

## Physical education learning outcomes of senior high school students based on gender and intellectual intelligence review

### Rendimiento en el aprendizaje de la educación física de los alumnos de último curso de secundaria basado en el género y la revisión de la inteligencia intelectual

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**Abstract.** This study examined the disparities in Physical Education (PE) learning Outcomes among high school pupils by considering their gender and intellectual aptitude. The study involved participants from a high school in Yogyakarta, selected using the Simple Random Sampling method. The data were then analysed using descriptive statistics and a two-way factorial inferential analysis of variance (ANOVA). The study divided the results into two groups based on their intellectual intelligence: low and high. In the low intellectual category, the average learning outcome for male students was 83.60. Meanwhile, the average for female students was 84.10. In the high intellectual intelligence category, the average results for male students were 85.30, while the average achievement for female students was 83.70. The ANOVA test for the intellectual intelligence variable yielded a p-value (Sig.) of 0.303, which is greater than the significance level of 0.05. This figure suggests that there is no statistically significant difference in students' learning outcomes based on their level of intelligence, whether low or high. Similarly, the p-value of 0.383 for the gender variable was also greater than the significance level of 0.05, indicating no statistically significant variations in learning results. Additionally, the interaction effect between IQ and gender yielded a significance value of 0.100, which is greater than 0.05. It indicates no significant interaction between these two variables on the learning performance of high school students. The finding means that cognitive intelligence does not have a substantial impact on the performance of physical education (PE) among high school students. Moreover, there is no notable disparity in PE performance between male and female students, suggesting gender equality in both the opportunities and abilities in PE. Finally, the study found no notable correlation between gender and IQ levels in performance on intelligence tasks. These results diminish the importance of considering other criteria, such as physical aptitude, in evaluating PE performance and emphasize the need for comprehensive and inclusive physical education programs.

**Keywords:** Learning Achievement, PE, Students, Adolescents, Gender, Intellectual Intelligence

**Resumen.** El estudio pretende examinar las disparidades en el rendimiento en el aprendizaje de la Educación Física (EF) entre los alumnos de secundaria, teniendo en cuenta su género y su aptitud intelectual. El participante en este estudio fue un alumno de secundaria de Yogyakarta, seleccionado mediante el método de muestreo aleatorio simple. Los datos se analizarán mediante estadística descriptiva y un análisis de varianza inferencial factorial de dos vías (ANOVA). La media de los resultados de aprendizaje de los alumnos varones con inteligencia intelectual baja es de 83,60, mientras que la media de los resultados académicos de las alumnas es de 84,10. En la categoría de inteligencia intelectual alta, los resultados medios de los alumnos varones son de 85,30, y el rendimiento medio de las alumnas es de 83,70. Los resultados de la prueba Anova para la variable del factor inteligencia intelectual indican que el valor p (Sig.) de 0,303 es superior al nivel de significación de 0,05. Esto sugiere que no existe una relación estadísticamente significativa entre la inteligencia intelectual y el rendimiento académico. Esto sugiere que no hay diferencias estadísticamente significativas en los resultados de aprendizaje de los alumnos en función de su nivel de inteligencia, ya sea bajo o alto. Un valor p de 0,383, superior al nivel de significación de 0,05, indica que no existen variaciones estadísticamente significativas en el resultado del aprendizaje entre alumnos y alumnas en función del sexo. Si el valor de significación del factor CI y la variable sexo es 0,100, superior a 0,05, indica que no existe influencia significativa ni interacción entre las variables CI y sexo en el resultado del aprendizaje de los alumnos de bachillerato. El hallazgo es que la inteligencia cognitiva no tiene un impacto sustancial en el rendimiento de la educación física (EF) entre los alumnos de secundaria. No existe una disparidad notable en el rendimiento en educación física (EF) entre alumnos y alumnas, lo que sugiere que hay igualdad de género tanto en las oportunidades como en las capacidades en EF. Además, no hubo una interacción notable entre el género y los niveles de CI en el rendimiento en tareas de inteligencia. Estos resultados restan importancia a otros criterios, como la aptitud física, y también restan importancia al impacto de las capacidades globales e integradoras de la educación física.

