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An analysis of the influence of physical activity break on primary school student fitness
Un análisis de la influencia de las pausas de actividad física en el fitness de los alumnos de primaria

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Abstract. To avoid issues with primary school pupils' sedentary lifestyle and fitness, it is important to evaluate how long they sit while studying in class. This study aims to ascertain 1) the impact of physical activity breaks on elementary school students' physical fitness, and 2) the variation in the improvement in physical fitness of elementary school students between the group with physical activity break intervention and the group without intervention. This is a quasi-experimental study with a Pretest-Posttest Control Group Design. The study's subjects were Yogyakarta Syuhada Mosque School elementary school children aged 7 to 9. The cluster random sampling method was employed to choose the research sample, with 40 students serving as the experimental group and 40 serving as the control group. A physical fitness test was used to collect data for this research. The paired T test was employed in the first analysis to examine the effect of physical activity break treatments on students' fitness. The Mann-Whitney Test was employed in the following data analysis to determine the difference in the outcomes of the rise between the experimental group and the control group.
The results of the paired T test concluded that physical activity breaks had an influence on the dimensions of physical fitness which included the dimensions of speed with a value of sig 0.0, Agility sig 0.001, Arm Power sig 0.0, Leg Power sig 0.0, and flexibility sig 0.003. Based on the improvement results of each group, there were differences between the experimental group and the control group based on the Mann-Whitney Test sig value. Increase in speed sig 0.0, agility sig 0.032, arm power sig 0.0, and leg power sig 0.02. There is no difference in the flexibility dimension between the experimental group and the control group with a sig value of 0.908. Effect size with Cohen's formulation and criteria for the experimental group in the dimensions of speed 1.16 (high), agility 0.59 (moderate), flexibility -0.51 (very low), arm power 1.55 (high), leg power 0.87 (moderate). Because of the good impact on the dimensions of physical fitness, physical activity breaks can be incorporated in primary schools. In this day and age, physical activity breaks could be a solution to students' low fitness and sedentary lifestyle issues.
Key words: physical activity break, primary school, student fitness

Resumen. Para evitar problemas con el sedentarismo y la forma física de los alumnos de primaria, es importante evaluar cuánto tiempo pasan sentados mientras estudian en clase. Este estudio tiene como objetivo determinar 1) el impacto de las pausas de actividad física en la aptitud física de los estudiantes de escuela primaria, y 2) la variación en la mejora en la aptitud física de los estudiantes de escuela primaria entre el grupo con intervención de pausas de actividad física y el grupo sin intervención. Se trata de un estudio cuasiexperimental con un diseño de grupo de control Pretest-Postest. Los sujetos del estudio fueron niños de escuela primaria de la Escuela Mezquita Syuhada de Yogyakarta, de edades comprendidas entre 7 y 9 años. Se empleó el método de muestreo aleatorio por conglomerados para elegir la muestra de investigación, con 40 estudiantes como grupo experimental y 40 como grupo de control. Se utilizó una prueba de aptitud física para recopilar datos para esta investigación. La prueba T pareada se empleó en el primer análisis para examinar el efecto de los tratamientos de descanso de actividad física sobre la condición física de los estudiantes. La prueba de Mann-Whitney se empleó en el siguiente análisis de datos para determinar la diferencia en los resultados del aumento entre el grupo experimental y el grupo de control.
Los resultados de la prueba T pareada concluyeron que los descansos de actividad física influyeron en las dimensiones de aptitud física que incluyeron las dimensiones de velocidad con un valor de sig 0.0, Agilidad sig 0.001, Potencia de Brazos sig 0.0, Potencia de Piernas sig 0.0 y flexibilidad. sig 0,003. Con base en los resultados de mejora de cada grupo, hubo diferencias entre el grupo experimental y el grupo de control según el valor sig de la prueba de Mann-Whitney. Aumento de la velocidad sig 0,0, la agilidad sig 0,032, la potencia del brazo sig 0,0 y la potencia de las piernas sig 0,02. No existe diferencia en la dimensión de flexibilidad entre el grupo experimental y el grupo control con un valor sig de 0,908. Tamaño del efecto con formulación y criterios de Cohen para el grupo experimental en las dimensiones de velocidad 1.16 (alta), agilidad 0.59 (moderada), flexibilidad -0.51 (muy baja), potencia de brazos 1.55 (alta), potencia de piernas 0.87 (moderada). Debido al buen impacto en las dimensiones de la aptitud física, se pueden incorporar pausas para la actividad física en las escuelas primarias. Hoy en día, las pausas para la actividad física podrían ser una solución a los problemas de falta de condición física y estilo de vida sedentario de los estudiantes.
Palabras clave: pausas de actividad física, escuela primaria, fitness estudiantil

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Introduction

In an era of technological progress and the rise of sedentary lives, primary school pupils' physical fitness is critical. According to a study detailing the fitness level of elementary school pupils in Indonesia, the fitness level in the poor category is 37.82%, and the fitness level in the very poor category is 12.61% (Dartini, Suwiwa, & Spyanawati, 2017). Lack of physical activity is a rising problem in China (Chen, Hammond-Bennett, Hypnar, & Mason, 2018), as does obesity in the United States (NASPE, 2016). During the pandemic, similar conditions in studies explained why mothers thought their children were less active and used more screen-based gadgets (Andriyani, Biddle, & De Cocker, 2021). This condition has a negative impact on children. Sedentary behavior raises the risk of noncommunicable diseases (Akksilp et al., 2023). Sedentary behavior is associated with a variety of negative

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health consequences, including obesity, cardiovascular disease, type 2 diabetes, and early death (Bailey, Hewson, Champion, & Sayegh, 2019; Wilmot et al., 2012). While sedentary activity suggests a condition of low energy expenditure (i.e., 1.5 METs), excessive levels of sedentary time may result in low daily energy expenditure, leading to an energy imbalance in which energy intake surpasses expenditure (Tremblay et al., 2017).

