACK may be more likely to feel self-efficacy (Friskawati, 2021), which contributes to enhanced motivation and engagement in teaching (Shilenkova, 2020). TPSE refers to a teacher's confidence in their professional abilities and their sense of worth in the context of their teaching role (Carmel, 1997). It is closely related to self-efficacy, where teachers' belief in their competence (Hussain, Khan, 2022). Recent studies suggest that TPACK plays an important role in influencing teachers' psychological states, including TPSE. Chai et al. (2013) emphasized that TPACK competencies help build teacher confidence, particularly in adapting to evolving educational technologies, thereby reducing anxieties linked to pedagogical challenges. Moreover, teachers with high TPSE often display greater enthusiasm for their work, are more resilient in the face of challenges, and demonstrate a stronger sense of commitment to their careers (Granjo et al., 2021; Shao, 2023). In contrast, teachers with low TPSE may struggle with burnout, lower job satisfaction, and an increased likelihood of leaving the profession (Granjo et al., 2021; Shilenkova, 2020).

Based on the existing literature and conceptual framework, we propose that TPSE mediates the relationship between TPACK and TCC. In addition, it is essential to include variables such as gender and age. Research highlights that demographic factors like gender and age may shape career priorities and motivational drivers, potentially influencing career commitment (Aan Osch, Schaveling, 2017; Weng, McElroy, 2012). Similarly, educational attainment and salary are linked to career satisfaction, which indirectly affects an individual's dedication to their profession (Judge et al., 2010; Solomon et al., 2022). Work experience may be associated with career commitment (Bhawna et al., 2024). Therefore, we proposed the following hypothesized model (see Fig. 1).

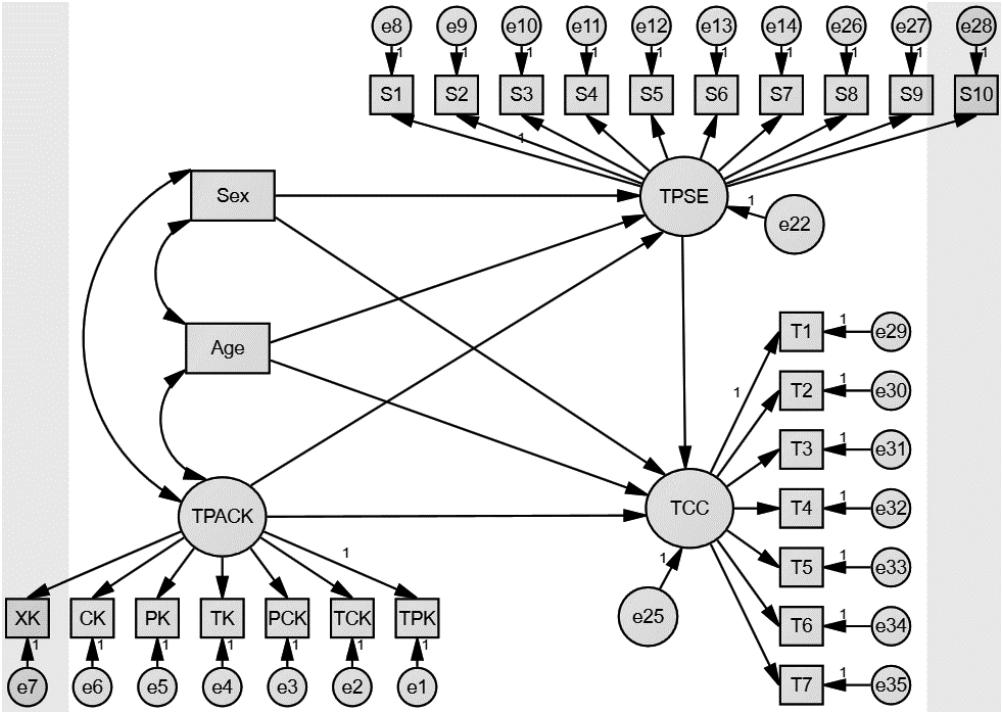

Fig. 1. Hypothesized model: TPSE: Teacher Professional Self-Esteem. TCC: Teacher Career Commitment. TPACK: Technological Pedagogical Content Knowledge

Materials and methods

Participants and procedures

This study used a cross-sectional design to examine the proposed model. The data were collected through an online survey using Google Forms. The survey link was shared with teachers working in primary, secondary, and high schools across various provinces in Vietnam. Before starting the survey, all participants were given detailed information about the study. They were told about the purpose of the research and how their responses would be used. Participants were assured that their information would remain confidential. Only those who agreed to the terms and provided informed consent were allowed to complete the survey. This ensured that all responses were provided voluntarily and ethically. In total, 413 valid responses were collected. The sample included 89 male participants and 324 female participants. The average age of the respondents was 40,21 years, with a standard deviation of 8,11 years. This showed that the sample had a range of ages suitable for the study's purpose. More details about the participants' demographic information can be found in Table 1.

