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Comprehensive study on elementary school children's 24-hours movement guidelines in physical education class

Yusra Dinafi[1abc], Adhe Saputra[2bcd,*], & Ahmad Muzaffar[3cde]

Universitas Jambi, Indonesia

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ABSTRACT

Sedentary behavior changes during the pandemic caused a crucial reduction in the need for physical education and the time involved in physical activity so all parents and teachers at school experienced this challenge. The purpose of this study was to investigate the 24-hours movement guidelines, sleep quality, and screen time during and after the pandemic. This study used a cross-sectional method with an observational approach. The total subjects in this study were 1070 elementary school students with an average age of 10.69 ± 0.83 years, body weight 37.32 ± 10.57 kg, and height 139.66 ± 9.78 cm. The results showed that after the pandemic, children's playing habits outdoors and sleep duration increased sharply as the time in front of the screen decreased, although they tended to be the same as during the pandemic. Thus, it is hoped that these findings can serve as a reference for parents and teachers in schools to adopt a healthy lifestyle by prioritizing physical activity compared to using screens. so that habits during a pandemic can be overcome and students can improve their fitness levels. This investigation is limited to Jambi and its surrounding areas. Additional research can investigate the rise in the number of elementary school and respondents, as well as expand the scope to include the province, island, and country of Indonesia. This study findings may assist in restoring the physical activity behaviors of elementary school-aged children whose well-being is presently being compromised by excessive screen time, so that habits during a pandemic can be overcome and students can improve their fitness levels.

Keywords: physical activity; screen time; sleep duration; 24-hour movement guideline

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Corresponding Author: Adhe Saputra, Department of Sport Education, Faculty of Teacher Training and Education, Universitas Jambi, Jambi, Indonesia
Email: adhe_saputra@unja.ac.id

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INTRODUCTION

The activity pattern of elementary school-age children still depends on the habits carried out at their respective homes. This is because physical education subject activities in schools are still limited in time, which is once a week. To help promote health for elementary school-age children, recommendations for 24-hours movement are considered to be appropriate for children's needs and make it easier for teachers to identify and control children's activities (Carson et al., 2017; Lee et al., 2018; Tremblay et al., 2011). Motion recommendations consisting of fulfilling the aspects of sweat, step, sleep, and screen (Tremblay et al., 2016, 2017) felt able to encourage health promotion through physical activity in elementary school-aged

children (Guan et al., 2020). Children should practice healthy sleep quality (habits and practices conducive to achieving restful sleep), limit sedentary behavior (especially screen time), and participate in a variety of physical activities in a variety of environments (Tremblay et al., 2016).

Elementary school-aged children are expected to be able to move actively and energetically by involving aerobic activity for at least 60 minutes per day (sweating), followed by a variety of structured and unstructured physical activities (steps) (Howie et al., 2020; Knell et al., 2019), and the optimal sleep duration is 9-11 hours every night for ages 5-13 years. No more than 2 hours of recreational use of screen time (Arufe-GirÁldez et al., 2020; Xu et al., 2016). Then, limit sitting time that is too long in children's (Cliff et al., 2017). All of these things need to be fulfilled every day so that the fulfillment of the child's quality of life can ultimately be achieved. If it has not been achieved or is not achieved and on the way, there is no effort to fulfill the recommendations, the risk that is felt most quickly is that the child will experience an increase in body fat levels, which will lead to obesity as a result of sedentary behavior that lasts all day (Decraene et al., 2021).

