2024, Retos, 61, 130-140

Factors influencing sedentary behavior and its impact on early childhood psychomotor skills
Factores que influyen en el comportamiento sedentario y su repercusión en la psicomotricidad de la primera infancia

Dewi Wahyuni, Nasuka, Heny Setyawati, Sulaiman, Rivan Saghita Pratama
Universitas Negeri Semarang (Indonesia)

Resumen. El comportamiento sedentario puede afectar negativamente a la coordinación motora y cognitiva en la primera infancia. Este estudio explora los factores que influyen en el comportamiento sedentario en el desarrollo psicomotor de la primera infancia. Este método de investigación utiliza un enfoque cuantitativo con un diseño de encuesta e incluye una muestra de 400 profesores de educación infantil. Los datos se recogieron mediante cuestionarios distribuidos a través de Google Forms. El análisis de los datos se realizó mediante estadística descriptiva e inferencial con el enfoque de mínimos cuadrados parciales (PLS). Los resultados del análisis muestran que los factores de actividad física (β = -0,222), comprensión digital de los padres (β = -0,109), instalaciones de apoyo a la actividad física (β = -0,080), participación de los padres (β = -0,094), competencia del profesor (β = -0,128) y competencia digital del profesor (β = -0,235) tienen una correlación negativa con el comportamiento sedentario de la primera infancia, lo que significa que cuanto mayor es el factor, menor es el comportamiento sedentario. El comportamiento sedentario afecta negativamente a la coordinación motora (β = -0,552) y a la psicología infantil (β = -0,545) aumentando el riesgo de problemas psicológicos como la ansiedad y la depresión. Mientras tanto, las características de la primera infancia y la tecnología no tuvieron una influencia importante en el comportamiento sedentario en la primera infancia. La importancia de la concienciación sobre el comportamiento sedentario requiere la creación de un programa de actividad física para niños que implique a los padres.
Palabras clave: comportamiento sedentario, desarrollo psicomotor, primera infancia, educación infantil.

Abstract. Sedentary behavior can negatively impact motor and cognitive coordination in early childhood. This study explores the factors that influence sedentary behavior on early childhood psychomotor development. This research method uses a quantitative approach with a survey design and involves a sample of 400 early childhood education teachers. Data were collected through questionnaires distributed using Google Forms. Data analysis was carried out using descriptive and inferential statistics with the Partial Least Square (PLS) approach. The results of the analysis show that the factors of physical activity (β = -0.222), parental digital understanding (β = -0.109), physical activity support facilities (β = -0.080), parental involvement (β = -0.094), teacher competence (β = -0.128), and teacher digital competence (β = -0.235) have a negative correlation with sedentary behavior of early childhood, which means that the higher the factor, the lower the sedentary behavior. Sedentary behavior negatively affects motor coordination (β = -0.552) and child psychology (β = -0.545) increasing the risk of psychological problems such as anxiety and depression. Meanwhile, early childhood characteristics and technology did not have a major influence on early childhood sedentary behavior. The importance of awareness of sedentary behavior requires the creation of a physical activity program for children that involves parents.
Keywords: sedentary behavior, psychomotor development, early childhood, early childhood education.

Fecha recepción: 22-07-24. Fecha de aceptación: 07-09-24
Dewi Wahyuni
wahyunidewi3003@students.unnes.ac.id

Introduction

Early childhood is a golden age development phase that requires optimal stimulus, including for physical-motor development (Sunanto, Himawan, Purwoto, Machmudah, & Handayani, 2024; Sutapa, Pratama, Rosly, Ali, & Karakauki, 2021; Untung et al., 2023). As stated in the Sustainable Development Goals point 4 on quality education, by 2030 all young children are expected to receive an appropriate education before entering primary school (UNICEF, 2024). Early childhood is a critical period for to development of a child's sense of self and their relationship with their surroundings and external experiences (Jing, Jia, & Yang, 2024). Based on statistical data on Early Childhood Education (ECE) from the Ministry of Education and Culture as of 2019/2020, the total number of ECE schools is 202,991 schools with a total number of students of 6,543,758 students, while the number of ECE teachers available is only 666,678 teachers or teaching staff or 10.19% or has a ratio of 1:10 (Tarida & Khadafy, 2020). The aforementioned data indicates that early childhood education is very important and will contribute to success in later life (González-Moreira, Ferreira, & Vidal, 2024).

The early childhood education program emphasises the importance of promoting physical activity and reducing idle time for the child (Bourke et al., 2024). Sedentary behaviour is any type of activity outside of the bedtime, such as reading or working in a position that doesn't require a lot of energy (Aadland & Nilsen, 2022; Bento & Dias, 2017a; Syamsudin et al., 2023). Activities conducted at home, school, or the workplace, such as reading, watching television, playing video games, using a computer, and giving up sedentary work (Ashadi, Mita Andriana, & Pramono, 2020; Ishariani, 2020a; Kul et al., 2022; Rocliffe et al., 2023).

The role of parents in the physical and psychological development of early childhood is very important (James, Arbour-Nicitopoulos, Kwan, King-Dowling, & Cairney, 2024; Nur & Malli, 2024), but most parents' frequent use of gadgets can interfere with verbal and non-verbal interactions with their children, as well as affect their physical activity (Kildare & Middlemiss, 2017; Morris, Filippetti, & Rigato, 2022). Sedentary behavior, which

includes activities with very little caloric output, such as screen time, may increase the risk of childhood obesity (Haghjoo, Siri, Soleimani, Farhangi, & Alesaeidi, 2022; Kumari Ekanayake, Salibi, & Tzenios, 2023).

Excessive use of gadgets by early childhood can affect children's behavioral and character development, health, cognitive skills, and social skills (Kurniawati & Sutharjana, 2023; Zain, Jasmani, Haris, & Nurudin, 2022). Preschool children need high physical activity, but many of them prefer to play gadgets (Engberg, Figueiredo, Rounge, Weiderpass, & Viljakainen, 2019; Fadhli, Yudasmara, Taufik, Ludyana, & I'tamada, 2022; Piores, Omar Dev, Muhamad, & Puad Mohd Kari, 2024). This decreased interest in physical activity also contributes to increased sedentary behavior and the risk of childhood obesity (Ishariani, 2020b; Piores, Omar Dev, Muhamad, & Puad Mohd Kari, 2024b). This condition is exacerbated by the lack of physical activity and an unhealthy diet (Jezewska-Zychowicz et al., 2018; Nurwanti et al., 2018).

Research by (Arihandayani & Martha, 2020) found an increase in sedentary behavior across all age groups in Jawa Tengah from year to year, especially in children and adolescents, which if it continues can have a significant negative impact. An increase in sedentary behavior in Jawa Tengah, particularly in Ciamis, associated with excessive sleep duration and obesity risk (Sara, Risma, & Sutisna, 2020). The role of parenting is also very influential, as highlighted by (Ludyanti & Ishariani, 2020a) research which shows that Parent Coaching and screen interaction can influence sedentary behavior (Ludyanti & Ishariani, 2020b). Another study emphasized that parents' perceptions of technology, such as gadget use, can influence children's behavior (Rodwell, Alexander, Bates, Larue, & Watson, 2021).

