Comparative Study of 30-Meter Running Ability Between Male and Female Elementary School Students

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ABSTRACT

Speed is an essential indicator of motor performance among elementary school students. Preliminary observations at UPT SPF SD Inpres Karunrung suggested that male students tend to demonstrate faster sprint performance than female students. This study aimed to examine differences in 30-meter sprint ability between male (n = 10) and female (n = 10) students. A comparative quantitative design was employed, and total sampling was used. Sprint time was measured using a 30-meter test, and data were analyzed using an independent samples t-test. The results showed that male students recorded an average time of 4.47 ± 0.41 seconds, whereas female students recorded 5.15 ± 0.85 seconds. Although the t-test indicated no statistically significant difference (p = 0.151), this finding should be interpreted with caution due to the small sample size and the use of manual timing instruments. Nevertheless, the descriptive gap of 0.67 seconds represents a meaningful practical difference in short-distance sprint performance among elementary school students. These findings highlight the importance of evaluating both statistical and practical perspectives when interpreting sprint ability, and future research should involve larger samples and more precise measurement tools.

1. Introduction

Physical Education, Sports, and Health (PJOK) plays an important role in the development of students' physical, motor, social, and mental abilities. One fundamental aspect of physical fitness emphasized in PJOK is speed, which reflects the ability to perform fast and explosive movements. At the elementary school level, 30-meter sprint test is commonly used to assess acceleration and lower-limb power (Fitriana & Kurniawan, 2021). This test provides teachers with objective information about students' basic physical capacities, which is essential for planning appropriate and effective learning activities.

Field observations often show that male students tend to produce faster sprint times than female students. Although biological factors such as muscle mass and movement patterns may contribute to these differences, research indicates that physiological distinctions between boys and girls at the elementary school age remain minimal (Hidayat, 2023). At this stage, children's sprint ability may also begin to reflect the influence of early motor experiences and varying exposure to movement-rich activities, which shape coordination and acceleration during growth (Rahayu & Siregar, 2020). These emerging influences help explain why previous studies have reported inconsistent findings regarding gender-based sprint performance.

Several studies have reported inconsistent findings regarding sprint performance differences between boys and girls. Some research found significant differences (Prasetyo & Nugroho, 2022), whereas others reported relatively similar sprint abilities (Nugroho & Pratama, 2022). These inconsistencies indicate that variations in children's play environments, physical activity exposure, and movement opportunities may influence sprint performance across different contexts. Therefore, evaluating sprint ability requires a broader perspective that considers both biological and contextual factors. This underscores the importance of examining sprint performance within specific school environments.

Preliminary observations at UPT SPF SD Inpres Karunrung revealed that male students appeared to achieve faster sprint times than female students. However, no structured assessment had been conducted to determine whether these differences were statistically meaningful. Without objective measurements, teachers may face challenges in designing equitable and developmentally appropriate learning programs. These initial observations highlight the need for empirical data to verify whether performance differences truly exist.

Previous literature also notes that children's physical development is shaped by environmental stimulation, daily activity patterns, and learning opportunities provided by teachers and parents. Children who frequently participate in active play and structured physical activities tend to develop better neuromuscular coordination and acceleration (Dewi & Yulianto, 2021). In school settings, diverse PJOK learning activities-particularly those emphasizing basic techniques, movement coordination, and explosiveness-contribute significantly to students' sprint performance.

In the Indonesian context, opportunities for physical activity between boys and girls remain unequal. Boys often receive more encouragement to participate in competitive games, outdoor running activities, and high-intensity movements, whereas girls may be directed toward more moderate or less dynamic activities due to cultural expectations and social norms (Lestari & Firmansyah, 2020). Such disparities affect children's motivation, confidence, and opportunities to develop speed-related motor skills. Despite these sociocultural differences, research suggests that adequate training exposure can improve sprint performance regardless of gender.

Empirical findings further show that structured sprint training tailored to children's developmental abilities can significantly enhance speed performance for both boys and girls (Pradipta & Sukamto, 2022). This indicates that improvements in sprint ability depend more on training exposure and movement practice than on biological sex alone. Therefore, understanding sprint performance among elementary school students requires examining the combined influence of developmental factors, access to physical activity, sociocultural expectations, and school-based learning experiences.

Considering these factors, this study aims to analyze differences in 30-meter sprint ability between male and female students at UPT SPF SD Inpres Karunrung. Rather than assuming inherent gender differences, the findings are expected to provide a more comprehensive understanding of sprint performance by acknowledging the role of environmental conditions, movement experiences, and unequal access to physical activity commonly observed among Indonesian children.

2. Methods

This study used a quantitative approach with a comparative research design to analyze differences in 30-meter sprint ability between male and female students. The research was conducted at UPT SPF SD Inpres Karunrung, considering facility availability and student readiness. The sample consisted of 20 students, including 10 males and 10 females, selected through purposive sampling based on healthy physical condition, readiness to participate, and appropriate age. Purposive sampling was considered appropriate for comparative studies requiring subjects with specific physical and developmental characteristics (Hidayat, 2023).

