Improving academic outcomes through accessible physical activity for students with disabilities

Mejorar los resultados académicos a través de actividad física accesible para alumnos con discapacidad

Authors

Gulzam Abilkassimova [1]
Nurlan Baigabylov [2]
Oxana Chernova [3]
Aleksandr Litvinov [4,3]
Elena Koneeva [5]

[1] Bolashaq Academy, (Kazakhstan)
[2] Eurasian National University named after Gumilyov L. N. (Kazakhstan)
[3] Peoples' Friendship University of Russia (Russia)
[4] Moscow State University of Psychology and Education (MSUPE) (Spain)
[5] Moscow Aviation Institute (National Research University) (Russia)

Corresponding author:
Gulzam Abilkassimova
botam_@mail.ru

How to cite in APA

Abilkassimova, G., Baigabylov, N., Chernova, O., Litvinov, A., & Koneeva, E. (2025). Improving academic outcomes through accessible physical activity for students with disabilities. *Retos*, *67*, 1202–1115. https://doi.org/10.47197/retos.v67.113639

Abstract

Introduction: A significant proportion of students with disabilities fail to reach the recommended levels of physical activity, a shortfall that may adversely impact both their academic performance and general well-being. Despite its relevance, the relationship between physical activity and academic outcomes in this population remains insufficiently explored.
Objective: This study aimed to investigate the influence of recommended levels of physical activity on the academic performance of students with disabilities and to identify the primary barriers preventing their engagement in regular exercise.
Methodology: A prospective longitudinal study was conducted involving 120 students with disabilities from four universities. Physical activity levels were measured using the Physical Activity Questionnaire-Disability, and barriers to activity were identified through the Barriers to Physical Activity Questionnaire. Academic performance was assessed by analyzing grade point averages and the frequency of exam retakes.
Results: The study revealed a moderate positive correlation between physical activity levels and academic performance. Students classified as highly active had significantly higher grade point averages (4.1 versus 3.4) compared to their less active peers. Organizational (87.5%) and institutional (72.9%) barriers were the most frequently reported obstacles to engaging in physical activity.
Discussion: The results are consistent with existing literature that highlights the academic and health benefits of regular physical activity among students. However, this study underscores the unique challenges faced by students with disabilities that require targeted interventions.
Conclusions: The findings testify to the need to develop comprehensive programs to improve the physical activity of students with disabilities considering the identified barriers.

Keywords

Academic performance; Institutional barriers; inclusive education; longitudinal study.

Resumen

Introducción: Una proporción significativa de estudiantes con discapacidad no alcanza los niveles recomendados de actividad física, lo que puede afectar negativamente tanto su rendimiento académico como su bienestar general. A pesar de su relevancia, la relación entre actividad física y resultados académicos en esta población ha sido escasamente explorada.
Objetivo: Este estudio tuvo como objetivo investigar la influencia de los niveles recomendados de actividad física sobre el rendimiento académico de estudiantes con discapacidad, así como identificar las principales barreras que dificultan su participación en ejercicio regular.
Metodología: Se realizó un estudio longitudinal prospectivo con la participación de 120 estudiantes con discapacidad de cuatro universidades. Los niveles de actividad física fueron evaluados mediante el Cuestionario de Actividad Física para Personas con Discapacidad, y las barreras se identificaron mediante el Cuestionario de Barreras para la Actividad Física. El rendimiento académico se midió a través del promedio de calificaciones y la frecuencia de exámenes repetidos.
Resultados: El estudio reveló una correlación positiva moderada entre los niveles de actividad física y el rendimiento académico. Los estudiantes altamente activos obtuvieron promedios significativamente más altos (4.1 frente a 3.4) en comparación con sus pares menos activos. Las barreras más frecuentemente reportadas para realizar actividad física fueron las organizativas (87.5%) e institucionales (72.9%).
Discusión: Los resultados son coherentes con la literatura existente que resalta los beneficios académicos y de salud de la actividad física regular en estudiantes. No obstante, este estudio pone de manifiesto los desafíos específicos que enfrentan los estudiantes con discapacidad y que requieren intervenciones focalizadas.
Conclusiones: Los hallazgos evidencian la necesidad de desarrollar programas integrales que fomenten la actividad física entre estudiantes con discapacidad, considerando las barreras identificadas.

Palabras clave

Rendimiento académico; barreras institucionales; educación inclusiva; estudio longitudinal.

Introduction

Insert Physical activity is key to maintaining health and well-being, especially for people with disabilities (Fomicheva et al., 2021; Shvakov et al., 2024; Vasudevan et al., 2015). Regular physical exercise can improve physical function, psychological well-being, and quality of life among students with disabilities (Pans et al., 2021; Shurygin et al., 2024; Zorina et al., 2022).

Studies suggest that about 50% of adult persons with disabilities do not follow the recommendations of the World Health Organization (WHO) on physical activity (World Health Organisation (WHO), 2018). This percentage is even lower among university students with disabilities, with only 36.9% achieving the recommended level of activity (Úbeda-Colomer et al., 2019). This problem has grown especially acute during the COVID-19 pandemic, when the level of physical activity in this group of students decreased by an average of 1,000 minutes a week (Osipov et al., 2021).