The availability of outdoor areas for play is very important for early childhood (Bento & Dias, 2017b; Hernawan et al., 2024), especially in big cities that often have limited land. The lack of outdoor play areas can increase the risk of sedentary lifestyle and obesity in children (Ne'matullah et al., 2022). This condition is also reinforced by (Karatzi et al., 2018) research which found an association between lack of physical activity and hypertension in children.

This drastic decrease in physical activity can also ultimately have a negative impact on motor coordination (Sunanto, Asmara, Himawan, & Purwoto, 2022; Taufik, Winarno, Hariadi, Yudasmara, & Fadhli, 2024). As in research by Yu who said that sedentary behavior and lack of physical activity can development coordination disorder or impairment in the growth of motor nerve coordination (Yu, Capio, Abernethy, & Sit, 2021). The worst impact of this condition is a disturbance in early childhood psychology that can continue into adulthood, and can even trigger violent behavior (Ramaiya et al., 2021). So far, regulations related to restrictions on the use of digital devices by children are still minimal, only limited to appeals and initiatives from the Ministry of Communication and Information through training and campaigns such as https://internetsehat.id/.

Whereas with the development of technology can be used positively (Santosa, Pratama, Imron, & Nadzalan, 2024; Widiastuti et al., 2024). Therefore, this research is an expected to be one of the solutions for the government's consideration in formulating a policy or regulation regarding sedentary behavior towards children, one of which may be caused by unhealthy digital device use behavior and lack of physical activity, for example through policies limiting the use of digital devices, as well as regulations on the availability of children's activity locations.

Based on the above problems, the researcher intends to conduct research on sedentary which includes the influence of child characteristics, digital understanding, teacher competence includes teacher digital competence, the role of parents includes overall intervention of parents' digital understanding, the influence of technology including personal smartphone ownership, laptop ownership, play area facilities, including indoor physical play areas and outdoor play areas that can affect early childhood.

Material & methods

Research Design

This research used a quantitative approach because it is the most appropriate method for the investigative phase of a study because it emphasizes surveys and historical processes as a way for causal explanations (Sunanto et al., 2022). Therefore, the research method used is a quantitative method using a survey (Sugiyono, 2019). This survey method is used to obtain data that occurs, the relationship between variables, and to test hypotheses about the variables to be studied. The nature of quantitative research survey methods used is associative research and structural relationships (Sugiyono, 2019).

Populations and Samples

The population in this study are all teachers or educators who teach in the scope of early childhood education in Jawa Tengah Province with a total of 38,895 schools and 73,289 teachers. The sample in this study used the cluster sampling method because the sample taken was divided into several specific groups based on the characteristics of the teachers and early childhood taught. (Firmansyah & Dede, 2022). Determining the number of samples, researchers used the Slovin method because of the large population (Santoso, 2023). The formula and calculations are as follows:

$$n = \frac{N}{1 + N.e^2}$$

Description:

n : Sample

N : Population

e : Level percentage of allowance for sampling error that can still be tolerated; e= 0,05

Using the slovin method, the following results were

obtained:

$$n = \frac{73289}{1 + 73289.(0{,}05^2)}$$
$$n = 397{,}83 \approx 400$$

The calculation results obtained a value of 397.83 or rounded up to 400 teacher samples.

Data Collection Techniques

The data collection technique use is survey using a Google Form that will be sent to the teacher representative of the international school for young people.

Data Analysis Techniques

Data analysis was performed using descriptive and inferential statistics, using the Partial Least Square (PLS) method, a multivariate statistical technique capable of handling multiple response and explanatory variables, providing a robust alternative to multiple regression and principal component regression (Evi & Rachbini, 2022). PLS can overcome multicollinearity problems and does not require normal data distribution or large samples, allowing the use of indicators from various data scales. This data analysis uses the help of SmartPLS software version 3.0, for an effective structural equation analysis tool for testing measurement models and structural models simultaneously, supporting validity, reliability, and hypothesis testing (Dedi & Rahadi, 2023; F. Hair Jr, Sarstedt, Hopkins, & G. Kuppelwieser, 2014).

Results

The distribution of respondents in this study was 400 teachers from various types of early childhood education institutions who responded to the questionnaire. The following is data on the age range and gender of teachers who were respondents in this study:

Table 1.
Teachers' Age Range and Gender

Age Ranges	Male	Female
21 - 30 years old	46	58
< 21 years old	35	44
31 - 40 years old	38	40
> 50 years old	43	34
41 - 50 years old	25	37

From data presented in Table 1, it can be seen that the respondents consisted of teachers with a diverse age and gender distribution. The 21-30 years old category is the largest with 46 males and 58 females, indicating a tendency that most teachers are relatively young. This is followed by the under-21 years old category, with 35 males and 44 females, indicating that there is considerable new receptivity among young teachers. The 31-40 years age category has an almost even distribution of males and females, with 38 and 40 respectively. Meanwhile, for the over 50 years age category, there are 43 more males than 34 females, which may indicate that some senior teachers choose to continue teaching at an older age. For the 41-50 years age category, there were 25 males and 37 females, indicating that a number of teachers are in the middle of their careers.

Reliability and Validity

Construct Reliability and Validity tests the reliability and validity of the constructs in the model, ensuring that the measurements are accurate and reliable. Details are shown in

Table 2.
Construct Reliability and Validity Model Penelitian

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Physical Activity	0.657	0.681	0.765	0.297
Parental Digital Understanding	0.462	0.463	0.736	0.482
Support Facility	0.643	0.664	0.769	0.364
Child Characteristics	0.139	-0.047	0.023	0.332
Parental Engagement	0.507	0.525	0.751	0.504
Teacher Competence	0.728	0.746	0.799	0.258
Teacher Digital Competence	0.592	0.600	0.767	0.454
Motor Skills	0.806	0.827	0.854	0.429
Sedentary Behavior	0.676	0.680	0.788	0.384
Psychology	0.826	0.842	0.856	0.384
Technology	-0.125	0.072	0.312	0.338

Fornell-Larcker Criterion Validity analysis is an important part of ensuring discriminant validity between constructs in the model. Table 3 shows that each construct in this model measures the desired dimension without any significant overlap with other dimensions, which is a crucial requirement in structural equation modeling. This validity strengthens the reliability of the research results.

