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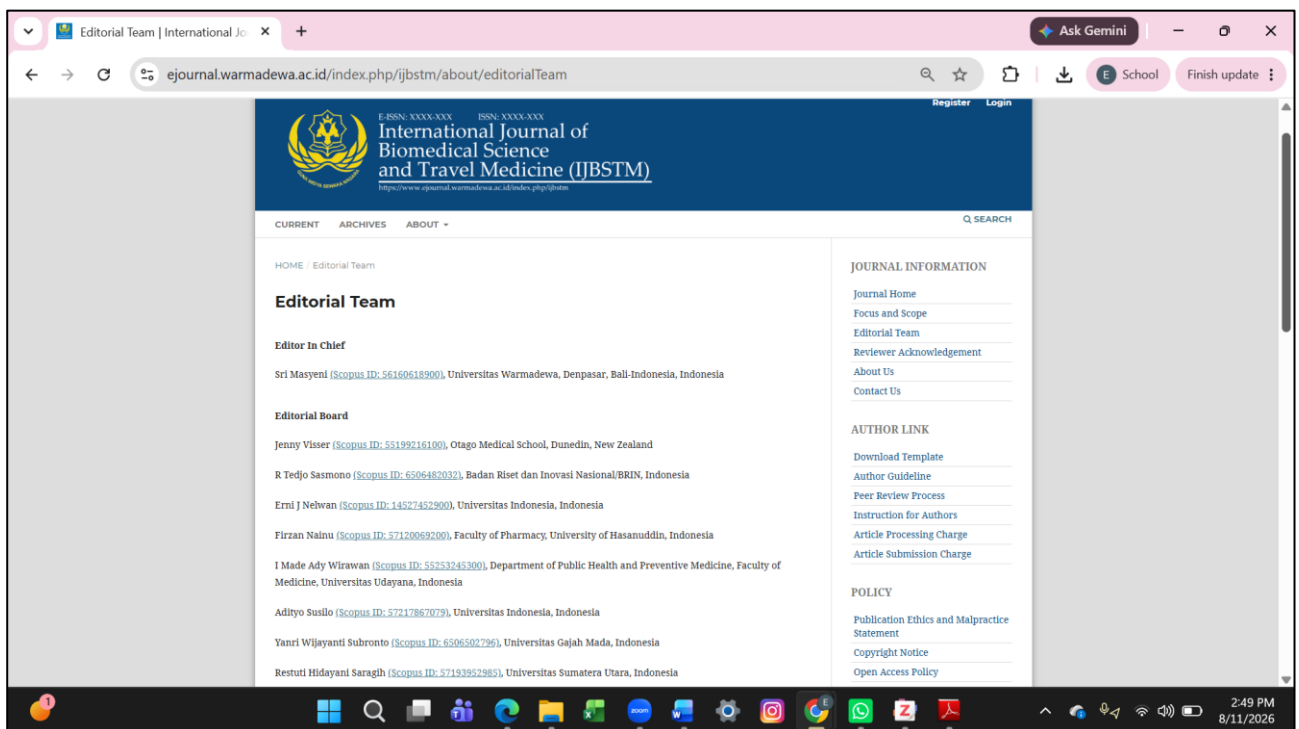
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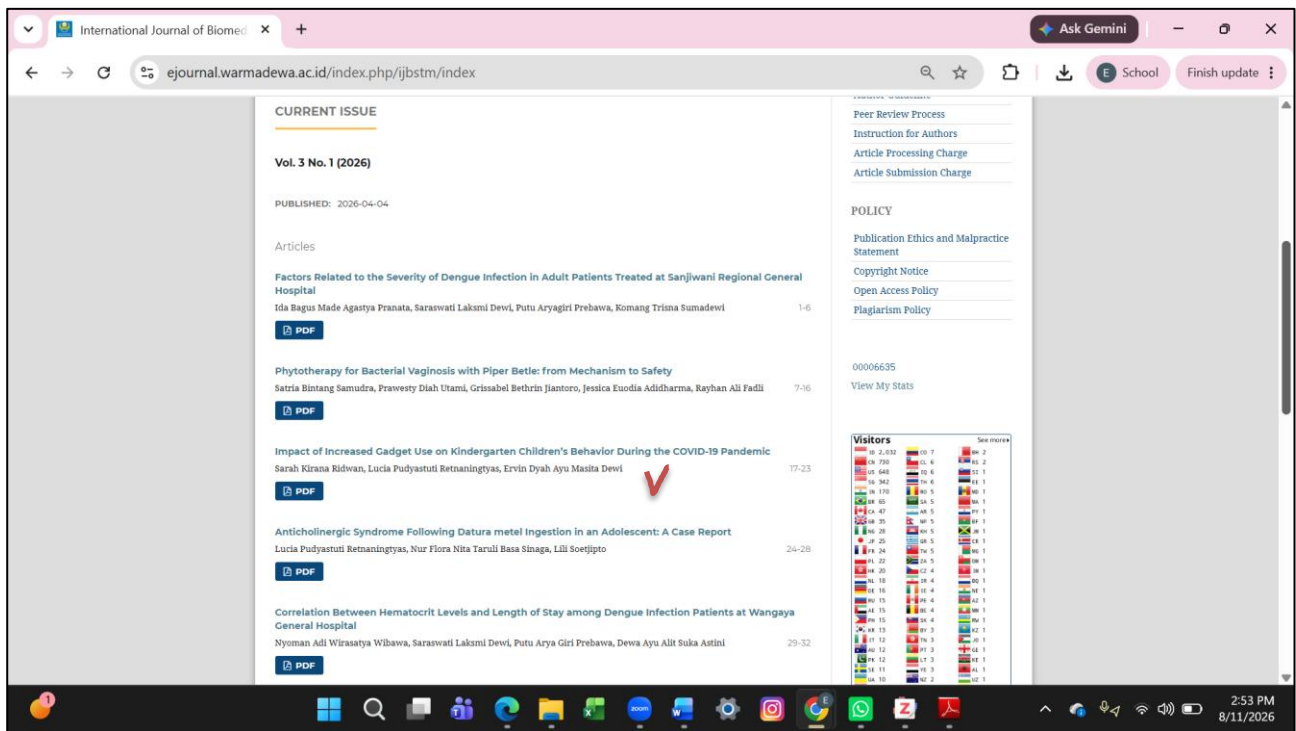