Physical fitness is an important concern for students in elementary schools. Physical fitness is one of the main indicators of health in children and adolescents and can predict health status in the final phase of a person's life (Kolimechkov, 2017). A person with a low fitness level is more likely to become overweight or obese over time compared to a high fitness level (He et al., 2011; Hussey et al., 2007). Physical fitness training has a positive impact on increasing student performance levels (Martins, Honório, & Cardoso, 2022). Findings highlight the importance of developing healthy fitness behaviors from an early age and the importance of intervention during adolescence in youth with low fitness (True et al., 2021). Strategies are needed to improve school children's motor competence and physical fitness, from an early age, in order to improve their physical skills and health in the long term (Carballo-Fazanes, Rodríguez-Fernández, Mohedano-Vázquez, Rodríguez-Núñez, & Abelairas-Gómez, 2022), prevention and control of obesity and related cardiovascular diseases, morbidity and mortality (Tucker, Bebeley, & Conteh, 2018). Physical fitness has a multidimensional structure and can be assessed through its various components: body composition, cardiorespiratory fitness, musculoskeletal fitness, motor fitness, and flexibility (Kolimechkov, 2017). Fitness levels can be measured with various instruments and adjusted to the characteristics of the person being measured. The diversity of tests allows the selection of those that best suit specific goals and assessment settings (Marques et al., 2021). Fitness measures used in a study for students aged 6-15 years include hanging arm flexion, hanging arm flexion/weight, jump and reach, standing long jump, standing/high long jump, agility shuttle run, 30-yard dash, running endurance shuttle, and sit and reach (True et al., 2021).

To avoid the sedentary lifestyle of elementary school pupils, the period of sitting while studying at school must be considered**.** Students spend the majority (63%) of their time at school not moving much (Egan et al., 2019), with a comparable belief that students spend more than 50% of their time sitting (Minges et al., 2016). Because children engage in sedentary activity, a significant amount of sedentary time occurs during the workday (Bailey et al., 2012). Children spend the majority of their school day sitting, with girls, older students, and obese students sitting even more than their classmates (da Costa, da Silva, George, & de Assis, 2017). Students are frequently inactive for the majority of the school day and fail to satisfy daily activity standards (Campbell & Lassiter, 2020). One issue that is not given enough consideration is staying in one posture for an extended period of time, such as sitting for several hours without changing position or standing for an extended period of time during the learning process (Cho et al, 2015).

Sitting for an extended period of time as a sort of sedentary behavior in the classroom has a negative impact on pupils. In school-aged children, sedentary behavior is associated with unfavorable health consequences that appear to be independent of activity level (Katzmarzyk, 2010). Sedentarism has been linked to a number of health issues, including obesity (Egan et al., 2019). Sedentary behavior in children has been linked to early health concerns such as increased body fat mass, high blood pressure, and depressed symptoms (da Costa et al., 2017). Sitting for an extended period of time is a risk factor for all causes of death (Ploeg, Chey, Korda, Banks, & Adrian, 2004). Long periods of sitting can result in musculoskeletal issues, eye tiredness, and even a loss of focus (Indrawati, Tirtayasa, & Adiatmika, 2015).

There should be a strategy in place to address the issues of physical fitness and sedentary behavior among elementary school pupils, such as the Physical Activity Break intervention**.** Sedentarism must be solved in the school setting (Fiorilli et al., 2021). One promising strategy for increasing physical activity is interrupting instruction to take short activity breaks or teaching in a way that incorporates movement directly into learning, which can be described as "active learning" (Turner & Chaloupka, 2017). A physical activity break is a brief exercise performed by pupils to break up the learning process. Physical activity breaks, often known as brain breaks or energizers, are defined as short bursts of movement integration within the school day (Webster, Russ, Vazou, Goh, & Erwin, 2015). Active breaks are described as short periods of time, between 5 and 15 minutes, during which physical activity with moderate to strong intensity is incorporated within class, without the requirement for additional space, supplies, or personnel (Masini et al., 2020). A physical activity break is a brief exercise performed by pupils to break up the learning process. Sedentary periods and behaviors should be included in school staff professional development and intervention activities (Egan et al., 2019). The implementation of physical activity breaks is explained in a study that activity breaks are carried out for 5-10 minutes, 3-5 times a day for 17 weeks), where physical activity is combined with curricular content, cooperative work and Emotional Intelligence (Muñoz-Parreño, Belando-Pedreño, Manzano-Sánchez, & Valero-Valenzuela, 2021).

Several relevant research investigate treatments that have a favorable influence on pupils in the form of Physical Activity Breaks. Physical activity (PA) in the classroom stimulates students and creates an engaging environment (Jiménez-Parra, Manzano-Sánchez, Camerino, Castaer, & Valero-Valenzuela, 2022). Physical activity (PA) can significantly mitigate the negative effects of prolonged sitting on acute cognitive performance, perceived

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advantages (e.g., mood), vascular function, and metabolic health (Wanders et al., 2021). Another study found that active class breaks increased daily physical activity for the majority of participants without requiring substantial teacher training and competence and without affecting classroom conduct (Wilson, Olds, Lushington, Petkov, & Dollman, 2016). Similar studies concluded that physical activity breaks with the "Brain Breaks" relaxation and stretching model had an influence. These exercises increase physical activity in elementary school pupils during classroom instruction (Bobe, Perera, Frei, & Frei, 2014). Implementing class physical activity breaks can boost students' physical activity and behavior in the classroom (Carlson et al., 2015). Physical exercise breaks with and without integrated math material improve children's task behavior and learning scores (Mavilidi et al., 2020).

