



REVIEW ARTICLE

CURRENT TRENDS AND ISSUES INVOLVING SCREEN TIME AND PHYSICAL ACTIVITY ENGAGEMENT AMONG SCHOOL STUDENTS: A THEMATIC REVIEW

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Abstract

Study purpose. Physical inactivity and excessive screen time engagement among school-aged children is a global issue which is known to be linked with sedentary lifestyle. Several studies were conducted about sedentary behavior among children, but still lacking is a review paper that analyzes the current trends and issues on physical inactivity and excessive screen time. This study aims to identify the current issues and trends on physical activity and screen time among school students discussed in the articles published from 2018-2022.

Materials and methods. Quantitative and qualitative methods were used in this study. Quantitative approach was used to explain the trends and statistics in terms of literatures geographical dissemination and specified topic or themes developed within the period from 2018 to 2022. Qualitative approach was implemented to establish patterns and themes. This study generates themes and patterns from the articles published from 2018 to 2022. Thirty articles were included via database searched from SCOPUS, SportsDiscus and PubMed.gov. Thematic analysis was done using ATLAS.ti 22.

Results. Five main themes were generated: 1) behavioral impact; 2) engagement level: age and gender specific; 3) association to socio-economic status; 4) impact on adiposity; and 5) school curriculum role.

Conclusions. Excessive screen time and physical inactivity have a diverse effect on young populations health. Understanding the patterns and themes generated in this study will be of great help in terms of designing a program of activity that will counter measure the negative effect associated with sedentary lifestyle.

Keywords: screen time, physical activity, sedentary lifestyle, children.

Introduction

Physical inactivity is one of the current health global concerns among children. Majority of the school students are experiencing this phenomenon. According to Zhu et al. (2019) sedentary lifestyle among children was significantly high globally. In connection to that, World Health Organization (2020) created a guideline for physical activity and sedentary behavior. Recommended engagement time for physical activity among children and adolescents was at least average of 60 minutes per day and less than 2 hours of spending time on screen as well Bull et al. (2020). Compliance

and other related factors to the movement guidelines become a popular topic to explore across the globe.

Despite of being one of the concerns in child's development over previous decade, managing the lifestyle in terms of being active and lessening the screen engagement time among society was still an issue Scully et al., (2022). Movement guidelines were made to address the public health issue about inactivity but the pattern of non-compliance was still emerging (Moitra et al., 2021). Meeting the recommended movement guidelines was still a problem in the community. Seems that society was normalizing the trends among school students as they accept that the said phenomena was part of kid's and youths' daily life or activities. Hashem et al. (2018) describes that excessive screen time and inability to engage in movement exercises was extremely integrated in current technologically advance community. According to Ngantcha

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et al. (2018) several activities by adolescents are connected and achieved through the use of technology such as internet and gadgets. Kids nowadays consider gadget use as significant part of their daily activities (Kidokoro et al., 2022)

Vast improvement on technology that provides advance gadgets and web applications that capture young populations interest will be additional factor for sedentary lifestyle (Wang et al., 2018). Recent studies shows that negative health related impact among children was linked to sedentary behavior, studies identified duration of exposure to gadget and movement engagement time as its main contributors (Zhang et al., 2020). Supported by Toledo-Vargas et al. (2020) stated that children and youth development was significantly affected by screen time engagement and being inactive and Zhang et al., (2020) concluded that unfavorable health consequences are linked to children physical activity engagement level.

Overall, these phenomena warrant a better understanding that can help to achieve the improvement that researchers and health practitioners were aiming which is compliance to the movement guidelines and managing the negative effect associated to sedentary lifestyle. Most of the articles recommend to develop an intervention program or activities specifically designed and anchored to the factors that affects inactivity. Therefore, this review was driven by the impression that managing physical activity and screen time engagement must be an issue and factor specific to be effective. There is a limited review article on current issues and trends on sedentary behavior. Hence, the purpose of this paper is to examine current issues and patterns in physical activity and screen time among school students' literature from 2018 – 2022 to provide knowledge and understanding on dealing inactivity and gaining insights for possible future studies.