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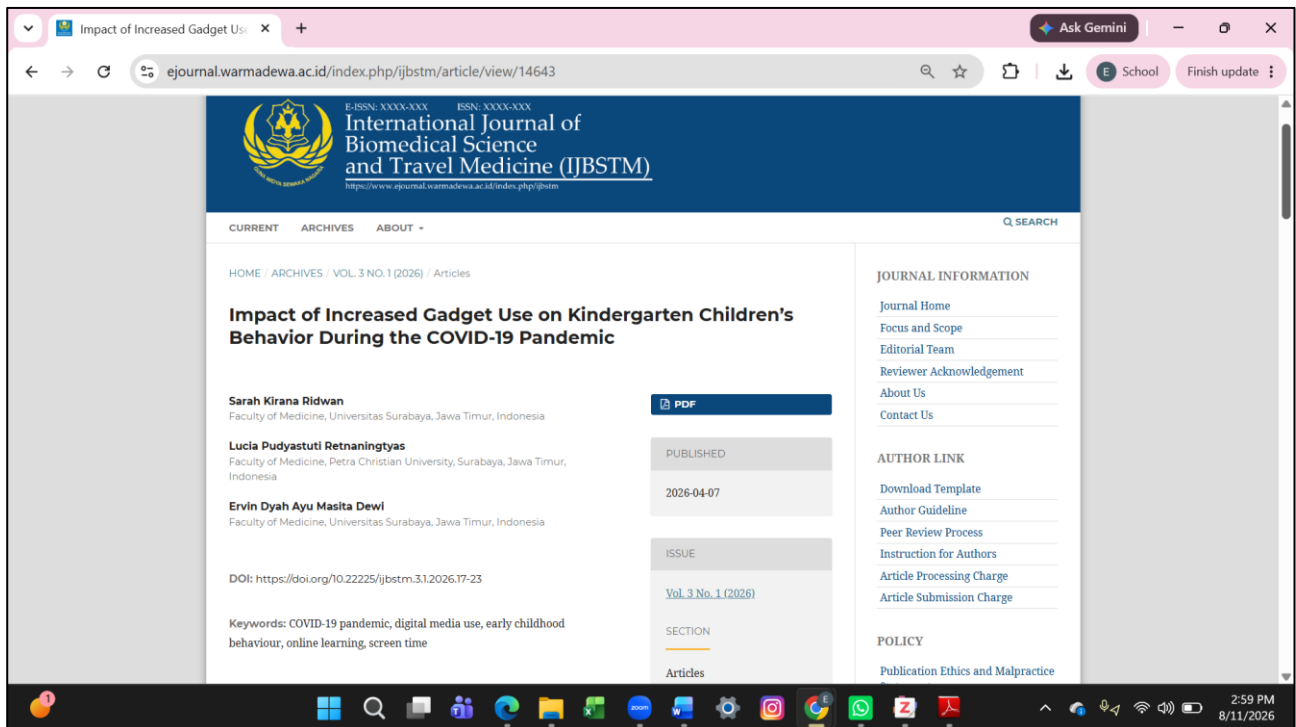
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Impact of Increased Gadget Use on Kindergarten Children's Behavior During the COVID-19 Pandemic

