The Effect of Screen Media on Children

The Change from Negative to Positive

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Abstract. Given the inconsistent findings on the evaluation of screen media and its effect on children, the current paper aims to provide a relatively comprehensive understanding of the controversial topic. The effects of screen media are discussed and illustrated from the perspectives of children's development stages and several sections, including cognitive, social, and emotional growth, as well as physical development. Based on the results from previous studies, a significant body of researchers has focused on the harm of screen media to children, including video deficit, lower social reactivity, obesity, and behaviour problems. But the potential benefits gradually draw public attention, especially under the circumstance of COVID-19. It is found that co-viewing with parents is one of the most applicable approaches to activating screen media's positive effects. However, most of the previous research about the bad influence only analyses the correlations. And the study usually focuses on the children in developed countries, the data and resources of other developing countries become "invisible". More causal effects and longitudinal studies from diverse samples are expected in a relatively new field.

Keywords: Screen Media · Children Development · Co-viewing · Parental Involvement

1 Introduction

When coming into the digital era in the 21st century, the new generation is born in an environment full of electronic devices. It seems that children nowadays can easily get access to various digital devices with screens. Thus, the influence of such electronic devices is irresistible to children in such a digital society. The long-term influence of screen media on children is highlighted in the study of Paudel et al. [1], as their childhood screen habits can have an impact on their media use in adolescence and adulthood. One of the particular examples is that children may establish a stable lifestyle with huge amounts of digital devices and relatively low physical activity frequency. The consequent increase in sedentary behaviours is regarded as a risk factor for an individual's health. In addition, if children do not learn how to use screen media appropriately, their online habits will stay passive and hinder their ability to effectively gather, select and use the information on the internet. This is one of the reasons why media education is gradually becoming an

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inevitable new topic for families, schools, and societies. Teaching the way that children use screen media contains a key process to educate them on how to adapt to the lifestyles with the massive use of digital devices. Yet screen media in daily life is regarded as a distraction for children's learning and development, and parents and teachers find it difficult to avoid negative impacts while using screen media as supportive instruments. The basic objective of this review is to clarify the effect of screen media on children under the age of 12. Understanding the positive and negative influences can point the way for future study and provide constructive suggestions in education.

Therefore, the upcoming challenge is how to deal with the relationship between children and screen media. It has become a conventional consensus that screen media is detrimental to children's development and school performances, but some of the research regarded screen media as a brand-new potential instrument to facilitate children's learning, especially when traditional education felt a full impact of coronavirus disease 2019 (COVID-19).The American Academy of Pediatrics now urges parents to use screen media together with their kids and teenagers rather than rigorously regulating or sternly limiting these digital devices for toddlers [2], indicating the dynamic change of attitudes along with the development of electronic devices. Hence, it hints at the potentially positive role of screen media in bringing innovations to home and school education.

Given the inconsistent findings on the evaluation of screen media and its effect on children, the current study aims to relatively provide a comprehensive understanding of the controversial topic. First, the paper proposes the present situation of screen media use by children. Second, the effects of screen media are discussed and illustrated from the perspective of children's development stages and different areas of children's development, including cognitive, social, and emotional growth, as well as physical development.

2 Screen Media

Children nowadays can easily get access to various screen media, and the overall amount of screen media use is constantly climbing higher. In 2013, children have much greater access to mobile media devices than they did two years ago [3]. Meanwhile, children use mobile devices on average for triple the previous amount of time. And the situation had an obvious change in 2019 due to COVID-19. Lockdowns and school closures rapidly prompt distance learning, so inevitably young children of school age are required to have increased access to all kinds of screen media, causing higher screen time in total. During the pandemic, the average time of using smartphones had dramatically raise compared to that before the pandemic [4], since over two-thirds of the children spent more than 4 h per day. Meanwhile, an increase in overuse and screen media addiction was observed. The number of children who showed smartphone addiction almost doubled after the COVID-19 outbreak.

The use of screen media in children has shown a trend of younger age and increase in the total of time. Kabali et al. [5] examined 350 children between the ages of 6 months and 4 years living in a Philadelphia, Pennsylvania, low-income, minority district. The results show that nearly all of the families had television, also smartphone and tablets are common in over 75% of total families. At age 4, three-fourths of children had their smartphones and half own televisions. The majority of kids (96.6%) who utilized mobile

devices did so before turning one. Most kids used a device every day by the time they were two, and they watched TV and used their phones for about the same amount of time. Poulain et al. [6] also discovered significant increases in the average time of screen media use in both preschool-age and school-age children. As the children grow up, the potential risks and benefits of using screen media will augment with the age.

In this review, the screen media that will be discussed contains the common types that children may be exposed to, including television, mobile phone, and electronic tablets.