Measurements

The Technology Pedagogical Content Knowledge Survey (Mishra, Koehler, 2006) is designed to measure the level of technological pedagogical content knowledge among teachers. The survey contains 28 items that assess how well educators integrate technology with content and teaching methods. Participants rate each statement using a 5-point Likert scale (ranging from 1 to 5), with higher scores indicating a higher level of TPACK. The survey demonstrates excellent reliability, as indicated by a Cronbach's alpha of 0,97.

To assess TPSE, this study adapted a version of the Professional Self-Esteem of Physicians Scale (Carmel, 1997). The scale comprises 10 items that measure confidence in teaching abilities, pride in professional achievements, and a sense of impact on students' lives. For example, items include statements such as "I feel confident in my teaching abilities" and "I am proud of my achievements as a teacher." Participants responded using a 5-point Likert scale, with higher scores indicating stronger TPSE. The internal consistency of the scale in this study was high, with a Cronbach's alpha of 0,94, confirming its reliability.

TCC was measured using an adapted version of the Career Commitment Scale (Blau, 1985). The 7-item scale includes items like "I definitely want a career for myself in the teaching profession" and "If I had all the money I needed without working, I would probably still continue to work in teaching." The items were rated on a 5-point Likert scale, with reverse coding applied to certain negatively worded items. Higher scores reflect stronger TCC. In this study, the scale showed good reliability with a Cronbach's alpha of 0,73.

Data analysis

We used SPSS 20.0 and AMOS software to analyze the data. Descriptive statistics were calculated to provide an overview of the sample's characteristics. Spearman's correlation coefficient among variables were also analyzed to explore their relationships. After this initial step, we used AMOS to test the proposed research model. To evaluate the goodness-of-fit of the research model, we used several fit indices. These indices included Discrepancy divided by Degrees of Freedom (CMIN/DF), which measures the relative discrepancy between the observed and estimated covariance matrices. We also used the Comparative Fit Index (CFI) to assess the improvement of the proposed model over a baseline model. The Tucker-Lewis Index (TLI), another indicator of model fit, was applied to determine the model's overall coherence. Finally, the Root Mean Square Error of Approximation (RMSEA) was used to evaluate the model's approximate fit in the population.

Results

Table 1 presents the descriptive statistics of the research variables.

Table 2 shows that TPSE is strongly correlated with TPACK ($r = 0,64$, $p < 0,001$) and moderately correlated with TCC ($r = 0,22$, $p < 0,001$). TPACK is also moderately correlated with TCC ($r = 0,30$, $p < 0,001$).

Table 1

Descriptive statistics of study variables

Characteristic		N	%	Mean	SD	Skewness	Kurtosis
Gender	Male	89	21,5	–	–	–	–
	Female	324	18,5	–	–		
Age	–	–	–	40,21	8,11	–0,15	–0,48
Highest Education Level	Intermediate	4	1,0	–	–	–	–
	Associate degree	11	2,7	–	–		
	Bachelor's	349	84,5	–	–		
	Master's	49	11,9	–	–		
	Doctorate	0	0,0	–	–		
Salary	< 5 million VND	10	2,4	–	–	–	–
	5–10 million VND	136	32,9	–	–		
	10–15 million VND	207	50,1	–	–		
	15–25 million VND	56	1,36	–	–		
	> 25 million VND	4	1,0	–	–		

Characteristic		N	%	Mean	SD	Skewness	Kurtosis
Experience	< 1 Year	20	4,8	–	–	–	–
	< 3 Year	17	4,1	–	–		
	< 5 Year	17	4,1	–	–		
	< 10 Year	59	14,3	–	–		
	> 10 Year	300	72,6	–	–		
TPACK	–	–	–	3,86	0,57	–0,33	6,54
TPSE	–	–	–	3,97	0,66	0,17	–0,01
TCC	–	–	–	3,28	0,56	–2,12	3,52
Total	–	413	100	–	–	–	–

Note: N = 413. TPSE: Teacher Professional Self-Esteem. TCC: Teacher Career Commitment. TPACK: Technological Pedagogical Content Knowledge.

Table 2

Correlation matrix

	Sex	Age	H_Edu	Salary	Exp	TPACK	TPSE	TCC
Sex	–							
Age	–0,14**	–						
H_Edu	0,03	–0,02	–					
Salary	–0,11*	0,57***	0,05	–				
Exp	–0,07	0,57***	0,03	0,49***	–			
TPACK	–0,07	0,11*	0,06	0,06	0,03	–		
TPSE	–0,06	0,25***	0,07	0,22***	0,15*	0,64***	–	
TCC	–0,14*	0,09	–0,06	0,03	0,05	0,22***	0,30***	–

Note: Spearman's correlation coefficients are reported. * — p < 0,05, ** — p < 0,01, *** — p < 0,001. TPSE: Teacher Professional Self-Esteem. TCC: Teacher Career Commitment. TPACK: Technological Pedagogical Content Knowledge. H_Edu: Highest Education Level. Exp: Experience.

