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EFFECTS OF SCREEN TIME ON SLEEP PATTERNS IN TODDLERS: A SYSTEMATIC REVIEW

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Abstract

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The development of technology and information provides changes and convenience in human life. Technology that we often use in our daily lives such as television, mobile phones, DVDs and other forms of screen media. Nowadays, it is easier for children to access digital media or screen time to play games, read books and watch TV. This systematic review aims to assess, identify and describe studies that focus on the impact of screen time exposure on sleep patterns in toddlers. The method of searching research articles through the electronic databases Pro quest, Spinger Link, SAGE journals, Scopus, Science Direct and PubMed which were published in 2018 - 2023 found 10 articles that were included in the analysis list. The article has gone through a study selection process using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). PICO/PEO in this systematic review is whether the impact of screen time exposure on sleep patterns of toddlers. The results of the study indicate that excessive use of screen time causes poor sleep quality in children. The most important criteria for children's sleep quality are the number of awakenings at night, difficulty sleeping at night and total sleep time of at least 9 hours. Conclusion: screen time exposure and sleep habits have an effect on children's sleep quality. Implications: need for efforts to provide education to the public to limit the use of digital media in toddlers.

Keywords: Sleep Patterns, Screen Time, Toddlers, Technology, Education



INTRODUCTION

The development of technology and information provides changes and convenience in life such as ease of communication, work, completing school assignments, buying and selling and so on so that humans are required to use technology and information (Putri, 2021). Technology and information provide progress and changes in parents' views, including how to educate children. Children can access technology-based games through screen time. Screen time is the duration a person is exposed to electronic media screens such as television, smartphones, laptops and tablets / ipads (World Health Organization, 2020). Parents need to consider giving screen time to their children toddlers. Age child Toddlers are children aged between 12 months and 36 months (Madigan et al., 2019). During the toddler period, children's growth and development experiences very rapid changes (Leoziana, 2015). The toddler period is an important period for children because the child's growth and development during this period will influence the child's subsequent growth and development (Cameron & Brock, 2018). The American Academy Pediatric (2020) recommends that screen time is not recommended for children aged 18-24 months and children aged 2 to 5 years are only advised to access a maximum of 1 hour/day. The Women, Infants and Children program in New York states that around 82% of one-year-olds and 95% of two-year-olds watch television and videos. One year old children spend an average of 10 hours per week watching TV/Videos. A national survey found that 25.9 % of children aged 1-4 years used screen time and 3.5% of

babies under 1 year old (Central Statistics Agency, 2020). Use of screen time has detrimental effects on children's health and development. High levels of exposure to screen time will have a negative impact on thinking, the emergence of behavioral problems such as aggression, hyperactivity, inattention and emotional problems (Chauhan et al., 2021). The influence of screen time not only has an impact on the cognitive side but also has an impact on toddler children's sleep patterns (Nisioka, 2022). Sleep is important for maintaining physical, mental and emotional health. Sleep duration is very important for brain and body development, especially in children aged 1-3 years (Jiang, 2020). A decrease in sleep time for babies and toddlers will cause various major effects, such as suboptimal cognitive development, long-term memory and increasing the potential for obesity (Nisioka, et al, 2022). The effects of using screen time are not only limited to disrupting sleep patterns but in the long term also affect children's physical and health (Alaman et al., 2016). Therefore, researchers are interested in looking more deeply into the effects of screen time exposure on children toddlers.

RESEARCH METHODS

This research uses a systematic review method which aims to identify, assess and describe studies that focus on the effects of screen time on the sleep patterns of toddler-aged children. The specified PICOT was searched for synonyms using the MeSH database, followed by a structured search using the keywords - Toddler OR young child; early years; early childhood; toddlerhood- ; Screen AND time; digital media; gadgets; electronic screen;





touchscreen; digital screens; electronic devices; digital technology; television; media exposure; Sleep OR sleep patterns OR Sleep quality; sleeping habits; sleep behavior; sleep duration, bedtime. The electronic database used is Proquest, SpringerLink, Sage journals, Scopus, Science Direct and PubMed. The inclusion criteria for the article were the pediatric population toddler, published between 2018-2023, open access, English and research articles . Articles were excluded if they were included in systematic reviews, literature reviews and meta-analysis. Duplicates were removed and remaining references were uploaded to the software. All titles and abstracts were selected that were related to the effects of screen time on children's sleep patterns toddlers. The study selection process and reasons for exclusion are shown in the flowchart below.

