

RESEARCH ARTICLE

Physical Activities and sedentary time of Students Outdoor Education and Conventional Education in Primary Schools

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Abstract

This research set out to evaluate physical activity and sedentary time between outdoor education and conventional education settings. The research methodology employed a mixed method technique. The research methodology employed a mixed method technique. The research sample consisted of twenty-one students in fourth and fifth grades at an elementary school in Sudamanik 01, Cimarga District, Lebak Regency, Banten Province, Indonesia. The demographics of the participants in grades four and five were similar in terms of height (144.31 ± 2.01) centimeters and body weight (37.02 ± 1.26) kilograms. The level of physical activity and sedentary time were assessed through the utilization of an accelerometer. For twenty-one students, physical activity and sedentary time were compared in participating school during six days of outdoor education and five days of conventional education. The group in outdoor education exhibited a higher level of physical activity compared to conventional education, as evidenced by the results of statistical tests with a p - value < 0.001 ; conversely, outdoor education results in less sedentary time than traditional education ($p < 0.001$). The primary conclusions of research revealed that switching from conventional education to outdoor education environment reduced the sedentary time and increased light to moderate the level of physical activity during school hours. There are differences in leisure time physical activity on days at school with or without outdoor education. Henceforth, it can be concluded that outdoor education successfully prompted students to engage in physical activity.

Keywords

Physical Activities, Sedentary Time, Outdoor Education, Conventional Education

INTRODUCTION

Patton et al (2018) explain that in recent years, lifestyle has shifted in various age groups, including children, especially in late childhood. Therefore, the World Health Organization and national public health guidelines in a number of countries recommend that children and adolescents aged 5 to 15 years engage in at least 60 minutes of moderate-to-vigorous physical activity (MVPA) per day or on average across days of the week (Parrish et al., 2020; WHO, 2020). It is also

recommended to engage in vigorous PA at least three days per week to strengthen muscles and bones. PA in sports improves quality of life because of its psychological and social advantages. The positive correlation between student's performance in PA, improved behavior, and its relationship to academic achievements (Pardos-mainer et al., 2021).

The percentage in question tends to exhibit a decline as children progress through the developmental stage of adolescence (Merlo et al., 2020). During this period, the engagement in

Received: 12 December 2023 ; Revised ; 15 January 2024 ; Accepted: 08 March 2024; Published: 25 March 2024

How to cite this article: Hernawan, H., Widyawan, D., Mukhtar, M., Nugraha, H. and Haqiyah, A.(2024). Physical Activities and sedentary time of Students Outdoor Education and Conventional Education in Primary Schools. *Int J Disabil Sports Health Sci*;7(2):389-395. <https://doi.org/10.33438/ijdshs.1403090>

moderate-to-vigorous physical activity (MVPA), reducing by thirty-eight minutes/year from ages nine to fifteen, experiences a gradual reduction, it is important to study the positive impact of PA and sedentary behavior on cognitive function (Cox et al., 2015).

Based on the findings of a study conducted by (Tammelin et al., 2015), the average duration of leisure daily among elementary school students was six hours and twenty-four minutes. Student's daily of ST occurred during the school day, averaging thirty-nine minutes per hour. Excessive ST in students is poorly understood, but growing evidence from adult studies suggests that long ST is associated with negative outcomes such as waist circumference and fasting blood glucose (Healy et al., 2011). According to a researcher, it is advisable to give careful consideration to ST that extends beyond ten minutes, as research indicates that prolonged periods of inactivity are linked to heightened cardiovascular risk among adults (Kim et al., 2015).

In their study conducted by (Fiskum & Jacobsen, 2012), a group of twelve fifth-grade students were carefully observed over a period of four days in a CE setting, followed by three days of engaging OE instruction. The researchers conducted a systematic observation of students' PA across four distinct time periods throughout the day. The researchers classified a scale with three points: sedentary or standing, walking, or more active than brisk walking. Furthermore, boys exhibited more significant differences between the indoor and outdoor settings in terms of their levels of PA. This research measured a participant's level of PA through direct observations and an acceleration index of total PA. However, other studies have measured a participant's heart rate and found that exercise results in higher levels of PA (Dettweiler et al., 2015). Nonetheless, a number of researchers have advocated for a more sophisticated analysis of PA measurements during school-based Education Outdoor (Barnett et al., 2016; Dettweiler et al., 2023).