The instrument used was the 30-meter sprint test, which is widely applied to measure acceleration and sprint ability among elementary school students (Fitriana & Kurniawan, 2021). Each participant completed two sprint attempts, and the best recorded time was taken as the final measurement. Timing was conducted using a digital stopwatch with 0.01-second precision under standardized field conditions.

Before hypothesis testing, assumption tests were conducted. The Shapiro-Wilk test was used to assess data normality for both male and female groups, while Levene's Test was used to evaluate the homogeneity of variances. Both normality and homogeneity assumptions were met, allowing the use of parametric analysis. These assumption tests are essential when applying an independent samples t-test in sports-based physical research to ensure valid comparative results (Pradipta & Sukamto, 2022).

After confirming the assumptions, data were analyzed using descriptive statistics (mean and standard deviation) and an independent samples t-test to determine whether significant differences existed between groups. The significance level was set at α = 0.05. All analyses were performed using SPSS.

3. Results

Descriptive analysis showed that male students achieved an average sprint time of 4.47 ± 0.41 seconds, while female students recorded 5.15 ± 0.85 seconds. These results indicate that, descriptively, male students displayed faster sprint performance and lower variability compared to females.

Prior to hypothesis testing, assumption tests were conducted. The Shapiro-Wilk test showed that sprint time data from both groups were normally distributed (male p = 0.742; female p = 0.514). The Levene's Test also indicated homogeneous variances between groups (o = 0.543). Thus, the data met the requirements for independent samples t-test.

The independent samples t-test result showed no statistically significant difference in sprint performance between male and female students (t = -1.51, p = 0.151). Although the difference was not statistically significant, the descriptive gap of 0.67 seconds represents a meaningful practical difference for a short-distance sprint. Even small variations in time at 30 meters can reflect noticeable differences in acceleration and movement coordination during physical education activities.

Table 1. Shapiro-Wilk Normality Test for 30-Meter Sprint Time

Group	N	Statistic	p-value	Interpretation
Male	10	0.957	0.151	Normal
Female	10	0.941	0.151	Normal

Interpretation:
Both groups have p > 0.05, indicating normal data distribution.

Table 2. Levene's Test of Homogeneity of Varians

Variable	F	p-value	Interpretation
30-meter sprint time	0.384	0.543	Homogeneous

Interoretation:
P = 0.543 > 0.05 indicates equal variances (homogeneous).
Data meet assumptions for independent samples t-test.

Table 3. Descriptive Statistic for 30-meter Sprint

Groups	N	Mean (s)	Standard Deviation (SD)
Male	10	4.47	0.41
Female	10	5.15	0.85

Table 4. Independent Samples t-Test for 30-Meter Sprint Ability

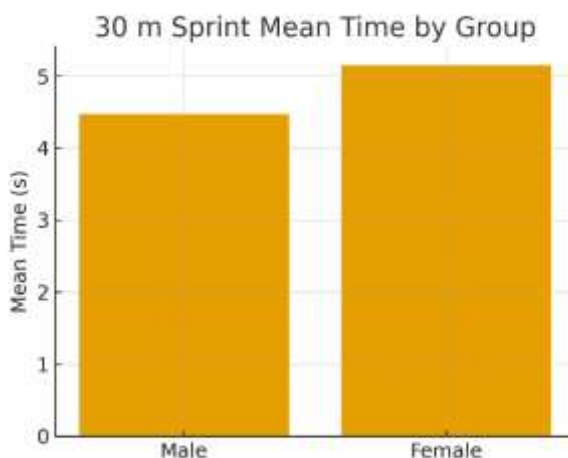| Variable	t-value	Df	p-value	Descriptions
Sprint Time	-1.51	18	0.151	Not Significant

Figure 1. Independent t-Test Result of 30-Meter Sprint Ability by Gender

The analysis indicates that the difference in sprint performance between male and female students is not statistically significant ($p > 0.05$). This finding suggests that, within the context of this simple, gender does not produce a measurable statistical effect on 30-meter sprint ability. This result is consistent with literature noting that physiological differences between boys and girls at the elementary school age remain relatively small (Hidayat, 2023), which may contribute to the absence of statistically significant performance differences.

Although the statistical result is non-significant, the 0.67-second difference in 30-meter sprint time represents a meaningful practical difference in the context of fundamental movement activities among elementary school students. This gap may influence aspects such as acceleration, coordination, and task execution during PJOK instructional activities. Furthermore, sprint performance at this age is strongly shaped by motor experience, physical activity exposure, and opportunities for movement

practice, as supported by previous findings (Hidayat, 2023). Therefore, practical interpretation remains essential to provide a more comprehensive understanding of students' sprint performance.

