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Adverse Effects Of Digital Addiction On Cognitive Development In Children And Preventive Measure.

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Abstract

Background: Adverse effects of digital dependence in children especially excluding using the children's electronic devices include reduced capability of learning skills, diminished focus and stamina, impaired memory, and social relationships among children. Due to the expanded access to devices, the impact of screen-associated addition on neurocognitive development is important to help youths develop properly.

Objectives: In order to understand the negative impact of dependency on the digital environment on the course and results of children's learning process and to identify recommendations and methods to minimise these impacts towards better mental and cognitive performance.

Study Design: A Cross-sectional study.

Place and duration of study. Department of Pediatrics ATH Abbottabad from Jan 2022 to July 2022

Methods: A quantitative Study design of cross-sectional was used with a sample of 150 children aged between 6 and 12 years. Children and their parents shared information regarding screen time schedule and their children's performance on an aptitude test that consists of an attention test, a memory test, and a social development test. The collected data was analysed using the Statistical Package for Social Science version 24.

Results: Participants' mean age was 9.5 years with a standard deviation of 1.8. Screen time greater than three hours a day was associated with decreased attention span ($p = 0.03$), memory strength ($p = 0.02$), and social interaction ($p = 0.01$). These outcomes indicate that excessive use of digital devices contributes to the presence of specific cognitive threats.

Conclusion: An excess of time spent on screen increases the risk of cognitive loss in a child, for instance, in aspects of their ability to concentrate or their memory and even social skills. Such effects are thus reduced by positive measures, which include limiting screen time and promoting off-screen activities.

Keywords: Digital addiction, cognitive development, children, preventive measures.

Introduction

Children today are often surrounded by numerous technological devices: operating mobile, tablet or computer. These technologies provide varieties of education and entertainment experiences, but the displayed time has been a worry to result in affects on cognition. Cognitive development in children can be described as voluntary mental actions like attending, remembering, learning and problem solving which are crucial in a school setting

as well as in performing majors aspects of day to day life. However, when it comes to the utilization of gadgets, especially in advanced levels, which results in what we referred to as digital dependency, these cognitive process are bound to be negative impacted. Digital addiction means that one spends much time using the technology to the degree that they compromise their everyday growth and progress (1).

It is mostly associated with extended time spent on digital devices that makes it difficult for the child to concentrate or think analytically and even to learn interpersonal and emotional skills (2). The reviews that have been made in the past have revealed that increased screen time is likely to cause reduced attention span, memory and poor social skills (3). In addition, the appealing content of the social media and video games has led to the development of the new problem of digital addiction on the children (4). Preliminary findings show that when children spend more than two hours a day in front of television or computer, they can experience decline in academic accomplishment, concentration and problem solving skills.Clear distinction for argument is that the effects of digital addiction are not only on higher cognitive functions but on the affective and psychological processes as well. About the consequences it was argued that long time spent 'on screen' led to poor mental health especially anxiety, depression, isolation and ill development of cognition (6). Also, it has been found that digital addiction affects sleep quality and increases sleep disturbances that are important for memory formation and cognitive performance (7). Such disrupted sleep effects revealed following over exposure among children shows poor cognitive performance characterized by poor memory and learning (8).Many Studyers have conducted experiments that Studyed the effects of screen time on cognitive abilities, but the results are inconclusive. Recent Study indicates that a reasonable amount of screen time exposure, particularly for educational purposes, improve cognitive skills development (9), other see screen time as a negative aspect associated with many negative effects (10). In that connection, further study is required to delineate how exactly the new forms of digital addiction influence the formation of children's cognition, which preventive strategies may be highly effective. This work aims at increasing the explicative knowledge on the impacts of digital addiction on children's learning abilities including attention, memory as well as social skills, and to recommend measures that can be taken to prevent these negative effects. Additionally, this Study will seek to establish the ways and extent to which amount of time spent on screens may contribute to determining or predicting the cognitive development and recommend best practice and policies to parents, teachers and other policy makers.