Therefore, this study aims to generate themes according to issues and patterns that have been discuss in physical activity and screen time among school students' literature from 2018-2022 through following research question:

RQ: What are the current issues and trends on physical activity and screen time among school students discussed in the articles published from 2018 – 2022?

Materials and methods

Articles that serve as to be the main data for this review were gathered via SCOPUS, SportsDiscus, PubMed.gov searches. Mendeley was also used to organized the metadata needed in the review.

According to Braun & Clarke (2008), thematic analysis is the process of recognizing the pattern and establishing themes trough in-depth reading on the topic. Reviewing themes with the use of ATLAS.ti that was introduced by Zairul (2020) intends to analyse themes within the sets of literature. ATLAS.ti 22 was use in analysing themes across papers that were selected to identify the pattern and issues in physical activity and screen time engagement among school students. This paper aims to investigate the findings for possible reference in future sedentary behaviour studies and related fields.

Inclusion criteria was set for literature selection: 1) published from year 2018 to 2022; 2) participants was school students; 3) published in a journal and full text article; 4) English as language. Literature search through data bases, SCOPUS, SportsDiscus and PubMed.gov were done using search string as shown in table 1.

Screen time, gadget use, screen dependen*, physical activity, play, sports, game, exercise, child, prevalence, occurrence and inciden* were the key words sought in the literature search. Searching was performed on June 24, 2022 and had 1,285 articles in the results. Scopus data base generated 278 literatures, SportsDiscuss data base resulted 423 articles and PubMed.gov data base produced 584 research works.

Searched articles from SCOPUS and SportsDiscus was downloaded in excel file and word file for PubMed.gov as the data base don't have the feature of downloading articles in excel file. Abstract screening was performed for the first phase of literature selection. From the initial set of articles, 1,225 documents were excluded for not meeting the set criteria. Therefore, the remaining documents were move to the second phase of selection process which is full article screening. During this phase, 30 articles were excluded due to 1) not meeting the required participants which is being school students, 2) being incomplete paper, and 3) being inaccessible. Consequently, 30 articles were included for the review in this study (Figure 1). Remaining papers were uploaded to Mendeley to organize the data included for the review process. Metadata created in Mendeley was transferred to ATLAS.ti 22 for thematic review.

Qualitative and quantitative perspective were used to attain the results of this article. Establishing theme was done through qualitative approach, initial phase was through coding, followed by categorizing and pattern recognition so that it can be generated at different extent (Braun & Clarke, 2008). Quantitative approach was used to describe

Table 1. Search string from SCOPUS, SportsDiscus and PubMed.gov

SCOPUS	TITLE-ABS-KEY ((("screen time" OR "gadget use" OR "screen dependen*") AND child* AND (prevalence OR occurrence OR inciden*) AND ("Physical activity" OR play OR sports OR game OR exercise))) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018)) AND (LIMIT-TO (LANGUAGE , "English"))	278
SportsDiscus	("screen time" OR "gadget use" OR "screen dependen*") AND child* AND (prevalence OR occurrence OR inciden*) AND ("physical activity" OR play OR sports OR game OR exercise)	423
PubMed.gov	("screen time" OR "gadget use" OR "screen dependency" OR "screen dependent") AND child OR children AND (prevalence OR occurrence OR incidence OR incident) AND ("physical activity" OR play OR sports OR game OR exercise)	584

Table 2. Thematic review of physical activity and screen time from 2018-2022

Themes	2018	2019	2020	2021	2022	Total
Behavioural impact	1	1	0	3	2	7
Engagement level: age and gender specific	5	2	2	4	4	16
School curriculum role	0	1	0	1	1	3
Association to socio-economic status	4	0	3	2	3	12
Impact on adiposity	1	1	2	2	0	13
Total	11	5	7	12	10	45

Table 3. Number of articles per periodical (2018-2022)

