International Journal of Social Science and Humanities Research-MIYR
2026, Volume 6, Issue 2, pp.1~15
https://doi.org/10.53468/mifyr.2026.6.2.1

Students' physical well-being: Implications for physical education and health promotion

Tuul Suvd[1], Enkhsaikhan Gombojav[2*], Maralgua Tuvshin[3], Munkhshur Enkhtuvshin[4]

[1,2,3,4]School of Physical Education, Mongolian National University of Education
[*]Corresponding author: Enkhsaikhan Gombojav, enkhsaikhan@msue.edu.mn

CITATION

Tuul Suvd, Enkhsaikhan Gombojav, Maralgua Tuvshin, Munkhshur Enkhtuvshin. Students' physical well: Implications for physical education and health promotion. International Journal of Social Science and Humanities Research-MIYR 2026, 6(2), 1~15. https://doi.org/10.53468/mifyr.2026.6.2.1

ARTICLE INFO

Received: 09 June 2026
Revised: 10 June 2026
Accepted: 22 June 2026
Available online: 30 June 2026

Abstract- This study aims to examine how gender, sport participation, and regional background are related to university students' physical well-being and provide implications for improving physical education programs. A total of 704 students participated in the study, including 92 males (13.1%) and 612 females (86.9%). Data were collected through standardized physical fitness tests, including a 50 m sprint (speed) and endurance assessment. Independent samples *t-tests* and one-way ANOVA were conducted using SPSS software to analyze group differences. The results revealed statistically significant gender differences in both speed ($t(702) = -9.75$, $p < .001$) and endurance ($t(702) = -12.08$, $p < .001$). Male students demonstrated significantly faster sprint performance, whereas female students showed higher endurance levels. No significant differences in speed were found across sport types ($p = .382$), suggesting that speed is a general physical fitness attribute. However, endurance varied partially across sport types, with dance students outperforming others in certain comparisons. Additionally, regional differences indicated that students from rural areas performed better in speed compared to those from urban environments. The findings highlight the importance of differentiated physical education curricula that consider gender, sport-specific characteristics, and lifestyle factors. These results provide evidence-based insights for improving physical education programs in higher education. Physical fitness is a key indicator of health and functional capacity, encompassing flexibility, muscular strength, endurance, and explosive power. Among university students, engagement in different sports may lead to distinct physiological adaptations due to sport-specific demands. Previous studies have shown that training type influences physical performance outcomes, particularly in strength-and power-related activities. However, limited research has compared multiple fitness components simultaneously across sport types, gender, and regional differences within a single population.

Keywords: Student well-being, Health promotion, Physical education, Inclusive education

1. INTRODUCTION

Physical education (PE) plays a critical role in enhancing not only students' physical health but also their cognitive performance and psychological well-being. Previous studies have demonstrated that structured and tailored PE programs can effectively improve physical activity levels, reduce excess body weight, and alleviate stress among university students [1]. Furthermore, PE contributes significantly to students' academic performance and overall functional capacity [2]. In recent years, increasing attention has been given to differentiated instruction in physical education, which emphasizes adapting curriculum content to students' needs, interests, and abilities. Research suggests that aligning PE programs with students' preferences enhances participation and learning outcomes [3~5]. This is particularly relevant in higher education settings, where students often experience high levels of stress and sedentary behavior due to academic demands and lifestyle factors [6]. University students experience a critical transitional stage of life during which health-related behaviors established in early adulthood may persist throughout later life. Maintaining adequate levels of physical activity during this period is essential for improving physical fitness, promoting physical well-being, and preventing chronic diseases [7]. However, a growing body of evidence indicates that many university students fail to meet the recommended levels of physical activity because of increasing academic demands, prolonged screen exposure, and changes in lifestyle associated with higher education [8, 7]. Consequently, physical inactivity has become a significant public health concern among university populations. The increasing prevalence of sedentary behavior further exacerbates this problem. University students often spend prolonged periods attending lectures, studying, or using digital devices, resulting in reduced energy expenditure and declining physical fitness. Sedentary lifestyles have been associated with obesity, cardiovascular and metabolic disorders, poor musculoskeletal health, and reduced physical performance [9]. These findings emphasize the importance of promoting regular physical activity as an integral component of healthy university life.

In addition to its physical health benefits, physical activity plays a vital role in supporting psychological well-being. Regular participation in physical activity has consistently been associated with lower levels of perceived stress, anxiety, and depression, while improving emotional well-being, cognitive functioning, and academic performance [10]. Conversely, physically inactive students are more likely to experience psychological distress and reduced quality of life, highlighting the multidimensional value of active lifestyles within higher education settings.

Within this context, university physical education extends beyond the development of physical fitness and serves an important educational and social function. Physical education programs provide opportunities for students to adopt healthy lifestyles, develop lifelong physical activity habits, and promote social inclusion regardless of gender, sporting experience, or regional background [11]. Well-designed university physical education curricula may therefore contribute not only to improving students' physical well-being but also to enhancing health equity and overall quality of university life.

Previous studies have primarily examined individual components of physical fitness or differences according to isolated demographic characteristics. Comparatively little attention has been given to understanding how gender, sport participation, and regional background collectively relate to university students' physical well-being. Addressing this knowledge gap is important for developing evidence-based and inclusive physical education policies and health promotion strategies that reflect the diverse characteristics of university students.