Table 3.
Construct Reliability and Validity Model Penelitian

	Physical Activity	Parental Digital Understanding	Support Facility	Child Characteristics	Parental Engagement	Teacher Competence	Teacher Digital Competence	Motor Skills	Sedentary Behavior	Psychology	Technology
Physical Activity	0.545										
Parental Digital Understanding	0.398	0.694									
Support Facility	0.658	0.328	0.603								
Child Characteristics	-0.015	-0.049	-0.009	0.576							
Parental Engagement	0.514	0.426	0.348	0.015	0.710						
Teacher Competence	0.659	0.475	0.537	-0.038	0.475	0.508					
Teacher Digital Competence	0.687	0.410	0.513	-0.039	0.460	0.604	0.674				
Motor Skills	0.493	0.401	0.409	-0.037	0.456	0.595	0.516	0.655			
Sedentary Behavior	-0.612	-0.421	-0.484	0.057	-0.450	-0.556	-0.595	-0.552	0.619		
Psychology	0.514	0.426	0.427	-0.047	0.444	0.564	0.498	0.822	-0.545	0.620	
Technology	-0.050	-0.089	-0.017	0.065	-0.039	-0.036	-0.057	0.001	0.030	-0.042	0.581

The results of the validity and reliability analysis based on Table 2. and Table 3. show that the physical activity variable obtained an Average Variance Extracted (AVE) value of 0.297, which indicates low convergent validity. However, discriminant validity through the Fornell-Larcker Criterion is quite fulfilled, because the diagonal value (AVE) is higher than the correlation value between constructs (Table 3). Reliability analysis showed a Cronbach's Alpha value of 0.657 and composite reliability of 0.765 for the physical activity variable, indicating acceptable reliability.

The parental digital understanding variable has a Cronbach's Alpha of 0.462 and a Composite Reliability of 0.736, indicating that this construct is quite reliable. The AVE value is 0.482, meeting the criteria for convergent validity. Based on the Fornell-Larcker Criterion, discriminant validity is also met, indicating that digital comprehension has adequate measurement.

The supporting facilities variable shows an AVE value of 0.364, which is below the minimum standard of 0.5, indicating low convergent validity. However, discriminant validity through the Fornell-Larcker Criterion shows a higher diagonal value than the correlation value between constructs in Table 4.3, which means that discriminant validity is sufficiently met. Cronbach's Alpha for facilities is 0.643 and composite reliability is 0.769, which indicates a fairly good reliability.

The early childhood characteristics variable has Cronbach's Alpha value of 0.139 and a Composite Reliability of 0.023, both of which show very low values and do not meet standard reliability criteria (>0.7 for Composite Reliability and >0.6 for Cronbach's Alpha). The convergent validity of this construct is also low, with an AVE value of only 0.332, not meeting the minimum threshold of 0.5. From a discriminant validity perspective, the Fornell-Larcker criterion in **Table 3**. is not met because the AVE value of this construct (0.332) is not greater than the squared correlation between this construct and other constructs in the model (the largest value of squared correlation is 0.576), which means the construct does not meet discriminant validity.

The parental involvement variable has a Cronbach's Alpha of 0.507 and a Composite Reliability of 0.751, both indicating sufficient reliability. The AVE for parental involvement is 0.504, which indicates good convergent validity as the AVE value is more than 0.5. and the Fornell-Larcker Criterion values in **Table 3**. were also met, indicating good discriminant validity.

The teacher competency variable has a Cronbach's Alpha value of 0.728, with a Composite Reliability value of 0.799, and an Average Variance Extracted (AVE) value of 0.258. Teacher competencies in Table 3. also show that construct validity is adequate. The square root value of the AVE for teacher competence of 0.508 is greater than the correlation between teacher competence and other constructs, indicating that this construct can be distinguished from other constructs in the model. It could be concluded that the teacher competence construct in this study is valid and reliable in measuring its influence on sedentary behavior of early childhood.

Teacher digital competence based on Table 2. has good reliability with a Cronbach's Alpha value of 0.592 and a Composite Reliability value of 0.767, while the Average Variance Extracted (AVE) value is 0.454. The Composite Reliability value above 0.7 indicates that the Teacher Digital Competency construct is consistent in measuring the construct. While discriminant validity, based on Table 3. shows that teacher digital competence has adequate validity with the square root value of AVE for teacher digital competence of 0.674 greater than the correlation between teacher digital competence and other constructs.

Sedentary behavior variables show validity and reliability with an Average Variance Extracted (AVE) value of 0.384, Cronbach's Alpha of 0.676, and Composite Reliability of 0.788. As for the motor coordination variable, the AVE value was 0.429, Cronbach's Alpha was 0.806, and Composite Reliability was 0.854. These values indicate that both variables have adequate validity and reliability.

The sedentary behavior variable has an AVE value of 0.384, Cronbach's Alpha of 0.676, and Composite Reliability of 0.788. As for the psychology variable, the AVE value is 0.384, Cronbach's Alpha is 0.826, and Composite Reliability is 0.856. These values indicate that both variables are valid and reliable.

The technology variable shows an AVE value of 0.338, which is below the minimum standard of 0.5, indicating low convergent validity. However, the discriminant validity of the Fornell-Larcker Criterion shows a higher diagonal value than the correlation value between constructs, so discriminant validity is sufficiently met (Table 3). Cronbach's Alpha for technology was -0.125 and composite reliability was 0.312 (Table 2), indicating very low reliability. Analysis of the Relationship between Factors Affecting Sedentary Behavior in Early Childhood.

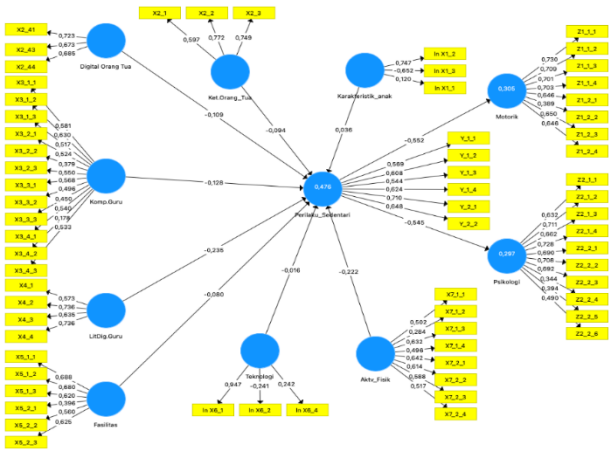

Figure 1. Output Model PLS Algorithm

Analysis using the Partial Least Squares (PLS) model, this study presents various tables that assist in interpreting

the analysis results in detail. The Path Coefficients table shows the path coefficients between constructs in the model, which indicate the strength and direction of the relationship between the independent and dependent variables which can be seen in Table 4 below:

Table 4.
Path Coefficients

Correlation	Sedentary Behavior	Motor	Phychology
Physical Activity	-0.222		
Parental Digital Understanding	-0.109		
Supporting Facilities	-0.080		
Child Characteristics	0.036		
Parental Involvemnet	-0.094		
Teacher Competency	-0.128		
Teacher Digital Competence	-0.235		
Technology	-0.016		
Sedentary Behavior		-0.552	-0.545
Motor			
Psychology			

After that, the analysis of Mean, STDEV, T-Values, and P-Values presents descriptive statistics for the model estimation, including the mean, standard deviation (STDEV), T-Values to test statistical significance, and P-Values indicating the probability of the test results which can be seen in Table 5 below:

Table 5.
Path Coefficient (T-hitung, Standar Deviasi, dan P-Values)