Few research have been discovered that study the impact of physical activity breaks on the physical fitness of primary school pupils. Some relevant research focuses on assessing the effect of physical activity breaks on student responses (Jiménez-Parra et al., 2022), active behavior (Bobe et al., 2014; Carlson et al., 2015; Wilson et al., 2016), learning values (Mavilidi et al., 2020), and overall health (Wanders et al., 2021). Researchers believe that experimental research is needed to determine the effect of physical activity breaks on the physical fitness of primary school pupils. The unique aspect of this research is that it does not provide an overview of fitness levels in general, but rather describes each type of fitness that is being studied. A study with a similar design compared active rest intervention (Fit), rest intervention with creativity (Creat), and groups without intervention on attention and performance in mathematics (Fiorilli et al., 2021). The study's findings suggested that the Creat and Fit groups had a higher level of enjoyment than the control group. The study specifically demonstrates the beneficial acute impact of the activity break intervention. Fit had a greater beneficial affect on attention and math performance than Creat. These findings are consistent with the assertion that schools can employ moderate-intensity physical activity breaks during the school day to increase attention levels and thus school achievement (Janssen et al., 2014). The purpose of this study is to examine 1) the effect of physical activity breaks on physical fitness and 2) differences in the increase in physical fitness of elementary school pupils between the intervention group and the control group**.** Physical fitness is measured using numerous dimensions, including speed, agility, flexibility, arm power, and leg power. It is believed that the findings of this study would lend weight to past related hypotheses and research. It is also intended that the findings of this study would help teachers, school principals, and education offices make decisions on the process of teaching and learning activities.

Material and methods

Methods

This study is a quasi-experimental design with a Pretest-Posttest Control Group. The purpose of this study is to investigate the effect of physical activity breaks on fitness as well as the differences in the increase in student fitness between the experimental and control groups. Participants.

Participants

The subjects of this study were elementary school pupils aged 7 to 9 years old from the Yogyakarta Syuhada Mosque School. The research sample was chosen using the cluster random sampling approach. 40 students were assigned to the experimental group, and 40 students were assigned to the control group.

Table 1.
Distibution sample

Class	Experiment	Control
Male	27	26
Female	13	14

Procedure

In this study, a physical fitness exam was used to collect data. The test was performed twice, once at the start and once after three months of treatment. The tests used are adjusted to the age characteristics of students, namely 7-9 years. The study used several similar valid tests (True et al., 2021), as well as fitness test constructs from different countries (Marques et al., 2021). Testors in data collection are physical education teachers who have sufficient experience and have expertise certification. The tests based on fitness dimensions are listed in the table 2. below;

Table 2.
Dimension physical fitness & test

No	Dimensions	Test	Measurement
1	Speed	Sprint 20 m	Second
2	Agility	Shuttle run	Second
3	Flexibility	Sit n Reach	Milimeter
4	Arm power	Basketball throw	Centimeter
5	Leg power	Standing Long jump	Centimeter

The treatment offered to experimental group students in this study was physical activity for roughly 5 minutes during the shift of class hours. The accompanying teacher is given prior knowledge about the physical activity break mechanism a week before the treatment is given. Lesson breaks are given every 60 minutes, so that students do activities 5-6 times every day. Activities are carried out 5 days each week, because students have school holidays on Saturday and Sunday. Physical activity breaks are carried out over a period of 3 months or 14 weeks. The activities provided are very diverse, including locomotor and non-locomotor movements, involving the superior and inferior extremities. For example, there are activities such as jumping, running in place, walking, spinning, clapping, and so on. Activities are not carried out monotonously to avoid student boredom. Students are urged to move vigorously while listening to the teacher's instructions and watching the video on the screen in front of the class. The videos utilized in the study were from the websites *dannygo.net (https://www.dannygo.net/),* GoNoodle *(https://www.gonoodle.com/)*, and Learning Station Music

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on YouTube. Physical activity breaks are scheduled every three months.

Data Analysis

The paired T test was employed in the first analysis to detect differences in the experimental group's physical fitness levels before and after the physical activity break intervention. The paired T test was used because the samples per pest and post test were the same group, and the normality test was met. The Shapiro-Wilk normality test was used to perform the data precondition test.The Mann-Whitney Test was used in the following data analysis. This analysis is used to compare fitness improvement results between the experimental and control groups. This analysis was selected based on parametric prerequisite tests that were not met. There are several dimensions in each group that are not normally distributed. The Mann-Whitney U test is a nonparametric method designed to handle the two-sample problem, continuous data consisting of two mutually independent random samples (Oti, Olusola, & Esemokumo, 2021). Data analysis was carried out using SPSS 26 software. The effect size uses Cohen's formulation (Cohen, Manion, & Morrison, 2011) with the criteria in the following table 3;

Table 3.
Scores and effect size criteria

Score	Criteria
< 0.20	Very low
0.21 – 0.50	Low
0.51 – 0.80	Moderate
0.80 <	Hight

Result

Normality test

The first requirement test was performed using the Shapiro-Wilk normality test, with the constraint that if Sig. > 0.05, the data is normally distributed, and if Sig. < 0.05, the data is not normally distributed. Speed .471*, Agility .075*, Flexibility .303*, Arm Power .289*, Leg Power .712* are the findings of the pre-test data normality test connected to fitness characteristics. Meanwhile, based on the results of the post-test normality test, fitness dimensions such as speed (.768*), agility (.628*), flexibility (.603*), arm power (.912*), and leg power (.476) were calculated. All fitness scores, both pre-test and post-test, have Sig values greater than 0.05, indicating that the data distribution is normally distributed. As a result, we can conclude that the data distribution is regularly distributed. The table 4 provides a more detailed explanation of normality data.

Table 4.
Data normality pre and post test experiment group

	Shapiro-Wilk.	
Dimensions	Pre Test	Post Test
Speed	.471*	.768*
Agility	.075*	.628*
Flexibility	.303*	.603*
Arm Power	.289*	.912*
Leg Power	.712*	.476*

Paired T Test

The paired t test is designed to assess the impact of physical activity breaks on student fitness. Based on the test findings, the sig value for each fitness parameter was 0.05, including speed (0.000), agility (0.001), flexibility (0.000), arm power (0.000), and leg power (0.000). This figure indicates that the physical activity break treatment has an effect on all dimensions of physical fitness in primary school pupils. The table 5 below explains the paired t test.