Therefore, this study aimed to examine differences in physical fitness according to gender, sport participation, and regional background in order to identify factors associated with university students' physical well-being. The findings are expected to provide empirical evidence for improving university physical education programs and promoting healthier lifestyles among young adults.

Despite the recognized importance of physical activity, there remains a gap in understanding how key physical fitness components—such as speed and endurance—vary across different student populations. Specifically, limited research has examined how these attributes differ by gender, sport type, and regional background within the context of university PE programs.

From a physiological perspective, speed is largely influenced by neuromuscular coordination, muscle fiber composition, and anaerobic power, whereas endurance is associated with aerobic capacity and metabolic efficiency. These differences suggest that physical fitness components may respond differently to training stimuli and environmental factors. Therefore, the present study aims to:

1. Examine differences in speed and endurance among university students;
2. Determine whether these differences are statistically significant across gender, sport type, and region;
3. Provide evidence-based recommendations for improving PE curriculum design in higher education.

This study aimed to examine the associations between gender, sport participation, and regional background and university students' physical well-being through the assessment of physical fitness. The findings provide insights that may support the development of inclusive physical education programs and health promotion strategies for university students.

First, the observed gender differences in speed performance are consistent with well-established physiological theories. Male students demonstrated significantly faster sprint performance, which can be explained by greater skeletal muscle mass, higher anaerobic capacity, and a larger proportion of type II (fast-twitch) muscle fibers. These findings align with previous research indicating that neuromuscular and hormonal differences, particularly testosterone levels, play a decisive role in short-distance sprint performance [12, 13]. Therefore, the current results reinforce the argument that gender-specific performance standards are essential in PE assessment systems.

In contrast, female students outperformed male students in endurance, with a large effect size (Cohen's d ≈ 1.4). This finding, while less commonly reported, is supported by emerging evidence suggesting that females may exhibit greater fatigue resistance and more efficient aerobic metabolism under certain conditions [5]. Additionally, differences in pacing strategies, substrate utilization (greater reliance on fat oxidation), and muscle fiber composition may contribute to enhanced endurance performance among females. Thus, endurance capacity appears to be influenced not only by training but also by sex-specific physiological adaptations.

Regarding sport type, the absence of significant differences in speed performance suggests that speed is a generalized motor ability rather than a sport-specific skill within the context of university PE programs. This supports the theoretical framework that fundamental physical capacities—such as speed and power—are transferable across multiple physical activities when similar neuromuscular demands are involved [14]. The lack of differentiation may also reflect relatively homogeneous training loads across sports in university settings.

However, endurance showed partial variation across sport types, particularly with higher values observed in dance and aerobics. These activities are characterized by continuous, rhythm-based, and predominantly aerobic workloads, which are known to enhance cardiovascular efficiency and muscular endurance. The significant difference between dance and basketball participants further supports the principle of training specificity, where physiological adaptations are closely aligned with the dominant energy systems utilized during activity [15].

Regional differences in speed performance also provide important insights into environmental and lifestyle influences. Students from rural regions demonstrated superior speed compared to their urban counterparts. This may be attributed to higher levels of habitual physical activity, greater exposure to outdoor movement, and lower sedentary behavior. In contrast, urban students may be more affected by lifestyle constraints such as prolonged sitting and limited physical space. These findings are consistent with ecological models of health behavior, which emphasize the interaction between individual and environmental factors in shaping physical activity patterns [16].

Taken together, the results highlight that physical fitness is a multifactorial construct, influenced by biological, behavioral, and environmental determinants. Importantly, the findings support the theoretical and practical relevance of differentiated PE instruction, suggesting that a "one-size-fits-all" approach is insufficient in higher education contexts.

2. THEORETICAL BACKGROUND

2.1 Research Design

This study employed a quantitative, cross-sectional research design to examine differences in physical fitness components among university students. The study aimed to compare speed and endurance based on gender, sport type, and regional background.

2.2 Participants and Sampling

A total of 704 university students participated in the study. The sample consisted of:

- Male: 92 students (13.1%)
- Female: 612 students (86.9%)

Participants were also categorized based on:

- Sport type (bodybuilding, volleyball, basketball, aerobics, dance, table tennis)
- Regional background (Khangai, Eastern, Western, Central, and Ulaanbaatar regions)

A non-probability convenience sampling method was used, as participants were selected from available university PE classes.

2.3 Data Collection and Measures

Physical fitness was assessed using standardized tests:

- Speed: 50 m sprint (measured in seconds)

- Endurance: measured using a standardized 1000-meter running test, conducted in accordance with internationally recognized testing standards (unit-based score).

Descriptive statistics including mean, standard deviation, minimum, and maximum values were calculated.

2.4 Data Analysis

Data were analyzed using SPSS software (version XX). The following statistical methods were applied:

- Descriptive statistics (Mean, SD, Median)
- Independent samples *t-test* (gender and regional comparisons)
- One-way ANOVA (sport type comparisons)
- Levene's test (homogeneity of variance)
- Effect size (Cohen's d)

The significance level was set at $p < 0.05$.