The results from Table 3 show that the model fits the data well. The chi-square value is 1093,02 with 289 degrees of freedom, and the CMIN/DF is 3,75, which is within the acceptable range. RMSEA is 0,082, indicating a good fit, while SRMR is 0,058. Additionally, TLI (0,896) and CFI (0,908) are close to the ideal threshold of 0,90. The p-value is less than 0,001, confirming the overall significance of the model.

Table 4 and Figure 2 presents the results of testing the mediation effects of TPSE in the relationship between TPACK and TCC. The total impact of TPACK on TCC is significant (β = 0,53, p < 0,001). The direct impact of TPACK on TPSE is also significant (β = 0,73, p < 0,001). However, the direct impact of TPACK on TCC is not significant (β = –0,07, p = 0,269). The impact of TPSE on TCC is strong and significant (β = 0,82, p < 0,001),

Table 3

Model fit summary

Factors	Values	Factors	Values	Factors	Values	Factors	Values
Chi-square	1083,02	Degrees of freedom	289	CMIN/DF	3,75	RMSEA	0,082
P-value	<0,001	SRMR	0,058	TLI	0,896	CFI	0,908

Note: N = 388. CMIN/DF = Discrepancy divided by Degrees of freedom. CFI = Comparative Fit Index. TLI = Tucker-Lewis's coefficient. RMSEA = Root Mean Square Error of Approximation.

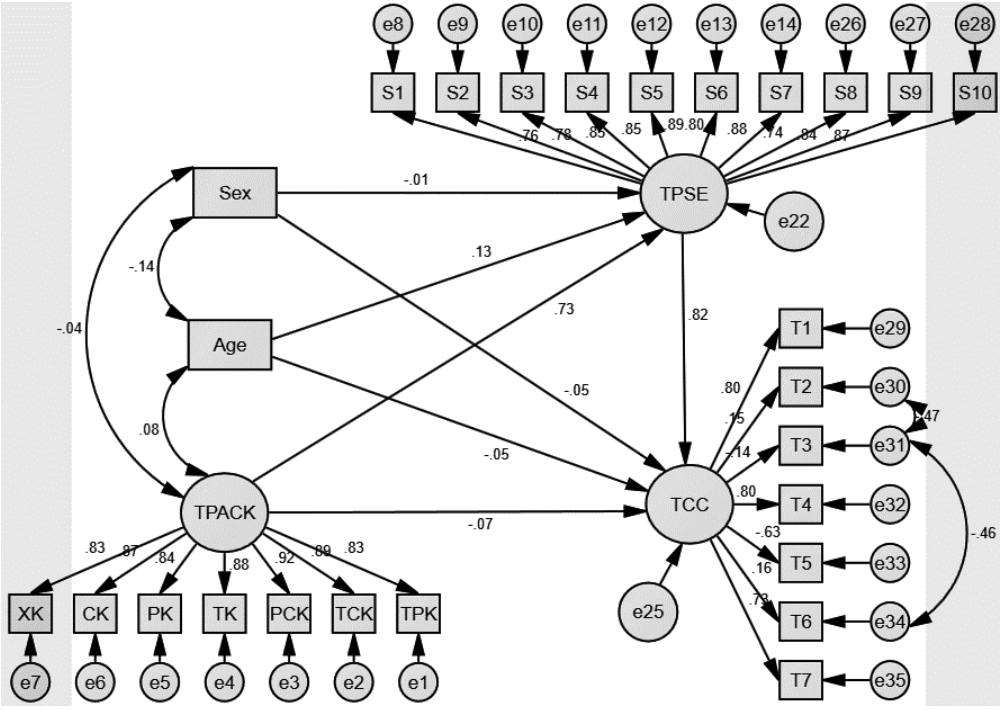

Fig. 2. Results of the hypothesized model: TPSE: Teacher Professional Self-Esteem. TCC: Teacher Career Commitment. TPACK: Technological Pedagogical Content Knowledge

indicating that higher TPSE contributes to increased TCC. The indirect impact of TPACK on TCC through TPSE is also significant (β = 0,60, p < 0,001). These results support that TPSE plays a full mediator in the relationship between TPACK and TCC.

