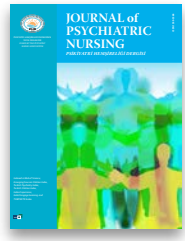
JOURNAL OF
PSYCHIATRIC NURSING

DOI: 10.14744/phd.2025.53179
J Psychiatric Nurs 2025;16(1):67-72



Review

Digital dementia: The mental destruction of technology addiction

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Abstract

The concept of digital dementia provides important findings that excessive use of digital devices leads to impairments in cognitive functions. Factors such as early digital device use, digital amnesia, excessive screen exposure, digital addictions, and multitasking habits increase the risk of digital dementia. Increased screen time and digital device use lead to negative effects on brain structure and function, learning and memory, sleep patterns, attention and concentration, social isolation, emotional regulation, and mental health. The use of digital devices may adversely affect learning and memory processes, leading to a decrease in memory functions. Blue light decreases sleep quality by suppressing melatonin production. Continuous digital stimuli shorten attention and concentration periods, and social media use increases social isolation. Intensive use of digital devices may negatively affect emotional regulation and lead to mental health problems and substance use disorders. These findings emphasize the need for careful regulation of digital device use and the importance of limitations, especially for children and young people. In conclusion, digital dementia is a cognitive impairment caused by excessive use of digital devices, which is a consequence of the modern age. Prevention of this condition is possible by individuals limiting their use of digital media and developing healthy living habits. Further research and awareness studies will help us understand the effects of digital dementia and develop strategies to prevent this condition.

Keywords: Dementia; digital technology; screen time; technology addiction

The concept of digital dementia, coined by German neuroscientist Manfred Spitzer to draw attention to the "mind-disrupting" effects of digital technology, describes a condition in which excessive use of digital devices leads to impaired cognitive functioning. Spitzer argued that the use of digital media can have long-term detrimental effects, especially on young people. These effects take the form that signs of neurodegeneration (the progressive loss of neurons, either structurally or functionally), which should be expected in old age, are increasingly seen in younger adults. In particular, excessive use of digital devices has been associated with cognitive impairments characteristic of dementia, such as reduced attention and memory impairment.[1,2]

Biopsychosocial research shows that chronic sensory stimulation through excessive screen exposure affects brain development, increasing the risk of cognitive, emotional, and behavioral disorders in adolescents and young adults. In this process, synaptic pathways become progressively less stimulated and begin to deteriorate due to excessive use of technology. Excessive screen time can increase the risk of mental impairment by causing changes in gray and white matter volumes, known dementia risk factors, and can negatively affect memory loss and learning. Chronic sensory overstimulation due to excessive screen time during brain development may increase the risk of amnesia and early-onset accelerated neurodegeneration in adulthood.[3] For children, the Amer-

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Submitted Date: July 24, 2024 **Revised Date:** December 08, 2024 **Accepted Date:** January 27, 2025 **Available Online Date:** March 28, 2025
Journal of Psychiatric Nursing - Available online at www.phdergi.org

ican Academy of Pediatrics has stated that media exposure should be 2 h or less per day to promote optimal development.[4] Screen exposure above this time causes attention problems and decreased academic performance.

Emerging evidence suggests that some of these effects are similar to those seen in adults who show signs of mild cognitive impairment in the early stages of dementia. Excessive screen time (i.e., exposure to electronic media, including television, computers and mobile devices such as smartphones, tablets and laptops, for more than 2–3 h per day), especially during brain development, is associated with learning and memory disorders, emotional disorders, substance abuse, attention deficit, disorientation, recent memory problems (anterograde amnesia), past memory problems (retrograde amnesia), social functioning and self-care problems.[3,5] Children with more than 2 h of screen time per day showed decreased performance on cognitive tasks and children exposed to seven or more hours of screen time per day showed impairments in the basic structure of the reward circuit pathway, which is responsible for decision-making and addiction disorders in adolescence and adulthood.[6]

Causes of Digital Dementia

The factors that lead to the emergence of digital dementia are not yet fully understood and need further research. However, a review of the literature shows that early digital device use, digital amnesia, excessive screen exposure, digital addictions and multitasking habits pose a risk of digital dementia.[7–14]

Early Digital Device Use

It has been reported that as the duration of digital device use increases in early childhood, attention problems also increase.[7] In a study examining the relationship between television exposure at an early age (ages one and three) and attention problems at age seven, it was found that there was a relationship between the hours of television watched per day at ages one and three and having attention problems at age seven.[7] In a study examining the effect of early screen time on communication and problem solving skills, it was reported that more screen time for 1-year-olds caused developmental delays in communication and problem solving at ages two and four.[8] In another study, 2 h or more of screen time per day was associated with lower psychological well-being among preschool-aged children.[9]

Digital Amnesia

Digital amnesia is a concept that describes changes in our ability to remember and process information as a result of the widespread use of digital devices and the internet. Digital amnesia refers to the reduced need for individuals to rely on digital devices to memorize information. This results in a tendency to remember where and how to find information rather than recalling it directly. Research shows that memory functions are weakened and the learning of new skills is hindered because digital devices provide quick access to information.[10]

What is presently known on this subject?