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Abstract

Background: The COVID-19 pandemic caused major disruptions in educational systems worldwide, including early childhood education. Kindergarten learning shifted from face-to-face instruction to online learning, increasing children's exposure to digital devices. Increased screen exposure may influence children's behavioural development, particularly emotional regulation, discipline, and social interaction.

Objective: This study aimed to explore behavioural changes associated with increased gadget use among kindergarten children during the COVID-19 pandemic.

Methods: This qualitative study employed an interpretative descriptive approach. Data were collected through semi-structured interviews with six parents of kindergarten students and one teacher as a triangulation source at Dharma Wanita Persatuan Pepelegi Kindergarten, Waru, Sidoarjo, Indonesia. Participants were selected using purposive sampling. Interview recordings were transcribed verbatim and analysed using inductive thematic analysis.

Results: Children's gadget use increased during the pandemic due to online learning demands and environmental factors such as limited supervision and restricted outdoor activities. Although social interaction with peers remained relatively maintained in some contexts, increased gadget exposure was associated with emotional responses including irritability and frustration when use was restricted, as well as reduced behavioural discipline such as delaying tasks and decreased responsiveness to parental instructions.

Conclusion: Increased gadget use during the pandemic was associated with behavioural changes among kindergarten children, particularly in emotional responses and discipline. Environmental conditions and parental supervision played important roles in moderating these effects. Structured guidance and balanced digital media use are therefore essential to support healthy behavioural development in early childhood.

Keywords: COVID-19 pandemic; digital media use; early childhood behaviour; online learning; screen time

Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic has profoundly affected various sectors of human life, including the education system. To prevent the spread of the virus, governments implemented social distancing policies that led to school closures

and the rapid transition from face-to-face learning to online learning environments (Dong et al., 2020). These changes affected students across all educational levels, including early childhood education.

In kindergarten education, the transition to online learning required children to use digital devices such as

smartphones, tablets, or computers as primary learning tools. Consequently, children were exposed to digital screens for longer durations compared to the period before the pandemic. Several studies reported that children's screen time increased significantly during the pandemic due to remote learning and restrictions on outdoor activities (Nagata et al., 2022; Xiang et al., 2020; Neville et al., 2021; Wiederhold, 2020).