Researchers point to a set of interconnected factors preventing students with disabilities from participating in physical activity:

- Physical barriers include not only the limited accessibility of sporting facilities and the lack of specialized equipment, but also factors such as the lack of adapted showers, changing rooms, and special shower seats and unsuitable water temperature in swimming pools (Richardson et al., 2017). Williams et al. (2018) note that even if ramps are installed, their angle of inclination often does not meet accessibility requirements;

- Interpersonal barriers manifest in the negative attitudes of others and stigmatization in sports institutions. This problem is acute in regular gyms, where people with disabilities face increased attention and experience discomfort due to not fitting the body standard (Richardson et al., 2017). Negative attitudes of others have been highlighted as a key barrier to regular exercise (Almutairi, 2023; Williams et al., 2018);

- Institutional barriers: lack of adapted programs and qualified specialists (Barber, 2018; Doğru, 2024; Ruggeri et al., 2020). In Russian universities, the lack of teachers trained to work with students with disabilities is an acute problem. The personnel training system requires improvement in terms of methodological training and practical skills in working with different nosological groups (Makhov & Stepanova, 2020). Institutional barriers are prominent in countries with a developing system of inclusive education (Bakri & Alshahrani, 2024; Martin Ginis et al., 2016);

- Intrapersonal factors: low self-efficacy, insufficient motivation (Chen, 2024), the fear of getting injured (Williams et al., 2018). Personality factors are complemented by the fear of being outed as a person with a disability, which forces individuals to hide their disabilities and thereby hinders their participation in physical activity (Monforte et al., 2021; Popov et al., 2024);

- Organizational factors: inconvenient schedules, transportation problems, and lack of coordination between support services for students with disabilities and sports departments at universities, which makes it difficult to create effective physical activity programs (Buffart et al., 2009; Monforte et al., 2021; Zernov et al., 2023).

Researchers also point out several factors promoting physical activity in this group of students. The most significant of these include accessible infrastructure (Katanani et al., 2023), a supportive environment (Ramaswamy et al., 2023), skilled supervision, flexible schedules, freedom to choose activities, and positive experiences of participation (Jaarsma & Smith, 2018; Ross, 2019). Therefore, successful programs promoting physical activity should comprehensively address physical and socio-psychological aspects (Martin, 2013; Popov et al., 2024).

The relevance of this study stems from the need to thoroughly understand the relationship between physical activity and the academic performance of students with disabilities and identify the most significant barriers and contributing factors. This understanding is critical to developing effective strategies to increase engagement in regular physical activity in this group of students.

The relevance of this study stems from the need to thoroughly understand the relationship between physical activity and academic performance. Substantial evidence suggests that regular physical activity

positively affects cognitive function and academic achievement in the general student population (Santana et al., 2017; Singh et al., 2019). Research has demonstrated that exercise influences brain structure and function through increased blood flow, neurotrophic factors, and neurogenesis, which may enhance learning capacity (Mandolesi et al., 2018). A meta-analysis by Álvarez-Bueno et al. (2017) found that physical activity interventions have positive effects on academic achievement, classroom behavior, and cognitive outcomes. However, these relationships remain understudied specifically in students with disabilities, creating a significant gap in literature.

Numerous studies confirm the positive impact of physical activity on academic performance (Fetisov et al., 2024; Çali et al., 2024). Bellar et al. (2014) found that students who regularly engaged in aerobic exercise and strength training had a higher grade point average (GPA). Al-Drees et al. (2016) in their one-year study confirmed that students with high levels of physical activity perform better in exams. Calestine et al. (2017) discovered a positive relationship between regular physical activity and cognitive function, which influences academic performance. However, few works deal with students with disabilities specifically.

Some studies suggest that physical activity can positively affect academic performance and cognitive function among students with disabilities. According to Gitimoghaddam et al. (2021), regular physical activity improves attention, self-control, cognitive processes, and vigilance. Nakutin and Gutierrez (2019) observed a significant improvement in academic engagement among students with autism spectrum disorder (ASD) after implementing a running exercise program.

Our study aims to investigate the influence of the recommended level of regular physical activity on the academic performance of university students with disabilities. The research also focuses on identifying the leading barriers to physical activity and the factors contributing to it in this group of students to develop recommendations on increasing their engagement in physical exercise.

Our primary hypothesis is that regular physical activity at the recommended level (more than 600 MET min/week) has a positive effect on the academic performance of students with disabilities. It is hypothesized that:

1. Students with higher activity levels will demonstrate higher academic performance indicators.

2. An increase in the level of physical activity will be accompanied by an improvement in academic performance indicators.

Attention should be paid to organizational and institutional barriers, which vary significantly across different educational systems. In the context of Russian higher education, Makhov and Stepanova (2020) identified a systemic deficit of adapted programs and qualified specialists to work with students with disabilities. Similarly, in Saudi Arabia, Almutairi (2023) highlighted that institutional barriers are compounded by cultural attitudes toward disability. Contrastingly, in countries with more established inclusive education systems like the United Kingdom and Australia, Richardson et al. (2017) found that physical barriers and interpersonal factors were more prominent than institutional ones. Jaarsma and Smith (2018) noted that in the Netherlands, while institutional support was stronger, transportation and accessibility issues remained significant obstacles. In developing educational systems across different regions, Monforte et al. (2021) emphasized that institutional barriers are especially significant. The cross-cultural study by Martin Ginis et al. (2016) revealed that while organizational factors like transportation problems appear universally challenging, their impact varies substantially based on regional infrastructure and policy frameworks. This international perspective demonstrates the complexity of barriers facing students with disabilities across different educational contexts. Based on these findings, we propose a third hypothesis:

3. The leading barriers to achieving the recommended level of physical activity are organizational and institutional factors.

Method

A prospective longitudinal study was conducted over one academic year (September 2023 – June 2024).

Participants

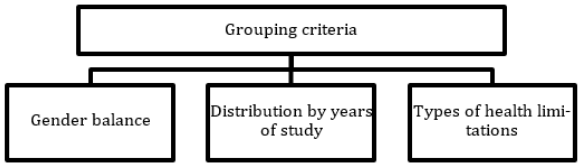
The participants recruited for the study were 120 students with disabilities from four universities (30 people from each). The recruitment was carried out through the universities' support services for students with disabilities. Initial screening cut the sample down to 248 students (Table 1).