**Palabras clave:** Educación física, aprendizaje, rendimiento, alumnos, género, inteligencia intelectual

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## Introduction

Through learning, someone can also measure their abilities and achievements. Learning achievement can be measured in various subjects including in PJOK. Learning is "Learning is a relatively permanent change in behavior that results from past experience or purposeful instruction

(Zulbahri et al., 2020). From this explanation we can conclude that learning is a process of permanent change in attitudes and behavior resulting from experience and the learning process. Physical Education, Sports and Health subjects are part of general education in schools which aim to develop aspects of physical fitness, movement skills, critical thinking skills, social skills, reasoning, emotional

stability, moral actions, as well as aspects of a healthy lifestyle (Zulbahri et al., 2020). Physical education aims to promote physical and sports activities as learning outcomes. In this subject, students are directed to do various sports activities (individual or team), allowing them to gain positive values as individuals and team players (Firdaus et al., 2023). Apart from achievement, achieving competency is also very important to achieve in learning. So achieving competency is by applying various learning and activating students and containing life skills that students need to master (Pitnawati et al., 2019)

The academic performance of high school students in Physical Education (PE) is a complex area that is affected by various elements, such as gender and intellectual aptitude. Several studies have investigated the correlation between these variables and the students' PE learning achievement. Academic performance is perceived as the highest point reached in the educational journey pursued by students (Ardian et al., 2019). Research has demonstrated that the students' academic performance was greatly affected by emotional intelligence, social intelligence, learning motivation, and self-effectiveness (Panggabean et al., 2022; Ratana & Kaluge, 2023; Rosalina & Yamlean, 2021). Emotional intelligence significantly influences student academic achievement, as exemplified by students learning economics at the high school level (Ibenu & Mufidah, 2022). In addition, other research found a significant correlation between emotional intelligence and the academic achievement of fifth-grade kids (Oryza & Listiadi, 2021). Meanwhile, Upu et al. (2020) developed strategies that enhance emotional intelligence to improve academic achievement in mathematics. Cognitive intelligence is also substantial in improving students' academic performance. For example, it was reported to affect the academic performance of 11th-grade pupils in the science program (Ariani et al., 2021). In PE and sports subjects, a correlation between intelligence and performance was discovered in activities such as futsal (Wardaya et al., 2022). Nevertheless, it is important to note that academic achievement is not only influenced by cognitive intelligence but also the interplay of various aspects, such as emotional intelligence, learning motivation, and learning behavior (Ermannudin, 2021).

Besides those variables, academic achievement can also be influenced by gender. For example, studies have demonstrated the disparities in academic achievement between male and female students in learning physics (Talelu et al., 2022). The language subject revealed similar findings, indicating distinct outcomes between male and female students (Achtziger & Bayer, 2020; Herrera et al., 2020). Nevertheless, Liora et al. (2024) claimed that variables such as emotional intelligence, intellectual intelligence, and learning behavior have the potential to mitigate the impact of gender on academic performance. For instance, prior studies have demonstrated that English learning results are influenced by emotional intelligence, learning motivation, and language proficiency (Ardian et al., 2019). Emotional intelligence is also a factor in acquiring economic knowledge (Aflahah,

2021) and correlates positively with the academic achievement of 5th-grade students (Sunarti, 2019). Meanwhile, Darmawan and Rahajeng (2022) believed that implementing strategies to effectively regulate emotional intelligence can enhance learning results. In addition, emotional intelligence plays a role in fostering the incentive to acquire mathematical knowledge (Rikayoni & Rahmi, 2022). It has been examined in elementary school students during remote learning (Andika et al., 2020). Research has also examined the correlation between emotional intelligence and academic performance in specialized sports classes (Kurniawati & Zubir, 2020). Emotional intelligence has the potential to enhance academic performance across a range of courses, including mathematics, within the realm of education (Utami & Sasongko, 2021).