Early childhood is a critical stage of development in which children develop cognitive abilities, emotional regulation, and social interaction skills. Environmental stimulation during this developmental period plays a crucial role in shaping behavioural patterns. Excessive exposure to digital devices may potentially influence children's behavioural development, including their emotional stability, discipline, and social relationships (Madigan et al., 2020; Rismala et al., 2021). In particular, increased exposure to digital media may affect children's emotional responses, daily discipline, and patterns of social interaction during early childhood.

Research has shown that prolonged screen exposure among young children is associated with several behavioural concerns, including irritability, decreased attention span, and reduced self-regulation abilities (Domoff et al., 2022). Furthermore, children who spend extended periods using digital devices may experience difficulties disengaging from screen-based activities, which may affect their daily routines and discipline. In this study, the term "*gadget use*" refers to children's exposure to digital devices that contributes to increased screen time during the COVID-19 pandemic.

Despite these potential negative impacts, digital technology also offers certain benefits for children when used appropriately. Educational applications and interactive learning platforms may enhance children's learning experiences and provide access to educational content (Bergmann et al., 2022; Zhao et al., 2021). Therefore, gadget use should not be viewed solely as harmful but rather as a tool that requires appropriate supervision and regulation.

During the COVID-19 pandemic, parents played a critical role in managing children's gadget use at home. However, the sudden shift to online learning created new challenges for parents in balancing educational screen use and recreational screen time.

Despite the growing number of studies examining children's screen time during the COVID-19 pandemic, most of these studies have applied quantitative approaches that focus on statistical associations between screen exposure and developmental outcomes. Limited research has explored parents' experiences and observations regarding behavioural changes among young children during this period.

Moreover, limited qualitative research has specifically explored how increased gadget use during pandemic-related online learning shapes behavioural domains such as emotional responses, discipline, and social interaction among kindergarten children within real-life home learning environments. Therefore, this study aims to explore the impact of increased gadget use on behavioural changes among kindergarten children during the COVID-19 pandemic using a qualitative approach. By examining parents' experiences and observations, this research contributes to a deeper understanding of how digital technology exposure during the pandemic influences children's emotional regulation, discipline, and social interaction in early childhood.

Methods

This study employed a qualitative research design using an interpretative descriptive approach. The research was conducted at Dharma Wanita Persatuan Pepelegi Kindergarten, Waru, Sidoarjo, Indonesia, in July 2023.

Participants consisted of six parents of kindergarten students who were involved in online learning during the COVID-19 pandemic. Parents were selected using purposive sampling based on their willingness to participate and their experience in assisting children during online learning. In addition, one kindergarten

teacher was included as an additional data source for triangulation to provide complementary perspectives regarding children's behaviour in the school environment. Data collection was continued until thematic saturation was achieved, indicated by the absence of new themes in subsequent interviews.

Data were collected through semi-structured interviews lasting approximately 40–50 minutes for each participant. Interviews were guided by an interview protocol and audio-recorded to ensure data accuracy. The recordings were transcribed verbatim prior to analysis.

Data analysis was conducted using an inductive thematic analysis approach as described by Braun and Clarke (2006). The analysis began with repeated reading of the transcripts to achieve data familiarisation. Meaningful units related to behavioural changes were identified and assigned initial codes. These codes were then compared and grouped into broader categories, which were subsequently developed into themes. The coding and theme development process involved iterative review of the data and discussion among the researchers to reach

agreement on theme interpretation and refinement.

To ensure the trustworthiness of the findings, several strategies were applied. Credibility was strengthened through triangulation of data sources by including both parents and a teacher. Dependability and confirmability were supported by maintaining detailed documentation of coding decisions and theme development, as well as repeated review of interview data to ensure consistency between participants' statements and the emerging thematic structure.