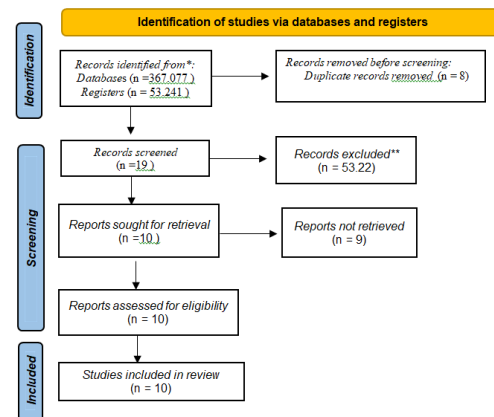


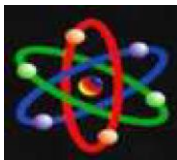
Figure 1. PRISMA Flow Diagram (Page et al., 2021)

The risk of bias was assessed by researchers using the Joanna Briggs Institute (JBI) critical appraisal tool according to the study design. The instrument consists of several questions with choices and answer scores "Yes = 2, No = 1, and Not clear = 0". The total score was then converted into a percentage and scores < 60% were removed from the list. Extracted data included first author, year of publication, location, study design, data collection methods, number of respondents, and research results (further details in Table 1).

RESULTS AND DISCUSSION

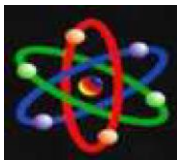
Databases	Authors, country of origin, year of publication	Article title	Journal title	Aim	Design/instrument/intervention	Samples	Results (can be expanded)
Sage Journal 3/30/2023	Bellagamba, Francesca, et al. (2021)	How Infants and Toddlers' Media Use Is Related to Sleeping Habits in Everyday Life in Italy	Psychology journal	The aim of the study was to examine the relationship between children's technology use and children's sleep patterns	Longitudinal design. Instrument: the Brief Screening Questionnaire for Infant Sleep Problems (BISQ).	The sample consisted of 264 parents with toddlers aged 8 months to 36 months.	The research results show that time spent watching TV and using tablets was negatively related to hours sleep at night. Time spent watching TV/DVD and on smartphones was associated with sleeping late. Time spent with books was associated with going to bed earlier at night, taking less time to fall asleep and sleeping less during the day. From this research it can be concluded that the duration of digital media use is related to sleep time.
ScienceDirect 3/16/2023	Fatma Diler, MSc, RN	The influence of sleep patterns and	Journal of Pediatric	The aim of this research is to examine	A descriptive cross	The sample consisted of 304	Screen time use also significantly predicted children's sleep needs (p < 0.05). The difference between sleep





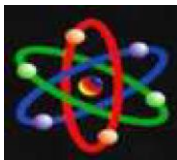
	a, Hatice Başkale. Türkiye (2022)	screen time on the sleep needs of infants and toddlers: A cross-sectional study	Nursing	the effect of screen time and sleep patterns on the sleep needs of infants and toddlers	sectional Instrument: the Brief Screening Questionnaire for Infant Sleep Problems (BISQ)	pediatric patients aged 6 to 36 months	needs children who used TV ($\beta = 0.914$, Wald = 4.361, $p < 0.05$) and portable electronic devices (PEDs) (smartphones, tablets, and PC/laptops) ($\beta = 1.437$, Wald = 8.498, $p < 0.05$) was statistically significant compared with children who did not use any screening. Children using TV have 149.3% higher sleep requirements than children who never used TV, while children who used PED had a 320.8% higher need for sleep than children who never use portable electronic devices . The results of this study also show several sleep problems when children are given access to screen time, whether children are exposed to television, portable electronic devices (PED) including when they go to bed. Where children's sleep problems include 12.8% of children waking up more than 3 times a night, 6.6% of children experiencing insomnia, 5.9% of children having difficulty sleeping, 6.6% of children having time to fall asleep for more than 1 hour.
ProQuest	Stevens, Jack, et al, USA. (2019)	A Randomized Trial of a Self-Administered Parenting Intervention for Infant and Toddler Insomnia	Clinical Pediatrics	The aim of the research was to test DVD, website and wait list interventions for solutions to sleep problems.	Randomized controlled trial Intervention instrument s: DVD, website comparison conditions	The sample consisted of 239 families with children aged 6 to 36 months	The results showed that there were differences in the use of DVDs, websites and waiting lists ($p = 0.07$). DVD is superior to Wait-List in the main way - less problematic sleep ($P = 0.03$; odds ratio = 0.44; 95% confidence interval [CI] = 0.21–0.93). DVDs did not outperform websites on this trichotomous variable ($P = 0.37$). An exploratory analysis involving this dichotomization the main results revealed that DVD was superior both Websites ($P = 0.02$; odds ratio = 0.35; 95% CI = 0.14-0.88) and Waitlist ($P = 0.01$; odds ratio = 0.27; 95% CI = 0.10-0.68) when comparing any ranking sleep problems .
ProQuest	A. Alqarn, et al, Türkiye. (2022).	Prevalence of screen time use and its relationship with obesity, sleep quality, and parental knowledge of related guidelines: A study on children and adolescents attending Primary Healthcare Centers in the Makkah Region	Journal of Family and Community Medicine	to investigate prevalence Screen use and its relationship to sleep quality and obesity	cross-sectional instrument: Pittsburgh Sleep Quality Index (PSQI)	The sample for this study was 450 people, with an age range of 2 to 12 years who spent more time on phones, tablets, television.	This research shows that children use cellphones and TV the most every day , and many use them for more from 2 hours every day so children have fewer hours of sleep. One The study found that children whose parents set rules for watching TV tended to have rules that exceeded recommended limits for screen time use
PubMed	Hepsi Bai	Touch Screen	Indian	The aim of	Cross	The sample	There was a negative association