Table 4

Testing the mediation effects of TPSE in the relationship between TPACK and TCC

Model pathways	β	p	95% CI	
			Lower	Upper
Total effects				
TPACK → TCC	0,53	<0,001	0,39	0,66
Direct effects				
TPACK → TPSE	0,73	<0,001	0,63	0,82
TPACK → TCC	–0,07	0,269	–0,21	0,07
TPSE → TCC	0,82	<0,001	0,68	0,95
Indirect effects				
TPACK → TPSE → TCC	0,60	<0,001	0,47	0,73

Note: *N* = 413. TPSE: Teacher Professional Self-Esteem. TCC: Teacher Career Commitment. TPACK: Technological Pedagogical Content Knowledge.

Discussion

The TPACK framework provides a crucial foundation for understanding teachers' ability to integrate technology into teaching in the modern educational context. Numerous studies have suggested that developing TPACK can enhance teachers' confidence in their competencies, thereby improving their capacity to meet the demands of digital education and complex pedagogical tasks (Chai et al., 2013; Koh, 2019). However, empirical evidence regarding the impact of TPACK on TCC remains limited, particularly in developing educational settings such as Vietnam. Building on this theoretical foundation, our study investigated the relationship between TPACK and TCC, while also examining the mediating role of TPSE in this connection. Our findings revealed a significant positive relationship between TPACK and TCC, suggesting that enhanced TPACK may contribute to higher levels of TCC. This result aligns with prior studies indicating that technology integration skills bolster teachers' confidence and motivation to sustain their careers (Klassen, Chiu, 2011; Shilenkova, 2020). Furthermore, this not only supports Self-Determination Theory (Ryan, Deci, 2000, 2020) in emphasizing the importance of meeting teachers' competency needs, but also suggests that investing in TPACK development may be an effective strategy for improving TCC.

Our findings support the hypothesis that TPACK positively impact TPSE, which is consistent with previous research (Chai et al., 2013; Klassen, Chiu, 2011). Chai et al. (2013) suggested that mastering TPACK helps teachers develop confidence in their ability to integrate technology into teaching. This, in turn, may enhance their sense of competence and professional identity. Our results suggest that TPACK not only improves teachers' technical skills but also strengthens their belief in their effectiveness as educators.

Another significant finding of our study is that TPSE has a positive relationship with TCC. This aligns with previous research showing that teachers with higher TPSE are more committed to their profession, as they feel more confident in their abilities to overcome challenges (Granjo et al., 2021; Klassen, Chiu, 2011). Teachers with high TPSE tend to exhibit greater resilience, allowing them to cope with the difficulties of the profession more effectively (Baguri et al., 2022). Furthermore, studies have shown that TPSE can lead to increased job satisfaction and a deeper sense of motivation to continue teaching, ultimately enhancing TCC (Granjo et al., 2021; Shilenkova, 2020). This result suggests that enhancing TPSE can be an effective strategy for increasing their long-term commitment to teaching. Finally, our study shows that TPSE fully mediates the relationship between TPACK and TCC. This finding is consistent with previous research suggesting that confidence in ability may be a critical factor in linking teachers' technological and pedagogical competence to their commitment to the teaching profession (Chai et al., 2013; Klassen, Chiu, 2011). Teachers with higher TPACK not only feel more confident in their teaching abilities but also develop a stronger sense of professional identity, which in turn strengthens their career commitment.

Implications

The findings underscore critical implications for the Vietnamese education system, particularly in leveraging the TPACK framework (Mishra, Koehler, 2006) to address current challenges in teacher training and pedagogy. Vietnamese educators often face barriers in aligning technological, pedagogical, and content knowledge due to disparities in access to resources and professional development opportunities, especially in rural areas (Nguyen et al., 2024). Enhancing TPSE is vital to bridge these gaps, as teachers with higher self-esteem are more likely to experiment with innovative teaching strategies and incorporate technology effectively. This aligns with the self-determination theory of (Ryan, Deci, 2000), which highlights the interplay between competence and intrinsic motivation. Tailored interventions in Vietnam could focus on strengthening teachers' confidence in technology use while ensuring that these skills integrate seamlessly with their pedagogical and content

expertise. For instance, localized professional development programs could offer hands-on workshops and peer collaboration initiatives, fostering both technical competence and professional self-esteem. Such targeted approaches ensure that technological integration supports meaningful learning outcomes rather than becoming a superficial add-on.

Moreover, the success of TPACK-based initiatives in Vietnam depends heavily on addressing systemic factors such as workload, access to resources, and institutional support. Research by Klassen and Chiu (2011) emphasizes that environments prioritizing collaboration, emotional support, and professional recognition significantly enhance teacher well-being and engagement. For Vietnam, these findings point to the necessity of creating structures that promote both technological competency and professional growth. For example, mentorship programs where experienced teachers guide peers in integrating TPACK principles can enhance collective efficacy and reduce resistance to change. Additionally, recognizing regional differences in educational infrastructure is essential; rural teachers may require greater support in accessing technology and adapting it to their teaching contexts.