This study obtained ethical approval from the Health Research Ethics Committee of Universitas Surabaya (No. 187/KE/VII/2023, dated 28 July 2023). All participants provided informed consent prior to participation.

Results and Discussion

The characteristics of the research participants are presented in Table 1. The participants consisted of six parents of kindergarten students and one teacher who served as a triangulation source.

Table 1. Characteristics of Research Participants

Participant	Age (years)	Role	Occupation
P1	34	Mother	Private employee
P2	38	Mother	Housewife
P3	36	Mother	Entrepreneur
P4	35	Mother	Private employee
P5	39	Mother	Housewife
P6	37	Mother	Entrepreneur
T1	54	Kindergarten teacher	Teacher

Source: Primary data, 2023

The thematic analysis of interview data identified five main themes related to children's gadget use and behavioral changes during the COVID-19 pandemic. The main themes that emerged from the data included: (1) increased gadget use during the pandemic, (2) environmental factors influencing gadget use, (3) social interaction among children, (4) changes in discipline, and (5) emotional responses related to gadget use.

Theme 1: Increased Gadget Use During the COVID-19 Pandemic

All parents reported that the duration of gadget use among their children increased during the COVID-19 pandemic. Before the pandemic, children generally used gadgets for a limited period, mainly for entertainment. However, during the pandemic, gadgets became an important learning medium in online education.

One parent explained that their child used gadgets more frequently because online

classes were conducted through video calls or online meeting applications.

"Before the pandemic my child only used the phone for a short time, but during online school the phone had to be used almost every day." (Parent 2)

Another parent also reported that children tended to continue using gadgets after completing their online learning activities.

"After the online class finished, my child often continued watching videos or playing games on the phone." (Parent 4)

These findings indicate that the transition to online learning significantly increased children's exposure to digital devices. The increased gadget use reported by parents in this study reflects how online learning reshaped children's daily routines, where digital devices became integrated not only into educational activities but also into leisure time. This shift suggests that the pandemic not only increased screen exposure but also transformed children's daily activity structures, with digital media becoming a dominant component of both learning and recreation.

These findings are consistent with previous research indicating increased sedentary behaviour and screen exposure among children during pandemic lockdowns (Xiang et al., 2020). This shift toward digital learning environments has created new challenges in managing children's screen time. Similar trends of increased screen exposure among children during pandemic-related school closures have also been reported in several studies examining early childhood learning environments (Yulia et al., 2021).

Theme 2: Environmental Factors Influencing Gadget Use

Another important theme identified in this study relates to environmental factors that influence children's gadget use. Parents reported that their work responsibilities sometimes limited their ability to supervise their children continuously.

One parent stated:

"Because I have to work, sometimes I

give my child the phone so they can stay at home and not disturb others." (Parent 1)

This situation suggests that gadgets may function as tools to occupy children when parental supervision is limited. Previous studies have also identified parental workload as an important factor contributing to increased screen exposure among children (Sultana et al., 2021; Marchetti et al., 2021).

However, environmental factors could also reduce gadget use in certain situations. Parents reported that children who had friends living nearby tended to spend more time playing outside rather than using gadgets.

"There are many children around the house, so my child often plays with friends outside instead of using the phone." (Parent 5)

This finding highlights the important role of social environments in shaping children's daily activities. Opportunities for outdoor play and peer interaction may help reduce children's reliance on digital devices.

Furthermore, similar findings have been reported in studies highlighting the protective role of social environments and outdoor play opportunities in reducing children's dependence on digital media (Nagata et al., 2022).

Theme 3: Social Interaction Among Children

Interestingly, most parents reported that increased gadget use did not significantly reduce children's social interaction. Children were still able to interact and play with peers in their neighbourhood.

A parent explained:

"My child still plays with friends around the house, so the phone does not stop them from meeting others." (Parent 3)

Observations from the classroom teacher also supported this finding. According to the teacher, students continued to interact normally with their classmates during school activities.