Table 1. Distribution of study participants by universities at the stage of initial screening

University	Number of students, n	Share of the total sample, %
University A	67	27.0
University B	58	23.4
University C	71	28.6
University D	52	21.0
Total	248	100

After checking for compliance with the inclusion and exclusion criteria, we were left with 120 participants, who were then divided into equal groups of 30 people from each university based on the following criteria (Figure 1).

Figure 1. Grouping criteria



Source: Created by authors

Next, the participants were randomly assigned to observation groups using a computerized random number generator.

Table 2. Characteristics of the final sample (N=120)

Characteristic	n (%)
Gender:	
- Men	68 (56.7)
- Women	52 (43.3)
Age, Me (Q1; Q3)	20.0 (19.0; 22.0)
Year of study:	
- 1st-2nd year	71 (59.2)
- 3rd-4th year	49 (40.8)
Type of health limitation:	
- Musculoskeletal disorders	45 (37.5)
- Somatic disorders	38 (31.7)
- Hearing impairments	24 (20.0)
- Other impairments	13 (10.8)
Physical activity level:	
- Low (<600 MET min/week)	52 (43.3)
- Average (600-3000 MET min/week)	45 (37.5)
- High (>3000 MET min/week)	23 (19.2)

Procedure

The study was conducted in three main phases over one academic year (September 2023 – June 2024):

1. *Beginning stage (September 2023)*

Initial assessment of physical activity

- The study participants individually completed the Instrument Physical Activity Questionnaire-Disability (IPAQ-D) survey. It should be noted that IPAQ-D provides indirect estimates of physi-

cal activity levels rather than objective measurements that would be obtained through accelerometers or other direct monitoring devices. This limitation is acknowledged in the research design and will be further addressed in the discussion of study limitations.

- The filled-in questionnaires were checked for completeness and correctness;
- Students' individual MET min/week were calculated according to the formula provided in Appendix 1.

The respondents were then categorized into activity groups according to international recommendations (World Health Organisation (WHO), 2018) and the IPAQ protocol (Burhaein et al., 2021):

- Low level: <600 MET min/week (insufficient to maintain health);
- Average level: 600-3000 MET min/week (minimal recommended level);
- High level: >3000 MET min/week (optimal to obtain additional health benefits).
- Assessment of barriers to physical activity:
- The respondents completed the Barriers to Physical Activity Questionnaire (BPAQ) in an electronic format;
- Each category of berries was assessed on a five-point scale;
- The respondents' open-ended comments were subjected to qualitative analysis;
- The barriers predominant for each participant were identified.

The BPAQ was administered in Google Forms. Each respondent received a personal link to the survey and completed it within a week of the initial consultation. The survey comprised 20 questions grouped into four categories of barriers (intrapersonal, interpersonal, organizational, and community). Each barrier was rated on a five-point Likert scale. The respondents were asked to leave more detailed comments on each category. To ensure data reliability, phone interviews were conducted with 20% of the students to clarify their responses.

Assessment of academic performance over the previous period

- The necessary data were collected from the universities' electronic student performance monitoring systems;
- Gpa was calculated based on all grades for the previous semester;
- Attendance records were analyzed and attendance rates were calculated;
- The number of re-taken exams was recorded;
- Personal academic performance profiles were created;
- The grades were normalized given differences between the universities' grading systems.

Academic performance was analyzed based on data from the universities' electronic student performance monitoring systems with the written consent of the participants. The indicators analyzed included:

1. GPA calculated for all disciplines in the semester based on data from electronic grade books.
2. Attendance based on data from attendance records, excluding absences for valid reasons (confirmed by medical certificates).
3. The number of retaken exams, including all cases of retaking exams and tests based on grade book entries.
4. To make the data from different universities comparable, the grades were standardized on a single five-point scale.

2. Intermediate stage (January 2024)

Intermediate assessment of physical activity indicators

- The respondents completed the IPAQ-D a second time with the same methodology as in the first stage;
- Individual consultations were conducted to clarify changes in behavioral patterns;
- Individual MET min/week indicators were calculated;
- A comparative analysis of indicators in the first and second stages was conducted;
- The reasons for significant changes were identified and documented;
- Assignment to activity groups was adjusted, if necessary.
- Assessment of current academic performance:
- First-semester grade data were collected from electronic systems;
- A detailed analysis of the results of intermediate exams was conducted;
- Current GPA was calculated;
- All forms of continuous assessment were considered;
- Attendance was analyzed taking excused absences into account;
- The reasons behind academic debts were documented;
- Academic performance was correlated with changes in physical activity levels.
- Adjustment of research methodology:
- The completeness and quality of the collected data were analyzed;
- Problem areas in data collection were identified;
- The methods of dealing with specific cases were refined;
- The changes were agreed with study participants;
- All methodological adjustments were documented.
- 3. Concluding stage (June 2024):
- Final assessment of physical activity:
- The respondents completed the IPAQ-D for the final time;
- In-depth interviews were conducted to understand the dynamics of activity;
- Final MET min/week indicators were calculated;
- Individual profiles of changes in activity were created;
- Seasonal fluctuations in the level of activity were analyzed;
- Consistent patterns of physical activity were identified.
- Repeated assessment of barriers:
- The respondents completed the BPAQ with additional comments;
- A comparative analysis of changes in the perception of barriers was conducted;
- The effectiveness of overcoming different types of barriers was assessed;
- Newly discovered obstacles were documented;
- Successful strategies for overcoming barriers were analyzed.
- Final assessment of academic performance:
- Complete academic performance data for the entire academic year were collected;

- Final GPA was calculated;
- A comprehensive analysis of academic performance dynamics was conducted;
- All forms of continuous assessment and final exams were considered;
- Total attendance over the academic year was analyzed;
- All cases of retaking exams were documented;
- A final academic profile was created for each participant.