Limitations and future research directions. This study has several limitations that should be acknowledged. First, the cross-sectional design restricts our ability to infer causal relationships between TPACK and TPSE (Maier et al., 2023). Second, reliance on self-reported data may introduce bias, as participants might overestimate or underestimate their abilities or feelings due to social desirability or self-perception issues (Erol, Ayta , 2023). Third, our study is limited to Vietnamese-speaking participants, which restricts the generalizability of the findings to other cultural or linguistic contexts. The TPSE scale was adapted from the Professional Self-Esteem of Physicians Scale (Carmel, 1997), but this remains a preliminary adaptation and has not yet undergone a standardized validation process. Despite this, the model fit and internal consistency provide initial evidence supporting the construct validity of the scale. Moving forward, validating this instrument in Vietnamese and across other languages and cultural contexts is essential to establish a standardized and widely applicable measure for use in diverse educational settings. Building on these limitations, several promising lines of inquiry emerge that could advance theoretical understanding and practical application of TPACK, TPSE, and TCC in educational contexts. Future studies should investigate whether long-term professional development initiatives that explicitly target TPACK lead to sustainable changes in TPSE and TCC over time. Second, given that TPSE fully mediated the relationship between TPACK and TCC, further research should examine whether this mediating mechanism remains consistent across subgroups of teachers such as those working in rural versus urban regions, novice versus experienced teachers, or those teaching at different educational levels. Third, future work should explore contextual moderators that may strengthen or weaken the influence of TPACK and TPSE on TCC. Factors such as school leadership, professional learning communities, workload, and access to digital resources could significantly shape how teachers translate technological competence into professional motivation. It would also be valuable to examine whether different components of TPACK exert differential effects on TPSE and TCC. Finally, future research should compare self-reported measures with observational or behavioral data to determine whether the relationships identified in this study hold across methodological approaches. Such triangulation would address the inherent limitations of self-report data and help build a more comprehensive account of teachers' technological and motivational development.

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DISCUSSION AND DISCOURSES
ДИСКУССИИ И ДИСКУРСЫ

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On the issue of analyzing psychological well-being in the context of personal and demographic parameters

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Abstract

Context and relevance. The mental well-being of the population is a critical issue in modern society. Big data technologies offer new opportunities for identifying factors that influence a person's psychological state, while minimizing the researcher's influence and enhancing the reproducibility of results in the context of the crisis in the reproducibility of psychological research. **Objective.** Analysis of the relevance, methodological and practical limitations of using research methods for working with large databases to solve the problems of studying the psychological well-being of teachers who are at the stage of resocialization. **Results.** The study's findings confirm the feasibility of using Big Data methodology in analyzing respondents' psychological well-being. Taking into account the characteristics of the study population and existing limitations allows for modern research that addresses new psychological and methodological needs and contemporary challenges, and for developing a system of psychological and pedagogical support for potential and current teaching staff. **Conclusions.** Big data methodology overcomes the problem of reproducibility by passively collecting data and eliminating the influence of the experimenter. The resulting patterns open up opportunities for developing preventive programs and psychological and pedagogical support, including work with special military operation veterans transitioning to civilian teaching.

Keywords: big data, psychometric data, mental well-being, demographic parameters, passive data collection, and resocialization of teaching staff

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К вопросу об анализе психологического благополучия в контексте личных и демографических параметров

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Резюме

Контекст и актуальность. Психическое благополучие населения является критической проблемой современного общества. Технологии больших данных открывают новые возможности для выявления факторов, влияющих на психологическое состояние человека, минимизируя при этом влияние исследователя и повышая воспроизводимость результатов в контексте кризиса воспроизводимости психологических исследований. Актуальность решения данной проблемы рассматривается на примере интеграции в педагогическую систему особой социальной педагогической группы — ветеранов специальной военной операции, в контексте деятельности которых значимы выявление, оценка, анализ, формирование и корректировка психологического статуса и психологической готовности к педагогической работе. **Цель**. Анализ актуальности, методологических и практических ограничений применения исследовательских методов работы с большими базами данных для решения задач исследования психологического благополучия педагогов, находящихся на этапе ресоциализации. **Результаты**. Материалы исследования подтверждают целесообразность применения методологии Big Data в контексте анализа психологического благополучия респондентов. Учет особенностей исследуемого контингента и имеющихся ограничений позволяет проводить современные исследования, отвечающие новым психолого-методическим задачам и современным вызовам, развивать систему психолого-педагогического сопровождения потенциального и действующего кадрового педагогического состава. **Выводы.** Методология больших данных позволяет преодолеть проблему воспроизводимости за счет пассивного сбора информации и исключения влияния экспериментатора. Полученные закономерности открывают возможности для разработки профилактических программ и психолого-педагогического сопровождения, включая работу с ветеранами специальной военной операции, переходящими на гражданскую педагогическую деятельность.