Source title	2018	2019	2020	2021	2022	Total
Applied Physiology, Nutrition and Metabolism	1					1
BMC Pediatrics				1		1
BMC Public Health	1	1	2	1	1	6
BMJ Open	1					1
European Journal of Pediatrics					1	1
European Journal of Sports Science				1		1
Frontiers in Pediatrics					1	1
Health Science Report				1		1
Healthcare (Switzerland)				1		1
International Journal of Adolescence and Youth				1		1
International Journal of Environmental Research and Public Health					1	1
International Journal of Public Health					1	1
Journal of Exercise Physiology online		1				1
Journal of Physical Activity and Health	4		2			6
Journal of Sport and Health Science			1			1
Journal of Sports Science	1					1
Journal of Tropical Pediatrics		1				1
PLoS ONE				1		1
Scientific Reports			1			1
Sports	1					1
Total	9	3	6	7	5	30

also shows that 2018 has the greatest number of papers published (9 articles), next was 2021 with 7 papers followed by 2020, 2022 and 2019 having 6, 5, and 3 academic literatures published respectively.

Qualitative Reports

Central themes were identified from a thorough qualitative analysis. Figure 4 shows the overall network on how to identify the issues and patterns on physical activity and screen time engagement among school students through thematic review. Preliminary phase of analysis provided 9 initial codes, possible association and similarities in context on different codes were identified and merged some codes which was necessary. After thorough analysis of the preliminary codes, 5 themes and patterns were generated.

What are the current issues and trends on physical activity and screen time among school students discussed in the articles published from 2018-2022?

Theme 1: Behavioural impact

Figure 5 shows the results of extensive analysis of behavioral impact as one of the central themes generated. School students' behavior was discussed in 7 literatures as one of its focal points being affected by physical activity and screen time engagement.

Childhood stage is one of the crucial parts for behavioral development. According to Schaan et al. (2018) managing the impact of screen engagement to emotional well-being was vital to youth. More so, Toledo-Vargas et al. (2020) stated that children and youth development was significantly

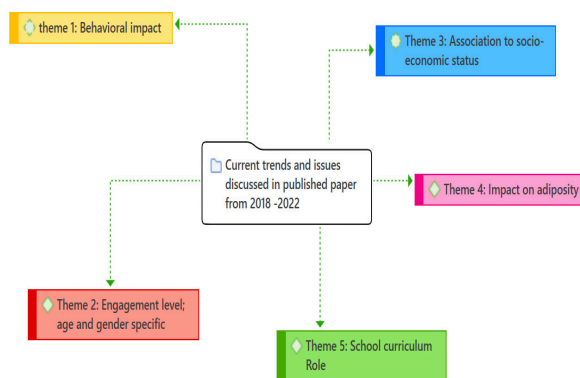


Fig. 4. Overall network for current trends and issues in physical activity and screen time among school students discussed in published literature from 2018-2022

affected by screen time engagement and being inactive. This was supported by Rashid et al., (2021) who cited that screen activities were identified to be a prominent factor on emotional well-being status.

According to Taheri et al. (2019), inactivity and excessive screen time were link to behavioral effect among children, “depression, anger, worthlessness, confusion, anxiety and worry” are the negative impacts on child attitude. In the study conducted by Ngantcha et al., (2018) predictors of screen time (ST) gadget used was associated to bullying behaviors, depression symptoms and lower life satisfaction. Additionally, excessive screen time has a negative association to depression symptoms (Moitra et al., 2021) excess screen time (ST). Similar findings was concluded by Hutzler et al. (2021) that attitude towards screen engagement was linked to violent behavior. Moreover, according to Rashid et al. (2021) excessive screen time has negative impact on students’ behavior such as being irritability and hopelessness.

According to Kidokoro et al. (2022) types of screen activities should be consider in terms of behavioral impact association i.e. online platforms and applications such as games affects female middle school age student and watching videos on internet have negative effect on primary school students. On the other hand, physical activity was reported to be independently associated to behavioral impact, compliance to physical activity recommendation can decrease the occurrence of depression among secondary high school students (Kidokoro et al., 2022). This was supported by Taheri et al. (2019) which stated that negative behavioral effect was lesser among school students who actively engage on physical activity than those who do not, therefore, author concluded that engagement on movement exercises or activities has a positive impact on managing the undesirable effect on young populations behavior.