There has not been a significant amount of research conducted in elementary schools that investigates the relationship between physical activity and sedentary time. Based on the systematic literature, it was discovered that researchers from Indonesia have not studied a great deal about the relationship between physical

activity and sedentary time in elementary schools. This is a researcher gap in this research.

The research examines at the impact of OE on the PA and ST of elementary school students. It compares the disparities in students' levels of PA and ST between OE and CE settings in the context of physical education. This research hypothesizes that students engage in Physics Activity with lighter, moderate, and vigorous intensity and ST during OE.

MATERIALS AND METHODS

Participant

This study followed ethical standards and received approval from the Institutional Review Board of Universitas Negeri Jakarta, Indonesia with reference number (Protocol code NO: 806/UN39.14/PT.01.05/XI/2023 and date of approval November 7, 2023). Participant provided informed consent, with the volunteer form covering research details, risks, benefits, confidentiality, and participant rights. The research strictly adhered to the ethical principles of the Declaration of Helsinki, prioritizing participant's rights and well-being in design, procedures, and confidentiality measures. Participant provided informed consent, with the volunteer form covering research details, risks, benefits, confidentiality, and participant rights. The research strictly adhered to the ethical principles of the Declaration of Helsinki, prioritizing participant's rights and well-being in design, procedures, and confidentiality measures.

Following receipt of an authorization letter from the Institutional Review Board (IRB) at Universitas Negeri Jakarta, the letter was forwarded to the school administration for voluntary completion by parents and students. Still, the completion rate was only 21 (parents and students). The demographics of the participants in grades four and five were similar in terms of height (144.31 ± 2.01) centimeters and body weight (37.02 ± 1.26) kilograms.

The sample in this study were students in grades 4 and 5 who attended Sudamanik 01 Elementary School, Cimarga District, Lebak Regency, Banten Province, Indonesia. Pragmatism has been widely acknowledged as one of the earliest philosophical frameworks to advocate for the integration of mixed methods research (Morgan, 2007). Participants were selected from

both fourth and fifth grades, as they were enrolled in concurrent physical education classes with the same teacher. In classes 4 and 5, there are a total of 53 students. Among them, 22 (41.5%) are male students and 31 (58.5%) are female students. Physical activity activities included students exploring the nearby forest, visiting the river bank, exploring the rice fields, and hiking up the hills. The mixed method research has been adopted to integrate qualitative and quantitative data, resulting in a more comprehensive understanding of student PA and the impact of OE.

Data collection tools

The levels of PA and ST among students were assessed using accelerometers, while the content and behavior of participants during the school day were evaluated through nonparticipant observations. For twenty-one students, physical activity and sedentary time were compared in participating school during six days of outdoor education and five days of conventional education. The students used accelerometers in the classroom during a 90-minute class period.

Statistical Analysis

Statistics analysis techniques used software statistics; specifically, the means and standard deviations for activity and step minutes during the school day, leisure time, and whole day. The ANOVA, analysis of variance, was applied to evaluate the differences between CE days and OE days. The most and least active students were measured by the number of steps, then an

independent samples t-test was carried out. The analysis of participant was conducted as a one group due to the small sample size, but age and gender differences were examined.

RESULTS

The research examined the mean and standard deviation of PA and ST (minutes per hour) in the context of OE and conventional education at school and during leisure time. During OE days, students engaged in ST and ST > 10 behavior and more light1, light2, moderate-intensity, and MVPA behavior than Conventional Education. Furthermore, the students demonstrated a greater inclination towards engaging in OE. Conversely, no differences in physic activity were reported between OE and conventional Education. The data indicated a significant increasing in the amount of time allocated to PA and sedentary behavior variables, specifically from 16% to 59%, when comparing CE to OE. The students in part two demonstrated a statistically significant difference ($p < 0.001$) in the number of steps taken during Conventional Education. The second group was more active in OE, but the less active group improved significantly more. There appear to be notable distinctions in the levels of PA and ST during leisure time between CE and OE. The students in part two exhibited a notable distinction ($p < 0.001$) in the quantity of steps taken during CE practices (Table 1 and Figure 1).