The fifth study has demonstrated disparities in learning outcomes between students instructed utilizing problem-based learning models and conventional models. The study indicates a correlation between learning models and emotional intelligence that impacts learning outputs. As argued earlier, emotional intelligence exerts a substantial influence on student learning behavior across a range of subjects. It covers the capacity to perceive and stimulate emotions in order to facilitate the cognitive processing and comprehension of emotions (Fitriani, 2022). Meanwhile, research by Handayani et al. (2021) stated that emotional intelligence encompasses the aptitude to identify and acknowledge one's own emotions and the emotions of others, along with the capability to manage and regulate impulsive behaviors and emotional responses.

Additional investigation is required to understand how emotional and intellectual intelligence intersect and impact academic achievement. Furthermore, it is crucial to take into account variables such as learning motivation, learning environment, and social interaction when aiming to enhance student academic performance (Fadlilah et al., 2022). Gender also has a discernible impact on academic performance, particularly in fields like physics, where notable disparities exist between male and female students (Kirana et al., 2023). Therefore, it is crucial to consider gender, alongside other variables such as emotional and intellectual intelligence, learning motivation, and learning behavior, when developing a successful and inclusive educational approach (Widiati et al., 2022). Gaining a comprehensive understanding of how these components interact can provide deeper insights to enhance academic achievements in physical education for high school students.

Indeed, research on human movement has touched on many areas. For example, some popular studies investigated the achievement of physical education learning outcomes (Martono et al., 2024; Komari et al., 2024a; Komari et al., 2024b; Septiantoko et al., 2024; Suyato et al., 2024; Widiyanto et al., 2024), motor development (Susanto et al., 2024; Susanto et al., 2024). Other studies examined specific areas of PE or sports, such as health and fitness sports (Widiyanto et al., 2024a; Widiyanto et al., 2024b; Syaukani et al., 2024; Pranoto, et al., 2024; Astuti

et al., 2024), law and sports education (HB et al., 2024), sports communication (Charlina et al., 2024), active lifestyle with exercise (Tafuri et al., 2024a), interval training and physiological (Latino et al., 2024a), circuit training programme (Tafuri et al., 2024b; Tafuri et al., 2024c; Latino et al., 2024b), injury risk on sports (Fahrosi et al., 2024; Anam et al., 2024a), endurance training and physiological (Latino et al., 2024c), therapeutic sports (Zanada et al., 2024), movement skills (Susanto et al., 2023; Anam et al., 2024b; Pranoto et al., 2024), and sports training and performance (Kurniawan et al., 2024; Susanto et al., 2024), curriculum and management of physical education learning (Mardiyah et al., 2024a; Yani et al., 2024; Mardiyah et al., 2024b), and the management of sports education and archery (Hamsyah et al., 2024; Mulyanti et al., 2024; Setyawan et al., 2024a; Setyawan et al., 2024b; Destriani et al., 2024).

Despite the myriad research, there is a lack of scholarly research on the disparities in physical education learning Outcomes among high school pupils by considering their gender and intellectual aptitude. The dearth of studies on this topic can impede understanding and scientific development in the field. Hence, it is imperative to research this issue by thoroughly reviewing existing literature studies

## Methodology

This study quantitatively compared studies that sought to determine the degree of correlation between variables. It examined the disparities in physical education (PE) learning outcomes among high school students, according to their gender surveys and intellectual intelligence. The participants in this study consisted of male and female high school students from the Yogyakarta region of Indonesia. They were selected based on their levels of intellectual intelligence: low and high. Samples were collected using a Simple Random Sampling technique. All high school students had an equal opportunity to be chosen as participants in this study.

As argued earlier, this study involved the students' Physical Education (PE) performance. The data were obtained from secondary data of the evaluation report of PE topics for the sample group, which included 40 students from classes X and XI at a high school in the Yogyakarta region of Indonesia. Intellectual intelligence data were gathered through a Likert scale questionnaire ranging from 1 to 5, which was distributed to students. The questionnaire comprises 14 items designed to measure various factors of intellectual intelligence. These items were validated using the Pearson's product-moment correlation, while the reliability was measured with the Cronbach's alpha. Experts in the fields also reviewed the instruments to ensure accuracy. The intellectual intelligence data were subsequently analyzed using Microsoft Excel and were categorized into three groups: low intelligence, moderate intelligence, and high intelligence.