Table 5.
Paired t test pre test & post test

Dimensions	Mean	SD	t	df	Sig. (2-tailed)
Speed	52.625	45.5044	7.314	39	.000
Agility	136.75	231.70447	3.733	39	.001
Flexibility	21.675	42.52564	3.224	39	.003
Arm Power	-41.5	26.84715	-9.776	39	.000
Leg Power	-14.275	16.49707	-5.473	39	.000

Mann-Whitney Test

The Mann-Whitney test is used to see if there is a difference in the physical fitness levels of the experimental and control groups. In the Mann-Whitney Test, if the Sig value is less than 0.05, Ho is rejected and Ha is accepted; if the Sig value is greater than 0.05, Ho is accepted and Ha is rejected. The difference between the fitness levels of the experimental and control groups can be seen descriptively in the table 6 and picture 1.

Table 6.
Pre & post physical fitness test

	Experiment			Control		
Dimensions	Pre	Post	Difference	Pre	Post	Difference
Speed	578.725	526.1	52.63	533.23	526.20	7.03
Agility	2628.63	2491.875	136.75	2609.43	2606.75	2.68
Flexibility	266.25	244.575	-21.675	266.5	242.73	-23.78
Arm Power	216.5	258	41.5	245.60	252.48	6.88
Leg Power	106.43	120.7	14.275	108.28	113.98	5.7

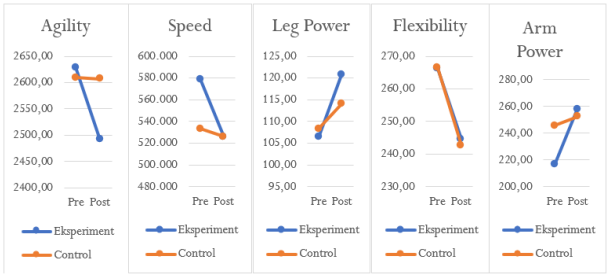

Figure 1. pre & post physical fitness test diagrams

Table 7.
Result of mann-whitney test

	Control (N=40)		Experiment (N=40)		Mann-Whitney U	Asymp. Sig. (2-tailed)
	Median	SD	Median	SD		
Speed	13	72.5589	50	45.5044	313	.000
Agility	37	282.99836	118.5	231.70447	576.5	.032
Flexibility	-17.5	49.43034	-16	42.52564	788	.908
Arm Power	10	13.14454	37.5	26.84715	162	.000
Leg Power	5	17.08381	13.5	16.49707	557	.020

The significance value of each variable is shown below based on the Mann-Whitney Test analysis results; Speed was 0.000 <0.05, agility was 0.032 <0.05, flexibility was

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0.908 > 0.05, arm power was 0.00 <0.05, and leg power was 0.02 <0.05. These findings indicate that: 1) there is a difference in the increase in students' speed with the physical activity break intervention and the control group, 2) there is a difference in the increase in students' agility with the physical activity break intervention and the control group, 3) There is no difference in the increase in flexibility of students receiving the physical activity break intervention and the control group, 4) there is a difference in the increase in arm power of students receiving the physical activity break intervention and the control group, and 5) there is a difference in the increase in leg power of students receiving the physical activity break intervention and the control group.

Table 8.
Effect Size Cohen experiment groups & control groups

	Experiment				Control			
Dimensions	Mean	SD	Cohen d	Criteria	Mean	SD	Cohen d	Criteria
Speed	52.63	45.5	1.16	High	7.03	72.56	0.1	Very Low
Agility	136.75	231.7	0.59	Moderate	2.68	283	0.01	Very Low
Flexibility	-21.675	42.53	-0.51	Very Low	-23.78	49.43	-0.48	Very Low
Arm Power	41.5	26.85	1.55	High	6.88	13.14	0.52	Moderate
Leg Power	14.28	16.5	0.87	Moderate	5.70	17.08	0.33	Low

Based on the calculation of the effect size using Cohen's formulation and criteria (Cohen, Manion, & Morrison, 2011), it can be explained in the table 8. In the speed dimension, the experimental group has an effect size value of 1.16 with high criteria, while the control group has a value of 0.1 with very low criteria. In the agility dimension, the experimental group had an effect size value of 0.59 with medium criteria, while the control group had a value of 0.01 with very low criteria. In the flexibility dimension, the experimental group had an effect size value of -0.51 with very low criteria, while the control group had a value of -0.48 with very low criteria. In the flexibility dimension, it can be interpreted that there is a decrease in scores from the pre-test and post-test for both the experimental group and the control group. In the arm power dimension, the experimental group had an effect size value of 1.55 with high criteria, while the control group had a value of 0.52 with medium criteria. In the leg power dimension, the experimental group had an effect size value of 0.87 with medium criteria, while the control group had a value of 0.33 with low criteria.

Discussion

To avoid the sedentary lifestyle of elementary school pupils, the period of sitting while studying at school must be considered. Sitting for long periods of time as a sort of sedentary behavior in the classroom has a negative impact on children. There should be a strategy in place to address the issues of physical fitness and sedentary behavior among elementary school pupils, such as the Physical Activity Break intervention. Several relevant studies look at interventions in the form of Physical Activity Breaks to see if they have a good impact on pupils, but barely any research has been identified that looks at the impact of physical activity breaks on the physical fitness of elementary school pupils. Physical fitness can be measured in numerous ways, including speed, agility, flexibility, arm power, and leg power. The purpose of this study is to assess 1) the influence of physical activity breaks on physical fitness, and 2) differences in the increase in physical fitness of elementary school pupils between the intervention group and the control group.