2.5 Theoretical Framework

The development of physical fitness is influenced by a complex interaction of biological, behavioral, and environmental factors. Biological characteristics such as sex, growth, and maturation contribute to individual differences in physical performance. However, contemporary research suggests that physical activity participation, training experience, lifestyle, and environmental opportunities also play substantial roles in shaping physical fitness outcomes [17].

From the perspective of the Social Ecological Model, health behaviors and physical fitness are influenced not only by individual characteristics but also by interpersonal relationships, institutional environments, community resources, and broader social contexts [18]. Therefore, differences in physical fitness among university students may reflect variations in physical activity opportunities, educational environments, and regional living conditions rather than biological factors alone.

The Youth Physical Development Model further explains that motor abilities such as speed undergo rapid development during childhood and adolescence and approach maturity in early adulthood [18]. Consequently, by university age, speed performance may be relatively similar across different sport disciplines, whereas endurance remains more responsive to training volume, exercise intensity, and participation in aerobic activities.

Participation in organized sport has also been identified as an important determinant of physical fitness. Different sport disciplines impose distinct physiological demands that may contribute to variations in endurance performance, while basic speed abilities are often developed through general physical conditioning shared across many sports [12].

Furthermore, university physical education plays an important social role in promoting healthy lifestyles, reducing sedentary behavior, and improving students' physical and psychological well-being. Higher education institutions provide an important setting for establishing lifelong physical activity habits and reducing health inequalities among young adults [7]. Therefore, examining physical fitness according to gender, sport participation, and regional background provides valuable evidence for designing inclusive and evidence-based physical education programs.

Based on these theoretical perspectives, this study assumes that physical fitness among university students is determined through the interaction of biological characteristics, physical activity participation, and environmental conditions. Accordingly, differences in speed and endurance are expected to reflect not only individual physiological characteristics but also variations in sport participation and regional lifestyle patterns.

3. RESEASCH METHODOLOGY

3.1 Research Design

This study employed a quantitative, cross-sectional comparative research design to examine differences in physical fitness among university students according to gender, sport participation, and regional background. A cross-sectional design was considered appropriate because it enabled the comparison of physical fitness characteristics across different groups at a single point in time.

3.2 Participants

The study included 704 undergraduate students enrolled in physical education and sport-related programs at universities in Mongolia. Participants were selected using a convenience sampling method. The sample consisted of 92 male students

(13.1%) and 612 female students (86.9%). According to regional background, participants represented the Khangai, Eastern, Western, Central, and Ulaanbaatar regions. Participation in the study was voluntary. Prior to data collection, all participants were informed about the purpose and procedures of the study, and informed consent was obtained.

3.3 Measurements

Two components of physical fitness were assessed:

- **Speed:** measured using a standardized 50-meter sprint test. Performance was recorded in seconds, with lower values indicating better speed performance.
- **Endurance:** measured using a standardized 1000-meter running test conducted in accordance with internationally recognized physical fitness testing standards. Performance was recorded using a unit-based scoring system derived from the official testing standards, with higher scores indicating better endurance performance.

3.4 Data Collection Procedure

All physical fitness assessments were conducted by qualified physical education instructors under standardized testing conditions. Before testing, participants completed a standardized warm-up session. Speed and endurance tests were administered following the official testing protocols to ensure consistency and reliability across all participants.

3.5 Statistical Analysis

The data were analyzed using IBM SPSS Statistics (Version XX). Descriptive statistics, including frequency, mean, standard deviation, median, minimum, and maximum values, were calculated for all variables. Independent samples t-tests were used to compare physical fitness according to gender and selected regional groups. One-way analysis of variance (ANOVA) was performed to examine differences among sport types. Levene's test was used to assess the assumption of homogeneity of variances before conducting parametric analyses. Where appropriate, effect sizes (Cohen's d) and 95% confidence intervals were calculated to evaluate the magnitude and precision of the observed differences. Statistical significance was established at **$p < .05$**.

3.6 Ethical Considerations

The study was conducted in accordance with the ethical principles for research involving human participants. Participation was voluntary, informed consent was obtained from all participants, and the confidentiality and anonymity of participant information were maintained throughout the research process.

4. RESULTS AND DATA ANALYSIS

A. Speed, Overall conclusion on the relationship between speed and gender

Result 3. Based on the 50 m sprint performance, male students are on average approximately 20% faster than female students. Gender was found to be a statistically highly significant and strong influencing factor on speed ability.

This difference indicates the necessity of adopting gender-specific approaches in curriculum planning, establishing normative standards, and developing assessment criteria.

Table 1. Speed performance by gender

Speed	male	female	Total
N	92	612	704
Mean	8.0463	10.0430	9.7821
Median	8.2350	10.3000	10.0900
Minimum	0.31	0.09	0.09
Maximum	10.87	19.36	19.36
Std. Deviation	1.51425	1.87363	1.94973

A total of 704 students (100%) participated in the study:

- Male – 92 students (13.1%)
- Female – 612 students (86.9%)

Based on the average 50 m sprint performance:

- Male students: Mean = 8.05 sec, SD = 1.51
- Female students: Mean = 10.04 sec, SD = 1.87

In other words, male students performed on average 1.99 seconds faster (≈19.9%) than female students. This represents a substantial difference in practical significance.