The subsequent procedure involves categorizing or dividing the data into four cells: male students with low intellectual intelligence, male students with high intellectual intelligence, female students with low intellectual intelligence, and female students with high intellectual intelligence. These categories are illustrated in Table 1 below.

Table 1.

Learning outcomes in physical education based on gender and intellectual intelligence survey

No	Male			No	Female		
	Student's Name	Intellectual Intelligence	Results		Student's Name	Intellectual Intelligence	Results
1	RP	Low	81	1	AQA	Low	84
2	AJP	Low	82	2	NLPA	Low	85
3	MND	Low	84	3	AA	Low	83
4	PGR	Low	84	4	LNH	Low	85
5	ARA	Low	83	5	UA	Low	84
6	ACK	Low	81	6	BRNK	Low	83
7	NFS	Low	83	7	SA	Low	84
8	ATA	Low	87	8	VR	Low	84
9	MFO	Low	85	9	RSR	Low	85
10	NH	Low	86	10	HMGL	Low	84
11	LH	High	84	11	AR	High	84
12	ASRW	High	84	12	ARA	High	83
13	AR	High	83	13	IL	High	84
14	AKA	High	80	14	HKZ	High	85
15	FG	High	82	15	LCD	High	84
16	BNN	High	88	16	FA	High	84
17	MFR	High	89	17	SNL	High	84
18	MZFR	High	89	18	BNA	High	84
19	AGI	High	87	19	LKP	High	84
20	MAD	High	87	20	IR	High	81
The Quantity of Male = 20				The Quantity of Female = 20			
Total = 40							

After collecting the data, a two-way ANOVA analysis was conducted. This statistical method categorizes data into two factors in order to examine and assess the variation influenced by these factors. The initial examination of the data involved conducting the Shapiro-Wilk test for normality and the Levene's test for equality of error variances to assess homogeneity. The test result indicated that the significance value (Sig.) of 0.312 was greater than the threshold value of 0.05, suggesting that the data followed a normal distribution. Nevertheless, even if the data were not homogeneous, the two-way ANOVA test could still be conducted as long as the data followed a normal distribution.

## Result

The analysis of the test results provides insight into the distribution of participants across the study's key factors. The results show that the total number of participants (N) between-subjects factors was 40. Specifically, there were 20 data points for students categorised as having low intellectual intelligence and 20 for those with high intellectual intelligence. Additionally, the gender was evenly distributed, with 20 data points for males and 20 for females. This information is presented in Table 2:

Table 2.  
Results Test Between-Subjects Factors

Between-Subjects Factors				
		Value Label	N	
Intellectual Intelligence	1	Low Intellectual Intelligence	20	
	2	High Intellectual Intelligence	20	
Gender	1	Male	20	
	2	Female	20	

The test results revealed that the mean learning outcome for male students with low intellectual intelligence was 83.60, with a standard deviation of 2.011. On the other hand, the mean study outcome for female students with lower intellectual intelligence categories was slightly higher by 84.10, with a standard deviation of 0.738. In addition, the average academic performance of male students with high intellectual intelligence was 85.30, with a standard deviation of 3.129. On the other hand, the average educational achievement of female students with high intellectual intelligence was 83.70, with a standard deviation of 1.059. This data indicates that male PE students with low intellectual ability have the lowest learning outcome, while male PE students with high intellectual intelligence have the highest learning output. The complete results are presented in Table 3.

Table 3.  
Results Test Descriptive Statistics

Descriptive Statistics				
Dependent Variable: Students' Learning Outcomes				
Intellectual Intelligence	Gender	Mean	Std. Deviation	N
Low Intellectual Intelligence	Male	83.60	2.011	10
	Female	84.10	.738	10
	Total	83.85	1.496	20
High Intellectual Intelligence	Male	85.30	3.129	10
	Female	83.70	1.059	10
	Total	84.50	2.417	20
Total	Male	84.45	2.704	20
	Female	83.90	.912	20
	Total	84.17	2.011	40

Based on the analysis of the between-subjects effects of 40 student data points, the results showed that the significance value (Sig.) for the intellectual intelligence factor was 0.303, which was greater than 0.05. This indicated that there was no significant difference or influence of intellectual intelligence (whether low or high) on student PE learning outcomes. For the gender factor, the significance value was 0.383, also greater than 0.05, indicating that there was no significant difference or impact of gender (male or female) on PE learning outcomes. Furthermore, the significance value for the interaction between intellectual intelligence and gender was 0.100, which was greater than 0.05. This result suggested that there was no interaction or combined influence of intellectual intelligence and gender on high school students' PE learning outcomes, as shown in Table 4.