These findings suggest that gadget use does not automatically reduce children's social interaction if opportunities for real-life

interaction remain available. Social interaction in early childhood is strongly influenced by environmental opportunities and peer relationships (Maunah, 2013).

Although several studies have suggested that excessive screen time may reduce social interaction among children (Oktafia et al., 2021; Ariston & Frahasini, 2018), the findings of this study indicate that the impact of gadget use may depend on the broader social environment.

Theme 4: Changes in Children's Discipline

Another theme identified in the interviews was related to changes in children's discipline. Several parents reported that children tended to delay tasks or ignore instructions when they were engaged with gadgets.

One parent described the situation as follows:

"When my child is playing games, it is difficult to ask them to stop. They often say 'wait a moment' before doing what we ask." (Parent 6)

This behaviour indicates that digital activities may interfere with children's daily routines and responsibilities. Digital media often provide strong visual stimulation and immediate gratification, which can make it difficult for children to disengage from screen-based activities.

Research on problematic media use suggests that excessive screen exposure may affect children's ability to regulate their behaviour and maintain discipline (Domoff et al., 2022; Rahayu & Lidinillah, 2022).

Young children have limited self-regulation abilities, which makes parental supervision and time regulation particularly important in managing gadget use.

Theme 5: Emotional Responses Associated with Gadget Use

The final theme identified in this study relates to children's emotional responses when gadget use was restricted. Several parents reported that their children became irritable, cried, or expressed anger when they were asked to stop using gadgets.

One parent stated:

"My child sometimes becomes angry or cries when I take the phone away." (Parent 2)

These emotional reactions may indicate the development of psychological attachment to digital devices, particularly when children experience frequent and prolonged exposure to screen-based activities. According to attachment theory, repeated interaction with certain objects or activities may create emotional bonds (Bretherton, 2013). Frequent reliance on digital devices may increase frustration when access is restricted.

However, emotional responses observed during the pandemic may also be influenced by broader psychosocial factors. The COVID-19 pandemic disrupted children's daily routines and limited opportunities for outdoor activities, which may have contributed to psychological stress among children.

Previous research has shown that pandemic-related restrictions were associated with increased emotional difficulties among children and adolescents (Panchal et al., 2021; Orgilés et al., 2020). Similar findings regarding emotional responses related to digital media exposure have also been reported in studies examining emotional regulation among children (Supervía et al., 2022).

These behavioural changes appear to be shaped by multiple interacting factors, including increased digital exposure, environmental conditions, and the psychological impact of the pandemic.

Overall, the findings suggest that children's behavioural responses to increased gadget use during the pandemic were shaped by the dynamic interaction between digital exposure, environmental context, and developmental characteristics. This study therefore provides qualitative contextual evidence that complements existing quantitative findings on children's screen exposure during the pandemic.

These findings highlight the importance of parental supervision and balanced digital media use among young children. Appropriate guidance from parents may help children benefit from digital

learning technologies while minimizing potential negative behavioural effects.

Conclusion

This study found that gadget use among kindergarten children increased during the COVID-19 pandemic, primarily due to the implementation of online learning. Although increased gadget exposure did not substantially reduce social interaction in all contexts, it was associated with behavioural changes, particularly in emotional responses and discipline. Children were reported to become more irritable or reluctant to stop using gadgets when their screen time was restricted, suggesting that increased reliance on digital devices may influence daily routines and emotional regulation in early childhood.

These findings highlight the important role of parental supervision and environmental conditions in moderating the impact of digital media use. Parents and educators are encouraged to provide structured guidance, including setting appropriate screen time limits and promoting alternative developmental activities such as physical play and peer interaction.

Future research is recommended to further explore additional factors influencing behavioural development related to digital technology use in early childhood.

Conflict of Interest

The authors declare that there is no conflict of interest related to this study.

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