4. Discussion

The present study found that male students demonstrated faster mean times in the 30-meter sprint than female students (4.47 s vs. 5.15 s); however, the difference was not statistically significant ($p > 0.05$). This result aligns with previous findings suggesting that physiological distinctions between boys and girls at the elementary school age remain relatively small (Hidayat, 2023), which may explain why gender-based differences in sprint performance often do not reach statistical significance. These findings also correspond with studies reporting mixed outcomes, in which some research observed significant differences (Prasetyo & Nugroho, 2022) while others found comparable sprint abilities between boys and girls (Nugroho & Pratama, 2022). Such inconsistencies highlight the influence of environmental, contextual, and experiential factors during childhood (Rahayu & Siregar, 2020; Dewi & Yulianto, 2021; Fitriana & Kurniawan, 2021).

Despite the non-significant p-value, the descriptive gap of the approximately 0.67 seconds carries meaningful practical implications. In short-distance sprint activities, even fractions of a second can influence acceleration, coordination, and task execution during PJOK learning. Practical differences such as these are commonly influenced not only by physiological attributes but also by motor experience, activity exposure, and opportunities for structured practice (Rahayu & Siregar, 2020). Therefore, the practical interpretation remains essential for understanding real performance differences among students, even when statistical significance is not achieved.

A critical sociocultural reflection further strengthens the interpretation. In many Indonesian school and community settings, boys tend to receive more freedom and social encouragement to engage in outdoor running games, high-intensity activities, or competitive play, whereas girls may experience more restrictions due to cultural expectations or safety concerns (Lestari & Firmansyah, 2020). These unequal opportunities can result in differences in movement confidence, coordination, or familiarity with maximal-speed tasks. As a result, observable performance differences may reflect sociocultural bias rather than inherent biological ability. Such relfections are crucial for interpreting findings fairly and for avoiding assumptions that reinforce gender norms in children's physical development.

Reviewer feedback highlighted the larger standard deviation (SD) observed among female students. Beyond motor experience differences, several alternative explanations may account for this variability. First, girls in this age group may display more diverse levels of daily physical activity, leading to greater performance dispersion across the group (Rahayu & Siregar, 2020). Second, unmeasured anthropometric and fitness-related factors-such as leg length, body mass, or neuromuscular coordination-may vary more widely among female participants. Third, motivational factors and confidence during maximal sprinting efforts may differ between individuals, contributing to higher within-group variability. Additionally, manual timing with a digital stopwatch can introduce minor measurement errors, especially in short events such as a 30-meter sprint, potentially increasing variability scores.

This study also carries methodological limitations that must be acknowledged. The use of manual stopwatch timing, although common in school-based assessments, is susceptible to reaction-time error at the start and finish, potentially affecting measurement precision. Future studies may benefit from using electronic timing gates to improve reliability. Furthermore, the sample size (n = 20) limits statistical power and generalizability; larger samples or multi-school sampling would enable more rebust analyses. Including anthropometric data, physical activity logs, and qualitative insights from teachers or parents may also help identify contextual and sociocultural factors influencing children's sprint performance. These additions would deepen interpretation and strengthen conclusions.

From a pedagogical perspective, the findings underscore the importance of providing equitable physical activity opportunities for both boys and girls. PJOK teachers should prioritize training that enhances acceleration, coordination, and movement confidence for all students. Structured sprint drills, varied active play, and consistent exposure to high-quality movement experiences can reduce performance gaps and promote motor development irrespective of gender (Pradipta & Sukamto, 2022). Because, many observed differences appear environmentally shaped rather than biologically fixed, equitable instructional practices become essential.

In conclusion, while statistical analysis did not reveal a significant difference in sprint performance between male and female students, the practical gap, sociocultural context, and observed variability among female students offer important insights. Recognizing measurement limitations, sociocultural contrains, and sample-related factors enhances the critical interpretation of the findings. Such reflections contribute to a more nuanced and responsible understanding of gender-related patterns in children's sprint performance and can inform more equitable practices in PJOK instruction.

5. Conclusion

This study concludes that although male students showed faster mean 30-meter sprint times than female students, the difference was not statistically significant. These findings indicates that gender did not produce a measurable statistical effect on sprint performance within the context of this sample. However, the absence of statistical significance should be interpreted cautiously, particularly considering the limitations of the study, including the small sample size (n = 20) and the use of manual stopwatch timing, which may reduce the statistical power to detect small performance differences. These limitations may contribute to the non-significant result and should be taken into account when interpreting the findings.

Despite these constraints, the practical difference of 0.67 seconds remains relevant in elementary school sprint performance and highlights the importance of providing equitable motor experiences and activity opportunities for both boys and girls. Future studies with larger and more diverse samples, more precise timing instruments, and additional contextual data are recommended to better understand gender-related patterns in children's sprint ability.

6. Author Contribution

Dian Malini contributed to concept development and manuscript writing. Dhiki Tamsar Ramadhan and Imam Abdullah were responsible for data collection and analysis. Muh. Rahman Nur Handa and Wibryan Fauzan Takdir contributed to theoretical framework development, literaturs review, and final manuscript editing. All authors participated in writing and preparing the final manuscript.

7. Acknowledgements

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