Ключевые слова: большие данные, психометрические данные, психическое благополучие, демографические параметры, пассивный сбор данных, ресоциализация педагогических кадров

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Introduction

Modern humanities are confronted with a fundamental challenge: how to transform the growing number of psychometric data into reliable knowledge about the factors influencing human mental well-being (Bainbridge, 2024). Two decades ago, collecting and analyzing such data was an extremely labor-intensive process, requiring significant resources. However, the development of information and communication infrastructure, mobile devices, and social media has fundamentally expanded the capabilities of researchers. Today, we have unprecedented access to data on the psychological state of large population samples.

This has led to the emergence of a new research paradigm: instead of classical experiments with strict control of variables, psychology can rely on observations of natural behavior and psychological characteristics of people in their everyday environments (Newson et al., 2024). Big data technologies are specialized tools designed to analyze massive datasets that cannot be handled manually. At the same time, the passive nature of data collection minimizes the influence of the experimenter — a problem that has historically complicated psychological research.

Along with the development of methodological approaches, significant progress has been made in statistical analysis and artificial intelligence. Machine learning and deep learning methods are actively used in healthcare to predict and identify hidden patterns. However, psychological sciences have been slower to adopt these tools, although their potential in this field is particularly significant.

However, mention should be made of the existence of a well-known problem, i.e., the reproducibility crisis in psychology (Open Science Collaboration, 2015). Attempts to replicate classical psychological experiments have yielded similar results in only 39% of cases. This figure indicates systematic problems in psychological methodology. One hypothesis is that the transition to observational methods based on big data, which eliminate the active role of the experimenter, can significantly improve reproducibility.

Finally, the issue of mental health monitoring is becoming critically important in the information age. Personalized information tools (such as social media and algorithmic news feeds) can trigger the formation of biased perceptions and mental disorders, including long-term depression. Therefore, regular diagnostic assessment

of both individuals and social groups becomes not merely desirable but essential (Bainbridge, 2024).

The aim of this paper is to examine the challenges and potential applications of big data methods for identifyi statistically significant relationships between various parameters and mental state, to formulate hypotheses for further research, and to provide a basis for practical applications in pedagogy and psychological support.

Practical application: diagnostics and resocialization of teaching staff

Modern Russian education is undergoing a comprehensive process of modernization, which involves the introduction of innovative approaches into educational practices at various levels, as well as the implementation of new trends and transformations aimed at addressing current challenges and priorities.

Effective implementation of educational objectives largely depends on the development of professionally significant characteristics of teaching staff, as well as on the sharpening of competencies and personal psychological traits relevant to their professional activities.

The use of the digital technologies analyzed aligns with state policy objectives (Decree of the President of the Russian Federation of July 21, 2020 No. 474 “On the National Development Goals of the Russian Federation through 2030,” Order of the Government of the Russian Federation of December 31, 2019 No. 3273-r, “Concept for the Training of Teaching Staff for the Education System through 2030,” etc.). According to these objectives, the teaching staff training system must address modern challenges by integrating technology-driven solutions, including digital transformation of the economy and public life. This entails the implementation of educational and diagnostic digital services to support the acquisition of skills in blended learning and design, as well as to master digital educational resources and other digital competencies among both prospective and practicing specialists. Moreover, modern teacher training programs must rely on the increased use of electronic educational environments in educational institutions, including various digital services for students and teachers; actively incorporate digital content and platform-based solutions in modern digital school; utilize big data tools in professional activities; develop and implement new master’s programs aimed at training teachers capable of creating technological and content-driven digital solutions for modern schools; and apply digital diagnostic tools for both pedagogical and psychological purposes. Work in this area involves conducting large-scale research aimed at identifying potential needs of the labor market and education sector, as well as psychological-pedagogical studies focused on identifying patterns in the development of children, adolescents, and young adults, along with the professional and other types of well-being of adults.

Currently, a new social group has emerged in Russian society — participants and veterans of special military operations. This group is of scientific interest from the perspective of psychological, social, and pedagogical research. This research allows for the collection of up-to-date data on significant social phenomena and processes, supports forecasting of social trends and risks, facilitates the effective implementation of social policy objectives, and creates

the conditions for the successful adaptation and resocialization of military personnel. Note that psychological research is becoming a key approach to rehabilitating and supporting veterans and combat participants, necessitating the search for effective diagnostic tools to address a wide range of research tasks.