Correlation	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Physical Activity -> Sedentary Behavior	-0.222	-0.218	0.061	3.656	0.000
Digital Parents Knowledge -> Sedentary Behavior	-0.109	-0.109	0.045	2.452	0.015
Supporting Facilities -> Sedentary Behavior	-0.080	-0.080	0.053	1.503	0.133
Child Characteristics -> Sedentary Behavior	0.036	-0.020	0.066	0.552	0.582
Parental Involvement -> Sedentary Behavior	-0.094	-0.097	0.046	2.046	0.041
Teacher Competency -> Sedentary Behavior	-0.128	-0.137	0.050	2.531	0.012
Teacher Digital Competence -> Sedentary Behavior	-0.235	-0.233	0.056	4.232	0.000
Sedentary Behavior -> Motor	-0.552	-0.559	0.036	15.170	0.000
Sedentary Behavior -> Psychology	-0.545	-0.555	0.034	16.032	0.000
Technology -> Sedentary Behavior	-0.016	0.020	0.052	0.306	0.760

Based on data analysis in Table 5. shows that physical activity is negatively correlated with sedentary behavior of early childhood β = -0.222, meaning that the higher the physical activity, the lower the sedentary behavior. Parents' digital understanding is also associated with a decrease in children's sedentary behavior β = -0.109, with a significance value of p = 0.015. In addition, physical activity support facilities have a negative influence on children's sedentary behavior β = -0.080. While early childhood characteristics do not have a significant effect β = 0.036 with a significance value of p = 0.582. Increasing parental involvement was significantly associated with decreasing children's sedentary behavior β = -0.094 with a significance value of p = 0.041, as well as increasing teacher competence β = -0.128 and teacher digital competence β = -0.235. The effect of technology on children's sedentary behavior is very weak β = -0.016. Furthermore, sedentary behavior has a significant negative impact on motor coordination β = -0.552 and early childhood psychological development β = -0.545, indicating that the higher the sedentary behavior, the lower the motor coordination and the worse the psychological development of children.

Discussion

Childhood is critical for developing physical, cognitive, and social skills (Likhar, Baghel, & Patil, 2022; Roslan, Selvam, Pandian, Abdul Rahman, & Motevalli, 2022). However, sedentary behavior and lack of physical activity among children are important issues that need to be addressed (Sunanto et al., 2022). The study by (Carson et al., 2020) showed that interactions and physical activities carried out by educators had a greater influence on children's sedentary behavior than the demographic factors of the children themselves. This finding suggests that to reduce sedentary behavior, interventions should focus more on increasing physical activity through structural and social changes in the child's environment, rather than individual changes based on demographic characteristics. This suggests that interventions to reduce sedentary behavior in early childhood need to prioritize environmental and social aspects over modification of individual demographic characteristics (Carayol et al., 2024). Thus, a more integrated and comprehensive approach to reducing sedentary behavior needs to be implemented in educational and community setting (Vilardell-Dávila et al., 2023).

Physical activity support facilities (Pratama, Hafidz, et al., 2024), both indoor and outdoor, are critical in encouraging children to be more physically active and reduce sedentary time (Hernawan et al., 2024; Hesketh & van Sluijs, 2016; Tonge, Jones, & Okely, 2016; Truelove et al., 2018; Zhang et al., 2021). Physical facilities can be in the form of public sports fields or other types of sports fields, both indoor and outdoor, or fields that are specifically provided for physical activities (Pratama, Seftiana, et al., 2024). However, this study shows that

these supporting facilities do not have a significant effect on early childhood sedentary behavior. There are several reasons explaining this finding. First, some early childhood education providers such as kindergartens, playgroups, Quranic education parks, and similar early childhood education units (SPS) do not have sufficient physical facilities.

Parental involvement in physical activity and limits on screen time use were correlated with decreased sedentary time. This confirms that parental involvement in managing children's daily activities plays a critical role in shaping early childhood sedentary behavior (Bruijns, Bourke, Saravanamuttoo, & Tucker, 2024; Kamionka, Lipowska, Lizińczyk, & Lipowski, 2023). The increased use of electronic devices such as smartphones, computers and televisions has been associated with sedentary behavior, i.e. sitting or lying down for long periods of time, which adversely affects health (Hanifah, Nasrulloh, & Sufyan, 2023). A sedentary lifestyle can lead to a variety of chronic health conditions (Pratama, 2021). The study by (Purnama, Wibowo, Narmaditya, Fitriyah, & Aziz, 2022) showed that close supervision of technology use can reduce the risk of sedentary behavior in children. The use of technology for educational and interactive activities is also not always sedentary. Factors such as parental supervision, use of educational technology, family habits, and available physical facilities play a dominant role in determining children's physical activity levels.

It is important that parents are not only "present" but also actively involved in getting children to participate in physical activities (Adriana & Zirmansyah, 2021; Vega-Díaz, González-García, & de Labra, 2023). This includes parental education, ideas for fun physical activities at home, and strategies to limit children's digital media time. The better parents' digital literacy, the more likely children will exhibit lower sedentary behaviors (Chia, Komar, Chua, & Tay, 2022). In addition, teacher competence also affects early childhood sedentary behavior (Tonge, Jones, & Okely, 2021). Teachers must be able to manage the classroom and apply active and interactive learning methods (Fidrayani & Mawadah, 2022). Competent teachers can create a learning environment that encourages children to be more active and engage in physical activities rather than sedentary activities such as sitting still or using gadgets.

According to Article 10 paragraph (1) of the Constitution of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers, teachers must have four main competencies. First, pedagogical competence includes the ability to design and implement effective learning. Second, personality competence includes role modeling and personal integrity. Third, social competence is related to the ability to communicate and interact with students, parents and the community. Fourth, professional competence includes mastery of the subject matter taught. Teachers who integrate these four competencies are more effective in creating an environment that supports physical activity and reduces sedentary behavior in early childhood. They should also be able to use digital technology to plan innovative and creative learning methods (Sagita & Nisa, 2019). High digital skills in teachers can improve learning quality and reduce children's time for passive activities (Astuti et al., 2021).

The results show that sedentary behavior has a significant negative impact on young children's motor coordination and negatively affects their psychological development. The path coefficient β of -0.552 indicates that an increase in sedentary behavior will be followed by a decrease in motor coordination ability. Meanwhile, the path coefficient β of -0.545 indicates a negative relationship between sedentary behavior and psychological development. Early childhood who do a lot of sedentary activities such as watching television or playing games on gadgets have fewer opportunities to develop motor skills through physical activity (Santos et al., 2021). Motor skills such as running, jumping and catching a ball require regular practice and physical stimulation. Lack of physical activity and large amounts of time spent sitting can reduce children's opportunities to develop these skills (Stephani, Sumarno, & Wibowo, 2019).

Lack of physical activity reduces children's opportunities to develop important motor skills and participate in active play that supports their social and emotional development (Gericke, Pienaar, Gerber, & Monyeki, 2024). Physical activity is necessary for, maintaining, and developing physical, mental, and social abilities (Hidayah et al., 2024; Pratama et al., 2023). Children who engage in sedentary behaviors tend to have fewer social interactions, which negatively impacts their psychological development (Wu et al., 2017; Zou et al., 2023). Studies show that low social interaction can lead to mental health problems such as anxiety, stress and depression (Almeida, Rego, Teixeira, & Moreira, 2022; Brandt, Liu, Heim, & Heinz, 2022; Hernawan et al., 2024; Wickramaratne et al., 2022). Intervention programs that encourage children to be more physically active can help improve their motor skills (Zeng et al., 2017). In the context of early childhood education, it is important for teachers and parents to understand the negative impact of sedentary behavior and encourage children to be more active.