3 The Effect of Screen Media on Different Age Groups

In different stages of the children's development, children and families must confront different challenges from screen media. The influence of screen media on children shows various forms and features.

3.1 Preschool Students (0–6 Years Old)

3.1.1 Cognitive Development

As for preschool children, video comprehension is a quite demanding task. Children under the age of three seem to be especially susceptible to the video deficit [7], which means that infants and toddler lack the ability to effectively learn from videos, compared to a similar situation in real life. The information from video cannot be effectively understood and absorbed by young children. This may be due to their limited capacity of the memory. It is believed that inferential activity, short-term visual and auditory memory, and other cognitive processes are needed for comprehension. Accordingly, video deficit will affect children's speech learning and memory processing. Early exposure to digital devices is just beyond the cognitive capacity of young children.

However, burgeoning electronic devices are gradually changing the negative situations. Screen media used to be regarded as passive learning materials since the informational interaction is only unidirectional. Through practice with letters, phonics, and word recognition, e-books and other interactive media, such as learn-to-read applications, may help young children become more capable of using early literacy abilities. By using digital scaffolds, e-books may be more interesting for young children and beneficial for fostering vocabulary and reading comprehension [8].

3.1.2 Social and Emotional Development

At the very beginning of screen media use, infants and young babies show no significant differences in responding to the screen media [9]. In the experiment, they found that 2-month-old babies respond in the same way to the live videos and videos that were recorded in advance in which their mothers were talking with and smiling at them. But the interaction gradually decreased, and children become less attentive and responsive to screen media [10]. This leads to the problem that the attachment and interaction between parents and children will decrease. Children will gradually lose the opportunity to learn social interactions through screen media.

However, the decrease in social reactivity towards videos did not necessarily impair the intimacy between parents and children. Linder et.al. [11] found that time spent on digital media and co-watching did not predict attachment insecurity for either the parent or the child. However, it was discovered that parental media consumption strongly predicted attachment insecurity. Only when parents showed little or no active mediation in children's media use was increased child TV media use linked to weaker attachment security. Parental media consumption is a risk factor for attachment, whereas active mediation is a protective factor. The findings show that children's single use of screen media may not harm their social development, but if the screen media use impairs the parent-children interaction and parents cannot show their positive role, attachment insecurity may emerge.

3.2 School-Age Children (6–12 Years Old)

3.2.1 Cognitive Development

In the research of cognitive development for school-age, some studies primarily try to focus on TV programs and films. They found that watching certain television programs can improve students' performance on tests of attention and select cognitive skills (e.g., Sesame Street) [12]. However, the beneficial impact of television can only be limited to educational programs and instructional films. Also, because the internalization of information needs massive exposure to television, in real life it is hard to control the viewing environment of children.

Besides television, various cognitive abilities may benefit from playing video games. Reaction time is an important aspect of an individual's cognitive ability. Orosy-Fildes and Allan [13] discovered that previous video game play among kids has also been linked to quicker reaction times on tasks involving colour and form discrimination as well as stimulus anticipation. Participants who played the video game in the experiment could press the correct coloured button in a shorter time and with higher accuracy. More studies focus on visual-spatial skills using the classic mental rotation task. In these experiments, youngsters were asked to examine a 3D target form in one way, and then determine whether or not another shape changed or remained the same when viewed from a different angle. McClurg and Chaillé [14] found that the performance of fifth graders on mental rotation tasks can be greatly improved by playing specific video games for five minutes, twice weekly, for six weeks. This improvement is even greater than that of ninth graders who did not undergo the video game training. Moreover, When Schmidt and Vandewater [15] compared the visual attention abilities of young gamers and children who did not participate in the video game, they discovered that playing video games increased their attentional capacity, attention deployment speed, and processing speed. From these studies, the positive influence of screen media was revealed, including reaction time, visual-spatial ability and attention.

More specific results about fluid cognitive functioning (FCF) were found through a big sample study. To examine FCF, which includes the learning capacity, problem-solving skills, and adaptive capacity to a new environment, Kirlic et al. [16] used a machine learning framework along with a large set of measurements and tested 9,718 primary students. From the machine learning and follow-up analysis, the study shows

weak negative correlations between FCF and time of watching internet videos on weekdays, playing mature-rated video games, watching mature-rated movies, and using social media. Whereas the time spent on using these screen media is significantly uncorrelated, indicating that the key to screen media use for school children is to supervise the contents and provide more beneficial educational information.

3.2.2 Social and Emotional Development

The results of the previous study on children's behaviours and family interaction are quite controversial. Studies from the negative side propose that the use of screen media is strongly correlated to behavioural difficulties and raising problems between family member, while several studies mention that with good use of screen media, the connection between parents and children can be improved.