Articles from 2018 to 2022 that focuses on physical activity and screen time among school students included their discussions on behavioral impact. However, Taheri et al. (2019) posed a notion that there is a need for strong justification that excessive screen time is a main contributor for negative impacts on children and adolescents’ behavior. According to Braidokienė et al., (2021) children in many countries might be engaged in more sedentary behavior and have limited possi-bilities to access the necessary level of physical activity to maintain their physical and mental

health. The aim of this study was to explore the relationships between child sedentary behavior, physical activity, mental and physical health, and parental distress in a sample of Lithuanian children aged 6-14 years during the COVID-19 pandemic lockdown in March–June 2020. Parents of 306 children (52.9% female) gadget use was not associated to the negative effect on students’ behavior during pandemic, home environment that is majority affected by parents’ actions was its main factor. This suggests that future studies can dig deeper in this particular issues.

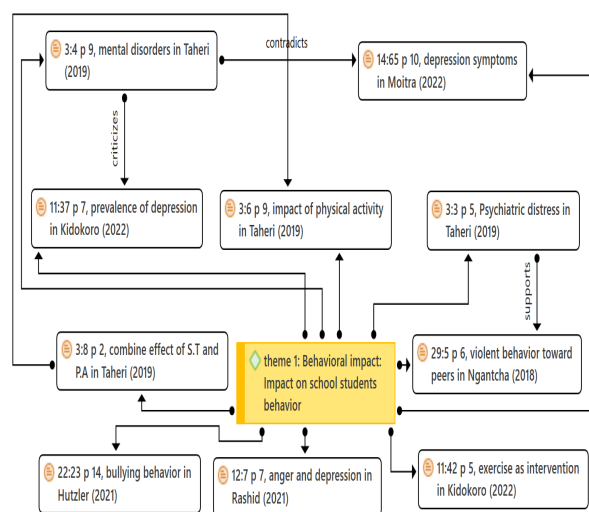


Fig. 5. Network of the behavioural impact theme

Theme 2: Engagement level: age and gender specific

This theme was the most discussed by the authors, child developmental stage by age and gender (Figure 6) was discussed 17 times in the reviewed articles. Literatures shows that physical activity and screen time among school students were link to age and gender which revealed mixed conclusions and results.

Physical activity by gender

It was discussed that boys were more inclined to physical activity rather than girls. This was supported by Hashem et al. (2018), pointed out that physical activity engagement was higher in male than female. Similarly, Chen et al. (2018) discussed that during adolescence, girls have an issue of meeting the recommended time for physical activity and screen time, also found out that male was inclined to physical activity engagement than girls. Additionally, it was pointed out that male engage on physical activity compare to female (De Araújo et al., 2018; Tadiotto et al., 2019) BMI-z, waist circumference (WC). Hansen et al. (2022) screen time, and sleep affect the health of children and adolescents. This study described the national prevalence estimates of German youth aged 9 to 18 years who meet PA, screen time, and sleep guidelines alone and in combination and examined the associations of demographic and personal characteristics with adherence to guidelines. Data from a 2019–2020 German student survey were used (n = 15,786) also found out that male has the high tendency to meet the movement guideline recommendation.

Screen time by gender

According to Rashid et al. (2021), gender factor has a strong link in screen time engagement. In the study of Moitra et al. (2021) excess screen time (ST results pointed out that screen time was more prevalent in girls than boys. Similarly, Zhu et al. (2019) concluded that male was most likely to meet physical activity recommendation but not for screen time. On the contrary, Hardy et al. (2018) stated that gender is not a factor in terms gadget used and its association to well-being during adolescent stage. This implies that association varies when gender and age were considered as its factor.