Based on the analysis of the between-subjects effects of 40 student data point, the results showed that the significance value (Sig.) for the intellectual intelligence factor was 0.303, which was greater than 0.05. This meant that there

was no significant difference or influence of intellectual intelligence (whether low or high) on student PE learning outcomes. For the gender factor, the Significance value was 0.383, also greater than 0.05, indicating that there was no difference or impact of gender (male or female) on PE learning outcome. Furthermore, the significance value for the interaction between intellectual intelligence and gender was 0.100, which was greater 0.05. This suggested that there was no combined influence or interaction between the intellectual intelligence and gender on high school students' PE learning outcomes, as shown in Table 4.

Table 4.  
Results Test Tests of Between-Subjects Effects

Tests of Between-Subjects Effects					
Dependent Variable: Students' Learning Outcomes					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	18.275 <sup>a</sup>	3	6.092	1.572	.213
Intercept	283417.225	1	283417.225	73139.929	.000
Intellectual Intelligence	4.225	1	4.225	1.090	.303
Gender	3.025	1	3.025	.781	.383
Intellectual Intelligence * Gender	11.025	1	11.025	2.845	.100
Error	139.500	36	3.875		
Total	283575.000	40			
Corrected Total	157.775	39			

a. R Squared = .116 (Adjusted R Squared = .042)

## Discussion

This study investigated the correlation between gender, intellectual intelligence, and physical education (PE) performance among high school students. These findings are essential to understand the interplay and impact of these factors on student's learning outcomes in physical education (PE) subjects. The initial hypothesis posits that there will be notable disparities in physical education performance between students with low and high intellectual intelligence. Nevertheless, the findings of the current study did not validate this hypothesis. The study revealed no significant difference in the average PE score between students with low intellectual intelligence (83.85) and students with high intellectual intelligence (84.50), with a significance value of  $0.303 > 0.05$ . This suggests that the level of intellectual intelligence, whether it is low or high, does not have a substantial influence on physical education achievement (Buczyłowska et al., 2023). This finding is consistent with earlier studies indicating that physical education (PE) performance may be greatly influenced by physical ability, motor skills, and engagement in physical activity rather than solely by cognitive competence (Mulyani & Lubis, 2024).

Further research supports that while cognitive intelligence is important, it is not the only factor determining students' academic achievement in PE. Other factors, such as physical abilities, motor skills, motivation, and engagement in physical activities, also play a role in academic performance in these subjects (Oktaviani et al., 2019). This exemplifies the importance of a comprehensive strategy for

understanding the various factors that impact students' academic achievement. Moreover, a study examining cognitive intelligence and academic performance among eleventh-grade students in mathematics, science, and technology found that while intelligence does influence outcomes, it is not the sole predictor of student learning (Utomo & Komarudin, 2022). The results affirm that student academic achievement is shaped by multiple factors, with cognitive capacity being just one factor. Therefore, it is crucial to assess student academic performance holistically, considering multiple factors like cognitive aptitude, physical skills, motivation, and engagement in physical activities. Adopting a comprehensive and inclusive approach when planning PE programs can lead to more effective improvements in student learning outcomes.