Conclusions

This study found that early childhood characteristics do not affect sedentary behavior. Parental involvement and parental digital literacy had a significant and negative effect, reducing children's sedentary behavior. Teacher competence, especially in digital literacy, also reduced children's sedentary time through active physical activities. Technology and supporting facilities showed no significant effect. Children's physical activity had a significant negative impact on sedentary behavior, with more active children tending to spend less time in sedentary activities. Overall, teacher competence, parental involvement, support facilities and physical

activity had a significant effect, with physical activity and parental involvement as the main factors. Sedentary behavior negatively affects children's motor coordination and psychological development, increasing the risk of problems such as anxiety and depression. Researchers suggest programs that involve parents in school activities and counseling on the importance of physical activity for children to increase parental participation and awareness.

Acknowledgements

This research can be carried out well thanks to the help of various parties. The researcher would like to thank the participation involved in this study. With this research, it is hoped that sedentary behavior can be overcome. This study is a prerequisite for completing the doctoral program in Sport Education at the Postgraduate Program of Universitas Negeri Semarang, Indonesia. The costs associated with the dissemination and publication of this research article are entirely covered by the Education Fund Management Institution of the Republic of Indonesia (LPDP RI) and the Indonesian Education Scholarship (BPI), both of which are managed by the Ministry of Education, Research, and Technology of the Republic of Indonesia (BPPT KEMENDIKBUDRISTEK RI).

References

Aadland, E., & Nilsen, A. K. O. (2022). Accelerometer epoch length influence associations for physical activity intensities with body mass index and locomotor skills in young children. *Journal of Sports Sciences*, *40*(14), 1568–1577. https://doi.org/10.1080/02640414.2022.2092979

Adriana, N. G., & Zirmansyah, Z. (2021). The Influence of Parenting Knowledge on Parental Involvement in Early Childhood Education Institutions. *Jurnal Anak Usia Dini Holistik Integratif (AUDHI)*, *1*(1), 40. https://doi.org/10.36722/jaudhi.v1i1.565

Almeida, I. L. de L., Rego, J. F., Teixeira, A. C. G., & Moreira, M. R. (2022). Social isolation and its impact on child and adolescent development: a systematic review. *Revista Paulista de Pediatria*, *40*, e2020385. https://doi.org/10.1590/1984-0462/2022/40/2020385

Arihandayani, Y., & Martha, E. (2020). Perilaku Sedentari Siswa Smp Di Kecamatan Cibinong Kabupaten Bogor Jawa Barat Tahun 2018. *Jurnal Ekologi Kesehatan*, *19*(1), 76–83. https://doi.org/10.22435/jek.v19i1.2685

Ashadi, K., Mita Andriana, L., & Pramono, B. A. (2020). Sports Activity Patterns Before and During the Covid-19 Pandemic Among Students of the Faculty of Sports and Non-Sports Faculty. *Jurnal SPORTIF : Jurnal Penelitian Pembelajaran*, *6*(3), 713–728.

Astuti, S., Prananingrum, N., Rahmiaji, L., Nurhajati, L., Lotulung, L., & Kurnia, N. (2021). Budaya Bermedia Digital. In *Modul : BUDAYA BERMEDIA DIGITAL* (1st ed.). Jakarta: Kementerian Komunikasi dan Informatika.

Bento, G., & Dias, G. (2017a). The importance of outdoor play for young children's healthy development. *Porto Biomedical Journal*, *2*(5), 157–160. https://doi.org/10.1016/j.pbj.2017.03.003

Bento, G., & Dias, G. (2017b). The importance of outdoor play for young children's healthy development. *Porto Biomedical Journal*, *2*(5), 157–160. https://doi.org/10.1016/j.pbj.2017.03.003

Bourke, M., Bruijns, B. A., Vanderloo, L. M., Irwin, J., Heydon, R., Carson, V., … Tucker, P. (2024). The efficacy of the TEACH e-Learning course at improving early childhood educators' physical activity and sedentary behaviour self-efficacy, knowledge, intentions, and perceived behavioural control: a randomized controlled trial. *International Journal of Behavioral Nutrition and Physical Activity*, *21*(1), 79. https://doi.org/10.1186/s12966-024-01628-0

Brandt, L., Liu, S., Heim, C., & Heinz, A. (2022). The effects of social isolation stress and discrimination on mental health. *Translational Psychiatry*, *12*(1), 398. https://doi.org/10.1038/s41398-022-02178-4

Bruijns, B. A., Bourke, M., Saravanamuttoo, K., & Tucker, P. (2024). Physical activity, sedentary behaviour, and sleep knowledge and self-efficacy among parents of young children in Canada. *Journal of Activity, Sedentary and Sleep Behaviors*, *3*(1), 12. https://doi.org/10.1186/s44167-024-00051-x

Carayol, M., Laujac, S., Cholley-Gomez, M., Franceschi, J., Rozand, A., Pallier, L., … Delpierre, C. (2024). Co-construct, implement and evaluate a multi-level intervention to prevent a sedentary lifestyle in children—Study protocol of the CIPRES study. *PLOS ONE*, *19*(5), e0302556. https://doi.org/10.1371/journal.pone.0302556

Carson, V., Adamo, K. B., Ogden, N., Goldfield, G. S., Okely, A. D., Kuzik, N., … Predy, M. (2020). Sedentary Time and Physical Activity Associations Between Child Care Educators and Children. *American Journal of Preventive Medicine*, *58*(4), e105–e111. https://doi.org/10.1016/j.amepre.2019.11.016

Chia, M. Y. H., Komar, J., Chua, T. B. K., & Tay, L. Y. (2022). Associations between Parent Attitudes and on- and off-Screen Behaviours of Preschool Children in Singapore. *International Journal of Environmental Research and Public Health*, *19*(18), 11508. https://doi.org/10.3390/ijerph191811508

Dedi, R., & Rahadi, R. (2023). *Pengantar Partial Least Squares Structural Equation Model (PLS-SEM) 2023* (1st ed.). Tasikmalaya: CV. LENTERA ILMU MADANI.

Engberg, E., Figueiredo, R. A. O., Rounge, T. B., Weiderpass, E., & Viljakainen, H. (2019). Heavy screen users are the heaviest among 10,000 children. *Scientific Reports*, *9*(1), 11158. https://doi.org/10.1038/s41598-019-46971-6

Evi, T., & Rachbini, W. (2022). *Partial Least Squares (Teori*

Dan Praktek) (1st ed.). Surakarta: TAHTA MEDIA GROUP.