Data analysis

At each stage, the data collected were quality-controlled and processed in a timely manner. Intermediate results were used to adjust the data collection process and refine the research methodology, if necessary.

1. Prior to data collection, a statistical power analysis was conducted using G*Power 3.1 software to determine the appropriate sample size. Based on previous similar studies (Al-Drees et al., 2016; Calestine et al., 2017), we anticipated a medium effect size (Cohen's d = 0.5) for the relationship between physical activity and academic performance. With a significance level of $\alpha = 0.05$ and a desired power of 0.80 for the primary correlation analyses, the minimum required sample size was calculated to be 102 participants. Our final sample of 120 students exceeded this requirement, ensuring adequate statistical power for detecting meaningful relationships. Data analysis was conducted in SPSS 26.0. Given the nature of the variables assessed, the analysis utilized descriptive and nonparametric statistics. Descriptive statistics:

- Median and interquartile range for quantitative variables;
- Frequencies and percentages for categorical variables;

2. To assess the influence of physical activity on academic performance:

- The Kraskell-Wallis test to compare the academic performance of groups with different levels of physical activity;
- The Wilcoxon test to analyze within-group changes in academic performance;
- Spearman's correlation coefficient to assess the relationships between physical activity levels (MET min/week) and academic performance indicators;
- Chi-squared test to compare the distributions of scores within the groups;

3. To analyze barriers to physical activity and the factors contributing to it:

- Chi-squared test to assess the relationship between the achievement of recommended physical activity and the presence of specific barriers;
- Fisher's exact test to analyze contingency tables with small expected frequencies (below five).

The level of statistical significance was taken as $p < 0.05$.

The choice of statistical methods relied on the nature of data distributions and previous studies of similar designs (Al-Drees et al., 2016; Calestine et al., 2017). The normality of distributions was checked using the Shapiro-Wilk test. Given the predominantly abnormal distribution of data, we employed nonparametric analysis methods.

The strength of correlations was assessed using the Chaddock scale widely used in social studies, where (Halibiyati et al., 2024): 0.1-0.3 – a weak relationship; 0.3-0.5 – moderate; 0.5-0.7 – evident; 0.7-0.9 – high; 0.9-1.0 – very high. This specific scale was chosen for its sensitivity to the features of sociological data, with very strong correlations being extremely rare.

Results

Table 3 indicates that by the end of the study, physical activity levels had increased significantly (p=0.042). A similar positive trend is observed across all academic performance indicators.

Table 3. Indicators of students' physical activity and academic performance (N=120)

Indicator	Beginning of the study Me (Q1; Q3)	End of the study Me (Q1; Q3)	p*
MET min/week	585 (320; 2450)	750 (380; 2680)	0.042
GPA	3.6 (3.2; 3.9)	3.8 (3.4; 4.1)	0.038
Attendance (%)	76.5 (68.0; 85.0)	82.0 (73.0; 89.0)	0.045
Number of retaken exams	2.0 (1.0; 3.0)	1.0 (0.0; 2.0)	0.031

* Wilcoxon test

As can be seen from Table 4, the Kruskal-Wallis test detected statistically significant differences in academic performance between the groups (p<0.001).

Table 4. Comparison of academic performance between groups with different levels of physical activity

PA level	n (%)	GPA Me (Q1; Q3)	Attendance Me (Q1; Q3)	Number of retaken exams Me (Q1; Q3)	p*
Low (<600 MET)	48 (40.0%)	3.4 (3.1; 3.7)	72.0 (65.5; 79.0)	2.0 (1.0; 3.0)	<0.001
Average (600-3000 MET)	47 (39.2%)	3.8 (3.5; 4.0)	85.0 (80.0; 89.0)	1.0 (1.0; 2.0)	<0.001
High (>3000 MET)	25 (20.8%)	4.1 (3.9; 4.3)	91.0 (88.0; 94.0)	1.0 (0.0; 1.0)	<0.001

* Kruskal-Wallis test

Correlation analysis reveals moderate correlations between the level of physical activity and all academic performance indicators. Moderate positive correlations are found with GPA (ρ=0.424, p<0.001) and attendance (ρ=0.383, p<0.001), while the number of retaken exams shows a moderate negative correlation (ρ=-0.392, p<0.001) (Table 5). On the Chaddock scale, all the observed correlations belong to the moderate category (0.3 < |ρ| < 0.5), which indicates a stable, albeit not too strong relationship between physical activity and academic performance in students with disabilities.

Table 5. Correlation analysis of the relationship between physical activity and academic performance indicators

Indicator	Spearman's correlation coefficient (ρ)	p	Strength*
GPA	0.424	<0.001	Moderate
Attendance	0.383	<0.001	Moderate
Number of retaken exams	-0.392	<0.001	Moderate

*On the Chaddock scale: 0.1-0.3 – weak; 0.3-0.5 – moderate; 0.5-0.7 – evident; 0.7-0.9 – high; 0.9-1.0 – very high

Comparing the distribution of the barriers across the groups with different physical activity levels, we observe statistically significant differences in all categories (Table 6). The most significant differences can be seen in the organizational barriers, especially transportation problems (χ^2=15.82, p<0.001) and the lack of specialized problems (χ^2=12.31, p<0.001).

Table 6. Distribution of barriers to physical activity by the levels of physical activity

Barrier	Low PA level (n=48)	Average/high PA level (n=72)	χ^2	p
Organizational barriers:				
Transportation problems	42 (87.5%)	38 (52.8%)	15.82	<0.001
Cost of classes	39 (81.3%)	41 (56.9%)	7.94	0.005
Lack of programs	35 (72.9%)	29 (40.3%)	12.31	<0.001
Intrapersonal barriers:				
Lack of motivation	37 (77.1%)	31 (43.1%)	13.45	<0.001
Fear of getting injured	28 (58.3%)	22 (30.6%)	9.12*	0.003
Interpersonal barriers:				
Lack of support	25 (52.1%)	19 (26.4%)	8.27*	0.004
Negative attitudes	18 (37.5%)	12 (16.7%)	6.94*	0.008

*Fisher's exact test was used when the expected frequencies were less than 5

Thus, our results confirm the main hypothesis on the positive influence of physical activity on academic performance among students with disabilities.