Table 2. Results of hypothesis testing analysis for speed performance

Group Statistics

	gender	N	Mean	Std. Deviation	Std. Error Mean
Speed	male	92	8.0463	1.51425	.15787
	female	612	10.0430	1.87363	.07574

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Speed	Equal variances assumed	2.944	.087	-9.752	702	.000	-1.99669	.20474	-2.39867	-1.59470
	Equal variances not assumed			-11.403	136.629	.000	-1.99669	.17510	-2.34294	-1.65043

Test of Homogeneity of Variances (Levene's Test) Levene's test results:

- F = 2.944, p = 0.087

Since $p > 0.05$, there is no statistically significant difference in variance between male and female groups in speed performance. In other words, the assumption of equal variances is met. Therefore, it is appropriate to interpret the t-test results under the "equal variances assumed" condition.

Results of the Independent Samples t-test (Mean Difference) t-test results:

- $t(702) = -9.75$, $p < 0.001$
- Mean difference = −1.997 seconds
- 95% CI = [−2.40; −1.59]

These results indicate that:

- There is a statistically highly significant difference between the mean speed performances of male and female students;
- The probability that this difference occurred by chance is less than 0.1%.

The 95% confidence interval does not include zero, and it is estimated that the advantage of male students ranges from at least 1.59 seconds to a maximum of 2.40 seconds.

The superior speed performance of male students is consistent with physiological factors such as:

- greater muscle mass,
- a higher proportion of type II (fast-twitch) muscle fibers,
- and hormonal influences (e.g., testosterone).

Table 3. One-way ANOVA analysis of speed performance across sport types

Speed	Bodybuilding	Volleyball	Basketball	Aerobics	Dance	Table Tennis	Total
N	272	151	62	68	116	35	704
Mean	9.6451	9.7091	9.6982	10.0187	9.9921	10.1540	9.7821
Median	10.0250	9.7400	10.0500	10.3550	10.1350	10.1600	10.0900
Minimum	0.31	0.09	0.31	0.80	0.43	6.37	0.09
Maximum	13.61	19.36	12.48	13.40	12.88	17.34	19.36
Std. Deviation	1.80848	2.34119	1.79086	1.80265	1.76419	2.25252	1.94973

https://doi.org/10.53468/mifyr.2026.6.2.1

A one-way ANOVA was conducted to compare the mean values of speed performance (50 m sprint) across different sport types (bodybuilding, dance, basketball, volleyball, aerobics, and table tennis). The results indicated no statistically significant differences ($F(5, 698) = 1.058$, $p = 0.382$). The absence of significant differences in speed performance across sport types suggests that sprint ability is relatively uniform among university students regardless of specialization. This may be explained by evidence that speed-related neuromuscular and motor abilities reach near-mature development during adolescence and early adulthood, limiting the additional impact of sport-specific training at university age [18]. Therefore, speed may function more as a general physical fitness component rather than a sport-specific skill in this population.

Table 4. One-way ANOVA results for speed performance by sport type

Source	Sum of Squares	df	Mean Square	F	Sig. (p)
Between Groups	20.108	5	4.022	1.058	0.382
Within Groups	2652.300	698	3.800		
Total	2672.408	703			

In other words, the 50 m sprint performance of the students in this study was relatively similar regardless of the type of sport they practiced. This suggests that speed is developed as a general physical fitness attribute across these sports, rather than being highly specific or dominant in any particular sport.

From a physiological perspective, 50 m sprint performance largely depends on neuromuscular coordination, explosive power, and the activation of fast-twitch muscle fibers. These abilities can be developed to a similar extent across bodybuilding, dance, basketball, volleyball, aerobics, and table tennis during training. Therefore, it is possible that there were no sufficiently distinct training loads or sport-specific demands to create noticeable differences in speed performance among the groups.

From a practical standpoint, training programs across these sports commonly include short-distance running and agility exercises that require speed. This may have contributed to maintaining similar levels of speed performance across different sport types.

Overall conclusion on the relationship between speed performance and regional background

Descriptive statistical analysis of speed performance by region reveals the following key findings:

1. Students from the Eastern and Western regions demonstrated relatively better mean speed performance, whereas students from the Ulaanbaatar region showed comparatively slower results.
2. In most regions, the distribution of speed scores was negatively skewed, indicating a concentration of higher-performing values around the mean.
3. Regional differences were not only reflected in mean values, but also in the shape of the distribution and internal variability of performance.

Table 5. Speed performance by region

Speed	Khangai region	Eastern region	Western region	Central region	Ulaanbaatar region	Total
N	203	83	170	97	151	704
Mean	9.7429	9.5090	9.5605	9.8435	10.1948	9.7821
Median	10.0400	9.5300	10.0550	10.0300	10.3400	10.0900
Minimum	0.31	1.18	0.43	0.09	5.15	0.09
Maximum	19.36	13.07	12.48	17.34	18.00	19.36
Std. Deviation	1.95915	1.81050	2.20416	1.81572	1.73165	1.94973
Kurtosis	10.578	5.682	7.715	10.522	2.601	8.399
Skewness	-1.496	-1.590	-2.487	-1.168	0.350	-1.554

These results indicate that regional background is associated not only with differences in average speed performance, but also with variations in data distribution patterns and within-group consistency.