F. Hair Jr, J., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM). *European Business Review*, *26*(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128

Fadhli, N. R., Yudasmara, D. S., Taufik, Ludyana, E., & I'tamada, E. Z. (2022). Sedentary Screen Time and Gross Motor Skills of Indonesian Preschoolers in Urban Areas. *Proceedings of the 5th International Conference on Sport Science and Health (ICSSH 2021)*, *45*(Icssh 2021), 184–190. https://doi.org/10.2991/ahsr.k.220203.031

Fidrayani, & Mawadah, S. (2022). Student Learning Activity Related To Classroom Management: How Teacher Role? *Instruktur*, *2*(1), 45–52. https://doi.org/10.51192/instruktur.v2i1.402

Firmansyah, D., & Dede. (2022). Teknik Pengambilan Sampel Umum dalam Metodologi Penelitian: Literature Review. *Jurnal Ilmiah Pendidikan Holistik (JIPH)*, *1*(2), 85–114. https://doi.org/10.55927/jiph.v1i2.937

Gericke, C., Pienaar, A. E., Gerber, B., & Monyeki, M. A. (2024). Relationships between moderate vigorous physical activity, motor- and health-related fitness and motor skills in children. *African Journal of Primary Health Care & Family Medicine*, *16*(1), e1–e12. https://doi.org/10.4102/phcfm.v16i1.4258

González-Moreira, A., Ferreira, C., & Vidal, J. (2024). A journey to primary education: a systematic review of factors affecting the transition from early childhood education to primary education. *Preventing School Failure: Alternative Education for Children and Youth*, 1–15. https://doi.org/10.1080/1045988X.2024.2335679

Haghjoo, P., Siri, G., Soleimani, E., Farhangi, M. A., & Alesaeidi, S. (2022). Screen time increases overweight and obesity risk among adolescents: a systematic review and dose-response meta-analysis. *BMC Primary Care*, *23*(1), 161. https://doi.org/10.1186/s12875-022-01761-4

Hanifah, L., Nasrulloh, N., & Sufyan, D. L. (2023). Sedentary Behavior and Lack of Physical Activity among Children in Indonesia. *Children*, *10*(8), 1283. https://doi.org/10.3390/children10081283

Hernawan, Makadada, F. A., Hakim, H., Taufik, S. M., Puspodari, Kholis, Moh. N., … Purwoto, S. P. (2024). Outdoor education program reduces anxiety levels in Indonesian sports college students. *Retos*, *60*, 21–26. Retrieved from https://recyt.fecyt.es/index.php/retos/index

Hesketh, K. R., & van Sluijs, E. M. F. (2016). Features of the UK childcare environment and associations with preschooler's in-care physical activity. *Preventive Medicine Reports*, *3*, 53–57. https://doi.org/10.1016/j.pmedr.2015.12.004

Hidayah, T., Pratama, R. S., Nasuka, N., Rahayu, S., Budiono, I., Sugiharto, S., … Nurrachmad, L. (2024). Do Petanque Sports Athletes in Jawa Tengah Need Android-Based Applications for Training Program Implementation? *Retos*, *53*, 69–77. https://doi.org/10.47197/retos.v53.102289

Ishariani, L. (2020a). Penggunaan Gadget Dan Sedentary Behaviour Pada Anak Usia Prasekolah Di Taman Kanak-Kanak Aisyah Bustanul Athfal Iii Pare. *Jurnal Ilmiah Pamenang*, *2*(1), 36–40. https://doi.org/10.53599/jip.v2i1.62

Ishariani, L. (2020b). Penggunaan Gadget Dan Sedentary Behaviour Pada Anak Usia Prasekolah Di Taman Kanak-Kanak Aisyah Bustanul Athfal Iii Pare. *Jurnal Ilmiah Pamenang*, *2*(1), 36–40. https://doi.org/10.53599/jip.v2i1.62

James, M. E., Arbour-Nicitopoulos, K. P., Kwan, M., King-Dowling, S., & Cairney, J. (2024). Physical Activity and Motor Skill Development During Early Childhood: Investigating the Role of Parent Support. *Pediatric Exercise Science*, 1–10. https://doi.org/10.1123/pes.2023-0074

Jezewska-Zychowicz, M., Gębski, J., Guzek, D., Świątkowska, M., Stangierska, D., Plichta, M., & Wasilewska, M. (2018). The Associations between Dietary Patterns and Sedentary Behaviors in Polish Adults (LifeStyle Study). *Nutrients*, *10*(8), 1004. https://doi.org/10.3390/nu10081004

Jing, J.-Q., Jia, S.-J., & Yang, C.-J. (2024). Physical activity promotes brain development through serotonin during early childhood. *Neuroscience*, *554*, 34–42. https://doi.org/10.1016/j.neuroscience.2024.07.015

Kamionka, A., Lipowska, M., Lizińczyk, S., & Lipowski, M. (2023). The impact of parents' physical activity goals and parental attitudes on physical activity during leisure time among children in middle childhood. *Frontiers in Public Health*, *11*, 1170413. https://doi.org/10.3389/fpubh.2023.1170413

Karatzi, K., Moschonis, G., Botelli, S., Androutsos, O., Chrousos, G. P., Lionis, C., & Manios, Y. (2018). Physical activity and sedentary behavior thresholds for identifying childhood hypertension and its phenotypes: The Healthy Growth Study. *Journal of the American Society of Hypertension*, *12*(10), 714–722. https://doi.org/10.1016/j.jash.2018.07.001

Kildare, C. A., & Middlemiss, W. (2017). Impact of parents mobile device use on parent-child interaction: A literature review. *Computers in Human Behavior*, *75*, 579–593. https://doi.org/10.1016/j.chb.2017.06.003

Kul, M., Turkmen, M., Ceylan, R., Sipal, O., Cabuk, R., Akova, A., … Adatepe, E. (2022). High-Intensity Interval Training with Cycling and Calisthenics: Effects on Aerobic Endurance, Critical Power, Sprint and Maximal Strength Performance in Sedentary Males.

Retos, *46*, 538–544. https://doi.org/10.47197/retos.v46.94255

Kumari Ekanayake, H. D., Salibi, Dr. G., & Tzenios, N. (2023). Analysis of association between childhood overweight/obesity with screen time, sedentary life style and low levels of physical activity. *Special Journal of the Medical Academy and Other Life Sciences*, *1*(6), 1–17. https://doi.org/10.58676/sjmas.v1i6.40

Kurniawati, N. N., & Sutharjana, I. M. (2023). The Influence of Gadgets on The Development of The Early-Age Learners' Behavior and Character. *International Journal of Multidisciplinary Sciences*, *1*(2), 159–171. https://doi.org/10.37329/ijms.v1i2.2321

Likhar, A., Baghel, P., & Patil, M. (2022). Early Childhood Development and Social Determinants. *Cureus*, *14*(9), e29500. https://doi.org/10.7759/cureus.29500

Ludyanti, L. N., & Ishariani, L. (2020a). Parent Coaching dan Aktivitas Berbasis Layar sebagai Bentuk Sedentary Behaviour pada Anak Pra Sekolah. *Jurnal Sehat Mandiri*, *15*(1), 122–129. https://doi.org/10.33761/jsm.v15i1.191

