



Risk Factors and Adverse Effects of Smartphone Addiction in Early Childhood: A Systematic Review

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Abstract. Smartphones are technological devices that have a significant impact on people's daily lives. However, excessive smartphone usage can have negative effects on individuals. This study aims to systematically identify the risk factors and impacts associated with smartphone addiction in early childhood. The systematic review method is used for searching articles. The review was conducted with the processes of identification, screening, eligibility, inclusion, and data analysis on three search engines which were Scopus, SpringerLink, and SAGE Publication. The analysis results reveal that the risk factors of smartphone addiction among children were divided into parental variables and child variables, while the negative impacts of smartphone addiction include problems in mental, physical, communication, and cognitive development in children.

Keywords: Risk Factor, Smartphone Addiction, Early Childhood.

1 Introduction

In the current era of globalization, the growth and development of children are influenced by technological and communication devices [1], [2]. One of the commonly used communication and information technologies is smartphone. Children are accustomed to using smartphones to explore the online world, play games, watch YouTube and TV shows, which are expected to be enjoyable toys and sources of satisfying their curiosity [3]. This happens because there are many benefits that can be gained from using technology, ranging from convenience in education, work, and even as a form of entertainment.

However, behind the benefits of smartphones, excessive usage can lead to addiction, where individuals become dependent on continuous usage. Therefore, users must balance in gadget usage, pay attention to screen time, and avoid negative effects such as smartphone addiction.

Smartphone addiction is not limited to adults but can also occur in early childhood. Children are already familiar with technological products such as smartphones, TVs, iPods, the internet, and so on. The availability of various digital technologies is due to parents facilitating the provision of these facilities at home. In America, 52% of families with young children already had smartphones in 2011, and this increased to 98%

smartphone ownership in 2017 [4]. A study of parents with children aged 3-8 years in five Southeast Asian countries reported that 66% of children had used smartphones, and 14% owned their own smartphones [5].

Smartphone addiction can be triggered by various factors. High smartphone usage carries a risk of addiction. A study by Kim et al. in 2013 reported that out of 1.63 million teenagers, 17.9% experienced smartphone addiction, and over 24% of children were diagnosed with internet addiction, requiring hospital treatment [6]. In Indonesia, 48 adolescent and child patients were treated at Dr. Soeharto Herdjan Jakarta Mental Hospital in 2016 due to smartphone addiction, hyperactivity, and learning disorders [7]. Smartphone addiction can also be triggered by income and education level. For instance, research has shown that children from families with lower income and education levels are more likely to face issues [8]. When parents have lower levels of education, their awareness of the seriousness of smartphone addiction is often limited, making it easier for them to provide smartphones to their children, which can lead to a higher rate of smartphone addiction. Additionally, parents with limited financial resources may not be able to afford expensive smartphones, potentially resulting in a lower rate of smartphone addiction among their children.

Smartphone addiction not only poses problems on the physical aspect but also on the social, behavioral, and affective aspects. Common physical impacts include visual impairments and pain in the fingers and neck [9], while in terms of mental health, smartphone addiction can lead to depression, neuroticism, and obsessive-compulsive behavior disorders and can affect academic performance [10]. Accordingly, the aim of this study was to systematically identify the risk factors and adverse effects from smartphone use in early childhood.

2 Methods

To systematically identify the risk factors and adverse effects of smartphone addiction in early childhood, we conducted a systematic review. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement [11] and flowchart were used in this review as they are designed to assist in synthesizing relevant journal articles. In general, this method consists of three phases: review planning, review execution, and reporting.

2.1 Review Planning

The literature search was conducted systematically through several databases, namely Scopus, SpringerLink, and SAGE Publication, with a limitation on articles published in the timeframe of 2020-2023. The keywords used in the literature search were "smartphone addiction" AND "factor" AND "effect" AND "children" OR "child."

2.2 Review Execution

The next phase involved the ongoing search for pertinent articles following the PRISMA guidelines. This step played a crucial role in gathering data, involving the collection of information from research journals. The PRISMA selection process encompassed four key stages: identification, screening, eligibility, and included.