Before the pandemic, children were active and energetic in various motor movements. However, when the pandemic hit, all the limitations of movement began to appear and the habit of being sedentary increased sharply (Bhargava & R, 2016). The expectation that is expected when all movement restrictions end is the emergence of changes in behavior in playing outdoors without restrictions like in the period before the pandemic hit. However, the reality is the opposite, in fact, the habits in front of the screen during the pandemic have increased sharply, have not changed at all, and are still being maintained and the impact continues to get worse (Ghram et al., 2021; Xiang et al., 2020). The Covid-19 pandemic caused a crucial reduction in the need for physical education and the time involved in physical activity, so challenges were experienced by all teachers in schools (Pavlovic et al., 2021). The problem does not stop there, this is also related to taking other studies that show sedentary behavior that occurred before and during the pandemic, which investigated the behavior of decreased sleep time and increased time in front of the screen (Fauziah et al., 2022; Nopembri et al., 2023), followed by exploring the relationship between habit in front of the screen and decreased playing habits (Fauziah et al., 2022). Therefore, in order to prevent prolonged sedentary habits, it is necessary to initiate a new movement from the teacher in generating the desire to move, sweat, and socialize more actively than before.

Traditional methods have persistently been used to assess student fitness within schools, encompassing activities like the 40-metre run, upright jump, push-ups, sit-ups, 600-metre run, and adapted exercise routines (Arif, 2020; Permana, 2016). However, these assessments have yet to encompass a comprehensive understanding of how the fulfilment process relates to broader aspects of student well-being, including body composition, cardiovascular health, musculoskeletal strength, emotional regulation, and overall quality of life (Alvarez et al., 2021). Thus, there is a compelling need for novel testing methods that can delve deeper into student habits, providing a robust foundation for analysis and study by both sports practitioners and school educators.

The integration of the 24-hours movement guidelines has emerged as a recommended approach tailored to the unique needs of elementary school children, emphasising four key aspects: physical activity, step count, sleep duration, and screen time (Decraene et al., 2021; Hyunshik et al., 2021; Tapia-Serrano et al., 2021). This study seeks to investigate and uncover insights derived from data collected from elementary school-age children, specifically examining their patterns of active and energetic behaviour, sleep quality, and screen time duration. Through this study, we the reseachers aim to elucidate the pivotal roles of both educators and parents in providing daily support to align with the recommended guidelines. Ultimately, the anticipated long-term impact rests upon the potential transformation of the Sport Development Index in Indonesia, particularly in the geographical region where this study is conducted. The early establishment of these habits is anticipated to streamline future implementation efforts, fostering a more health-conscious and active generation.

METHOD

This study used a cross-sectional method with an observational study approach. This methodwas used to collect data at a certain time with the aim of comparing healthy lifestyle behaviors among children during the pandemic and after the Covid-19 pandemic. Initial data was collected during the Covid-19 pandemic starting from January-March 2022, and the second data was collected in October-December 2022. Subjects who took part in this study were based on inclusion criteria, namely, participants who had no history of cardiovascular disease, were healthy and were aged 9-11 years. Participant data was taken from 20 elementary schools in the city of Jambi with a total number of participants of 1070 male and female elementary school students with an average age of 10.69 ± 0.83 years, body weight 37.32 ± 10.57 kg, and height 139.66 ± 9.78 cm. The data collected from this study included anthropometry (age, weight, and height), physical activity, screen time, and sleep duration. Anthropometric data were collected directly, while other parameters such as physical activity, screen time, and sleep duration used the 24-hours movement guidelines questionnaireby filling out the questionnaire directly delivered and accompanied by each class teacher.

Measurement and Research Procedures

Anthropometry

Data collection on the age of the children was carried out using a questionnaire which was filled out independently by the subject and accompanied by the class teacher, while height was measured using the GEA HT721 Digital Stature Meter, and body weight was measured using a SECA 762 brand scale. The procedure for collecting data This was done by having the subject stand upright on the unit by placing his feet on the surface of the scale without any shoes.

24-Hours Movement Guidelines

Children's physical activity data was measured using the Physical Activity Questionnaire For Older Children (PAQ-C) questionnaire (Marasso et al., 2021). The instrument consisted of nine items related to the type and frequency of participation in physical activity over the last 7 days. Participants self-reported the frequency of participation from a list of activities or moments such as physical education, school breaks, lunch hours, after school, evenings, and weekends. Each answer was scored on a 5-point scale ranging from 1 to 5. To calculate a physical activity index score, the average value of all responses (higher scores indicate higher levels of physical activity) was calculated. Physical activity recommendations were categorized based on the scores obtained and then classified, values (1) "very low", values (2) "low" values (3) "moderate", values (4) "high", and values 5 "very high".