Overall conclusion on the relationship between 50 m sprint performance and regional background

The 50 m sprint performance is significantly associated with regional background. Students from the Eastern and Western regions are approximately 7–10% faster on average compared to students from the Ulaanbaatar region. This finding suggests that differences in environmental conditions and lifestyle patterns across regions may have a meaningful influence on speed performance.

Table 6. Results of the Independent Samples t-test (Mean Difference)

Group Statistics

	Region	N	Mean	Std. Deviation	Std. Error Mean
Speed	Eastern region	83	9.5090	1.81050	0.19873
	Western region	170	9.5605	2.20416	0.16905
	Ulaanbaatar region	151	10.1948	1.73165	0.14092

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
speed	Equal variances assumed	.022	.884	-2.852	232	0.005	-.68580	.24048	-1.15960	-.21200
	Equal variances assumed	.894	.345	-2.842	319	0.005	-.63436	.22320	-1.07349	-.19524
	Equal variances not assumed			-2.815	162.708	0.005	-.68580	.24362	-1.16687	-.20473

These results indicate a statistically significant difference in sprint performance across regions ($p = 0.005$). The confidence interval does not include zero, confirming a reliable difference between groups.

From a practical perspective, students from Eastern and Western regions demonstrated faster sprint performance than those from Ulaanbaatar. This may be explained by differences in daily physical activity levels, environmental conditions, and lifestyle characteristics. In particular, rural or non-urban environments may provide more opportunities for spontaneous physical activity, while urban students may experience more sedentary lifestyles due to academic and environmental constraints.

t-test results:

- $t(232) = -2.85$, $p = 0.005$
- $t(319) = -2.84$, $p = 0.005$
- Mean difference = −0.686 seconds; Mean difference = −0.634 seconds
- 95% CI = [−1.160; −0.212], 95% CI = [−1.073; −0.195]

These results indicate that there is a statistically significant difference in mean speed performance across regions. In other words, students from the Eastern and Western regions are faster than those from the Ulaanbaatar region by approximately 0.21–1.16 seconds and 0.20–1.07 seconds, respectively, at the 95% confidence level.

This difference may be associated with several lifestyle and environmental factors, including:

- higher levels of natural physical activity among students from Eastern and Western regions;
- greater involvement in walking, running, and outdoor movement in rural settings;
- a more sedentary lifestyle in urban environments such as Ulaanbaatar.

The estimated effect size (Cohen's $d \approx 0.39$) falls within the small to medium range. This suggests that the difference is not only statistically significant but also has practical significance.

Descriptive statistics of endurance performance

The descriptive analysis of endurance performance indicates that female students show a clearly higher mean and median endurance level compared to male students. This suggests that gender is an important factor in explaining variations in endurance capacity at the descriptive level. In addition, the wider range and distribution of endurance scores among female students indicate greater variability within this group.

Table 7. Descriptive statistics of endurance by gender

Endurance	**Male**	**Female**	Total
N	92	612	704
Mean	4.9740	6.9545	6.6957
Median	4.4900	6.5500	6.4350
Minimum	3.39	4.52	3.39
Maximum	9.30	21.01	21.01
Std. Deviation	1.11969	1.51160	1.61072

https://doi.org/10.53468/mifyr.2026.6.2.1

Descriptive statistics of endurance by gender: A total of 704 students participated in the study, of which 92 were male (13.1%) and 612 were female (86.9%). Although the sample is dominated by female participants, the size is still sufficient for statistical analysis. The results show that female students have higher average and median endurance values than male students. This indicates that gender may be a key explanatory factor for differences in endurance performance. Furthermore, the larger dispersion of endurance scores among females suggests more variability in their performance levels compared to males. Independent samples t-test for endurance by gender: The results of the independent samples t-test indicate a statistically significant difference in endurance performance between male and female students, with female students showing significantly higher endurance levels ($t(702) = -12.08$, $p < .001$). The mean difference is 1.98 units, and the effect size is large (Cohen's d ≈ 1.4), suggesting that gender is a strong predictor of endurance capacity.

Table 8. t-test for endurance by gender

<table>
<tr><th colspan="11">Group Statistics</th></tr>
<tr><th colspan="2"></th><th>Gender</th><th>N</th><th colspan="2">Mean</th><th>Std. Deviation</th><th colspan="4">Std. Error Mean</th></tr>
<tr><td colspan="2" rowspan="2">Endurance</td><td>1.00</td><td>92</td><td colspan="2">4.9740</td><td>1.11969</td><td colspan="4">.11674</td></tr>
<tr><td>2.00</td><td>612</td><td colspan="2">6.9545</td><td>1.51160</td><td colspan="4">.06110</td></tr>
<tr><th colspan="11">Independent Samples Test</th></tr>
<tr><th colspan="2" rowspan="3"></th><th colspan="2">Levene's Test for Equality of Variances</th><th colspan="7">t-test for Equality of Means</th></tr>
<tr><th rowspan="2">F</th><th rowspan="2">Sig.</th><th rowspan="2">t</th><th rowspan="2">df</th><th rowspan="2">Sig. (2-tailed)</th><th rowspan="2">Mean Difference</th><th rowspan="2">Std. Error Difference</th><th colspan="2">95% Confidence Interval of the Difference</th></tr>
<tr><th>Lower</th><th>Upper</th></tr>
<tr><td rowspan="2">Endurance</td><td>Equal variances assumed</td><td>1.302</td><td>.254</td><td>-12.076</td><td>702</td><td>.000</td><td>-1.98052</td><td>.16401</td><td>-2.30252</td><td>-1.65852</td></tr>
<tr><td>Equal variances not assumed</td><td></td><td></td><td>-15.031</td><td>146.062</td><td>.000</td><td>-1.98052</td><td>.13176</td><td>-2.24092</td><td>-1.72012</td></tr>
</table>

These results confirm that there is a highly significant difference in endurance performance between genders. Female students outperform male students by approximately 1.98 units on average.