Identification. The identification stage was started by searching for relevant article to be reviewed. The search was conducted through Scopus, SpringerLink, and SAGE Publication for articles published from 2020 to 2023. The results are shown in Fig.1.

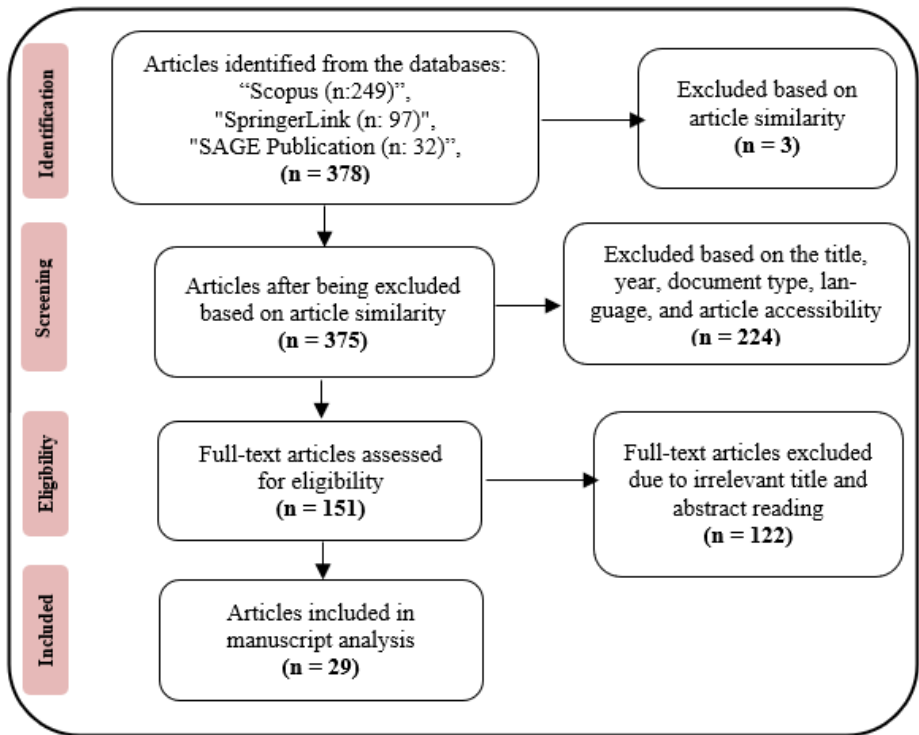


Fig. 1. PRISMA Protocol Flowchart

Screening. The screening phase was carried out by eliminating duplicates among the results obtained during the identification phase. From the list of results, a total of 167 entries were identified as duplicates of other studies. Using the PRISMA protocol flowchart, these duplicate entries were removed. Following this, we proceeded to organize the data based on article titles, publication years, document types, languages, and article accessibility. Article titles were required to be relevant to the topic, which is "Risk Factors and Adverse Effects of Smartphone Addiction in Early Childhood."

The publication years were restricted to the range of 2020 to 2023. The chosen document types were limited to original studies published in scholarly journals, while trade journals, magazines, books, newspapers, conference papers, and other types were excluded. The language criterion was set to English for standardization, and accessibility was restricted to full-text articles with free access.

Eligibility. A total of 505 articles in this step were obtained by excluding articles based on the title, year, document type, language, and article accessibility. This stage required a detailed manual examination based on the abstracts of these articles. The criteria we looked for were relevant titles, relevance to the topics, and suitability with our target sample. From this stage onwards, several criteria were identified that did not meet the requirements, including irrelevant titles and studies that fell outside the sample size, which consisted of adolescents and adults.

Included. From the previous stage, a total of 50 studies were selected to be included in this review based on our inclusion criteria for this systematic literature review. The validity and reliability of the research depend on the quality of the included articles and the techniques used in conducting the review. A strict sequence of steps following the PRISMA protocol, along with the inclusion criteria, is a method to enhance the validity and reliability of data by reducing the risk of bias. These selected articles were reviewed to determine the understanding of research on risk factors and adverse effects of smartphone addiction.