Research focusing on children's social and emotional development also presents negative evidence. Poulain et al. [6] assessed the prosocial behaviours and behavioural difficulties and explore relationship between children's behaviour and using digital screen devices. The research found that children who spend more time on screen media had greater behavioural issues, signs of hyperactivity or inattention, and less prosocial behaviour. This may be explained by the theory of displacement of activities. In the theory, it is said that although interactive media are excellent for imparting concrete knowledge, children develop other crucial pre-academic abilities through exploring the outdoors, interacting with friends and family, and engaging in free-form, creative play [8]. For instance, children learn primarily on social skills and problem-solving when playing cooperation games with peers. During the process, they can gradually gather experience in showing empathy and managing their own activities.

Moreover, the use of screen media usually causes conflicts between parents and children. Children are more likely to watch prohibited content with friends and have more favourable attitudes toward the programs that they are not allowed to watch when parents use restrictive mediation techniques, since it may be perceived as a sign that the parents do not really trust them. In a study in Hong Kong, China, the 'restrictive approach' was the predictor of increasing behavioural problems [17].

Nevertheless, from a beneficial perspective, screen media can help parents and kids communicate better. Co-viewing with kids, according to some parents, improved parent-child interaction. Some families watched media together, giving the parents and kids a chance to engage in a common activity. Evan et al. [18] proposes that screen media can play a positive role in assisting parents and family. Parents reported that screen media assisted them in managing their kids' behaviour. Particularly, some parents punished or rewarded their children by using television or video games. In addition, co-viewing with children can increase family connectedness.

3.2.3 Physical Development

Physical development is a dimension that is not obvious when children are young, but it becomes the focus of concern as children grow up. Results from previous studies show that high-calorie, low-nutritional food products predominate in advertisements targeted toward children, and exposure to food advertising causes kids to eat more

overall [19]. Besides the latent detrimental factor from advertisement, another argument that has been put forward is the time displacement theory. Children's media use with high intensity takes time away from sensorimotor activities that involve exploring the natural environment and interacting with others [8]. With the increasing incentive of obesity and decreasing amount of physical activity, it is possible that the children will face more risks in keeping physical health.

Moreover, sleep, which is important for memory and learning, is affected by the time of screen media use. Cain and Gradisar [20] elaborated that the effects of screen media use have been found to be most consistently associated with a later bedtime, less overall sleep time, and later sleep onset.

However, a few studies indicated opposite opinions about the effect of screen media on sedentary behaviour. Using screen media does not necessarily cause sedentary behaviours or prevent physical activities [21]. The times children spend on physically active behaviours in a day are not conflicting with the times of screen media use.

4 Limitation and Future Direction

The research on screen media should be especially concerned with the new situation that emerged in recent years, as COVID-19 is not only a vexing challenge but also an opportunity for transformation. Results from existing research still cannot reveal what function screen media plays in children's development and education in such unique settings. It is possible that screen devices can actively contribute to more inclusive educational opportunities, physical exercises, and novel forms of social support.

Most of the previous research about the bad influence only analyses the correlations. The results can be affected and explained by other variables, such as parent's characteristics and child characteristics (e.g., differential susceptibility) and parent's interactions [22]. These relationships disappear once the unobserved characteristics of parents and children are taken into account. For instance, it has been demonstrated that children with ADHD are particularly vulnerable to gaming disorders, suggesting that behavioural issues may potentially contribute to excessive use of screen media. Additionally, it's probable that parents of kids who exhibit more externalizing and antisocial behaviour approve of their kids using media more frequently, to distract or calm them [6]. Thus, the direction of future research should contain more rigorous causal analysis and longitudinal studies to eliminate the influence of confounding variables.

Moreover, the study usually focuses on the children in developed countries, the data and resources of other developing countries become "invisible". In the article of Jordan and Prendella [23] they mentioned that although journals are trying to solve the problem of sample diversity, it is true that samples from "WEIRD" countries occupy above 90% of the published research on the topic of children, adolescents and media (CAM). The invisible sample contained the ones who live in poor living conditions and children with disabilities are often neglected in the research, although screen media and other digital devices can play important role in improving their study and living environment. The problem that most researchers meet these days is that through standardized sample collecting process and requirements, most of the "invisible" children will be screened out. Thus, Jordan and Prendella [23] proposed that one approach to achieve wider inclusion

in studies was to enable passive consent, where parents can choose not to participate in the study rather than to do so.

5 Conclusion

The present paper analyses the hot debate on the effect of screen media on children. Based on the results from previous studies, a significant body of researchers have focused on the harm of screen media to children, including video deficit, lower social reactivity, obesity, and behaviour problems. But the potential benefits gradually draw public attention, especially under the circumstance of COVID-19. It is found that co-viewing with parents is one of the most applicable approaches to activate screen media's positive effects. Through supportive interaction of parents, children can actively gain educational and beneficial information. More causal and longitudinal studies are expected to reveal how screen media affects children's development.

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