The large effect size (d ≈ 1.4) indicates that this difference is not only statistically significant but also practically meaningful. This finding strongly supports the conclusion that gender plays an important role in explaining variations in endurance capacity among university students.

Main results of the t-test

- $t(702) = -12.076$, $p < .001$
- Mean difference = −1.98
- 95% Confidence Interval = [−2.30; −1.66]

These results indicate that there is a statistically highly significant difference in endurance performance between genders. Since the 95% confidence interval does not include zero, the observed difference is considered stable and not due to random variation.

Effect size (Cohen's d)

Based on the pooled standard deviation, Cohen's d was calculated as:

- Cohen's d ≈ 1.4 → large effect size

This indicates that gender has not only a statistically significant influence on endurance performance but also a strong practical impact.

Effect size (Cohen's d)

Cohen's d ≈ 0.65 → medium to large effect

This indicates that the observed difference is not only statistically significant but also has a meaningful practical impact.

The results indicate that sports characterized by repetitive and rhythmic movements, such as dance, aerobics, and volleyball, demonstrate relatively higher mean endurance performance, whereas basketball shows comparatively lower mean values. However, the mean scores across most sport types are relatively close, and the overlapping standard deviations suggest that differences in endurance capacity across sport types may be limited.

Table 9. One-way ANOVA analysis of enduranc performance across sport types

Enduranc	Bodybuilding	Volleyball	Basketball	Aerobics	Dance	Table Tennis	Total
N	272	151	62	68	116	35	704
Mean	6.4806	6.7909	6.1282	6.8057	7.2865	6.7911	6.6957
Median	6.4000	6.4000	6.2550	6.5250	6.5950	6.5100	6.4350
Minimum	3.40	3.49	3.39	4.53	5.10	5.17	3.39
Maximum	13.53	21.01	10.33	9.10	20.00	10.13	21.01
Std. Deviation	1.22252	1.91755	1.40939	0.95057	2.23394	1.03112	1.61072

The mean endurance performance differs across sport types as follows:

- The highest average endurance score was observed in dance, which is approximately 8.8% higher than the overall mean.
- The lowest average was found in basketball, which is approximately 8.5% below the overall mean.
- The mean values for the remaining sport types are clustered between 6.48 and 6.81, indicating relatively small differences among them.

Table 10. Results of the Independent Samples t-test (Mean Difference)

Group Statistics

	Sport	N	Mean	Std. Deviation	Std. Error Mean
endurance	Basketball	62	6.1282	1.40939	.17899
	Dance	116	7.2865	2.23394	.20742

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
endurance	Equal variances assumed	1.713	.192	-3.705	176	.000	-1.15824	.31264	-1.77525	-.54123
	Equal variances not assumed			-4.228	171.134	.000	-1.15824	.27397	-1.69904	-.61744

The confidence interval does not include zero, and the p-value is less than p <.001, indicating a statistically highly significant difference in endurance performance between the two sport types.

Effect size (Cohen's d)

Cohen's d ≈ 0.65 → medium to large effect

$$d \approx \frac{7.29 - 6.13}{\sqrt{\frac{1.41^2+2.23^2}{2}}} \approx 0.65$$

This indicates that the observed difference is not only statistically significant but also practically meaningful.

When comparing endurance performance between basketball and dance students, dance students demonstrated significantly higher performance ($t(176) = -3.71$, $p < .001$). The mean difference was 1.16 units, and Cohen's d ≈ 0.65, suggesting that the training characteristics of dance—such as continuous, rhythmic, and predominantly aerobic movements—may contribute more effectively to the development of endurance capacity. Therefore, the results suggest that sport type can be an important explanatory factor for endurance performance under specific conditions, particularly in training contexts with a strong aerobic emphasis.

When comparing endurance performance between basketball and dance students, dance students showed significantly higher performance ($t(176) = -3.71$, $p < .001$). The mean difference was 1.16 units, and Cohen's d ≈ 0.65, suggesting a medium to large effect size. This may indicate that the training characteristics of dance—such as continuous, rhythmic, and predominantly aerobic movements—contribute more effectively to the development of endurance capacity.

Therefore, the results suggest that sport type can be an important explanatory factor in endurance performance, particularly in activities where aerobic demands are dominant, such as dance-based training.

Endurance performance by regional background (summary of findings)

The descriptive analysis of endurance performance across regions shows the following pattern:

- Ulaanbaatar region (N = 151): M = 7.28, SD = 2.11, representing the highest average endurance score.
- Western region (N = 170): M = 6.45, SD = 1.37.
- Eastern region (N = 83): M = 6.49, SD = 1.26.

Thus, students from the Ulaanbaatar region demonstrated higher endurance performance compared to other regions.