2.3 Reporting

The results of data collection from previous research were analyzed and reported in this systematic literature review. The reporting section consisted of creating a matrix of included prior studies, an abstract of the literature review, research questions, findings, and conclusions. The matrix was used to identify basic information from each article used in this review to obtain information related to the risk factors and adverse effects of smartphone addiction in early childhood. From the study results, some of them were presented in the form of tables, graphs, and explanations.

3 Results and Discussion

The search results from three databases yielded 50 articles, which were subsequently analyzed. The analysis results are explained in three subsections: distribution of research by publication year, risk factors of smartphone addiction in early childhood, and adverse effects of smartphone addiction in early childhood.

3.1 Distribution of Research by Publication Year

There are a total of 27 articles published between 2020 and 2023 related to smartphone addiction. Figure 2 shows the distribution analyzed based on their publication years.

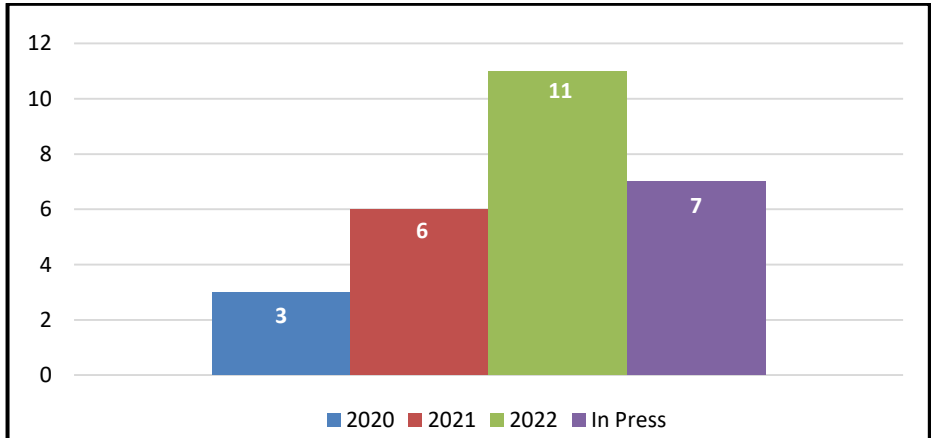


Fig. 2. Distribution of Research by Publication Year

Based on Figure 2, it can be seen that research related to smartphone addiction has been increasing every year, with three articles in 2020, six articles in 2021, eleven articles in 2022, and there have already been seven articles in 2023. This indicates that researchers' interest in smartphone addiction is growing and they are realizing the importance of understanding the factors that cause smartphone addiction and the consequences it has on young children if left unchecked [12].

3.2 Risk Factors of Smartphone Addiction in Early Childhood

Risk factors for smartphone addiction among children can be divided into parental variables and child variables. When parents have higher education, income, belong to dual-income families, use smartphones themselves for longer periods, adopt permissive parenting styles, and have positive attitudes towards smartphones, children tend to have a higher likelihood of becoming addicted to smartphones [13]–[15]. Additionally, Kids from families with lower economic means displayed more frequent and extended smartphone and tablet personal computer usage when contrasted with their counterparts from wealthier households. [16]. Mother's smartphone addiction is related with early smartphone exposure of children. High-risk group's children was exposed to smartphone earlier than low risk group [17], [18].

In terms of child variables, younger children, boys, and spending a lot of time using smartphones predict smartphone addiction [13][19]. These risk factors for smartphone addiction in early childhood are illustrated in Figure 3.

3.3 Adverse Effects of Smartphone Addiction in Early Childhood

Children with smart phone addiction show problems in mental, physical, communication, and, cognitive development. In other words, a child addicted to smart phone has higher possibility of having that these issues. This figure illustrates the adverse effects of smartphone addiction in early childhood can be seen in Figure 3.