	Joseph, K. Sandhiya, Asha P Shetty, India. (2022)	Device Usage and its Effect on Sleep among Young Children: Do Parents Delude Younger Generation Deliberately? Time to Ruminant and Impede this Technological Harm	Journal of Community Medicine	the research was to examine the relationship between the use of touch screen devices (TSD) and the sleep patterns of infant and toddler age children.	sectional Brief infant sleep questionnaire scale	consisted of 76 parents with infants and toddlers.	between night sleep and TSD (Touch Screen Device Usage) use among children ($r = -0.35, P < 0.01$). The time of use of TSD has a significant effect on the duration of sleep at night for babies and toddlers. Screen time affects sleep quality . Accessing TSD during sleep time has evidence reduced nighttime sleep time with poor sleep quality TSD can affect development, impacting the brain and cognition during golden period of early development. Use of display devices can directly replace children's sleep time, leading to later bedtimes and shorter nights sleep and c the light emitted by the TSD can directly affect circadian rhythm and melatonin suppression, which indirectly affects sleep desire levels. Content watched on screen devices can also improve psychological and emotional health physiological, making it more difficult for children to falling asleep and affecting sleep quality .
Proquest	Nishioka, Takafumi , et al, Japan. (2022)	Effects of Screen Viewing Time on Sleep Duration and Bedtime in Children Aged 1 and 3 Years: Japan Environment and Children's Study	International Journal of Environmental Research and Public Health	This study aims to clarify the effects watching television (TV/DVD) on sleep duration and sleep time and their differences between the effects of TV/DVD and PEI on sleep	Cohort	The sample consisted of 74,525 participants from 1 year to 3 years of age	Children who watch TV/DVD at the age of 1 year will have short sleep duration at the age of 3 years. Results this research shows that bedtime without staying up late from infancy leads to the formation of healthy sleep habits in the long term. Excessive use of tablets in children aged 6 months to 3 years will affect sleep duration and cause sleep delays.
Spinger Link	Chindamo, Sonia et al, Germany 2019	Sleep and new media usage in toddlers	European Journal of Pediatrics	This study aims to explore the relationship between the use of electronic devices and sleep problems in toddler-aged children.	Cross-sectional anonymous questionnaire	The sample consisted of 1,117 toddler age children	Daily use of a tablet or smartphone increased the odds of shorter total sleep time (OR 1.95 [1.00–3.79], $p < 0.05$) . The use of digital media is related to the length of toddler sleep time regardless of other confounding factors .
Spinger Link	Chen, Bozhi et al, Singapore, 2019	Screen viewing behavior and sleep duration among children aged 2 and below	BMC Public Health	This study aims to examine the relationship between staring at a screen and sleep duration in children aged 2 years and under.	Cross-sectional Children's Sleep Habit Questionnaire (CSHQ) instrument	The sample consisted of 714 children aged 2 years and under.	Every additional 1 hour per day of looking at a TV screen significantly reduces sleep duration by 0.26 hours shorter ($\beta = -0.28$ hours, 95 % CI: -0.50, -0.06) , while the addition of 1 hour/day playing mobile devices will reduce sleep duration by 0.35 hours ($\beta = -0.35$ hours, 95%CI: -0.61, -0.09). Thus, it can be concluded that increasing screen time, especially mobile devices, reduces sleep time by 0.35 hours .