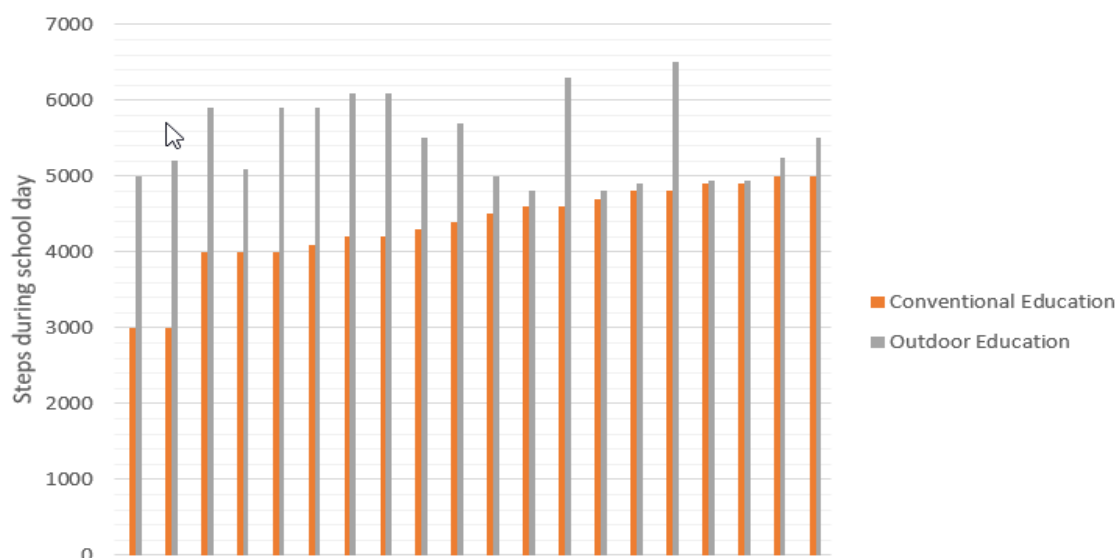


Figure 1. Individual result for steps during the school day presented in order by least to most steps taken during conventional days

Table 1. Data At school, leisure time, and Physical Activity (PA) throughout the day and (Sedentary Time) ST (Mean \pm Standard Deviation) among elementary school students (n = 21) Conventional education and Outdoor education.