It should be noted that the work of modern teachers is characterized by a high level of intensity and diverse workloads, which places increased demands on stress tolerance and resilience and increases the risk of psychological well-being and health problems. Timely identification of risks to teachers' health is a pressing issue requiring optimal solutions, particularly because seeking professional help from psychologists remains relatively uncommon among teaching staff. Conducting psychological diagnostics using digital technologies makes it possible to collect psychologically significant data from respondents in a short period of time and in a respondent-friendly format, process it, and build targeted psychological work. The solution to such problems is especially relevant due to the fact that the ranks of modern teaching staff are replenished with teachers from among veterans of special military operations, many of whom, after returning to civilian life, are at the stage of professional reorientation in new life conditions. Veterans who have no contraindications to teaching and demonstrate an interest in educational work are a valuable resource. This teaching potential requires identification, implementation, and provision of appropriate specialized training programs, in particular in the subject "Fundamentals of Security and Defense of the Homeland," which involves the competencies possessed by this group of specialists (self-defense skills, survival in natural conditions, first aid, orientation, etc.). A fundamentally significant aspect of this social group's readiness for teaching is their psychological preparedness and the absence of any mental or psychological impairments. Technologies are needed that allow for the identification of professionally significant characteristics and the absence of contraindications to teaching during the professional selection process. The technologies discussed in this paper make it possible to achieve this goal not only through targeted, individual work but also through large-scale diagnostic procedures, which can be conducted among former military personnel to identify their pedagogical potential and readiness for teaching, educational, and outreach activities with children and youth, including latent ones.

Currently, various studies are actively being conducted on these respondents. Because this understudied social group is characterized by a number of characteristics, professional potential, and specific educational and social needs, it is essential to select, adapt, and develop comprehensive diagnostic materials, tasks, and methodologies. Given that participants and veterans of special military operations represent a large group whose numbers are expected to increase as hostilities continue, research methods based on big data are becoming increasingly important. Since such studies have not yet been conducted for the respondents in question, we present an example of a standard study, which determines the possibilities and prospects for its application to the targeted group and the research subject.

Because the research process is complex, we will consider possible limitations in this area.

Subject-specific and conceptual limitations of the study. In this study, personal and demographic parameters are examined in relation to psychological well-being. These parameters in veterans of special military operations have unique characteristics. Research into personal and demographic parameters is important for any systematic study. However, for example, in the field of education, they are of primary importance for the development of both professional retraining programs and the assessment of readiness for teaching, as a certain percentage of special military operation veterans choose a new career path after completing their military service, including teaching. This social group is differentiated by educational level and personality traits, the impact of combat experience on which requires long-term study.

Thus, with the data presented in the examples, the educational level is shown to influence psychological well-being and stress resilience. Among veterans engaged in teaching, the educational level varies significantly, with differences in age, learning ability, flexibility, emotional, personal, and behavioral adjustment, and readiness to assume the role of a student and a novice professional. Heuristically, we can assume that the results of the study will not differ for this social group. However, this hypothesis requires verification, as statistically significant differences are likely to be identified, which underlies effective utilization of the research methods in question. In particular, as noted, the Big Five model allows for the assessment of significant personality traits, such as agreeableness (i.e., the ability to adaptively respond to situations and avoid conflict) and openness to experience, which is of interest in relation to the veterans' transition to a new professional field.

In this case, demographic variables are important for assessing personal well-being, because such factors as demographic stability and security — the presence of family, supportive relatives, etc. — help veterans cope with challenging, difficult, and extreme life situations.

In implementing psychological and pedagogical support programs for veterans, research into pronounced and latent negative emotional states is important. These states not only represent potential risks but also may persist and even re-emerge after rehabilitation. However, this does not exclude recurrence, especially in new stressful conditions, and requires long-term observation. For example, possible manifestations of anxiety, associated with a transition to a new professional activity and changes in life in general, require special attention; stress reactions, as the work of a modern teacher is excessively demanding, require collaboration closely within a pair (a person-to-person dyad). From the perspective of the essence approach, this inherently involves stress factors that teachers must be able to constructively overcome and mitigate.

In applying the data and methods discussed, some research limitations should be outlined. These limitations include the possible data incompleteness, the lack of fully developed and targeted diagnostic tools to account for all the characteristics of this social group, and the high variability of individual characteristics, which, although generalizable, still require direct measurement, a targeted approach, and the development of a mechanism for classifying and systematizing the obtained data.

Quantitative indicators may also represent a limitation. For example, during integration into the education system at this

stage, it is quite difficult to track the exact proportion of veterans who have chosen a profession related to working with children. This is due to the absence of a unified registry of veteran teaching staff, and their professional retraining in this area is carried out continuously by educational organizations across various regions. As a result, on the one hand, the researcher is dealing with a small sample of respondents, but on the other, he may not be able cover the full diversity of potential respondent in the study.