The analysis of trends in the indicators of physical activity and academic performance (Table 3) demonstrates a statistically significant increase in physical activity level from 585 (320; 2,450) to 750 (380; 2,680) MET min/week ($p=0.042$) by the end of the study, accompanied by an improvement of academic performance from a GPA of 3.6 (3.2; 3.9) to 3.8 (3.4; 4.1) ($p=0.038$).

As shown in Table 4, highly active students demonstrate better academic performance: GPA in this group reaches 4.1 (3.9; 4.3) compared to 3.4 (3.1; 3.7) in the low activity group ($p<0.001$). Attendance is also much greater in the group with high physical activity – 91.0% vs. 72.0% ($p<0.001$).

The analysis of barriers to physical activity (Table 6) confirms the assumption about the leading role of organizational and institutional factors. In the group with a low level of physical activity, organizational barriers were noted by 87.5% of students ($\chi^2=15.82$, $p<0.001$) and institutional – by 72.9% ($\chi^2=12.31$, $p<0.001$).

Discussion

The study confirmed the main hypothesis about the positive influence of physical activity on academic performance among students with disabilities. The analysis indicates that students who achieve the recommended level of physical activity (>600 MET min/week) demonstrate significantly better academic performance. As noted by Gitimoghaddam et al. (2021), regular exercise has a positive effect on cognitive function, which directly affects learning. Our correlation analysis shows a moderate positive correlation between the level of physical activity and GPA ($\rho=0.424$, $p<0.001$), consistent with the findings by Bellar et al. (2014), who report a correlation coefficient of 0.41. Similar results were obtained by Al-Drees et al. (2016) ($r=0.38$) and Calestine et al. (2017) ($r=0.45$). The moderate correlation with attendance ($\rho=0.383$, $p<0.001$) found in our study is also consistent with previous studies and points to a stable, albeit not that strong, relationship between physical activity and students' academic engagement. Al-Drees et al. (2016) report a 15% increase in attendance among students with a high level of physical activity. In our study, the difference in attendance between the high and low activity groups reaches 19% (91.0% vs. 72.0%), confirming and reinforcing the conclusions of the prior study.

The first partial hypothesis of higher academic performance in students with a high level of physical activity received strong evidence. The difference in GPA between the high and low activity groups (4.1 vs. 3.4, $p<0.001$) is significantly higher than that observed by Nakutin and Gutierrez (2019).

The second hypothesis about the positive trend in academic performance indicators with a higher level of physical activity is also confirmed (Wijaya & Syarifah, 2022). Increased physical activity is accompanied by a statistically significant improvement in academic performance ($p=0.038$), which agrees with the findings of Martin Ginis et al. (2016), Balcı and Çamlıyer (2022), Karakoç (2022), and Catunda et al. (2023).

Particularly notable is the conformation of the third hypothesis about the leading role of organizational and institutional barriers. Institutional barriers were previously highlighted as the leading ones by Monforte et al. (2021) and Mihajlovic (2020), but these barriers prove to be even more pronounced in the context of Russia (Makhov & Stepanova, 2020).

Furthermore, the analysis of barriers to physical activity demonstrates the predominance of organizational obstacles, which agrees with the results of Úbeda-Colomer et al. (2019), Vuhong (2022), and Othman et al. (2024). In our study, transportation problems were mentioned by 87.5% of students with a low level of activity, a share even greater than the 73% reported by other researchers. This observation can be explained by the regional specifics of transport infrastructure in the studied regions: long distances between sports infrastructure facilities and student housing, limited accessibility of specialized transport, and challenging weather conditions in autumn and winter (at temperatures near and below 0°C). The latter is especially typical for the regions of Russia and Kazakhstan where public transport is sometimes disrupted during this period and the insufficient development of territories affects the mobility of persons with disabilities.

Students refer to having to travel long distances to sporting facilities and facing difficulties using public transportation in the evening hours.

Similar to Martin Ginis et al. (2016) and Stárek (2023), we found that interpersonal barriers also play a substantial role in physical activity. Lack of support was noted by 52.1% of students with a low level of activity, which is consistent with the results of Martin Ginis et al. (2016) (48%) and Maia and Falkoski (2022). Our respondents highlighted the lack of individual support for physical activity, the absence of specialized consultations on choosing exercise programs, and limited opportunities for group exercise classes adapted to the specifics of their disabilities.

However, unlike Williams et al. (2018), we found no evidence of the leading role of intrapersonal barriers. Our study suggests that organizational barriers are more significant, which can be attributed to differences in the organization of support for students with disabilities in different educational systems.

Jaarsma and Smith (2018) emphasize the importance of a comprehensive approach to overcoming barriers to physical activity. Our findings support this conclusion: students with a high level of activity reported facing fewer barriers across all categories, which points to the need for a systemic solution.

Special attention should be paid to the practical significance of the findings. The observed relationship between physical activity and academic performance together with the detailed analysis of barriers to exercise creates a foundation for effective support programs for students with disabilities. In particular:

1. The developed programs to boost physical activity need to account for the identified institutional barriers. As found by Martin Ginis et al. (2016), successful programs include mandatory staff training and the creation of an adapted infrastructure. Based on the findings, we can offer the following recommendations for different levels of administration:

For municipal authorities:

- Accounting for the needs of students with disabilities when planning public transportation routes;
- Developing an accessible urban environment around sporting facilities;
- Creating adapted areas for physical activity in parks and public spaces.