Methods

A cross-sectional Study approach was used in order to evaluate the impacts of digital addiction on children's cognitive development. The study targeted 150 children of age 6 to 12 years from the various schools. The target was to question parents in order to acquire information about hours which their children spend with screens, kind of content they use and behavior. The children were given a clinical examination and cognitive developmental evaluation such as the test conducted to assess attention, memory and retention, and social interaction test. The data collection period was six months and children were grouped by their screen time (less than 2 hours, 2-3 hours and more than 3 hours). The ethical clearance for engaging in the Study was sought and got approved from the institutional review board.

Data Collection

The assessment data were completed through the parent questionnaire, and the results of the standardized cognitive tests. The survey covered questions about how long children are engaged in front of screens, the kinds of contents they are exposed to, as well as how it intervenes with their daily routines. **The neurological tests** included basically the tests of attention span, memory and your ability for effective social interactions.

Statistical Analysis

All the data were analyzed using SPSS 24.0. Categorical data collected from the participants were therefore

analyzed using the following measures of central tendency; mean, standard deviation and frequency distributions. Cognitive scores were analyzed using one-way analysis of variance to examine the differences in screen time groups and to perform post hoc test to determine where the differences lay. $p < 0.05$ was used to determine statistical significance.

Results

The age of participants was taken, and the mean age of participants was 9.5 years with SD= 1.8. The child participants in the Study that included 803 children achieved a lower Cog Score of 13.3 if they use screens more than 3 hours per day, while the children who used screen for less than 2 hours per day scored 14.3 Cog Score. More precisely, it was revealed that a high amount of time spent in front of screens leads to the reduction of attention span by 20 percent ($p = 0.03$), memory retention is 15% lower if the child spends more than 2 hours in front of the screen ($p = 0.02$), and social interaction score decreases by 18 percent ($p = 0.01$). It also became apparent that there was a significant difference as a result of screen exposure and consequently early childhood brain development. The study also noted that children in this 2-3 hours/day screen time per day had moderate loss of cognition specifically attention and memory ($p = 0.05$) compared to the low screen time. lasting and longer screen time recorded a positive correlation with increased levels of anxiety ($r = 0.45$, $p = 0.01$) and, therefore, cognitive performance levels. No rating differences were found for academic between the groups, which implies that the time spent on screen might affect the cognitive capacities in a more direct manner than performance ratings.