Screen Time

Screen time was obtained by using the Sedentary Leisure Behavior questionnaire for children and adolescents, which was validated in Spanish adolescents (Arufe-GirÁldez et al., 2020). Students self-reported their daily average time spent engaging in four screen-sitting behaviors (ie: TV, video games, computers, and cell phones). The average daily screen time spent for each screen behavior was calculated using a 5:2 ratio (i.e. ((Daily screen time on weekends ⇥ 5) + (Daily screen time on weekends ⇥ 2)) ÷ 7). The total daily screen time was measured by adding up the different daily screen time behaviors.

Sleep Duration

All subjects individually reported sleep duration on weekdays and weekends. Daily sleep duration was assessed by weighting weekdays and weekend days in a 5:2 ratio (that is, (Daily sleep duration on weekdays ⇥ 5) + (Daily sleep duration on weekends ⇥ 2)) ÷ 7). The 24-Hours Movement Guidelines for Youth recommend moderate to vigorous physical activity of 60 minutes/day, < 2 hours/day of screen time, and 8-10 hours of sleep/day. Participants were classified into two groups for each movement behavior: "meeting the guideline" and "not meeting the guideline" (Arufe-GirÁldez et al., 2020).

Procedure

The procedures carried out in this study included, in the early stages the researcher contacted the principal of each school in the city of Jambi to ask for permission to collect data at school, then parents were given an explanation and a written consent letter regarding the purpose and objectives of this research. In the second stage, all participants took anthropometric measurements (age, height, and weight) which were carried out directly at school and accompanied by the class teacher, then the physical activity questionnaire, sleep duration, and screen time were carried out in class guided by homeroom teacher each. Data collection was carried out twice in the same year and with the same subject.

Data Analysis

The presentation of the research data was shown in the form of an average value and standard deviation. Anthropometric data such as age, weight, and height are tested using one-way analysis or the one-way ANOVA test which aims to compare the differences between during the pandemic vs post-Covid-19 pandemic. Furthermore, the level of physical activity, sleep duration, and screen time was tested using a paired T-test to see comparisons between data during the pandemic and after the Covid-19 pandemic. All statistical analyses used the SPSS version 22 application with a significance level of $p < 0.05$.

RESULTS AND DISCUSSION

The results of this study indicated that anthropometric data from the two conditions (pandemic vs after-pandemic) did not not show any significant differences in the age, weight, and height of elementary school students where students' weight had a higher score during the pandemic compared to post-pandemic, while height showed an increase post-pandemic, but these two variables did not show any statistical difference (see Table 1).

Table 1. Subject's Anthropometric Data during the Pandemic vs. Post-Pandemic Covid-19

Variable	Total (N= 1070)	Group		p-value
		Pandemic (n= 535)	post-pandemic (n= 535)	
Age (years)	10.69 ± 0.83	10.68 ± 0.84	10.71 ± 0.82	0.509
Weight (kg)	37.32 ± 10.57	37.35 ± 10.58	37.29 ± 10.57	0.937
Hight (cm)	139.66 ± 9.78	139.63 ± 9.82	139.70 ± 9.75	0.902

*significant average difference $p < 0.05$

Table 2. Physical Activity Data, Sleep Duration, Duration of Screen use during the Pandemic vs Post-Pandemic

Variable	Total (N= 1070)	Group		p-value
		Pandemic (n= 535)	post-pandemic (n= 535)	
PA (METs)	2.83 ± 0.76	2.70 ± 0.73	2.96 ± 0.76	0.001*
Sleep duration (h/day)	6.25 ± 1.40	8.12 ± 1.45	8.38 ± 1.34	0.002*
Screen time (h/day)	4.89 ± 1.74	4.96 ± 1.74	4.82 ± 1.75	0.199

PA = Physical Activity
significant average difference $p < 0.05$

Table 2 shows that the average score of students' physical activity during the pandemic vs post the pandemic experienced a significant difference, where the PA score during the pandemic was 2.70 METs, while the post-pandemic was 2.96 METs. Furthermore, sleep duration also experienced an increase between the pandemic vs post-pandemic, where the duration of sleep after the pandemic was higher when compared to during the pandemic whereas for the duration of screen use in these two conditions, it did not show a statistically significant difference.