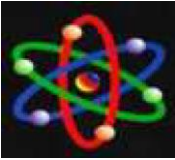
Spinger Link	Cassanella, Pia et al, Spain, 2021	How do infants and toddlers sleep in Spain? A cross-sectional study	European Journal of Pediatrics	This study aimed to assess the sleep patterns of children aged 3 to 36 months in Spain	Cross-sectional Instrument: The brief infant sleep questionnaire (BISQ - E)	The sample in this study consisted of 1,404 children (725 boys and 679 girls).	Parental presence at sleep onset and irregular bedtime routines were significantly associated with a reduced total sleep time, longer sleep latency, and disturbed nighttime awakenings ($p < 0.001$).
Spinger Link	Goode, Joshua A, et al, USA, 2019	Children's Technology Time in Two US Cohorts	Child Indicators Research	This study aims to examine the time spent using technology, physical activity, playing and sleep time among children in the US.	Cohort the Panel Study of Income Dynamics (PSID), Child Development Supplement (CDS)	Sample in this study: the Panel Study of Income Dynamics Child Development Supplement in 1997 (N = 2193) and 2014–2016 (N = 1009).	use increased by 6.1 hours in early childhood, time spent playing decreased by more than 16 hours per week in early childhood ($p < 0.01$) and the total time children engaged in physical activity decreased by 3 hours ($p < 0.001$). Sleep increased by 2.3 hours ($p < 0.01$). Technology use was lowest for children with the most highly educated parents. Increased technology use is associated with decreased child physical activity but with increased playtime and improved sleep in childhood.

Table 1. Characteristics of Included Articles

An initial search using databases obtained 367,077 articles in English. Of this number, screening was carried out based on the title and abstract to obtain 53,241 articles and complete screening resulted in 19 articles. There were 10 articles that met the inclusion criteria, so these 10 articles were analyzed (Figure 1). All articles analyzed were quantitative studies using questionnaire survey data collection methods, only one study used intervention. The study and data collection methods are appropriate so that valid and reliable results are obtained. The number of article samples analyzed was 10 and was suitable for quantitative testing and all samples were toddlers. The articles analyzed came from various countries and reached the same conclusions from the research results. Research conducted by Bellagamba et al (2022) states that there is a relationship between time spent using digital media, watching TV/DVDs and smartphones, which is associated with sleeping late at night. This research shows

that using screen time before bed is related to the length of time it takes to fall asleep and makes sleeping later at night. The article also states that TV and tablet viewing time usage was related to how long it took the child to fall asleep at night, while spending time with a book before bed was related to falling asleep quickly, talking less to fall asleep and less hours of sleep during the day. Another study found that excessive screen time can also affect children's sleep quality. Children who spend more time in front of electronic screens tend to have more disturbed and poor quality sleep. Fatma Diler, et al in Turkey found that the proportion of children who used a lot of screen time were in the age groups 6-12 months, 13-24 months and 25-36 months and as many as 53.9% of children did not have a fixed schedule for sleeping and 47.7% of parents report that their child has difficulty falling asleep. Based on parents' assessment of the level of sleep problems, 71.4% of children did not have sleep problems, of which 21.1% had mild sleep





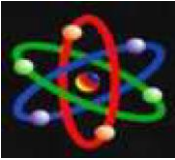
problems and 7.6% of children had severe sleep problems. As many as 12.8 % of children woke up >3 times, 6.6% of children remained awake > 1 hour when awakened at night and the total sleep time for children < 9 hours was around 2.3%. This article presenting screen time in infants and toddlers in Turkey states that the proportion of children experiencing sleep problems is increasing, infants are experiencing sleep problems such as insomnia, difficulty falling asleep and an increase in the number of times they wake up at night.