According to the findings of this study, physical activity breaks have an effect on boosting numerous characteristics of fitness, including speed, agility, arm power, and leg power. The findings of this study are consistent with the findings of another study that shows how physical activity breaks of various intensity while prolonged sitting boost reaction time (Chandran et al., 2023). The increase in fitness is consistent with the findings of a study which concluded that students' performance on physical fitness tests was significantly related to physical activity during physical education, rest, participation in sports/dance, and total weekly physical activity minutes (Chen et al., 2018). A comparable effect was discovered in a study of 44 students who participated in an 8-week physical activity program. According to the findings, moderate to intense physical activity is thought to promote physical fitness (Chaeroni, Kusmaedi, Ma'mun, & Budiana, 2021). The findings of this study were also supported by the findings of a survey of 282 people conducted to determine the most important elements influencing physical fitness. The study's bivariate analysis revealed that screen time and nutritional status had no significant link with physical fitness, however physical activity had a significant relationship with physical fitness (Cahyono, Wahjuni, & Wibowo, 2022). According to research, there is a considerable inverse relationship between inactive lifestyle and physical fitness. (Andi Nurul Fadillah, Immanuel Maulang, Nur Hardiyanty, 2021).

Based on the Mann-Whitney analysis test results, it can be concluded that there is a significant difference in the increase in physical fitness (speed, agility, arm power and leg power) of students in the physical activity break intervention group and the control group, with the experimental group having a median value of 50 and the control group having a median value of 13. Both groups experienced an increase in speed based on the pretest and posttest for running 20 meters. The physical activity break intervention resulted in a 0.52 second increase in group

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speed, while the control group increased by 0.7 second. The experimental group's agility dimension had a median value of 118.5, while the control group had a value of 37. Based on the 10 x 5 m shuttle run test, both groups had enhanced agility; the experimental group increased by 1.36 seconds on average, while the control group went up by 0.02 seconds. In the experimental group, the median value of arm power was 37.5, while in the control group, it was 10. Based on the findings of throwing a basketball, both groups had an increase in leg power: the experimental group was 41.6 cm and the control group was 6.88 cm. The experimental group's median leg power dimension was 13.5, while the control group's was 5. Based on the findingsof the standing long jump, both groups had an increase in leg power. The experimental group was 14.27 cm tall, while the control group was 5.70 cm tall. These findings were supported by research (Chen et al., 2018), which used independent sample t-tests to find significant differences between physically fit girls and boys in terms of average weekly physical activity minutes. Similar differences can be found when research skills improve (Scharf & Tilp, 2023). This study indicated that individuals in the physical activity intervention group improved their juggling skills after six and twelve weeks. This increase was significantly different compared to the control group.

In contrast to the aspects of flexibility fitness, physical activity breaks have a negative affect on students' flexibility in this study. According to the results of the average difference between pre and post utilizing the sit n reach test, there was a decrease in the amount of flexibility in both the experimental and control groups. The experimental group shrank by 2.16 cm and the control group shrank by 2.37 cm. According to the Mann-Whitney analysis test results, there was no significant difference between the physical activity break intervention group and the control group in terms of increased flexibility. The experimental group's median value for the flexibility dimension is -16.0000, while the control group's is -17.5000. Many factors can impact the negative impacts of physical activity breaks on flexibility. Students' physical activity breaks are more dominated by explosive movements. Stretching for the sake of bending or flexibility is only used in a few activities. Regular stretching can have an effect on overall body flexibility (Prativi, 2013). This statement was amended to provide an explanation that while muscles which are used to stretching will have an impact on growing muscular flexibility, joints that are stretched on a regular basis will have an impact on expanding joint range of motion.

The implementation of Activity Break has an impact on boosting numerous components of physical fitness in line with the joy felt by children throughout its implementation. Based on quantitative research findings, the level of enjoyment of primary school pupils toward physical activity breaks in learning has been claimed to be quite high (Gani, Yudanto, Hendra, & Willy, 2023). Multiple sources were triangulated, and all offered evidence that children enjoyed classroom activity breaks (Howie, Newman-Norlund, & Pate, 2014). Similar findings explain why the factor of student satisfaction is the most frequently reported as "fun" in interviews and journal reflections on the implementation of Physical Activity Break (McMullen, Kulinna, & Cothran, 2014). The same outcomes were described in good student responses to physical activity breaks (Stylianou, Kulinna, & Naiman, 2016). These findings support the assertion (Jiménez-Parra et al., 2022) that teachers who incorporate sporting activities (PA) into the classroom energize pupils and create an exciting environment.

Physical exercise breaks can be established by following pre-existing examples or by using teacher creativity. Students in their class perform short physical activities in five minutes based on a pre-planned curriculum (Campbell & Lassiter, 2020). Physical activity integration is age-appropriate and does not necessitate the use of any physical equipment. The following conditions are explained with more detail: Active rest lasts 10 minutes and includes a warm-up of 2 minutes, physical movement of 6 minutes, and a cool-down of 2 minutes (Wadsworth, Robinson, Beckham, & Webster, 2012). According to research (Mullins, Michaliszyn, Kelly-Miller, & Groll, 2019), physical activity breaks can be implemented using active videos and physical engagement or Brain Breaks Videos, which are based on students' physical mimicry of audiovisual sources projected on a digital whiteboard (e.g., dance, movement, etc.). Similar studies included PA Breaks that included music, dance, and free movement, as well as the GoNoodle website, followed by five deep breaths to assist students calm down and refocus (Campbell & Lassiter, 2020).

The beneficial influence on the dimensions of physical fitness makes it the foundation for implementing physical activity breaks in elementary schools. Sedentarism must be addressed in the school setting (Fiorilli et al., 2021). Physical activity breaks are class-based physical activities that can be done both inside and outside of the classroom; this activity has become one of the most widely used strategies in recent years to reduce children and adolescents' sedentary lifestyles (Watson, Timperio, Brown, Best, & Hesketh, 2017). Based on research results with an increase in post test results, it is recommended that the academic system recommend the use of active rest programs in schools (Zerf, Kherfane, & Bouabdellah, 2021). Similar research findings indicate that Activity Breaks might be beneficial and productive activities to do in between curricular lessons (Fiorilli et al., 2021). The conditions are nearly identical to those used by the core group of teachers. Physical exercise breaks should be taken at least once a week, despite concerns that they may cut into teaching time (Delk, Springer, Kelder, & Grayless, 2014).