The discovery of movement habits, sleep patterns, and duration of screen use in children in the Jambi area showed that for outdoor playtime, it was known that the average students physical activity score during the pandemic compared to post-pandemic experienced significant differences, where the physical activity score during the pandemic was at 2.70 METs, while post-pandemic it was at 2.96 METs. This is in line with several previous studies which raised the urgency of the decline that occurred in children's physical activity habits compared to before and during the pandemic, which was conducted in three major cities on the island

of Java. This study investigates that the level of physical activity decreased sharply when the pandemic took place compared to before the pandemic (Fauziah et al., 2022). One of the reasons for this physical education learning which was changed to an online mode.

Online physical education learning contributes the most to meeting or even exceeding the screen time recommendations, while the essence of outdoor play is precisely the most important for implementing the adequate and appropriate physical activity. Promoting safe and responsible outdoor activities, sustaining physical education learning outcomes during distance learning, and setting up pre-planned daily routines requires consistency in helping children maintain a healthy active lifestyle during a pandemic situation (Kovacs et al., 2022; Mocanu et al., 2021). These factors should be prioritized by policymakers, schools, and parents (Kovacs et al., 2022).

The recommendations regarding the 24-hours moving recommendations declared by one of them by Canada (Moore et al., 2020; Tremblay et al., 2016), the roots of the theory continue to spread to various countries in the world, not only multi-country studies in Europe (Kovacs et al., 2022), the mapping of the 24-hours recommendations have reached the continent of Asia, both in Japan (Hyunshik et al., 2021), Singapore (Chia et al., 2020), Australia (Cliff et al., 2017), and other countries. In Indonesia, studies in three major cities also concluded that there was a very significant increase in screen time when comparing before and during the pandemic (Nopembri et al., 2023), either in terms of the type of entertainment or no-show. When you increase screen time, it also correlates with decreased sleep and plays time (Fauziah et al., 2022). The urgency of this study arises because there has been no further study regarding screen time in comparing conditions during and after the pandemic ended. The evidence from this study also concluded that the variable length of time in front of the screen has a positive trend which tends to describe a pattern of decreasing screen time, although it is not significant and tends to be the same as conditions during a pandemic. This completes the researchers' curiosity about the condition of screen time in children before, during, and after the pandemic. The results of this study are inversely proportional to previous research, especially those carried out during a pandemic, a very significant increase in future screen time is common knowledge (Celis-Morales et al., 2018; Trina et al., 2018; Xu et al., 2016). In direct proportion to the significant relationship between playing and screen time, the higher the playing time, the lower the screen time which is also significant, and vice versa (Celis-Morales et al., 2018; Kovacs et al., 2022; Stienwandt et al., 2022).

Furthermore, sleep duration has also increased between the pandemic vs post-pandemic, where the duration of sleep time after the pandemic is higher when compared to during the pandemic, whereas the duration of screen use in these two conditions did not show a statistically significant difference. For children 5-17 years old, 9-11 hours of uninterrupted sleep is highly recommended (Tremblay et al., 2016). In contrast, sleep deprivation increases the risk of cardiometabolic disease in children and adolescents (Alvarez et al., 2021) and results in anxiety or mood swings, which can be exacerbated by poor mental health during the Covid-19 pandemic (Jiao et al., 2020). Though sleep is very important for children as the hormones necessary for growth and development are released during the sleep state (Paruthi et al., 2016). However, during the pandemic, children were less active, preferring sedentary activities, engaging more in screen-based recreational activities, and spending more time sleeping than before the Covid-19 pandemic (Wang et al., 2020). Therefore, this study also helps refine a small part of the anxiety that has arisen regarding the picture of what conditions will be obtained after this pandemic ends on the variable sleep duration, besides playing outside the field and in front of the screen habits. Furthermore, there needs to be comprehensive research involving tens or hundreds of cities and provinces in Indonesia to perfect the review of data regarding outdoor play time (play or outdoor play), sleep patterns, and screen time.