An article in Saudi Arabia in 2022 stated that parental knowledge was not related to children's sleep quality and sleep duration but was significantly related to total sleep time. This article states that the use of all electronic equipment is significantly associated with fewer hours of sleep and longer hours of wakefulness. Another study in 2019 in the United States stated that the use of electronic devices in children aged 2-5 years who spent 4 hours or more per day were more likely to experience sleep deprivation than children who did not use electronic devices. A study conducted by Joseph, et al (2022) in India using the Brief infant sleep Questionner scale stated that touch screen devices influence children's sleep duration at night. In line with studies conducted in the UK, increasing use of touchscreens is associated with a decrease in the number of hours children sleep. Chandra et al (2022) found that the use of portable electronic devices by children will have an impact on shorter sleep duration and later bedtimes. The use of portable electronic devices is associated with short sleep duration in children aged 1 and 3 years. Portable electronic devices have a greater

impact on children's sleep patterns than watching TV/DVDs. The effects of exposure to screen time and the sleeping habits of children aged 1-3 years will be at risk of experiencing late sleep. In a study, it was reported that 6 month old babies who were exposed to screen media had shorter sleep duration than babies who were not exposed to screen media. In children aged 6 months to 3 years, increasing the time of tablet use was reported to disrupt sleep duration and cause delayed sleep. A study conducted by Chindamo, et al (2018) in Germany stated that the use of media such as tablets and smartphones is associated with poor sleep quality in toddler-aged children. Cheung analyzed data on babies and toddlers aged between 6 and 36 months and found that there was a significant relationship between touchscreen use and poor sleep, shorter nighttime sleep times and later sleep onset . The brain develops most significantly in the first 3 years of life, meaning that at that time the child's brain is at its most vulnerable stage of development so it is possible that digital devices will indirectly affect the child's development as well.

In the article by Cassanello et al (2021) in Germany, screen viewing and sleep in children up to the age of 2 years and that an additional 1 hour of digital media use will reduce a child's sleep time by 1.5 hours compared to children without screen viewing. Based on research that has been conducted, there is a relationship between screen time (the time children spend using electronic screens such as television, tablet and smartphones) and the sleep patterns of toddler- aged children. The following conclusions can be drawn: excessive





exposure to screen time in children toddlers is associated with a decrease in their sleep duration. A study conducted by Madigan et al (2019) found that every additional hour of screen time per day in children aged 2-5 years was associated with a 15 minutes decrease in their sleep duration. Other research also indicates that children who are exposed to excessive screen time tend to experience sleep disorders. Exposure to blue light produced by electronic screens can interfere with the production of melatonin, a hormone that helps regulate sleep and wake cycles. This can result in difficulty sleeping and other sleep disorders in toddler -aged children (Hale & Guan, 2015).

CONCLUSION

Nurse can do management energy with review level fatigue child. A number of Nonpharmacological interventions, such as technique relaxation, meditation, education sleep hygiene, and Reiki therapy shows effect minimal and easy side done child. Relaxation is something approach helpful mind -body client for overcome pain, fatigue and eliminate tension through subtraction activity sympathetic and cerebral. Education sleep hygiene can carried out on children who undergo it therapy and parental support. Effectiveness intervention designed sleep with therapy behavior cognitive for insomnia like education sleep, stimulus control, relaxation, and sleep hygiene has applied to children age schools and teenagers with insomnia (Rogers et al., 2019).

RECOMMENDATION

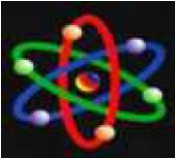
Based on research that has been conducted, there is a relationship between screen time (the time children spend using

electronic screens such as television, tablet and smartphones) and the sleep patterns of children aged toddler so it can be concluded that excessive screen time can also affect the quality of a child's sleep. Children who spend longer periods of time in front of electronic screens tend to have more disturbed sleep and poor quality sleep. These sleep disorders can have a negative impact on a child's overall development and well-being (Chen, et al, 2019). Although the research results show a relationship between screen time and the sleep patterns of toddler- aged children, it is important to remember that other factors such as healthy sleep habits and a good sleep environment can also influence children's sleep patterns. It is recommended to reduce screen time and create a consistent and supportive sleep routine for toddler- aged children to ensure adequate and quality sleep. After reviewing several literatures about screen time in toddlers, the American Academy of Pediatrics issued a policy in 2016 asking families to avoid providing screen time or any digital media to children aged 18 to 24 months and limit digital media use to only 1 hour a day. The widespread exposure to digital devices identified in some of this literature indicates a lack of awareness of the negative potential of digital media on children's health. Nurses need to provide parent education to limit children's use of screen time so that children can grow and develop optimally .

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