Physical activity by age

Results of the literature shows the following pattern of physical activity during adolescents. Hardy et al. (2018) discussed that movement exercise and its impact was considerable during adolescent stage. Similarly, Scully et al. (2022) stated that compliance to physical activity among adolescent is a problem. However, this was contradicted by the results in the study conducted by Chen et al. (2018) discussing that the age is not considerable aspect when it comes to inactivity among school students.

Screen time by age

Prevalence of excessive screen time in relation to school students age was observed by the authors during adolescence. Hardy et al. (2018) pointed out that gadget used was prevalent to adolescent compare to children. Additionally, it was discussed that excessive screen time was prevalent in adolescent (Moitra & Madan, 2022 and screen addiction behaviors in 10-15 years old adolescents in Mumbai during the COVID-19 pandemic and 2; Schaen et al., 2018). Similarly, study conducted by Rubín et al. (2020) stated that young

population are most likely to comply on physical activity and screen time guidelines compare to teen ager.

To address the issue on compliance of movement guidelines. Chen et al. (2018) suggests that approaches in increasing physical activity and limiting screen time must be plan and organized according to gender needs and assessments. Similarly, intervention must be based on gender and age specific to increase its effectivity (Kidokoro et al., 2022).

Theme 3: Association to socio-economic status

Socio-economic status discussed in the literatures were parents educational background, family income and community location classification (Figure 7).

Understanding the role and impact of socio-economic status in compliance to movement guideline is important. According to Chen et al. (2021), socio-economic status among factors linked to sedentary lifestyle was difficult to amend. However, awareness on different social and economic condition is significant to understand its association to sedentary lifestyle together with its undesirable health impact (Hashem et al., 2018).

Parents educational background

Family, including parental attributes had a significant role in achieving or meeting the movement guideline recommendation (Rubín et al., 2020). According to Rashid et al. (2021) screen time was affected by higher socio-economic status such as education level. Similarly, screen time engagement and participation in physical activity by school students was greatly affected by parent’s educational background (Chen et al., 2021). This was supported by Hashem et al. (2018) who specified that excessive screen time was linked to mother’s educational background and pointed out that educational background of father was not linked to inactivity. Educational level may also be associated to movement guideline awareness, (Chen et al., 2021; Wang et al., 2018), discussed that parent’s awareness on the limit and suggested number of hours in terms of physical activity and screen time engagement has positive link. More so, Ngantcha et al. (2018) predictors of screen time (ST stated that guidance from parents is a vital factor in terms of managing and controlling excessive screen time engagement.

Family income

Having full access to digital technology devices and internet can be consider as one of the causes for excessive screen time. Rashid et al. (2021) concluded that screen time was affected by higher socio-economic status such as income. Similarly, Chen et al. (2021) stated that screen time engagement and participation in physical activity by school students was greatly affected by parent’s salary. Additionally, (predictors of screen time (ST)González et al., 2022; Ngantcha et al., 2018) predictors of screen time (ST stated that excessive screen time was highly prevalent to students coming from rich families than to those children come from low-income family. Also, according to Zhang et al. (2020) health problem linked to sedentary lifestyle was associated to income level of the family.

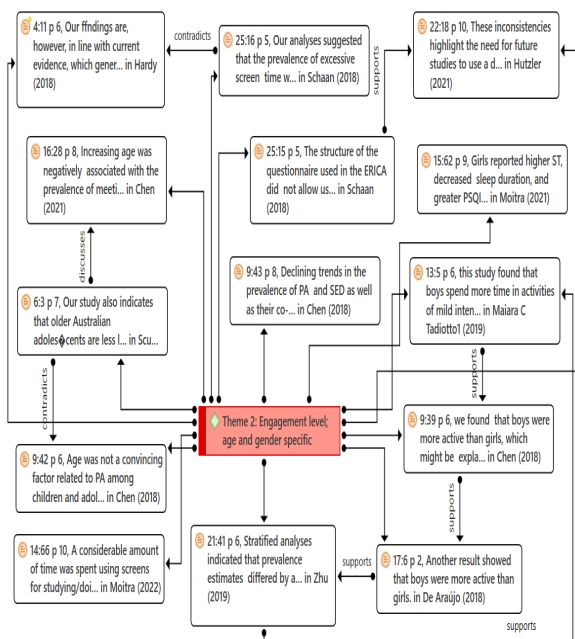


Fig. 6. Network of engagement level: age and gender specific theme

activities such as constructing and integrating specific approaches to physical education curriculum, providing student support in term of sports facilities availability as well as coaching