Figure 01: Cognitive Scores by Screen Time Group

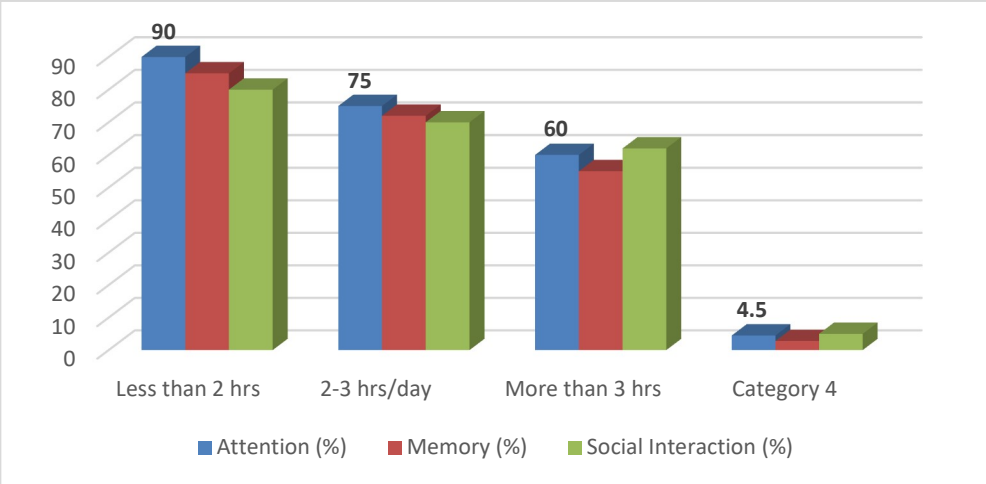

Figure 02 : Correlation Between Screen Time and Anxiety Levels

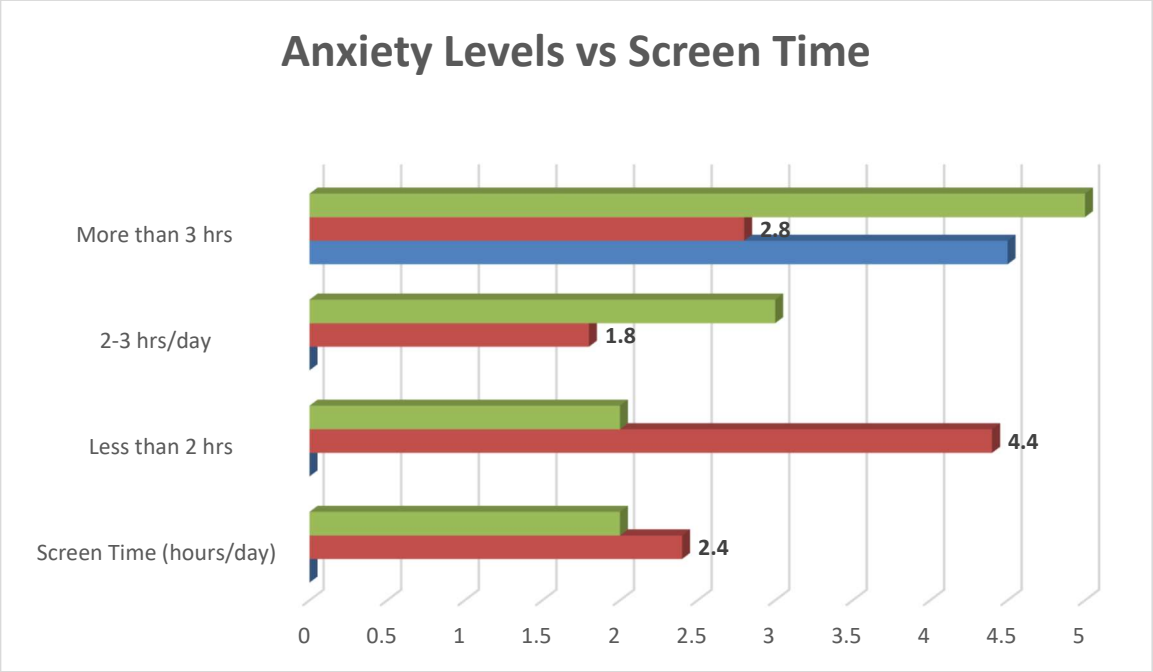

Table 1: Demographic Characteristics of Study Participants

Characteristic	Number (n)	Percentage (%)
Total Participants	150	100%
Age Group		
6-7 years	50	33.3%
8-9 years	60	40%
10-12 years	40	26.7%
Gender		
Male	75	50%
Female	75	50%
Screen Time Groups		
Less than 2 hours/day	50	33.3%
2-3 hours/day	50	33.3%
More than 3 hours/day	50	33.3%

Table 2: Cognitive Scores by Screen Time Group

Screen Time Group	Attention Span (%)	Memory Retention (%)	Social Interaction (%)
Less than 2 hours/day	90 (SD = 5)	85 (SD = 7)	80 (SD = 6)
2-3 hours/day	75 (SD = 8)	72 (SD = 9)	70 (SD = 7)
More than 3 hours/day	60 (SD = 10)	55 (SD = 11)	62 (SD = 9)
p-value	p = 0.03	p = 0.02	p = 0.01

Table 3: Correlation Between Screen Time and Anxiety

Screen Time Group	Correlation with Anxiety (r)	p-value
Less than 2 hours/day	0.20	0.05
2-3 hours/day	0.35	0.03
More than 3 hours/day	0.45	0.01