CONCLUSION

In the period following the pandemic, a notable shift in behaviour was observed among elementary school students. The habit of playing outdoors experienced a significant increase, coupled with an extended duration of sleep, while the time spent in front of screens notably decreased. However, it is noteworthy that screen time tendencies tended to align with those observed during the pandemic. This study findings shed

light on the immediate impact of the pandemic on children's activity patterns and screen usage. Nevertheless, there are important limitations to consider. This investigation was conducted exclusively in Jambi and its surrounding areas, which limits the generalizability of the results. To build a more comprehensive understanding, future research should aim to expand the scope of study to include major cities on Sumatra Island and, ideally, encompass all regions across Indonesia.

Furthermore, there is an urgent need for broader research efforts to map physical activity patterns, sleep durations, and screen time habits specifically among elementary school-aged children throughout Indonesia. Such comprehensive research could provide invaluable insights into the well-being of this demographic. In conclusion, this study findings hold promise for addressing the challenges posed by excessive screen time and sedentary behaviour among elementary school students. By prioritising physical activity and outdoor play, parents and educators can play a vital role in improving the fitness levels and overall well-being of children. As we move forward, it is expected that future research will further illuminate these trends, enabling more tailored interventions and policies to promote healthier lifestyles among young Indonesians.

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CONFLICT OF INTEREST

The authors state no conflict of interest

REFERENCES

Alvarez, C., Paredes-Arévalo, L., Obando, I., Leal, M., Avila, Y., Sadarangani, K. P., Delgado-Floody, P., Alonso-Martínez, A. M., & Izquierdo, M. (2021). Consequences of Low Sleep Duration in Anthropometric and Body Composition Parameters of Chilean Preschoolers. *Children*, *8*(1), 12–19. https://doi.org/10.3390/children8010008

Arif, Y. (2020). Identification of Jasmani Physical Fitness Through (TKJI) Children Age 10-12 Years in Class V Students Of SD Inpres Bertingkat Kelapa Lima 1, 2 and 3 Kupang Cities. *Kinestetik : Jurnal Ilmiah Pendidikan Jasmani*, *4*(2), 18–24. https://doi.org/10.33369/jk.v4i2.11430

Arufe-GirÁldez, Ví., Sanmiguel-Rodríguez, A., Zagalaz-SÁnchez, M. L., CachÓn-Zagalaz, J., & GonzÁlez-Valero, G. (2020). Sleep, Physical Activity and Screens In 0-4 Years Spanish Children during the COVID-19 Pandemic: Were the WHO Recommendations Met? *Journal of Human Sport and Exercise*, *17*(3), 1–20. https://doi.org/10.14198/jhse.2022.173.02

Bhargava, M., & Raghuveer, P. (2016). Physical Activity and Sedentary Lifestyle Towards Teenagers' Overweight/Obesity Status. *International Journal of Community Medicine and Public Health*, *3*(3), 988–988. https://doi.org/10.18203/2394-6040.ijcmph20160942

Carson, V., Chaput, J.-P., Janssen, I., & Tremblay, M. S. (2017). Health Associations with Meeting New 24-Hour Movement Guidelines for Canadian Children and Youth. *Preventive Medicine*, *95*, 7–13. https://doi.org/10.1016/j.ypmed.2016.12.005

Celis-Morales, C. A., Lyall, D. M., Steell, L., Gray, S. R., Iliodromiti, S., Anderson, J., Mackay, D. F., Welsh, P., Yates, T., Pell, J. P., Sattar, N., & Gill, J. M. R. (2018). Associations of Discretionary Screen Time with Mortality, Cardiovascular Disease and Cancer are Attenuated by Strength, Fitness and Physical Activity: Findings from the UK Biobank Study. *BMC Medicine*, *16*(1), 1–14. https://doi.org/10.1186/s12916-018-1063-1