Conclusion

Based on the findings and discussion, it is possible to conclude that physical activity breaks have an effect on

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enhancing physical fitness, which includes agility, speed, arm power, and leg power. There were differences in the increase in speed, agility, arm power, and trunk power of students with the physical activity break intervention compared to the control group based on the results of the difference between the pre and post tests for each group. When compared to the control group, there was no difference in the increase in students' flexibility with the physical activity break intervention. The favorable influence on the physical fitness component is the foundation for implementing physical activity breaks in elementary schools. In this day and age, physical exercise breaks might help students overcome their lack of fitness and sedentary lifestyle. It is believed that the findings of this study will help to support past related hypotheses and research. This research has limitations in sample size, and also limitations in controlling other factors, especially outside learning. This research can be used as a reference for developing similar research with a larger sample size, research with the aim of finding out how to increase other dimensions of fitness.

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References

Akksilp, K., Koh, J. J. E., Tan, V., Tong, E. H., Budtarad, N., Xueying, G., … Chen, C. (2023). The physical activity at work (PAW) study: a cluster randomised trial of a multicomponent short-break intervention to reduce sitting time and increase physical activity among office workers in Thailand. *The Lancet Regional Health - Southeast Asia*, 8, 1–11. Retrieved from https://doi.org/10.1016/j.lansea.2022.100086

Andriyani, F. D., Biddle, S. J. H., & De Cocker, K. (2021). Adolescents' physical activity and sedentary behaviour in Indonesia during the COVID-19 pandemic: a qualitative study of mothers' perspectives. *BMC Public Health*, 21(1), 1–14. Retrieved from https://doi.org/10.1186/s12889-021-11931-1

Bailey, D. P., Fairclough, S. J., Savory, L. A., Denton, S. J., Pang, D., Deane, C. S., & Kerr, C. J. (2012). Accelerometry-assessed sedentary behaviour and physical activity levels during the segmented school day in 10-14-year-old children: The HAPPY study. *European Journal of Pediatrics*, 171(12), 1805–1813. Retrieved from https://doi.org/10.1007/s00431-012-1827-0

Bailey, D. P., Hewson, D. J., Champion, R. B., & Sayegh, S. M. (2019). Sitting Time and Risk of Cardiovascular Disease and Diabetes: A Systematic Review and Meta-Analysis. *American Journal of Preventive Medicine*, 57(3), 408–416. Retrieved from https://doi.org/10.1016/j.amepre.2019.04.015

Bobe, G., Perera, T., Frei, S., & Frei, B. (2014). Brain Breaks: Physical Activity in the Classroom for Elementary School Children. *Journal of Nutrition Education and Behavior*, 46(4), S141. Retrieved from https://doi.org/10.1016/j.jneb.2014.04.116

Cahyono, E. A., Wahjuni, E. S., & Wibowo, S. (2022). Analisis Faktor Yang Berhubungan Dengan Kebugaran Jasmani Ditinjau Dari Screen Time, Aktivitas Fisik Dan Status Gizi. *JSES : Journal of Sport and Exercise Science*, 5(2), 59–65. Retrieved from https://doi.org/10.26740/jses.v5n2.p59-65

Campbell, A. L., & Lassiter, J. W. (2020). Teacher perceptions of facilitators and barriers to implementing classroom physical activity breaks. *Journal of Educational Research*, 113(2), 108–119. Retrieved from https://doi.org/10.1080/00220671.2020.1752613

Carballo-Fazanes, A., Rodríguez-Fernández, J. E., Mohedano-Vázquez, N., Rodríguez-Núñez, A., & Abelairas-Gómez, C. (2022). Competencia motriz y condición física relacionada con la salud en escolares de Educación Primaria (Motor competence and health-related physical fitness in schoolchildren). *Retos*, 46, 218–226. Retrieved from https://doi.org/10.47197/retos.v46.93906

Carlson, J. A., Engelberg, J. K., Cain, K. L., Conway, T. L., Mignano, A. M., Bonilla, E. A., … Sallis, J. F. (2015). Implementing classroom physical activity breaks: Associations with student physical activity and classroom behavior. *Preventive Medicine*, 81, 67–72. Retrieved from https://doi.org/10.1016/j.ypmed.2015.08.006

Cohen, L., Manion, L., & Morrison, K. (2011). Research Methods in Education (7th ed.). Routledge. https://doi.org/10.4324/9780203720967

Chaeroni, A., Kusmaedi, N., Ma'mun, A., & Budiana, D. (2021). Aktivitas Fisik : Apakah Memberikan Dampak Bagi Kebugaran Jasmani dan KesehatanMental? *Jurnal Sporta Saintika*, 6(1). Retrieved from https://doi.org/DOI: https://doi.org/10.24036/sporta.v6i1.163

Chandran, O., Shruthi, P., Sukumar, S., Kadavigere, R., Chakravarthy, K., Rao, C. R., & Chandrasekaran, B. (2023). Effects of physical activity breaks during prolonged sitting on vascular and executive function—A randomised cross-over trial. *Journal of Taibah University Medical Sciences*, 18(5), 1065–1075. Retrieved from https://doi.org/10.1016/j.jtumed.2023.03.004

Chen, W., Hammond-Bennett, A., Hypnar, A., & Mason, S. (2018). Health-related physical fitness and physical activity in elementary school students. *BMC Public Health*, 18(1), 1–12. Retrieved from https://doi.org/10.1186/s12889-018-5107-4

da Costa, B. G. G., da Silva, K. S., George, A. M., & de Assis, M. A. A. (2017). Sedentary behavior during school-time: Sociodemographic, weight status, physical education class, and school performance correlates in Brazilian schoolchildren. *Journal of Science and Medicine in Sport*, 20(1), 70–74. Retrieved from https://doi.org/10.1016/j.jsams.2016.06.004

Dartini, N. P. D. ., Suwiwa, I. G., & Spyanawati, L. P. (2017). Tingkat Kebugaran Jasmani Siswa Kelas V Sekolah Dasar Gugus VI Kecamatan Sukasada. *Journal of Chemical Information and Modeling*, 4(1), 27–37. Retrieved from https://ejournal.undiksha.ac.id/index.php/PENJAKORA/article/view/11751/7511