Ludyanti, L. N., & Ishariani, L. (2020b). Parent Coaching dan Aktivitas Berbasis Layar sebagai Bentuk Sedentary Behaviour pada Anak Pra Sekolah. *Jurnal Sehat Mandiri*, *15*(1), 122–129. https://doi.org/10.33761/jsm.v15i1.191

Morris, A. J., Filippetti, M. L., & Rigato, S. (2022). The impact of parents' smartphone use on language development in young children. *Child Development Perspectives*, *16*(2), 103–109. https://doi.org/10.1111/cdep.12449

Ne'matullah, K. F., Talib, N. A., Mee, R. W. M., Pek, L. S., Amiruddin, S., & Ismail, M. R. (2022). The impact of outdoor play on children's well-being: A scoping review. *Masyarakat, Kebudayaan Dan Politik*, *35*(3), 282–296. https://doi.org/10.20473/mkp.V35I32022.282-296

Nur, A., & Malli, R. (2024). The Role of Parents in Early Childhood Character Building in Bontoala Village, Pallangga District, Gowa Regency. *Dharmawangsa: International Journal of the Social Sciences, Education and Humanitis*, *5*(1), 23–31. https://doi.org/10.46576/ijsseh.v5i1.4355

Nurwanti, E., Uddin, M., Chang, J.-S., Hadi, H., Syed-Abdul, S., Su, E. C.-Y., … Bai, C.-H. (2018). Roles of Sedentary Behaviors and Unhealthy Foods in Increasing the Obesity Risk in Adult Men and Women: A Cross-Sectional National Study. *Nutrients*, *10*(6), 704. https://doi.org/10.3390/nu10060704

Piores, V., Omar Dev, R., Muhamad, M. M., & Puad Mohd Kari, D. N. (2024a). Gadget use and physical activity among children: Involvement Process Theory. *Journal of Physical Education*, *34*(1), 1–16. https://doi.org/10.4025/jphyseduc.v34i1.3456

Piores, V., Omar Dev, R., Muhamad, M. M., & Puad Mohd Kari, D. N. (2024b). Gadget use and physical activity among children: Involvement Process Theory. *Journal of Physical Education*, *34*(1), 1–16. https://doi.org/10.4025/jphyseduc.v34i1.3456

Pratama, R. S. (2021). FENOMENA PEMBELAJARAN JARAK JAUH PADA MATA PELAJARAN PENDIDIKAN JASMANI, OLAHRAGA, DAN KESEHATAN DI INDONESIA. *SPORTIVE: Journal Of Physical Education, Sport and Recreation*, *5*(2), 149. https://doi.org/10.26858/sportive.v5i2.23725

Pratama, R. S., Hafidz, A., Wahadi, Kriswantoro, Santosa, T., Ashadi, K., … Purwoto, S. P. (2024). Analysis of the main physical condition factors in petanque. *Retos*, *60*, 103–109.

Pratama, R. S., Santosa, T., Lengkana, A. S., Imron, F., Mahardika, W., & Hidayah, T. (2023). The impact of hexagon drill on the agility of junior men's tennis players. *Jurnal Keolahragaan*, *11*(1), 33–40. https://doi.org/10.21831/jk.v11i1.52532

Pratama, R. S., Seftiana, S., Wahadi, W., Aji, T., Nadzalan, A. M., Imron, F., … Setia Lengkana, A. (2024). Availability of Sports Open Spaces in Tawangharjo District, Grobogan Regency: A Sport Development Index Perspective. *JOSSAE (Journal of Sport Science and Education)*, *9*(1), 63–71. https://doi.org/10.26740/jossae.v9n1.p63-71

Purnama, S., Wibowo, A., Narmaditya, B. S., Fitriyah, Q. F., & Aziz, H. (2022). Do parenting styles and religious beliefs matter for child behavioral problem? The mediating role of digital literacy. *Heliyon*, *8*(6), e09788. https://doi.org/10.1016/j.heliyon.2022.e09788

Ramaiya, A., Choiriyyah, I., Heise, L., Pulerwitz, J., Blum, R. W., Levtov, R., … Moreau, C. (2021). Understanding the Relationship Between Adverse Childhood Experiences, Peer-Violence Perpetration, and Gender Norms Among Very Young Adolescents in Indonesia: A Cross-Sectional Study. *Journal of Adolescent Health*, *69*(1), S56–S63. https://doi.org/10.1016/j.jadohealth.2021.01.025

Rocliffe, P., O'Keeffe, B., Walsh, L., Stylianou, M., Woodforde, J., García-González, L., … MacDonncha, C. (2023). The Impact of Typical School Provision of Physical Education, Physical Activity and Sports on Adolescent Physical Activity Behaviors: A Systematic Literature Review. *Adolescent Research Review*, *8*(3), 359–385. https://doi.org/10.1007/s40894-022-00200-w

Rodwell, D., Alexander, M., Bates, L., Larue, G. S., & Watson, B. (2021). Parents' perceptions of driver education: A theoretically guided qualitative investigation. *Transportation Research Part F: Traffic Psychology and Behaviour*, *77*, 293–311. https://doi.org/10.1016/j.trf.2021.01.009

Roslan, F., Selvam, L., Pandian, T., Abdul Rahman, M. N. Bin, & Motevalli, S. (2022). A Systematic Review on Physical, Cognitive, and Social-Emotional Development of Pre-Schoolers. *International Journal of*

Academic Research in Progressive Education and Development, *11*(2). https://doi.org/10.6007/IJARPED/v11-i2/13013

Sagita, M., & Nisa, K. (2019). Pemanfaatan E-Learning Bagi Para Pendidik Di Era Digital 4.0. *Jurnal Sosial Humaniora Sigli*, *2*(2), 35–41. https://doi.org/10.47647/jsh.v2i2.169

Santos, G. dos, Guerra, P. H., Milani, S. A., Santos, A. B. D., Cattuzzo, M. T., & Ré, A. H. N. (2021). Comportamento sedentário e competência motora em crianças e adolescentes: revisão. *Revista de Saúde Pública*, *55*, 57. https://doi.org/10.11606/s1518-8787.2021055002917

Santosa, T., Pratama, R. S., Imron, F., & Nadzalan, A. M. (2024). Effectiveness Return Board To Improving Forehand Drive Table Tennis In Jawa Tengah. *Retos*, *53*, 445–452. https://doi.org/10.47197/retos.v53.102521

Santoso, A. (2023). Rumus Slovin : Panacea Masalah Ukuran Sampel ? *Suksma: Jurnal Psikologi Universitas Sanata Dharma*, *4*(2), 24–43. https://doi.org/10.24071/suksma.v4i2.6434

Sara, K., Risma, R., & Sutisna, N. (2020). Hubungan Durasi Tidur dan Perilaku Sedentari dengan Body Mass Index pada Siswa SMA Negeri 3 Ciamis. *Jurnal Terapan Ilmu Keolahragaan*, *5*(2), 120–127. https://doi.org/10.17509/jtikor.v5i2.27960

Stephani, M. R., Sumarno, G., & Wibowo, R. (2019). Early Childhood Motor Development: Descriptive study in moslem kindergarten school. *Proceedings of the 3rd International Conference on Sport Science, Health, and Physical Education (ICSSHPE 2018)*, *11*(Icsshpe 2018), 243–245. Paris, France: Atlantis Press. https://doi.org/10.2991/icsshpe-18.2019.69

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D* (2nd ed.; Sutopo, Ed.). Bandung: Alfabeta.