For university administrations:

- Establishing coordination centers to promote physical activity among students with disabilities;
- Developing adapted exercise programs;
- Organizing an individual assistance service;
- Ensuring that the university's sporting facilities are accessible.

2. Jaarsma and Smith (2018) underscore the importance of monitoring the effectiveness of physical activity programs over the long term. The obtained data on the dynamics of physical activity and academic performance over the academic year can serve as a basis for a monitoring system to be integrated into the existing structures of the university (Babu et al., 2024). It is proposed to assign this function to coordination centers working with students with disabilities together with physical education departments and involve specialists in adaptive physical education to assess the effectiveness of programs.

3. Monforte et al. (2021) note the need for objective methods to assess the level of physical activity. The assessment protocols developed in our study can be adapted for practical application in universities.

The identified role of organizational barriers is consistent with the findings of Williams et al. (2018) about the need for a comprehensive approach to the organization of physical activity. Based on the obtained data, we can recommend universities to create coordination centers that would combine the efforts of various departments to support students with disabilities.

Conclusions

The research achieved its goal by demonstrating a significant relationship between regular physical exercise and academic performance among students with disabilities. The primary barriers to physical activity were identified and analyzed, allowing us to develop practical recommendations for overcoming them.

However, in the course of the study, we faced several objective limitations that need to be considered when interpreting the results.

The duration of the study was limited to one academic year due to the time frame of the project and available resources. A longer observation could have provided more data on the consistency of the identified effects and seasonal fluctuations in physical activity.

The use of self-reports to assess physical activity levels was motivated by the desire to minimize the load on the study participants. Although this method is widely used in this type of research, it may lead to some subjectivity in the estimates.

Finally, the limitation of the sample to four universities is associated with the organizational capacity of the research team. A wider geography of the study could have given a more complete picture of regional features.

References

Al-Drees, A., Abdulghani, H., Irshad, M., Baqays, A. A., Al-Zhrani, A. A., Alshammari, S. A., & Alturki, N. I. (2016). Physical activity and academic achievement among the medical students: A cross-sectional study. Medical Teacher, 38(sup1), S66-S72. http://dx.doi.org/10.3109/0142159X.2016.1142516

Almutairi, H. (2023). Bullying toward individuals with mild intellectual disabilities in the Saudi Arabia workplace. Journal of Educational and Social Research, 13(5), 210-223. https://doi.org/10.36941/jesr-2023-0132

Álvarez-Bueno, C., Pesce, C., Cavero-Redondo, I., Sánchez-López, M., Martínez-Hortelano, J. A., & Martínez-Vizcaíno, V. (2017). The effect of physical activity interventions on children's cognition and metacognition: A systematic review and meta-analysis. Journal of the American Academy of Child & Adolescent Psychiatry, 56(9), 729–738. https://doi.org/10.1016/j.jaac.2017.06.012

Babu J., M., Virgin B., A., Edwin, M. R. S., Priya P, G., & Ravichandran, K. (2024). Identifying learning difficulties at an early stage in education with the help of artificial intelligence models and predictive analytics. International Research Journal of Multidisciplinary Scope, 5(4), 1455-1461. https://doi.org/10.47857/irjms.2024.v05i04.01821

Bakri, S. T. A., & Alshahrani, B. F. (2024). Exploring the perspectives of students with disabilities on the reasonable accommodations provided in higher education institutions. Journal of Educational and Social Research, 14(6), 286-296. https://doi.org/10.36941/jesr-2024-0172

Balcı, T., & Çamlıyer, H. (2022). Investigation of pre-service physical education teachers' epistemological and pedagogical beliefs. Journal of Pedagogical Research, 6(1), 40-56. https://doi.org/10.33902/JPR.2022175429

Barber, W. (2018). Inclusive and accessible physical education: Rethinking ability and disability in preservice teacher education. Sport Education and Society, 23(6), 520-532. http://dx.doi.org/10.1080/13573322.2016.1269004

Bellar, D., Judge, L. W., Petersen, J., Bellar, A., & Bryan, C. L. (2014). Exercise and academic performance among nursing and kinesiology students at US colleges. Journal of Education and Health Promotion, 3(1), 9. http://dx.doi.org/10.4103/2277-9531.127560

Buffart, L. M., Westendorp, T., Van Den Berg-Emons, R. J., Stam, H. J., & Roebroeck, M. E. (2009). Perceived barriers to and facilitators of physical activity in young adults with childhood-onset physical disabilities. Journal of Rehabilitation Medicine, 41(11), 881-885. http://dx.doi.org/10.2340/16501977-0420

Burhaein, E., Tarigan, B., Budiana, D., Hendrayana, Yu., Phytanza, D.T.P., Demirci, N., Fradelos, E. C., Lourenço, C., & Nikšić, E. (2021). Instrument physical activity questionnaire-disability (IPAQ-D) observe test for disabilities during COVID-19: Study of validity and reliability in 5 countries. Sport Science, 15(1), 13-20.