Chia, M. Y. H., Tay, L. Y., & Chua, T. B. K. (2020). Quality of Life and Meeting 24-h WHO Guidelines Among Preschool Children in Singapore. *Early Childhood Education Journal*, *48*(3), 313–323. https://doi.org/10.1007/s10643-019-00987-9

Cliff, D. P., McNeill, J., Vella, S. A., Howard, S. J., Santos, R., Batterham, M., Melhuish, E., Okely, A. D., & De Rosnay, M. (2017). Adherence to 24-Hour Movement Guidelines for the Early Years and associations with social-cognitive development among Australian preschool children. *BMC Public Health*, *17*(5), 208–215. https://doi.org/10.1186/s12889-017-4858-7

Decraene, M., Verbestel, V., Cardon, G., Iotova, V., Koletzko, B., Moreno, L. A., Miguel-Berges, M. L., Gurzkowska, B., Androutsos, O., Manios, Y., & De Craemer, M. (2021). Compliance with The 24-Hour Movement Behavior Guidelines and Associations with Adiposity in European Preschoolers: Results from the Toybox-Study. *International Journal of Environmental Research and Public Health*, *18*(14), 1–24. https://doi.org/10.3390/ijerph18147499

Fauziah, P. Y., Kusumawardani, E., Nopembri, S., Mulyawan, R., Susilowati, I. H., Nugraha, S., Alimoeso, S., Hasiholan, B. P., Fauzi, L., Cahyati, W. H., Rahayu, T., Chua, T. B. K., & Chia, M. Y. H. (2022). Play–Sleep Nexus in Indonesian Preschool Children before and during the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, *19*(17), 1–11. https://doi.org/10.3390/ijerph191710695

Ghram, A., Briki, W., Mansoor, H., Al-Mohannadi, A. S., Lavie, C. J., & Chamari, K. (2021). Home-Based Exercise can be Beneficial for Counteracting Sedentary Behavior and Physical Inactivity during the Covid-19 Pandemic in Older Adults. In *Postgraduate Medicine,133*(5), 469-480. https://doi.org/10.1080/00325481.2020.1860394

Guan, H., Okely, A. D., Aguilar-Farias, N., del Pozo Cruz, B., Draper, C. E., El Hamdouchi, A., Florindo, A. A., Jáuregui, A., Katzmarzyk, P. T., Kontsevaya, A., Löf, M., Park, W., Reilly, J. J., Sharma, D., Tremblay, M. S., & Veldman, S. L. C. (2020). Promoting Healthy Movement Behaviours among Children during the Covid-19 Pandemic. *The Lancet Child and Adolescent Health*, *4*(6), 416–418. https://doi.org/10.1016/S2352-4642(20)30131-0

Howie, E. K., Joosten, J., Harris, C. J., & Straker, L. M. (2020). Associations Between Meeting Sleep, Physical Activity or Screen Time Behaviour Guidelines and Academic Performance in Australian School Children. *BMC Public Health*, *20*(1), 1–10. https://doi.org/10.1186/s12889-020-08620-w

Hyunshik, K., Jiameng, M., Sunkyoung, L., & Ying, G. (2021). Change in Japanese Children's 24-Hour Movement Guidelines and Mental Health during the Covid-19 Pandemic. *Scientific Reports*, *11*(1), 1–10. https://doi.org/10.1038/s41598-021-01803-4

Jiao, W. Y., Wang, L. N., Liu, J., Fang, S. F., Jiao, F. Y., Pettoello-Mantovani, M., & Somekh, E. (2020). Behavioral and Emotional Disorders in Children during the COVID-19 Epidemic. *The Journal of Pediatrics*, *221*, 264-266.e1. https://doi.org/10.1016/j.jpeds.2020.03.013