| Physical Activity | Conventional education | Outdoor-education | Difference (percent) | P value |
|--|------------------------|-------------------|----------------------|---------|
| School day | | | | |
| ST >10 minutes, minutes/hour | 6.87 \pm 5.18 | 3.44 \pm 2.79 | -56% | <0.001 |
| ST, minutes/hours | 34.26 \pm 3.22 | 27.62 \pm 4.27 | -19% | <0.001 |
| Light 1 ^x physical activity, minutes/hour | 16.08 \pm 2.17 | 18.29 \pm 3.03 | 16% | <0.001 |
| Light 2 ^x physical activity, minutes/hour | 5.45 \pm 1.65 | 8.06 \pm 2.23 | 45% | <0.001 |
| Moderate physical activity, minutes/hour | 4.58 \pm 0.67 | 6.73 \pm 1.73 | 59% | <0.001 |
| Vigorous physical activity, minutes/hour | 4.24 \pm 1.12 | 4.04 \pm 1.73 | -8% | 0.268 |
| MVPA ^x , minutes/hour | 7.87 \pm 1.51 | 9.77 \pm 1.34 | 37% | <0.001 |
| Steps | 4325 \pm 657 | 5795 \pm 546 | 25% | <0.001 |
| Leisure time | | | | |
| ST >10 minutes, minutes/hour | 8,17 \pm 4,56 | 9,05 \pm 4.7 | 13% | 0.168 |
| ST, minutes/hours | 43.89 \pm 5.78 | 43.89 \pm 4.89 | 1% | 0.968 |
| Light 1 ^x physical activity, minutes/hour | 16.87 \pm 2.48 | 16.78 \pm 2.27 | -2% | 0.666 |
| Light 2 ^x physical activity, minutes/hour | 5.55 \pm 1.78 | 5.68 \pm 1.28 | 2% | 0.588 |
| Moderate physical activity, minutes/hour | 4.00 \pm 1.28 | 4.22 \pm 1.21 | 3% | 0.558 |
| Vigorous physical activity, minutes/hour | 2.39 \pm 1.76 | 2.34 \pm 1.73 | -9% | 0.282 |
| MVPA ^x , minutes/hour | 5.39 \pm 2.06 | 5.37 \pm 2.6 | 1% | 0.982 |
| Steps | 6567 \pm 2345 | 6579 \pm 1744 | 4% | 0.550 |
| Whole day | | | | |
| ST >10 minutes, minutes/hour | 7.69 \pm 4.76 | 7.29 \pm 4.45 | -7% | 0.459 |
| ST, minutes/hours | 43.1 \pm 5.39 | 42.53 \pm 4.85 | -7% | <0.01 |
| Light 1 ^x physical activity, minutes/hour | 21.49 \pm 3.07 | 20.24 \pm 3.07 | 3% | <0.06 |
| Light 2 ^x physical activity, minutes/hour | 5.55 \pm 2.35 | 6.50 \pm 2.13 | 17% | <0.001 |
| Moderate physical activity, minutes/hour | 4.27 \pm 1.96 | 4.98 \pm 1.93 | 22% | <0.001 |
| Vigorous physical activity, minutes/hour | 3.11 \pm 1.83 | 2.88 \pm 1.66 | -12% | 0.078 |
| MVPA ^x , minutes/hour | 6.37 \pm 2.61 | 6.87 \pm 2.47 | 8% | <0.06 |
| Steps | 11008 \pm 2321 | 12232 \pm 1911 | 11% | <0.01 |

Observation Process

Students primarily complete subject assignments at tables indoors. At the time of observation, Outdoor education teachers are responsible for facilitating, coordinating, and leading educational experiences that take place in natural environments such as lakes, rivers, rice fields, and hills. Outdoor education teachers intend to provide students with opportunities for experiential learning in natural settings, with the goal of assisting students in developing essential life skills and gaining a better understanding of the natural world. Outside education only requires students to sit for brief periods of time. Students participate in light activities during Outdoor Education by walking to the river bank, which is only a short distance from the school. The students' light activities are local traditional games that include elements of cooperation.

In outdoor education, students can go to the park behind the school during their breaks. This

elementary school has a volleyball court where all students in first through sixth grades can play. During breaks, students play traditional games such as "bebentengan and gobags," in which all students participate. When researchers observed students playing that game, bebentengan and gobags, because this game can be played by all levels of students. Students' levels of activity vary depending on the game and their individual roles, ranging from the lowest to the highest. The duration of the break time for students in first through sixth grade is consistent, occurring from 12:00 to 13:00 in the afternoon.

Physical education learning allows students to carry out high-intensity physical activities because starting at 07.30-11.20, including rest time. Students participate in physical education lessons, and the teacher has determined the lesson material. During OE, students carry out high activities according to the type of game. During outdoor and conventional education, numerous

students engage do light to high activity. Students need to look more enthusiastic when carrying out physical activities with increased intensity. Students are more enthusiastic about Outdoor Education because of the learning procedures and materials, after which students have break time. Because students are studying in an OE, participating students in OE are motivated to engage in PA. Majority students prefer outdoor education, because they have a higher PA and are more dynamic in their movement intensity.