Calestine, J., Bopp, M., Bopp, C. M., & Papalia, Z. (2017). College student work habits are related to physical activity and fitness. International Journal of Exercise Science, 10(7), 1009-1017. http://dx.doi.org/10.70252/XLOM8139

Çali, M., Lazimi, L., & Ippoliti, B. M. L. (2024). Relationship between student engagement and academic performance. International Journal of Evaluation and Research in Education, 13(4), 2210-2217. http://doi.org/10.11591/ijere.v13i4.28710

Catunda, F. N., Ferreira, H. S., Soares, S. L., & Holanda, S. A. (2023). Adapted sports and mental health: Promoting quality of life through lived experiences. Nuances: Estudos Sobre Educação, 34(00), e023010. https://doi.org/10.32930/nuances.v34i00.10164

Chen, C. (2024). Study on the influence of PE elective motivation on the mental health of Chinese college students. Pakistan Journal of Life and Social Sciences, 22(2), 2289-2304. https://doi.org/10.57239/PJLSS-2024-22.2.00164

Doğru, Y. (2024). Technological pedagogical content knowledge from the perspective of educational sciences and physical education. Pakistan Journal of Life and Social Sciences, 22(2), 1183-1192. https://doi.org/10.57239/PJLSS-2024-22.2.0082

Fetisov, A. S., Peshkova, I. A., & Ryapolova, E. N. (2024). Individualization of students' independent work as a factor in creating a comfortable health-saving environment. Perspektivy nauki i obrazovania – Perspectives of Science and Education, 71(5), 434-451. https://doi.org/10.32744/pse.2024.5.25

Fomicheva, T. V., Sulyagina, J. O., Kiseleva, E. M., Fomicheva, L. M., & Kryukova, E. M. (2021). Changing national health values of Russians: Perception of physical culture and sports. International Journal of Health Sciences, 5(3), 661-669. https://doi.org/10.53730/ijhs.v5n3.2863

Gitimoghaddam, M., Vanderloo, L. M., Hung, R., Ryce, A., McKellin, W., Miller, A., & Collet, J. P. (2021). Impacts of participation in community-based physical activity programs on cognitive functions of children and youth with neurodevelopmental disabilities: A scoping review. Brain Sciences, 11(2), 195. https://doi.org/10.3390/brainsci11020195

Halibiyati, H., Aratuly, K., Serikhan, A., Yergali, A. M., Beaver, K. M. (2024). Neuropsychological functioning and its association with juvenile arrest and findings from a longitudinal sample of youth. Journal of Criminal Justice, 91, 102153. http://dx.doi.org/10.1016/j.jcrimjus.2024.102153

Jaarsma, E. A., & Smith, B. (2018). Promoting physical activity for disabled people who are ready to become physically active: A systematic review. Psychology of Sport and Exercise, 37, 205-223. http://dx.doi.org/10.1016/j.psychsport.2017.08.010

Karakoç, B. (2022). Examination of physical fitness parameters of trainable individuals with intellectual disability. Revista on Line De Política E Gestão Educacional, 26(esp.1), e022045.

Katanani, H. J., Sakarneh, M. A., Alrahamneh, A. A., Awamleh, W., & Saaideh, N. M. (2023). Difficulties and obstacles in integrating students with disabilities in Jordanian schools. Perspektivy nauki i obrazovania – Perspectives of Science and Education, 65(5), 463-480. https://doi.org/10.32744/pse.2023.5.27

Maia, S. R., & Falkoski, F. C. (2023). Education of teachers and professionals to support the inclusion and participation of people with deafblindness. Revista on Line De Política E Gestão Educacional, 27(esp.1), e023013. https://doi.org/10.22633/rpge.v27iesp.1.17930

Makhov, A. S., & Stepanova, O. N. (2020). The problems in managing the adaptive sports development in Russia. Uchenye zapiski universiteta imeni P.F. Lesgafta, 4(182), 287-294.

Mandolesi, L., Polverino, A., Montuori, S., Foti, F., Ferraioli, G., Sorrentino, P., & Sorrentino, G. (2018). Effects of physical exercise on cognitive functioning and wellbeing: Biological and psychological benefits. Frontiers in Psychology, 9, 509. https://doi.org/10.3389/fpsyg.2018.00509

Martin Ginis, K. A., Ma, J. K., Latimer-Cheung, A. E., & Rimmer, J. H. (2016). A systematic review of review articles addressing factors related to physical activity participation among children and adults with physical disabilities. Health Psychology Review, 10(4), 478-494. http://dx.doi.org/10.1080/17437199.2016.1198240

Martin, J. J. (2013). Benefits and barriers to physical activity for individuals with disabilities: A social-relational model of disability perspective. Disability and Rehabilitation, 35(24), 2030-2037. http://dx.doi.org/10.3109/09638288.2013.802377

Mihajlovic, C. (2020). Special educators' perceptions of their role in inclusive education: A case study in Finland. Journal of Pedagogical Research, 4(2), 83-97. https://doi.org/10.33902/JPR.2020060179

Monforte, J., Úbeda-Colomer, J., Pans, M., Pérez-Samaniego, V., & Devís-Devís, J. (2021). Environmental barriers and facilitators to physical activity among university students with physical disability: A qualitative study in Spain. International Journal of Environmental Research and Public Health, 18(2), 464. http://dx.doi.org/10.3390/ijerph18020464

Nakutin, S. N., & Gutierrez, G. (2019). Effect of physical activity on academic engagement and executive functioning in children with ASD. School Psychology Review, 48(2), 177-184. http://dx.doi.org/10.17105/SPR-2017-0124.V48-2

Osipov, A. Iu., Kleptsova, T. N., Lepilina, T. V., Vorontsov, S. V., & Dankova, M. Yu. (2021). Impact of the covid-19 pandemic on physical activity of university students. Uchenye zapiski universiteta imeni P.F. Lesgafta, 3(193), 313-317. https://doi.org/10.34835/issn.2308-1961.2021.3.p313-317

Othman, N. N. J. N., Kamaruzaman, F. M., & Rasul, M. S. (2024). Challenges in engaging students with learning disabilities in food industry. International Journal of Evaluation and Research in Education, 13(4), 2357-2365. http://doi.org/10.11591/ijere.v13i4.28124

Pans, M., Úbeda-Colomer, J., Monforte, J., & Devís-Devís, J. (2021). Physical activity and accomplishment of recommendations in university students with disabilities: A longitudinal study. International Journal of Environmental Research and Public Health, 18(11), 5540. http://dx.doi.org/10.3390/ijerph18115540