Knell, G., Durand, C. P., Kohl, H. W., Wu, I. H. C., & Pettee Gabriel, K. (2019). Prevalence and Likelihood of Meeting Sleep, Physical Activity, and Screen-Time Guidelines Among US Youth. *JAMA Pediatrics*, *173*(4), 387–389. https://doi.org/10.1001/jamapediatrics.2018.4847

Kovacs, V. A., Starc, G., Brandes, M., Kaj, M., Blagus, R., Leskošek, B., Suesse, T., Dinya, E., Guinhouya, B. C., Zito, V., Rocha, P. M., Gonzalez, B. P., Kontsevaya, A., Brzezinski, M., Bidiugan, R., Kiraly, A., Csányi, T., & Okely, A. D. (2022). Physical Activity, Screen Time and the Covid-19 School Closures in Europe–An Observational Study in 10 Countries. *European Journal of Sport Science*, *22*(7), 1094–1103. https://doi.org/10.1080/17461391.2021.1897166

Lee, E.-Y., Spence, J. C., Tremblay, M. S., & Carson, V. (2018). Meeting 24-Hour Movement Guidelines for Children and Youth and Associations with Psychological Well-Being among South Korean Adolescents. *Mental Health and Physical Activity*, *14*, 66–73. https://doi.org/10.1016/j.mhpa.2018.02.001

Marasso, D., Lupo, C., Collura, S., Rainoldi, A., & Brustio, P. R. (2021). Subjective Versus Objective Measure of Physical Activity: A Systematic Review and Meta-Analysis of the Convergent Validity of the Physical Activity Questionnaire for Children (PAQ-C). *International Journal of Environmental Research and Public Health*, *18*(7), 1–14. https://doi.org/10.3390/ijerph18073413

Mocanu, G. D., Murariu, G., Iordan, D. A., Sandu, I., & Munteanu, M. O. A. (2021). The Perception of the Online Teaching Process during the Covid-19 Pandemic for the Students of the Physical Education and Sports Domain. *Applied Sciences (Switzerland)*, *11*(12), 1–22. https://doi.org/10.3390/app11125558

Moore, S. A., Faulkner, G., Rhodes, R. E., Brussoni, M., Chulak-Bozzer, T., Ferguson, L. J., Mitra, R., O'Reilly, N., Spence, J. C., Vanderloo, L. M., & Tremblay, M. S. (2020). Impact of the Covid-19 Virus Outbreak on Movement and Play Behaviours of Canadian Children and Youth: A National Survey. *International Journal of Behavioral Nutrition and Physical Activity*, *17*(1), 1–11. https://doi.org/10.1186/s12966-020-00987-8

Nopembri, S., Mulyawan, R., Fauziah, P. Y., Kusumawardani, E., Susilowati, I. H., Fauzi, L., Cahyati, W. H., Rahayu, T., Chua, T. B. K., & Chia, M. Y. H. (2023). Time to Play in Javanese Preschool Children—An Examination of Screen Time and Playtime Before and During the Covid-19 Pandemic. *International Journal of Environmental Research and Public Health*, *20*(3), 1–12. https://doi.org/10.3390/ijerph20031659

Paruthi, S., Brooks, L. J., D'Ambrosio, C., Hall, W. A., Kotagal, S., Lloyd, R. M., Malow, B. A., Maski, K., Nichols, C., Quan, S. F., Rosen, C. L., Troester, M. M., & Wise, M. S. (2016). Consensus Statement of the American Academy of Sleep Medicine on the Recommended amount of Sleep for Healthy Children: Methodology and Discussion. *Journal of Clinical Sleep Medicine*, *12*(11), 1549–1561. https://doi.org/10.5664/jcsm.6288

Pavlovic, A., DeFina, L. F., Natale, B. L., Thiele, S. E., Walker, T. J., Craig, D. W., Vint, G. R., Leonard, D., Haskell, W. L., & Kohl, H. W. (2021). Keeping Children Healthy during and after Covid-19 Pandemic: Meeting Youth Physical Activity Needs. *BMC Public Health*, *21*(1), 1–8. https://doi.org/10.1186/s12889-021-10545-x