- While the use of digital devices stimulates the left side of the brain, the right side, which is related to concentration, remains unused. This leads to increased forgetfulness over time. Especially children and adolescents are at high risk of dementia due to excessive use of digital devices while the brain is still maturing.

What does this article add to the existing knowledge?

- It is known that technology plays an important role in human development. However, the consequences of excessive technology/device use need to be identified. Studies show that excessive device use leads to various cognitive and behavioral impairments such as decreased attention, memory impairments, decreased social interactions, and psychological problems. In this review article, the literature is synthesized and presented in an up-to-date manner.

What are the implications for practice?

- Studies on digital dementia will help to understand the effects of digital dementia and to develop strategies to prevent this condition. Therefore, this study will contribute to protecting and improving public mental health.

Excessive Screen Exposure

Excessive screen exposure suggests that using digital devices for long hours a day can lead to cognitive fatigue and memory problems. This can negatively affect brain plasticity and synaptic connections, which can lead to weakened cognitive functioning. Prolonged screen time can negatively affect the development of children and young people's cognitive skills, leading to distraction and short-term memory problems. A meta-analysis of 87 studies and 159.425 children aged 12 years and under found that prolonged screen time was associated with externalizing (e.g., aggression, inattention) and internalizing (e.g., anxiety, depression) behavioral problems.[11]

Digital Addictions

Digital addiction refers to any "addictive behavior" related to the use of digital devices such as mobile phones, computers, internet, video games and social media.[12] In 2013, 45% of adolescents between the ages of 14–18 used social media daily, while this rate increased to 70% in 2018.[13] The negative effects of digital addiction on health are seen in various dimensions. In terms of physical health, there may be problems such as eye strain and neck pain caused by prolonged screen use; in terms of mental health, there may be consequences such as lack of attention, difficulty focusing, memory problems; and in terms of social health, there may be situations such as a decrease in real-world relationships and social isolation.[12]

Multitasking Habits

Digital multitasking refers to interacting with two or more types of digital technology at the same time or using dig-

ital technology in combination with non-media activities. Digital multitasking has been shown to negatively affect performance in some cognitive domains, such as working memory, long-term memory, associative reasoning and sustained attention.[14]

Effects of Digital Dementia

Recent studies discuss the effects of digital dementia on learning and memory, sleep disturbances, attention and concentration, social isolation, emotional regulation and social functioning, mental disorders and substance use disorders, physical health, and identity development.

Learning and Memory

Increased screen time and digital device use can have widespread consequences, particularly on learning. Storing information on digital devices reduces the need for individuals to use their own memory abilities.[15] Sparrow, Liu and Wegner and Gong et al.[16] noted that the use of the Internet and digital devices has created a phenomenon known as the "Google Effect." This effect causes people to tend to remember where they can find information rather than recalling it. This can lead to a decrease in memory capacity in the long run.[15,16]

Sleep Disorders

The widespread use of digital devices, especially the increase in time spent on social media and the negative effects of increased screen time on sleep quality have been the subject of many studies. Pelit[17] stated that the blue light emitted by digital devices suppresses melatonin production and this reduces sleep quality. Hale and Guan[18] stated that the use of digital devices is associated with increased screen time and this shortens sleep time. It was stated that the increase in screen time, especially in the evening hours, leads to a decrease in sleep time and the emergence of sleep disorders.

Attention and Concentration

Increased screen time and digital device use is an important factor associated with attention and concentration disorders. Continuous exposure to digital stimuli causes individuals' attention spans to shorten and their concentration abilities to decrease.[19] In the study conducted by Ozdes and Karaman,[20] it is stated that notifications and alerts from social media platforms cause attention disorders.

Social Isolation

Increased screen time and digital device use is a common factor associated with social isolation. The relationship between digital device use and social isolation has become the focus of research examining the effects of digital technologies on social relationships. Twenge et al.[21] showed that social ties weakened and social isolation increased with increased use of digital devices among young people. Roberts and David [22] similarly found that excessive smartphone use can lead to weakened interpersonal relationships and social connections. These studies reveal that the use of digital devices can distance individuals from their physical and social environment.[21,22]

Emotional Regulation and Social Functioning

Long screen time and digital addiction can lead to significant distress and functional impairments in daily life and have been reported to be associated with comorbid psychiatric disorders such as depression and anxiety.[23] Screen time is associated with poorer emotion regulation, inability to remain calm, lower self-esteem, increased anxiety and depressive moods, lower productivity and curiosity, inadequate social interaction, and uncooperative attitudes and behaviors. Symptoms related to low emotional regulation, self-care and social functioning are characteristic features of mild cognitive impairment, a known risk factor for Alzheimer's disease and related dementia.[24,25]