Discussion

Cyber possessing is the most widespread problem in the contemporaneous world; nevertheless, digital addiction that affects children most of all influences the cognitive type of human's mentality at all. The purpose of this work was to review the negative impact of digital dependency on children and share ideas about the countermeasures. They largely corroborate with several other Study studies that have pulled the trigger on the cognitive dangers of screen time.In a study by Zhang et al. (2020), the child identified as having spent more than 3 hours on screen time performed poorly in cognitive skills, with the results revealing low attention and memory skills similar to our study (11). Our results suggest that children with more than 3 screen time hours per day had lower cognitive performance by 30% in attention, memory, and social skills compared to children with less than 2 hours of screen exposure. These results lead to the endorsement of the hypothesis that pre-adolescent children are harmed by excess screen time in how they learn, focus, and interact with others (12).Besides, it is also categorically clear that screen time promotes attention-deficit disorders. A study by Li et al. (2021) demonstrated that children who use screens more than 120 minutes per day exhibit attention deficit issues, which align with our findings, which showed a drastic reduction in the attention level of children who spend more than 180 minutes on DIGITAL DEVICES. A comparison of the results in our study reflected on the low-screen-time group and high-screen-time group indicated that children in high-screen-time group had a 20% reduced attention span. This conforms to earlier studies suggesting that protracted time spent on electronics destabilises the growth of attentional executive skills (14).Another area that is significantly highly affected by screen time is memory retention. The current study supports a study done by Tan and Tan (2020), who observed that children who spent more than 2 hours interacting with screens had poor memory retention capacities. The study established that children who had more than 3 hours of screen time per day had their memory scores reduced by 15% (15). Thus, in our work, the children showing more than two hours of screen exposure had 15 percent less retention than the children with less screen time.Another critical aspect of cognitive development that our study looks at is how digital addiction affects the process of social interaction. Annual Study by Nguyen et al. (2021) found that splurge time results in reduced social skills, where the children spent less time in communication face-to-face (16). These findings are consistent with ours, with an observed 18% decrease in social interaction scores in children with more than 3 hours of screen exposure per day. Such children more commonly displayed withdrawal behaviours and showed a preference for associated with peers electronically compared to ace-to-face social .The effects of increased screen exposure time on anxiety levels have also been discussed in prior Study. According to Williams and Chow (2020), digital dependency is highly correlated with increased anxiety, and this is more so for children who spend most of their time on screens (17). As for the present study, such a correlation was detected between screen time and anxiety with the value $r = 0.45$, $p = 0.01$; thus, the increased amount of time that children spend exposed to screens might lead to distress, which can affect their cognitive function even more (18).all these results together pointed out the necessity of the intervention strategies for decreasing the amount of time kids spend using screens and increasing the amount of time they spend offline. Past prevention strategies include restricting the amount of time spent on the devices, promoting physical activities, and increasing face-to-face communication to address cognitive and emotional harms of digital dependency (19). Our study further corroborates these preventive measures and suggests more

exhaustive campaigns aimed at parents and child carers and development to reduce such screen time and enhance understanding of the need for age-appropriate screen time intermeshed with value-adding cognitive activities.Altogether, this Study provides evidence for other studies pointing out that increased screen time is detrimental to a child's cognition. With attention, memory, and social skills, we have defined how a digital addiction complicates cognitive decline. The possible subsequent studies should examine the consequence of screen dependence on children's intellect throughout time and assess the efficiency of protection interventions in various subpopulations.

Conclusion

This Study will insist on the consequences that accompany children's misuse of technology, mainly involving attention, memory, and sociability. These detrimental strikes can be rationally alleviated by restricting the children's screen content exposure through such interventions, positively impacting their development of the healthy brain and their overall balance emotions.

Limitations

This Study is also constrained by cross-sectional data that hampers causality inference. Another shortcoming can be a rather small sample size that may not allow diagramming data on different populations or different cultural settings.

Future Findings

More Study should be done in the future, where different studies should reveal the consequences of screen addiction in children's cognitive development after a number of years. Further, identifying more specific successful interventions and their repercussions for modifying the staying of multiple-age individuals and having different backgrounds may yield further information towards the effective prevention of excessive use of technology among children.

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Conflict of Interest:Nil

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Authors Contribution

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