In quantitative terms, the endurance mean of Ulaanbaatar students is:

- 0.83 units higher than the Western region (≈ 12.9%),
- 0.79 units higher than the Eastern region (≈ 12.2%).

Table 11. Endurance performance by region

Endurance	Khangai region	Eastern region	Western region	Central region	Ulaanbaatar region	Total
N	203	83	170	97	151	704
Mean	6.5929	6.4898	6.4479	6.6115	7.2803	6.6957
Median	6.3600	6.3600	6.4150	6.4000	7.1000	6.4350
Minimum	3.52	4.10	3.49	3.40	3.39	3.39
Maximum	15.00	10.02	12.34	11.58	21.01	21.01
Std. Deviation	1.46394	1.26230	1.37484	1.47064	2.10533	1.61072

The comparative analysis of endurance by region confirms that students from the Ulaanbaatar region perform significantly better than those from the Western and Eastern regions ($p < .01$). The mean differences range between 0.79 and 0.83 units, and the effect size is at a moderate level, indicating that regional background has a meaningful influence on endurance performance.

This difference may be associated with factors such as:

- differences in educational and training environments,
- variation in physical education workload,
- disparities in urban–rural infrastructure and training opportunities.

The comparative analysis of endurance performance across regions shows that students from the Ulaanbaatar region have significantly higher endurance levels than those from the Western and Eastern regions ($p < .01$). The mean differences range between 0.79 and 0.83 units, and the effect size is at a moderate level, indicating that regional differences have a meaningful impact on endurance capacity.

Table 12. Results of the Independent Samples t-test (Endurance performance by region)

Group Statistics

	Region	N	Mean	Std. Deviation	Std. Error Mean
Endurance	Ulaanbaatar region	151	7.2803	2.10533	.17133
	Western region	170	6.4479	1.37484	.10545
	Eastern region	83	6.4898	1.26230	.13856

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper
Endurance	Equal variances assumed	.711	.400	4.237	319	.000	.83232	.19643	.44586	1.21879
	Equal variances assumed	1.112	.293	3.124	232	.002	.79051	.25302	.29199	1.28903
	Equal variances not assumed			4.137	252.945	.000	.83232	.20118	.43613	1.22852

Test of Homogeneity of Variances

Levene's test results: Ulaanbaatar vs Western region: $F = 0.711$, $p = .400$, Ulaanbaatar vs Eastern region: $F = 1.112$, $p = .293$

Since $p > .05$ in both cases, the assumption of equal variances is satisfied. Therefore, the independent samples t-test results were interpreted under the assumption of equal variances.

Independent Samples t-test Results

Ulaanbaatar vs Western region: $t(319) = 4.237$, $p < .001$, Mean difference = 0.83, 95% CI = [0.45; 1.22]

Ulaanbaatar vs Eastern region: $t(232) = 3.124$, $p = .002$, Mean difference = 0.79, 95% CI = [0.29; 1.29]

In both comparisons, $p < .01$ and the confidence intervals do not include zero, indicating that students from the Ulaanbaatar region demonstrate significantly higher endurance performance compared to those from the Western and Eastern regions.

Effect size (Cohen's d – approximate): Ulaanbaatar vs Western region: $d \approx 0.50$ (medium effect), Ulaanbaatar vs Eastern region: $d \approx 0.45$ (medium effect)

These results suggest that regional differences in endurance performance are not only statistically significant but also represent a moderate practical effect.

This difference may be associated with factors such as: differences in the learning and training environment, variations in physical education workload, disparities in urban and rural infrastructure, as well as access to training opportunities.

4. DISCUSSION

From a social perspective, the findings of this study highlight the importance of university physical education in addressing the diverse backgrounds, physical conditions, and needs of students. The results indicate that university students' physical fitness is not determined solely by biological factors, but is also shaped by differences in lifestyle, access to physical activity opportunities, and broader socio-environmental conditions.

Accordingly, university physical education programs should be designed to ensure equitable opportunities for all students to participate in physical activity, regardless of gender, sport experience, or regional background. Providing equal access to physical activity is essential not only for improving students' physical health, but also for enhancing psychological well-being and reducing stress levels, thereby contributing to a more supportive learning environment.

Furthermore, the improvement of physical education in higher education institutions extends beyond the development of physical fitness. It plays a significant role in promoting students' overall health and enhancing the quality of university life. Therefore, there is a need to develop evidence-based and inclusive physical education policies and programs that consider the diverse needs of university students and promote lifelong engagement in healthy physical activity.

5. CONCLUSION

This study demonstrated that physical fitness components among university students vary according to gender, sport participation, and regional background.

The key findings are as follows:

1. Statistically significant differences were observed between male and female students in both speed and endurance. These differences may be influenced by a combination of biological characteristics, physical activity patterns, and levels of participation in sports and other physical activities.
2. Sport participation was not significantly associated with speed performance, suggesting that speed may represent a general component of physical fitness. In contrast, endurance varied across sport types, indicating that participation in activities emphasizing sustained or rhythmic movement, such as dance, may contribute to higher endurance performance.
3. Significant regional differences were identified in speed performance. These differences may be related to variations in lifestyle patterns, opportunities for physical activity, and environmental conditions rather than regional background alone.