Qualitative limitations include the following. Since this is the first time attempt to study the social group in question, the researcher must select information and data that are scientifically meaningful. This involves identifying and defining relevant qualitative characteristics and indicators, as well as developing criteria aligned with the research objectives.

Noteworthy are also the moral and ethical limitations. Given the life, personal, and professional experience of participants and veterans of special military operations, there are a number of questions that cannot be asked, or that respondents have the right not to answer, because these questions may inadvertently violate ethical principles or fall either inside or outside the boundaries of moral assumptions.

The main limitation is that the study presupposes a complete and honest response from the respondent, which in real-life situations may not coincide with expectations, thereby qualitatively and quantitatively affecting the data obtained. This situation can arise either intentionally or unintentionally, for example, when a respondent expresses a subjective assessment or opinion. A larger sample size and a longer research period will help overcome these limitations.

Given the limitations and missing information, the use of heuristics based on the researchers' scientific and practical experience, their ability to apply it effectively, and their deep knowledge of the subject matter can be a useful tool. Thus, several hypotheses can be formulated simultaneously, which can be verified or refuted using objective research methods. In this case, the researcher can act in one of two predetermined ways: when the problem is unknown and yet to be identified; or when the researcher recognizes the problem but cannot claim it without evidence that requiring validation with scientifically supported data. These opportunities allow one to overcome stereotypical perceptions of a given situation and tap into its resources and potential.

We should note another feature that arises in this context. A person's psychological and mental state is a dynamically changing process, requiring prolonged observation and periodic assessment.

Given that the analysis of statistically significant data using big data technologies reveals the influence of components such as educational level, family status, and others on psychological well-being, it is of interest to determine the status of future or current teachers who are veterans of special military operations. Note that, in terms of the parameters significant for psychological well-being, this social group is at risk due to the specific nature of their previous professional activities, the presence of high risks to life and health, infrequent communication with family, limited time spent at home, etc. Education also appears to be unstable in these respects. Most of the specialists in this group with bachelor's degrees in non-educational fields can become teachers through advanced training

or postgraduate certificates. Under these conditions, future teachers experience certain professional deficiencies, the presence of which can cause anxiety, generate professional insecurity, serve as a prerequisite for conflict, lead to professional failure, reduce motivation, and so on. Combined with other negative factors, these deficiencies can adversely affect the psychological health of specialists and influence their decisions, including those related to leaving their new profession. Early identification of potential problems using modern technologies, including big data, will facilitate the study of current issues and create conditions for the successful resocialization of this group of teachers.

Given the novelty and relevance of this issue, we emphasize once again the urgent need for specialized research into the development of various types of readiness for teaching among veterans of special military operations. In this case, important factors include cognitive and personal characteristics, analysis of professional predisposition, communication skills, goal-setting and life prospects, the development of social expectations, parameters of the need-motivational sphere, emotional stability, and the well-being of the emotional, volitional, and other spheres. The technologies under consideration will be in high demand for obtaining both individually oriented data and mass statistical data, enabling significant personnel, organizational, and managerial decisions, including at the national level. The insufficient representation and predominant absence of data on the relevant characteristics of the job descriptions of teachers among veterans of special military operations in scientific theory determine the high level of relevance of these technologies, which allow for the collection and processing of large volumes of scientifically significant information and data, as well as their scientific specification and visualization. Note that such technologies not only allow for statistical analysis but also provide information on significant relationships when analyzing massive psychometric datasets.

Modern school education is becoming increasingly technologically advanced: digital technologies are used in teaching lessons, assessing children's performance, and interacting with parents. Each teacher is tasked with conducting psychological, pedagogical, and educational assessments before and after teaching children. This procedure is labor-intensive, as the scope of competencies, such as those in the field of security, is multifaceted, encompassing knowledge of social, domestic, road, military, psychological, and other areas of security, and is associated with significant time expenditures. These technologies allow one to optimize data processing and collection, to collect accurate diagnostic information, and to integrate this information into both pedagogical and psychological work.

Thus, the active use of these resources, including big data, is relevant both for solving scientific problems in education and psychology and for everyday practical activities. Moreover, when working with children and young people of various age groups during the educational process, these resources may help realize and develop the teaching staff's potential and provide their psychological and pedagogical support. It is essential that all researchers are proficient in modern technologies for collecting, processing, and visualizing data; in fact, they must be adequately informed about variations and types of these

methods and be able to combine traditional and innovative technological approaches to solving scientific and practical problems.

Conclusions

The professional sphere has a differentiated impact on mental health, including in the field of education, where there is a poorly studied social group of teaching staff undergoing a stage of resocialization.

The passive collection of psychometric data represents a new paradigm in psychological research, promising more reliable and valid results compared to traditional experiments.

The practical application of these methods is critically important for organizing psychological and pedagogical support for teaching staff, including veterans of special military operations, who are transitioning to civilian activities.

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