and counseling. This was supported by Kovacs et al. (2022) few data on how the COVID-19 pandemic and restrictions affected children's physical activity in Europe have been published. This study examined the prevalence and correlates of physical activity and screen time from a large sample of European children during the COVID-19 pandemic to inform strategies and provide adequate mitigation measures. An online survey was conducted using convenience sampling from 15 May to 22 June, 2020. Parents were eligible if they resided in one of the survey countries and their children aged 6-18 years. 8395 children were included (median age [IQR], 13 [10-15] years; 47% boys; 57.6% urban residents; 15.5% in self-isolation, stated that the schools must have an organized activity that will contribute to the compliance of recommended movement guidelines among school students. Aside from participation to structured physical activities, awareness and understanding the context of sedentary lifestyle is important for effective counter measure strategies. Similarly, Zhang et al. (2020) pointed reinforcing physical activity engagement among school students can be integrated to physical education subjects and suggested that rural schools to have improve operation in open space activities.

Kovacs et al. (2022) few data on how the COVID-19 pandemic and restrictions affected children's physical activity in Europe have been published. This study examined the prevalence and correlates of physical activity and screen time from a large sample of European children during the COVID-19 pandemic to inform strategies and provide adequate mitigation measures. An online survey was conducted using convenience sampling from 15 May to 22 June, 2020. Parents were eligible if they resided in one of the survey countries and their children aged 6-18 years. 8395 children were included (median age [IQR], 13 [10-15] years; 47% boys; 57.6% urban residents; 15.5% in self-isolation reported that physical education lessons play a huge role in keeping school students engage in physical activities, specifically during pandemic, active participation in physical education has significant association in complying the recommended movement guidelines. Due to prevalence of inactivity among school students, promotion of physical activity engagement is starting to gain attention as curriculum agenda (Hutzler et al., 2021). Similarly, Zhu et al. (2019) pointed out that results from previous literatures suggests that school's curriculum and approaches towards sedentary lifestyle plays a significant part.

Association of academic excessive screen time to school students' health was also discussed. According to Bredokienė et al. (2021) children in many countries might be engaged in more sedentary behavior and have limited possibilities to access the necessary level of physical activity to maintain their physical and mental health. The aim of this study was to explore the relationships between child sedentary behavior, physical activity, mental and physical health, and parental distress in a sample of Lithuanian children aged 6-14 years during the COVID-19 pandemic lockdown in March-June 2020. Parents of 306 children (52.9% female, excessive academic related gadget used was link to adverse

outcome on health. Additionally, Hadianfard et al., (2021) stated excessive engagement on homework among school students have a negative association on health. Nevertheless, non-academic screen time and school subjects related gadget used is another context for sedentary lifestyle that might be discuss in future researches.