The second hypothesis yielded an unexpected result, showing no statistically significant difference between the physical education (PE) scores of male students (mean = 84.45) and female students (mean = 83.90) ( $p$ -value =  $0.383 > 0.05$ ). This finding indicates that gender does not play a major role in determining PE performance. Both male and female students appear to have equal opportunities and abilities in PE, reflecting gender-neutral teaching methods and fair access to PE resources. The study's findings indicate no notable difference in PE performance between male and female students, which supports the idea that gender does not significantly influence PE performance (Kaushik et al., 2024). This could be due to the implementation of gender-neutral teaching approaches and equal distribution of PE resources. These results align with the broader discussions on gender equality in education. Research highlights the importance of promoting gender equality and empowering all female students within the school system to ensure equal opportunities for everyone (Avraam & Anagnostou, 2022). Studies on gender stereotypes in PE further highlight the need to address equality in the educational setting (Cuenca-Soto et al., 2023). Moreover, public policies have been enacted to foster gender equality and incorporate gender perspectives in educational and research settings (Nowak, 2021).

Moreover, studies on students' perception of learning in physical education (PE) have examined gender differences, highlighting the significance of addressing gender equality in PE (Jansson et al., 2021). Understanding how gender affects education and the challenges related to achieving gender equality is crucial for creating an inclusive and equal learning atmosphere (Yang, 2024). Educational programs and initiatives have been developed to promote gender equality and challenge the traditional gender norms within the educational setting (Huang & Liu, 2021). The literature highlights the value of gender education programs in fostering early awareness and sensitivity to gender issues (Baena-Morales et al., 2020). Addressing gender bias and stereotypes in education is crucial for creating a more inclusive and fair learning environment. (Kiram, 2020). Studies have demonstrated that educational initiatives to promote gender equality have a beneficial effect on students' attitudes

toward equality and gender roles (Li & Yang, 2022).

The third hypothesis showed a non-significant interaction effect ( $\text{Sig.} = 0.100 > 0.05$ ), indicating that the combined impact of gender and intellectual intelligence does not substantially affect physical education (PE) performance. In other words, the variation in PE performance cannot be explained by the interaction between these two factors. This finding is significant because it suggests that other elements, such as physical fitness, motivation, and the teaching environment, are more likely to influence PE performance. Furthermore, these findings align with previous research that found no substantial impact of the interplay between cognitive intelligence and gender on PE performance (Handriani & Subhan, 2020). The study implies that male and female students have equal opportunities in PE, regardless of their IQ and gender. The study's findings support the broader discussions on gender equality and the significance of creating an inclusive school environment. The research highlights the need to overcome gender biases and stereotypes in education to foster equal chances for all persons (Bakti et al., 2022).

Moreover, research into the relationship between cognitive, emotional, and spiritual intelligence and academic success emphasizes the diverse factors that influence educational results (Mulbar et al., 2022). Understanding these elements, including gender, cognitive intelligence, and emotional intelligence, is crucial for creating an inclusive and supportive educational environment (Rasmini, 2022). Educational interventions that promote a holistic approach to intelligence and gender equality have shown positive effects on student learning and development (Fitri & Basri, 2022). Research findings that intellectual intelligence and gender do not significantly impact student performance highlight the need to promote gender equality and inclusive educational practices. By tackling gender bias, promoting equal opportunities, and acknowledging various factors contributing to student performance, educational institutions can create an environment that supports the overall development of all students.

## Conclusion

The study investigated the correlation between gender, cognitive intelligence, and physical education (PE) performance among high school students. The study findings revealed that intellectual intelligence did not have a significant influence on PE performance. Specifically, the average PE scores of students with low and high intelligence were not statistically different. This aligns with other research indicating that PE performance is more strongly influenced by physical aptitude and engagement in physical activities rather than cognitive intelligence. Additionally, there was no significant difference in PE performance between male and female students, indicating that gender does not play a major role in determining PE performance. These findings suggest that teaching methods free of gender bias and the equitable distribution of

physical education resources contribute to gender equality in school. Moreover, the research found no significant interaction between gender and intellectual intelligence on PE performance, further emphasizing that factors such as physical fitness and motivation are more influential. Overall, this research emphasizes the importance of a holistic approach to understanding the factors that impact students' academic performance in PE. It also highlights the importance of promoting gender equality and inclusive educational practices to establish learning environments that foster the overall development of all students

### Conflicts of Interest

The authors declare that there are no conflicts of interest.

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