Popov, V. V., Muzyka, O. A., & Kobysheva, L. I. (2024). Social interaction in an inclusive educational space in the context of studying the existential foundations of being a person with disabilities. Perspektivy nauki i obrazovania – Perspectives of Science and Education, 71(5), 481-497. https://doi.org/10.32744/pse.2024.5.28

Ramaswamy, M., Viswanathan, R., Kaniyarkuzhi, B., & Neeliyadath, S. (2023). A re-engagement model to overcome the psychological distress of students. International Journal of Evaluation and Research in Education, 12(4), 1973-1984. http://dx.doi.org/10.11591/ijere.v12i4.24553

Richardson, E. V., Smith, B., & Papathomas, A. (2017). Disability and the gym: Experiences, barriers and facilitators of gym use for individuals with physical disabilities. Disability and Rehabilitation, 39(19), 1950-1957. http://dx.doi.org/10.1080/09638288.2016.1213893

Ross, S. M. (2019). Disparities in physical activity experienced by children with disabilities: Secondary analysis of the national survey of children's health 2016-2017. Washington, DC: NCHS.

Ruggeri, M., Bianchi, E., Rossi, S., Vigani, B., Bonferoni, M. C., Caramella, C., Sandri, G., Ferrari, F. (2020). Nanotechnology-based medical devices for the treatment of chronic skin lesions: From research to the clinic. Pharmaceutics, 12(9), 815. http://dx.doi.org/10.3390/pharmaceutics12090815

Santana, C. C. A., Azevedo, L. B., Cattuzzo, M. T., Hill, J. O., Andrade, L. P., & Prado, W. L. (2017). Physical fitness and academic performance in youth: A systematic review. Scandinavian Journal of Medicine & Science in Sports, 27(6), 579–603. https://doi.org/10.1111/sms.12773

Shurygin, V., Abdullayev, I., Hajiyev, H., Yakutina, M., Kozachek, A., & Zakieva, R. (2024). Blended learning: The effect on students' self-regulation and academic achievements. Novitas-ROYAL, 18(1), 137-154. https://doi.org/10.5281/zenodo.11057892

Shvakov, E., Shamkov, A., Yakushina, T., Merkur'ev, V., & Balashova, I. (2024). Health-preserving system in modern enterprises: Concepts of formation and features of implementation. Revista relações internacionais do Mundo Atual, 3(45), 139-155.

Singh, A. S., Saliasi, E., van den Berg, V., Uijtdewilligen, L., de Groot, R. H. M., Jolles, J., Andersen, L. B., Bailey, R., Chang, Y.-K., Diamond, A., Ericsson, I., Etnier, J. L., Fedewa, A. L., Hillman, C. H., McMorris, T., Pesce, C., Pühse, U., Tomporowski, P. D., & Chinapaw, M. J. M. (2019). Effects of physical activity interventions on cognitive and academic performance in children and adolescents: A novel combination of systematic review and recommendations from an expert panel. British Journal of Sports Medicine, 53(10), 640–647. https://doi.org/10.1136/bjsports-2017-098136.

Stárek, L. (2023). Special education as an instrument of social change in Croatia. Nuances: Estudos Sobre Educação, 34(00), e023005. https://doi.org/10.32930/nuances.v34i00.9954

Úbeda-Colomer, J., Devís-Devís, J., & Sit, C. H. P. (2019). Barriers to physical activity in university students with disabilities: Differences by sociodemographic variables. Disability and Health Journal, 12(2), 278-286. https://doi.org/10.1016/j.dhjo.2018.11.005

Vasudevan, V., Rimmer, J. H., & Kviz, F. (2015). Development of the barriers to physical activity questionnaire for people with mobility impairments. Disability and Health Journal, 8(4), 547-556. http://dx.doi.org/10.1016/j.dhjo.2015.04.007

Vuhong, V. (2022). Traffic safety education activities for university students in Ho Chi Minh City. Nuances: Estudos Sobre Educação, 33(00), e022019. https://doi.org/10.32930/nuances.v33i00.9490

Wijaya, W. M., & Syarifah, L. S. (2022). The management of life skills program for students with disabilities. International Journal of Evaluation and Research in Education, 11(2), 532-539. http://doi.org/10.11591/ijere.v11i2.22192

Williams, T. L., Smith, B., & Papathomas, A. (2018). Physical activity promotion for people with spinal cord injury: Physiotherapists' beliefs and actions. Disability and Rehabilitation, 40(1), 52-61. http://dx.doi.org/10.1080/09638288.2016.1242176

World Health Organisation (WHO). (2018). Global action plan on physical activity 2018-2030: More active people for a healthier world. Geneva, Switzerland: WHO.

Zernov, D. Iu., Gorokhov, A. S., & Koleva, N. S. (2023). Genezis razvitiia problemy virtualnoi mobilnosti invalidov v sotsiokulturnom prostranstve [The genesis of the development of the problem of virtual mobility of the disabled in the socio-cultural space]. Perspektivy nauki i obrazovania – Perspectives of Science and Education, 2(62), 434-452. https://doi.org/10.32744/pse.2023.2.25

Zorina, N. M., Ksenofontova, T. Yu., Vanyan, M. N., & Ogneva, N. I. (2022). Impact of organizational and legal decisions on improving the level of health protection of university students. Relações Internacionais do Mundo Atual, 2(35), 137-149.

Authors' and translators' details:

Gulzam Abilkassimova	botam_@mail.ru	Author
Nurlan Baigabylov	nurlanbaigabyl@gmail.com	Author
Oxana Chernova	oxana-c@mail.ru	Author
Aleksandr Litvinov	alisal01@yandex.ru	Author
Elena Koneeva	elena_koneeva@mail.ru	Author