Sunanto, Asmara, B., Himawan, A., & Purwoto, S. P. (2022). Survey of Basic Movement Skills in Elementary School Students in The Midst of The Covid-19 Pandemic. *Physical Education Theory and Methodology*, *22*(3), S12–S20. https://doi.org/10.17309/tmfv.2022.3s.02

Sunanto, Himawan, A., Purwoto, S. P., Machmudah, & Handayani, Y. H. (2024). Basic motor movements of elementary school students following their experience with online learning during the COVID-19 pandemic period. *Sport TK*, *13*, 17. Retrieved from https://revistas.um.es/sportk

Sutapa, P., Pratama, K. W., Rosly, M. M., Ali, S. K. S., & Karakauki, M. (2021). Improving Motor Skills in Early Childhood through Goal-Oriented Play Activity. *Children*, *8*(11), 994. https://doi.org/10.3390/children8110994

Syamsudin, F., Qurnianungsih, E., Kinanti, R. G., Virgiawan, G. E., Putri, E. A. C., As'ad, M. R. F., … Herawati, L. (2023). Short Term HIIT increase VO2max, but can't decrease Free Fatty Acids in Women Sedentary Lifestyle. *Retos*, *50*(4), 380–386.

Tarida, A. R., & Khadafy, A. R. (2020). *Statistik Paud Pendidikan Anak Usia Dini 2019/2020* (1st ed.). Tangerang: Pusat Data dan Teknologi Informasi Kementerian Pendidikan dan Kebudayaan.

Taufik, T., Winarno, M. E., Hariadi, I., Yudasmara, D. S., & Fadhli, N. R. (2024). Exploring the validity and reliability of Active Motor Card: A Comprehensive Assessment of Gross Motor Development and Physical Fitness in Children Aged 6-9 Years. *Retos*, *54*, 100–105. Retrieved from https://recyt.fecyt.es/index.php/retos/index

Tonge, K. L., Jones, R. A., & Okely, A. D. (2016). Correlates of children's objectively measured physical activity and sedentary behavior in early childhood education and care services: A systematic review. *Preventive Medicine*, *89*, 129–139. https://doi.org/10.1016/j.ypmed.2016.05.019

Tonge, K. L., Jones, R. A., & Okely, A. D. (2021). The relationship between educators' and children's physical activity and sedentary behaviour in early childhood education and care. *Journal of Science and Medicine in Sport*, *24*(6), 580–584. https://doi.org/10.1016/j.jsams.2021.02.003

Truelove, S., Bruijns, B. A., Vanderloo, L. M., O'Brien, K. T., Johnson, A. M., & Tucker, P. (2018). Physical activity and sedentary time during childcare outdoor play sessions: A systematic review and meta-analysis. *Preventive Medicine*, *108*, 74–85. https://doi.org/10.1016/j.ypmed.2017.12.022

UNICEF. (2024). GOAL 4: QUALITY EDUCATION.

Untung, S. H., Pramono, I. A., Khasanah, L., Awwaluddin, A., Kholis, N., Muddin, M. I., … Maulana, A. R. M. (2023). *The Gold Age of Childhood: Maximizing Education Efforts for Optimal Development*. Atlantis Press SARL. https://doi.org/10.2991/978-2-38476-052-7_30

Vega-Díaz, M., González-García, H., & de Labra, C. (2023). Influence of parental involvement and parenting styles in children's active lifestyle: a systematic review. *PeerJ*, *11*, e16668. https://doi.org/10.7717/peerj.16668

Vilardell-Dávila, A., Martínez-Andrade, G., Klünder-Klünder, M., Miranda-Lora, A. L., Mendoza, E., Flores-Huerta, S., … Vilchis-Gil, J. (2023). A Multi-Component Educational Intervention for Addressing Levels of Physical Activity and Sedentary Behaviors of Schoolchildren. *International Journal of Environmental Research and Public Health*, *20*(4), 3003. https://doi.org/10.3390/ijerph20043003

Wickramaratne, P. J., Yangchen, T., Lepow, L., Patra, B. G., Glicksburg, B., Talati, A., … Weissman, M. M. (2022). Social connectedness as a determinant of mental health: A scoping review. *PLOS ONE*, *17*(10), e0275004. https://doi.org/10.1371/journal.pone.0275004

Widiastuti, Taufik, M. S., Setiakarnawijaya, Y.,

Zulqarnain Mohd Nasir, M., Wardoyo, H., Wijayanto, A., … Purwoto, S. P. (2024). Development of the ultrasonic sensor based modification coordination test device. *Retos*, *58*, 598–606. Retrieved from https://recyt.fecyt.es/index.php/retos/index

Wu, X. Y., Han, L. H., Zhang, J. H., Luo, S., Hu, J. W., & Sun, K. (2017). The influence of physical activity, sedentary behavior on health-related quality of life among the general population of children and adolescents: A systematic review. *PLOS ONE*, *12*(11), e0187668. https://doi.org/10.1371/journal.pone.0187668

Yu, J. J., Capio, C. M., Abernethy, B., & Sit, C. H. P. (2021). Moderate-to-vigorous physical activity and sedentary behavior in children with and without developmental coordination disorder: Associations with fundamental movement skills. *Research in Developmental Disabilities*, *118*, 104070. https://doi.org/10.1016/j.ridd.2021.104070

Zain, Z. M., Jasmani, F. N. N., Haris, N. H., & Nurudin, S. M. (2022). Gadgets and Their Impact on Child Development. *International Academic Symposium of Social Science 2022*, (Mcmc), 6. Basel Switzerland: MDPI. https://doi.org/10.3390/proceedings2022082006

Zhang, Z., Kuzik, N., Adamo, K. B., Ogden, N., Goldfield, G. S., Okely, A. D., … Carson, V. (2021). Associations Between the Child Care Environment and Children's In-Care Physical Activity and Sedentary Time. *Health Education & Behavior*, *48*(1), 42–53. https://doi.org/10.1177/1090198120972689

Zou, L., Wang, T., Herold, F., Ludyga, S., Liu, W., Zhang, Y., … Hossain, M. M. (2023). Associations between sedentary behavior and negative emotions in adolescents during home confinement: Mediating role of social support and sleep quality. *International Journal of Clinical and Health Psychology*, *23*(1), 100337. https://doi.org/10.1016/j.ijchp.2022.100337

Datos de los/as autores/as y traductor/a:

Dewi Wahyuni	wahyunidewi3003@students.unnes.ac.id	Autor/a
Nasuka	nasuka@mail.unnes.ac.id	Autor/a
Heny Setyawati	henysetyawati@mail.unnes.ac.id	Autor/a
Sulaiman	sulaiman@mail.unnes.ac.id	Autor/a
Rivan Saghita Pratama	rivan.saghita.pratama@mail.unnes.ac.id	Autor/a – Traductor/a