Permana, R. (2016). Penguasaan Rangkaian Tes Kebugran Jasmani Indonesia (TKJI) melalui Diskusi dan Simulasi. *Reflikasi Edukatika*, *6*(2), 119–129. https://doi.org/10.24176/re.v6i2.603

Stienwandt, S., Cameron, E. E., Soderstrom, M., Casar, M., Le, C., & Roos, L. E. (2022). Family Factors Associated with Hands-On Play and Screen Time During the COVID-19 Pandemic. *Child and Youth Care Forum*, *51*(6), 1091–1115. https://doi.org/10.1007/s10566-021-09668-4

Tapia-Serrano, M. A., Sevil-Serrano, J., & Sánchez-Miguel, P. A. (2021). Adherence to 24-Hour Movement Guidelines among Spanish Adolescents: Differences between Boys and Girls. *Children*, *8*(2), 1–10. https://doi.org/10.3390/children8020095

Tremblay, M. S., Aubert, S., Barnes, J. D., Saunders, T. J., Carson, V., Latimer-Cheung, A. E., Chastin, S. F. M., Altenburg, T. M., Chinapaw, M. J. M., Aminian, S., Arundell, L., Hinkley, T., Hnatiuk, J., Atkin, A. J., Belanger, K., Chaput, J. P., Gunnell, K., Larouche, R., Manyanga, T., … 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. https://doi.org/10.1186/s12966-017-0525-8

Tremblay, M. S., Carson, V., Chaput, J. P., Connor Gorber, S., Dinh, T., Duggan, M., Faulkner, G., Gray, C. E., Grube, R., Janson, K., Janssen, I., Katzmarzyk, P. T., Kho, M. E., Latimer-Cheung, A. E., LeBlanc, C., Okely, A. D., Olds, T., Pate, R. R., Phillips, A., … Zehr, L. (2016). Canadian 24-Hour Movement Guidelines for Children and Youth: an Integration of Physical Activity, Sedentary Behaviour, and Sleep. *Applied Physiology, Nutrition and Metabolism*, *41*(6), S311–S327. https://doi.org/10.1139/apnm-2016-0151

Tremblay, M. S., Leblanc, A. G., Kho, M. E., Saunders, T. J., Larouche, R., Colley, R. C., Goldfield, G., & Gorber, S. C. (2011). Systematic Review of Sedentary Behaviour and Health Indicators in School-Aged Children and Youth. *International Journal of Behavioral Nutrition and Physical Activity*, *8*(1), 1–22. https://doi.org/10.1186/1479-5868-8-98

Trina, H., Helen, B., Valerie, C., & Megan, T. (2018). Cross Sectional Associations of Screen Time and Outdoor Play with Social Skills in Preschool Children. *PLoS ONE*, *13*(4), 1–15. https://doi.org/10.1371/journal.pone.0193700

Wang, G. H., Zhang, Y. T., Zhao, J., Zhang, J., & Jiang, F. (2020). Mitigate the Effects of Home Confinement on Children during the Covid-19 Outbreak. *Journal of Shanghai Jiaotong University (Medical Science)*, *40*(3), 279–281. https://doi.org/10.3969/j.issn.1674-8115.2020.03.001

Xiang, M., Zhang, Z., & Kuwahara, K. (2020). Impact of COVID-19 Pandemic on Children and Adolescents' Lifestyle Behavior Larger than Expected. *Progress in Cardiovascular Diseases*, *63*(4), 531–532. https://doi.org/10.1016/j.pcad.2020.04.013

Xu, H., Wen, L. M., Hardy, L. L., & Rissel, C. (2016). A 5-Year Longitudinal Analysis of Modifiable Predictors for Outdoor Play and Screen-Time of 2- to 5-Year-Olds. *International Journal of Behavioral Nutrition and Physical Activity*, *13*(1), 1–9. https://doi.org/10.1186/s12966-016-0422-6

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