Delk, J., Springer, A. E., Kelder, S. H., & Grayless, M. (2014). Promoting teacher adoption of physical activity breaks in the classroom: Findings of the central texas CATCH middle school project. *Journal of School Health*, 84(11), 722–730. Retrieved from https://doi.org/10.1111/josh.12203

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Egan, C. A., Webster, C. A., Beets, M. W., Weaver, R. G., Russ, L., Michael, D., … Orendorff, K. L. (2019). Sedentary Time and Behavior during School: A Systematic Review and Meta-Analysis. *American Journal of Health Education*, 50(5), 283–290. Retrieved from https://doi.org/10.1080/19325037.2019.1642814

Fiorilli, G., Buonsenso, A., Di Martino, G., Crova, C., Centorbi, M., Grazioli, E., … Di Cagno, A. (2021). Impact of active breaks in the classroom on mathematical performance and attention in elementary school children. *Healthcare (Switzerland)*, 9(12). Retrieved from https://doi.org/10.3390/healthcare9121689

Gani, I., Yudanto, Hendra, S., & Willy, I. R. (2023). Tingkat enjoyment peserta didik sekolah dasar terhadap physical activity break dalam pembelajaran. *Trihayu: Jurnal Pendidikan Ke-SD-An*, 9(2), 165–178. Retrieved from https://doi.org/10.30738/trihayu.v9i2.14500

He, Q. qiang, Wong, T. wai, Du, L., Jiang, Z. qin, Yu, T. sun I., Qiu, H., … Wu, J. gang. (2011). Physical activity, cardiorespiratory fitness, and obesity among Chinese children. *Preventive Medicine*, 52(2), 109–113. Retrieved from https://doi.org/10.1016/j.ypmed.2010.11.005

Howie, E. K., Newman-Norlund, R. D., & Pate, R. R. (2014). Smiles count but minutes matter: Responses to classroom exercise breaks. *American Journal of Health Behavior*, 38(5), 681–689. Retrieved from https://doi.org/10.5993/AJHB.38.5.5

Hussey, J., Bell, C., Bennett, K., O'Dwyer, J., & Gormley, J. (2007). Relationship between the intensity of physical activity, inactivity, cardiorespiratory fitness and body composition in 7-10-year-old Dublin children. *British Journal of Sports Medicine*, 41(5), 311–316. Retrieved from https://doi.org/10.1136/bjsm.2006.032045

Indrawati, E. P., Tirtayasa, I. K., & Adiatmika, I. P. G. (2015). Pelatihan Peregangan Dan Istirahat Aktif Menurunkan Keluhan Muskuloskeletal, Kelelahan Mata Dan Meningkatkan Konsentrasi Kerja Karyawan Rekam Medis Rumah Sakit Sanglah Denpasar. *Jurnal Ergonomi Indonesia (The Indonesian Journal of Ergonomic)*, 1(1). Retrieved from https://doi.org/10.24843/jei.2015.v01.i01.p03

Janssen, M., Chinapaw, M. J. M., Rauh, S. P., Toussaint, H. M., Van Mechelen, W., & Verhagen, E. A. L. M. (2014). A short physical activity break from cognitive tasks increases selective attention in primary school children aged 10-11. *Mental Health and Physical Activity*, 7(3), 129–134. Retrieved from https://doi.org/10.1016/j.mhpa.2014.07.001

Jiménez-Parra, J. F., Manzano-Sánchez, D., Camerino, O., Castañer, M., & Valero-Valenzuela, A. (2022). Enhancing physical activity in the classroom with active breaks: a mixed methods study. *Apunts. Educacion Fisica y Deportes*, (147), 84–94. Retrieved from https://doi.org/10.5672/apunts.2014-0983.es.(2022/1).147.09

Katzmarzyk, P. T. (2010). Physical activity, sedentary behavior, and health: Paradigm paralysis or paradigm shift? *Diabetes*, 59(11), 2717–2725. Retrieved from https://doi.org/10.2337/db10-0822

Kolimechkov, S. (2017). PHYSICAL FITNESS ASSESSMENT IN CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW. *European Journal of Physical Education and Sport Science*, 3, 66. Retrieved from https://doi.org/10.5281/zenodo.495725

Marques, A., Henriques-Neto, D., Peralta, M., Martins, J., Gomes, F., Popovic, S., … Ihle, A. (2021). Field-Based Health-Related Physical Fitness Tests in Children and Adolescents: A Systematic Review. *Frontiers in Pediatrics*, 9(March). Retrieved from https://doi.org/10.3389/fped.2021.640028

Martins, J., Honório, S., & Cardoso, J. (2022). Physical fitness levels in students with and without training capacities – A comparative study in physical education classes. *Retos*, 43–50.

Masini, A., Marini, S., Gori, D., Leoni, E., Rochira, A., & Dallolio, L. (2020). Evaluation of school-based interventions of active breaks in primary schools: A systematic review and meta-analysis. *Journal of Science and Medicine in Sport*, 23(4), 377–384. Retrieved from https://doi.org/10.1016/j.jsams.2019.10.008

Mavilidi, M. F., Drew, R., Morgan, P. J., Lubans, D. R., Schmidt, M., & Riley, N. (2020). Effects of different types of classroom physical activity breaks on children's on-task behaviour, academic achievement and cognition. *Acta Paediatrica, International Journal of Paediatrics*, 109(1), 158–165. Retrieved from https://doi.org/10.1111/apa.14892

McMullen, J., Kulinna, P., & Cothran, D. (2014). Physical activity opportunities during the school day: Classroom teachers' perceptions of using activity breaks in the classroom. *Journal of Teaching in Physical Education*, 33(4), 511–527. Retrieved from https://doi.org/10.1123/jtpe.2014-0062

Minges, K. E., Chao, A. M., Irwin, M. L., Owen, N., Park, C., Whittemore, R., & Salmon, J. (2016). Classroom standing desks and sedentary behavior: A systematic review. *Pediatrics*, 137(2). Retrieved from https://doi.org/10.1542/peds.2015-3087