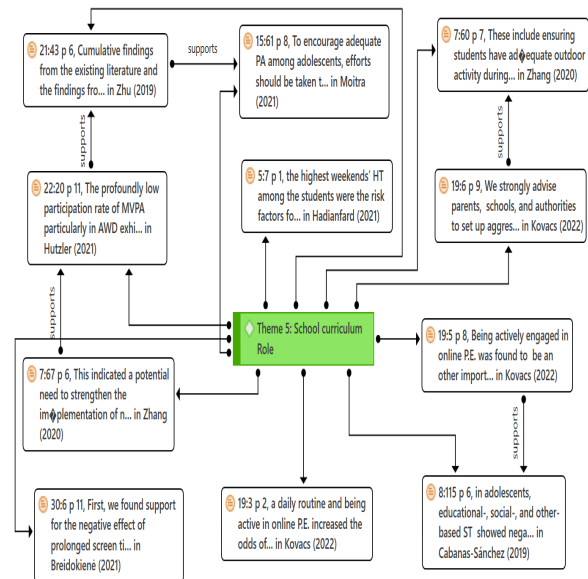


Fig. 9. Network of school curriculum role theme

Conclusions and future study

This paper highlights the current issues and patterns in physical activity and screen time engagement among school students. Sedentary lifestyle is a current health global issue among children. Movement guidelines were crafted to counter measure the effect of prolong gadget used and inactivity. The result shows that non-compliance to active lifestyle recommendation was still prevalent among school students. Despite of global interest to the topic, there is a limited review paper that focus on the current issues and pattern of sedentary behaviour. This article found out that recent literatures focused on the factors of having sedentary lifestyle and its influence to young populations health. Effect of excessive screen time to individuals' behaviour is one of the focal interests from the authors and due to mixed research outcomes, this warrants exploration for future studies. Findings on the patterns to engagement level: age and gender specific, suggests that strategies and approaches to promote physical activities and counter-measure the negative health impact of excessive screen time must be gender and age specific. Further, socio-economic issue can be address in partnership with community leaders and authorities. Additionally, contradicting results from adiposity and screen time engagement suggests that there is a need to investigate this factor in upcoming researches. Lastly, school curriculum is another factor that capture the authors interest in terms of promoting healthy and active lifestyle. It is suggested that strategies must be integrated to physical education and school framework as well. In summary, future study should explore on how would the generated issues and patterns can be integrated to a large-scale intervention program and test its effectivity as well.

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Conflict of interest

The authors declare that they have no conflict of interest.

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СУЧАСНІ ТЕНДЕНЦІЇ ТА ПРОБЛЕМИ, ПОВ'ЯЗАНІ З ПРОВЕДЕННЯМ ЧАСУ ПЕРЕД ЕКРАНОМ ТА ЗАНЯТТЯМИ ФІЗИЧНОЮ ДІЯЛЬНІСТЮ СЕРЕД ШКОЛЯРІВ: ТЕМАТИЧНИЙ ОГЛЯД

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 11 с., 3 табл., 9 рис., 31 джерело.

Мета дослідження. Відсутність фізичної активності та надмірне проведення часу перед екраном серед дітей шкільного віку є глобальною проблемою, яка, як відомо, пов'язана з малорухливим способом життя. Було проведено кілька досліджень щодо малорухливої поведінки дітей, але досі немає оглядової статті, у якій аналізують поточні тенденції та проблеми, пов'язані з відсутністю фізичної активності та надмірним часом перед екраном. Метою цього дослідження є визначення поточних проблем і тенденцій стосовно занять фізичною діяльністю та проведення часу перед екраном серед школярів, які обговорюються в статтях, опублікованих у 2018–2022 роках.

Матеріали та методи. У цьому дослідженні використовували кількісні та якісні методи. Кількісний підхід використовували для пояснення тенденцій і статистичних даних щодо географічного поширення літератури та визначеної теми чи тем, розроблених протягом 2018–2022 років. Якісний підхід застосовували для встановлення шаблонів і тем. У цьому дослідженні теми та шаблони генерують зі статей, опублікованих з 2018 по 2022 рік. Тридцять статей було включено через базу даних за пошуком із баз даних SCOPUS, SportsDiscus та PubMed.gov. Тематичний аналіз виконували за допомогою програмного забезпечення ATLAS.ti 22.

Результати. Було згенеровано п'ять основних тем: 1) вплив на поведінку; 2) рівень залучення: залежно від віку та статі; 3) асоціація з соціально-економічним статусом; 4) вплив на ожиріння; 5) роль шкільної програми.

Висновки. Надмірне проведення часу перед екраном і відсутність фізичної активності по-різному впливають на здоров'я молоді. Розуміння шаблонів і тем, згенерованих у цьому дослідженні, буде корисним для розробки програми активності, яка стане заходом протидії негативному впливу, пов'язаному з малорухливим способом життя.

Ключові слова: час перед екраном, фізична активність, малорухливий спосіб життя, діти.

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