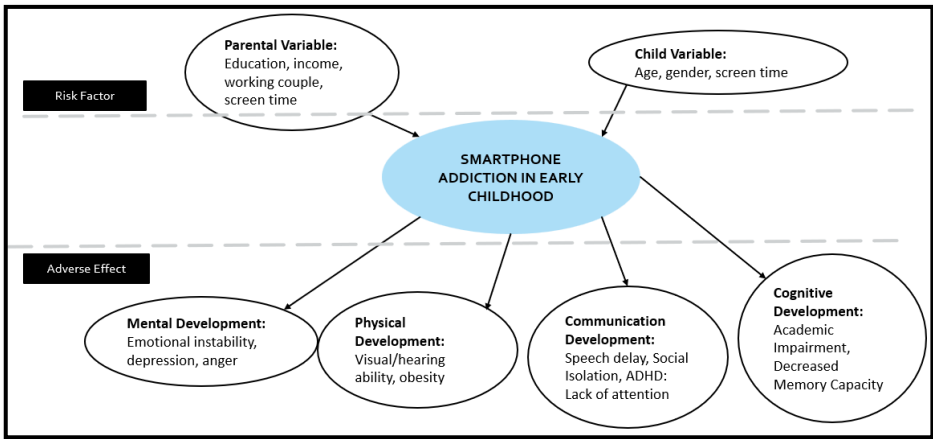


Fig. 3. Risk Factors and Adverse Effects of Smartphone Addiction in Early Childhood

Based on Figure 3, there are many adverse effects of smartphone addiction. A higher rate of smartphone addiction is associated with issues in mental development such as emotional instability, depression and anger[14], [20]–[25]. Excessive smartphone usage, due to the immediate and sensory stimulation it offers through visual and auditory experiences, has the potential to affect children negatively, especially those who are mentally immature, making them emotionally unstable[26]–[28].

Physical development, including problems with visual and hearing, obesity, and bodily imbalance, similar to the effects of children's gaming addiction. Continuously staring at a screen is detrimental to the eye health of adults, but children are at a higher risk of experiencing more severe visual impairments. Additionally, prolonged smartphone usage with earphones can have adverse effects on one's hearing. Smartphone addiction also reduces the likelihood of engaging in social interactions with others [29]–[32]

Smartphone addiction in children can have significant impacts on their communication development. Dependence on smartphone screens can result in speech delays, hinder a child's ability to engage in social interactions, and may even contribute to ADHD symptoms such as inattention [33]–[35]. Children who are excessively glued to their smartphones tend to isolate themselves from crucial social interactions that are essential for healthy language and social development [32], [33], [36]–[38]. Therefore, it is important for parents and educators to limit smartphone use in children and encourage a balanced social interaction and healthy communication development.

Smartphone addiction can also have negative impacts on the cognitive development of children. Excessive smartphone use can disrupt children's focus and attention, reduce their ability to learn effectively, and ultimately lead to academic problems. Moreover, spending too much time in front of smartphone screens can hinder children's memory capacity, affecting their ability to absorb and retain important information. With these disruptions in cognitive development, children may struggle to achieve optimal academic performance [19], [22], [28], [39]–[41]. Therefore, it is important for parents and educators to monitor and regulate children's smartphone usage to avoid hindering their cognitive development and emphasize the importance of balanced use between technology and other activities that support intellectual growth.

4 Conclusion

This study examined the risk factor and adverse effect of children's smartphone addiction. Risk Factor of smartphone addiction among children were divided into parental variables and child variables. Children with smart phone addiction show problems in mental, physical, communication, and, cognitive development. In other words, a child addicted to smart phone has higher possibility of having that these issues. In the end, the conduct of this systematic literature review was constrained to specific situations. One primary constraint was the restricted availability of articles for examination. It was also asserted that in this systematic literature review, the focus was solely on academic articles. Consequently, future researchers might consider exploring alternative forms of publications, such as books, theses, and conference papers, as these sources are known for their high-quality content.

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