Mullins, N. M., Michaliszyn, S. F., Kelly-Miller, N., & Groll, L. (2019). Elementary school classroom physical activity breaks: Student, teacher, and facilitator perspectives. *Advances in Physiology Education*, 43(2), 140–148. Retrieved from https://doi.org/10.1152/advan.00002.2019

Muñoz-Parreño, J. A., Belando-Pedreño, N., Manzano-Sánchez, D., & Valero-Valenzuela, A. (2021). The effect of an active breaks program on primary school students' executive functions and emotional intelligence. *Psicothema*, 33(3), 466–472. Retrieved from https://doi.org/10.7334/psicothema2020.201

National Association for Sport and Physical Education. Shape of the nation report. Reston, VA: National Association for Sport and Physical Education; 2016

Oti, E. U., Olusola, M. O., & Esemokumo, P. A. (2021). Statistical Analysis of the Median Test and the Mann-Whitney U Test. *International Journal of Advanced Academic Research* |, ISSN(9), 2488–9849. Retrieved from www.ijaar.org

Ploeg, H. P. van der, Chey, T., Korda, R. J., Banks, E., & Adrian, B. (2004). Sitting time and all-cause mortality risk in 222 497 Australian adults, 15(1), 1–14. Retrieved from https://doi.org/DOI: 10.1001/archinternmed.2011.2174

Prativi, G. O. (2013). Pengaruh Aktivitas Olahraga Terhadap Kebugaran Jasmani. *Journal of Sport Sciences and Fitness*, 2(3), 32–36. Retrieved from http://journal.unnes.ac.id/sju/index.php/jssf

Scharf, C., & Tilp, M. (2023). Twelve Weeks of Web-Based Low to Moderate Physical Activity Breaks with Coordinative Exercises at the Workplace Increase Motor Skills but Not Motor Abilities in Office Workers—A Randomised Controlled Pilot Study. *International Journal of Environmental Research and Public Health*, 20(3). Retrieved from https://doi.org/10.3390/ijerph20032193

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Stylianou, M., Kulinna, P. H., & Naiman, T. (2016). '…because there's nobody who can just sit that long': Teacherperceptions of classroom-based physical activity and related management issues. *European Physical Education Review*, 22(3), 390–408. Retrieved from https://doi.org/10.1177/1356336X15613968

Tremblay, M. S., Aubert, S., Barnes, J. D., Saunders, T. J., Carson, V., Latimer-Cheung, A. E., … Wondergem, R. (2017). Sedentary Behavior Research Network (SBRN) - Terminology Consensus Project process and outcome. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 1–17. Retrieved from https://doi.org/10.1186/s12966-017-0525-8

True, L., Martin, E. M., Pfeiffer, K. A., Siegel, S. R., Branta, C. F., Haubenstricker, J., & Seefeldt, V. (2021). Tracking of Physical Fitness Components from Childhood to Adolescence: A Longitudinal Study. *Measurement in Physical Education and Exercise Science*, 25(1), 22–34. Retrieved from https://doi.org/10.1080/1091367X.2020.1729767

Tucker, H. J., Bebeley, S. J., & Conteh, M. (2018). Physical Activity and Motor Fitness Skill Level of Children and Adolescents : A Motivational Factor for Health and Physical Education. *International Journal of Science and Research*, 79(57), 895–899. Retrieved from https://doi.org/10.21275/ART20179441

Turner, L., & Chaloupka, F. J. (2017). Reach and Implementation of Physical Activity Breaks and Active Lessons in Elementary School Classrooms. *Health Education and Behavior*, 44(3), 370–375. Retrieved from https://doi.org/10.1177/1090198116667714

Wadsworth, D. D., Robinson, L. E., Beckham, K., & Webster, K. (2012). Break for Physical Activity: Incorporating Classroom-Based Physical Activity Breaks into Preschools. *Early Childhood Education Journal*, 39(6), 391–395. Retrieved from https://doi.org/10.1007/s10643-011-0478-5

Wanders, L., Cuijpers, I., Kessels, R. P. C., van de Rest, O., Hopman, M. T. E., & Thijssen, D. H. J. (2021). Impact of prolonged sitting and physical activity breaks on cognitive performance, perceivable benefits, and cardiometabolic health in overweight/obese adults: The role of meal composition. *Clinical Nutrition*, 40(4), 2259–2269. Retrieved from https://doi.org/10.1016/j.clnu.2020.10.006

Watson, A., Timperio, A., Brown, H., Best, K., & Hesketh, K. D. (2017). Effect of classroom-based physical activity interventions on academic and physical activity outcomes: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1). Retrieved from https://doi.org/10.1186/s12966-017-0569-9

Webster, C. A., Russ, L., Vazou, S., Goh, T. L., & Erwin, H. (2015). Integrating movement in academic classrooms: Understanding, applying and advancing the knowledge base. *Obesity Reviews*, 16(8), 691–701. Retrieved from https://doi.org/10.1111/obr.12285

Wilmot, E. G., Edwardson, C. L., Achana, F. A., Davies, M. J., Gorely, T., Gray, L. J., … Biddle, S. J. H. (2012). Sedentary time in adults and the association with diabetes, cardiovascular disease and death: Systematic review and meta-analysis. *Diabetologia*, 55(11), 2895–2905. Retrieved from https://doi.org/10.1007/s00125-012-2677-z

Wilson, A. N., Olds, T., Lushington, K., Petkov, J., & Dollman, J. (2016). The impact of 10-minute activity breaks outside the classroom on male students' on-task behaviour and sustained attention: A randomised crossover design. *Acta Paediatrica, International Journal of Paediatrics*, 105(4), e181–e188. Retrieved from https://doi.org/10.1111/apa.13323

Zerf, M., Kherfane, M. H., & Bouabdellah, S. B. A. (2021). Classroom routine frequency and their timing practice as critical factor to build the recommended primary school active break program. *Retos*, 2041(41), 434–439. Retrieved from https://doi.org/10.47197/retos.v0i41.77808