Mental Disorders and Substance use Disorder

Increased screen time negatively affects overall mental health, increasing the risk of psychiatric conditions such as externalizing psychopathology (e.g., attention problems, hyperactivity, rule violations, and aggressive behaviors) and internalizing psychopathology (e.g., social anxiety and depression). Furthermore, excessive behaviors related to reward-learning disorders (e.g., impulse control and addictive behaviors related to internet and substance abuse) are also associated with screen time. These conditions are known risk factors for mild cognitive impairment, Alzheimer's disease and associated dementia.[6,15,26]

Physical Health

Physical health problems are another factor associated with increased screen time and digital device use. Increased screen time, sedentary lifestyles, decreased physical activity, obesity or excessive weight gain are associated with an increased incidence of vision and hearing problems. According to the World Health Organization, obesity is among the top five diseases and the obesity rate among children has tripled. In addition to genetic factors and nutritional disorders, the recent excessive use of technology also contributes to a sedentary lifestyle.[27,28] This sedentary lifestyle increases the risk of obesity and related physical health problems over time.

Identity Issues

Identity issues are another factor associated with increased screen time and digital device use. The risk of threatening the development of children or adolescents is higher because their identity is not yet fully formed and they have fewer coping mechanisms than adults. This risk increases in direct proportion to how early the addiction starts.[12]

Strategies to Prevent Digital Dementia

Various studies on digital dementia have focused on recommended strategies to prevent digital dementia. These strategies focus on digital detox, physical activity, control of digital device use, digital media education, social interaction, and community engagement. Digital detox means that a person or individual stays away from devices or social media for a certain period of time.[29] Wilmer et al.[30] suggested that digital detox improves cognitive functions and that individuals who limit digital device use exhibit better memory performance. Giving the brain the opportunity to rest by periodically staying away from digital devices protects cognitive function.[31] Ginsburg[32] stated that regular physical activity can reduce the risk of digital dementia and that exercise can offset the negative effects of digital device use by maintaining brain health. Rosen et al.[33] found that raising awareness about the effects of digital devices and educational programs can reduce the risk of digital dementia. Indeed, in a study conducted in Delhi to evaluate the impact of focused parent education to limit screen time in early childhood, after 6 months of follow-up, 53% of children in the control group had more than 1 h of screen time per day, while this rate was only 3% in the education group.[34] Furthermore, Yang et al.[35] showed that social interactions and community activities support cognitive functions and reduce the risk of digital dementia. These strategies aim to offset the negative effects of excessive and uncontrolled use of digital devices.

Conclusion

Digital dementia is a concept that describes the negative effects of excessive use of digital devices on cognitive abilities in today's rapidly digitalized world. This phenomenon has long-term detrimental effects, especially on young people, and is associated with characteristic symptoms of dementia, such as decreased attention and memory impairments. Excessive screen exposure negatively affects brain development, increasing the risk of emotional and behavioral disorders and weakening synaptic connections. Digital amnesia reduces individuals' ability to recall information, weakening memory functions while providing quick access to information. Moreover, early digital device use, addiction and multitasking habits are among the antecedents that increase the risk of digital dementia.

Screen time and digital device use can significantly affect brain development during childhood and adolescence. Prolonged screen exposure can disrupt sleep patterns, leading to side effects such as attention problems, social isolation and mental health problems. Furthermore, such use also has negative effects on physical health, increasing risk factors such as obesity and sedentary lifestyles, and reducing overall quality of life. Taken together, excessive use of digital devices can cause serious problems in the cognitive and physical development of children and adolescents.

Research on this topic suggests various strategies to prevent digital dementia. These strategies include digital detox, physical activity, controlled use of digital devices, digital media education, social interaction and community engagement. Research shows that digital detox improves cognitive functions and enhances memory performance. In addition, regular physical activity protects brain health by reducing the risk of digital dementia. Training on the conscious and balanced use of digital devices is of great importance, especially for young people. It is emphasized that social interactions and social activities support cognitive functions and reduce the risk of digital dementia.

As a result, it has become a critical necessity for individuals to adopt a more conscious and balanced approach in the digital world, both to protect their mental health and to cope with the challenges of the digital age.

Acknowledgment: The authors would like to acknowledge all the adolescents and the parents in this study for their valuable time and cooperation.

Authorship Contributions: Concept – Y.K., E.B.; Design – A.A.Y., E.B.; Supervision – Y.K.; Data collection &/or processing – Y.K., A.A.Y.; Analysis and/or interpretation – A.A., A.A.Y.; Literature search – Y.K., A.A.Y., E.B.; Writing – Y.K., A.A.; Critical review – A.A.

Conflict of Interest: There are no relevant conflicts of interest to disclose.

Use of AI for Writing Assistance: No AI technologies utilized.

Financial Disclosure: The authors declared that this study has received no financial support.

Peer-review: Externally peer-reviewed.

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