Overall, the findings suggest that physical fitness is a multidimensional construct shaped by the interaction of biological, behavioral, and environmental factors. These results highlight the importance of developing inclusive and evidence-based university physical education programs that consider students' diverse backgrounds, promote regular physical activity, and support their physical well-being.

REFERENCES

[1] Tuul, S., ChunYan, & Oyundari, T. (2025). Improving student physical training through inclusive and differentiated approaches. *International Journal of Social Science and Humanities Research-MIYR, 5*(2), 84–101. https://doi.org/10.53468/mifyr.2025.05.02.84

[2] Tuul, S., ChunYan, & Oyundari, T. (2022). Study of the physical development and preparedness of non-physical education students: On the example of Hulunbeier University. *Lavai - International Journal of Education, 18*(27), 14–23. https://doi.org/10.5564/lavai.v18i27.2494

[3] Tuul, S., Munkhbayar, N., et al. (2024). Culturally responsive school leadership and education for sustainable development. *International Journal of Social Science and Humanities Research-MIYR, 4*(1), 51–62. https://doi.org/10.53468/mifyr.2024.04.01.51

[4] Tremblay, M. S., Aubert, S., Barnes, J. D., Saunders, T. J., Carson, V., Latimer-Cheung, A. E., Chastin, S. F. M., Altenburg, T. M., & Chinapaw, M. J. M. (2017). Sedentary Behavior Research Network (SBRN): Terminology consensus project process and outcome. *International Journal of Behavioral Nutrition and Physical Activity, 14*(1), Article 75. https://doi.org/10.1186/s12966-017-0525-8

[5] Fagaras, S.-P., Radu, L.-E., & Vanvu, G. (2015). The level of physical activity of university students. *Procedia - Social and Behavioral Sciences, 197*, 1454–1457. https://doi.org/10.1016/j.sbspro.2015.07.094

[6] Gallotta, M. C., et al. (2024). Physical activity and academic performance in university students. *Journal of Sports Science & Medicine, 23*(1), 45–52.

[7] World Health Organization. (2020). *WHO guidelines on physical activity and sedentary behaviour*. World Health Organization. https://www.who.int/publications/i/item/9789240015128

[8] Keating, X. D., Guan, J., Piñero, J. C., & Bridges, D. M. (2005). A meta-analysis of college students' physical activity behaviors. *Journal of American College Health, 54*(2), 116–126. https://doi.org/10.3200/JACH.54.2.116-126

[9] Owen, N., Healy, G. N., Matthews, C. E., & Dunstan, D. W. (2010). Too much sitting: The population-health science of sedentary behavior. *Exercise and Sport Sciences Reviews, 38*(3), 105–113. https://doi.org/10.1097/JES.0b013e3181e373a2

[10] Biddle, S. J. H., & Asare, M. (2011). Physical activity and mental health in children and adolescents: A review of reviews. *British Journal of Sports Medicine, 45*(11), 886–895. https://doi.org/10.1136/bjsports-2011-090185

[11] UNESCO. (2015). *Quality physical education (QPE): Guidelines for policy-makers*. UNESCO Publishing.

[12] Bompa, T. O., & Buzzichelli, C. (2019). *Periodization: Theory and methodology of training* (6th ed.). Human Kinetics.

[13] McArdle, W. D., Katch, F. I., & Katch, V. L. (2015). *Exercise physiology: Nutrition, energy, and human performance* (8th ed.). Wolters Kluwer.

[14] Young, W., James, R., & Montgomery, I. (2001). Is muscle power related to running speed? *Journal of Sports Medicine, 35*(1), 13–19.

[15] Kenney, W. L., Wilmore, J. H., & Costill, D. L. (2020). *Physiology of sport and exercise* (7th ed.). Human Kinetics.

[16] Sallis, J. F., et al. (2016). Physical activity in relation to urban environments. *The Lancet, 387*(10034), 2207–2217.

[17] Fagaras, S.-P., Radu, L.-E., & Vanvu, G. (2015). The level of physical activity of university students. *Procedia - Social and Behavioral Sciences, 197*, 1454–1457. https://doi.org/10.1016/j.sbspro.2015.07.094

[18] Lloyd, R. S., & Oliver, J. L. (2012). The youth physical development model: A new approach to long-term athletic development. *Strength and Conditioning Journal, 34*(3), 61–72. https://doi.org/10.1519/SSC.0b013e31825760ea

AUTHORS' INFORMATION

1. First Author

Tuul Suvd tuul@msue.edu.mn

2011 PhD in Education Studies, Mongolian National University of Education

Work: Associate Professor, Lecturer, School of Physical Education, Mongolian National University of Education

2. Corresponding Author

Enkhsaikhan Gombojav Enkhsaikhan@msue.edu.mn

2012 PhD in Education Studies, Mongolian National University of Education

Work: Lecturer, School of Physical Education, Mongolian National University of Education

3. Co-Author

Maralgua Tuvshin maral_maralgua@yahoo.com

Work: Lecturer, School of Physical Education, Mongolian National University of Education

2026, Volume 6, Issue 2, pp.1~15
https://doi.org/10.53468/mifyr.2026.6.2.1

4. Co-Author

	Munhshur Enkhtuvshin munhshur.113@gmail.com Work: Lecturer, School of Physical Education, Mongolian National University of Education