DISCUSSION

The primary discovery indicated that the amount of Physical Activity (Minutes/Hour) was significantly greater in Outdoor Education compared to Conventional Education. There are many advantages to outdoor education for students, including enhanced learning and a deeper connection to the natural world (Kiviranta et al., 2023). In the course of this research, students participated in a variety of outdoor education activities. These activities included went to the hills, the river bank, the rice fields, and the forest that was located close to the school. The OE pedagogical framework influences students to participate in more PA; in addition, students derive happiness from time spent in outdoor and appreciate their teachers' efforts (Maynard et al., 2013; Waite et al., 2016) during the learning process.

However, the outcomes of learning outside the classroom have fallen short of expectations because students require more time to engage in strenuous physical activities while participating in OE. The results of previous researchers (Romar et al., 2016; Singerland et al., 2011), 10% high-intensity PA and an average of 41% MVPA, this is very clear differences between individual students. Aside from this, research (Mygind, 2007) comparing OE and CE in terms of PA did not reveal any significant differences. According to the findings of other traditional education studies, students took 45 to 90-minute outdoor breaks (Haapala et al., 2016). Participating in PA at school can be beneficial for students, as long as they also prioritize adequate rest and recovery (Blaes et al., 2013). However, students do not take advantage of the outdoors education, because some students are less physically active when using conventional education.

The primary finding is that OE is 20% and sed10 is 57%, resulting in a reduction of sedentary time. The effect on ST is indeed noteworthy, as the results demonstrate a significant decrease during the school hours. Furthermore, it is provided during break times in order to ensure students only sit for a short period of time while sitting on a stable ball (Braniff, 2011; Orłowski et al., 2013). Research has revealed that engaging in PA, even at lower intensities, can have a positive impact on overall health and well-being. This finding suggests that individuals should prioritize engaging in PA rather than remaining sedentary, as it can contribute to the promotion and maintenance of good health (Owen et al., 2010).

However, in outdoor and conventional education, students only move 45% while at school, and student behavior is sedentary. Previous findings are the same as our findings using CE (Haapala et al., 2016). Previous findings are the same as our findings using CE (Haapala et al., 2016). Similarly to the findings of our researcher, other researchers concur that OE will reduce ST. The sedentary lifestyle is of particular concern (Hegarty et al., 2016). CE emphasizes sedentary more than light PA (Haapala et al., 2016). CE should be revised. When using OE to teach, teachers must master the stages so that students are eager to participate in learning. Teachers must be capable at each stage of the process when utilizing OE to obtain students excited about learning.

Researchers have not optimally studied leisure time in elementary schools in Indonesia whether use outdoor or conventional education. However, numerous researches have been conducted in other countries because researchers are already aware of the low level of leisure time activity as a result of high activity at school (Møller et al., 2014). After a school day of OE, students may choose to participate in indoor activities or perform other tasks (Yang & Kankaanpa, 2017). The findings of leisure time activities reveal that OE has a positive impact. The participants in this research were accustomed to spending their leisure time outside of their homes.

The present research represents the pioneering research in Indonesia that combines the PA and ST of elementary school students through the lens of OE and conventional education. The methodology employed for data collection involves the presence of researchers within the educational institution throughout the entirety of

the school day. However, it requires attention due to limitations, such as only one school and a small sample size.

Conclusions

This research provides evidence that participating in OE is associated with a reduction in ST through increased PA. In addition to this research, outdoor and CE provide reason for gaps in leisure time activities. In order to enhance the efficacy of learning through PA, it is imperative to employ OE as opposed to conventional education.

ACKNOWLEDGMENT

We would like to thank all parties, especially the Postgraduate Program at Universitas Negeri Jakarta, who have carried out much of this research.

Ethics Statement

The research was conducted in accordance with the declaration and approved by the Institutional Review Board of Universitas Negeri Jakarta, Indonesia (Protocol code NO: 806/UN39.14/PT.01.05/XI/2023 and date of approval November 7, 2023).

Conflict of interest

The authors declare no conflict of interest.

Author Contributions

Author Contributions: Study Design, HR and DW; Data Collection, DW and MR; Statistical Analysis, MR, DW, AH; Data Interpretation, HR, DW, MR and AH; Manuscript Preparation, HR, DW and MR; Literature Search, HR, DW and MR. All authors have read and agreed to the published version of the manuscript.

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