INTERNATIONAL JOURNAL OF LATEST TECHNOLOGY IN ENGINEERING, MANAGEMENT & APPLIED SCIENCE (IJLTEMAS)

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VII, July 2025

Impact of Smart Phone Use on Cognition Including Short Term Memory and Quality of Life an Observational Study

Itesh Yadav, Dr. Nidhi Rawat PT, Dr. Pushpendra Yaduvanshi

Career Point University, India

DOI: https://doi.org/10.51583/IJLTEMAS.2025.1407000075

Abstract -Smartphones have become essential tools in modern life, evolving beyond communication to support a variety of cognitive, emotional, and social activities. This study investigates their dual role—as both tools and subjects of research—by examining their influence on human behavior. While smartphones offer benefits like instant information access, memory aids, and enhanced connectivity, they also raise concerns about attention span, emotional regulation, and dependency. This research aims to provide a balanced view of their impact on attention, working memory, and mental health.

Objective- To assess how smartphone usage affects cognition, short-term memory, and quality of life among young adults.

Methodology-The study involved 107 initially selected participants based on inclusion and exclusion criteria. Standardized questionnaires were administered online: Smartphone Addiction Scale (SAS): 10 items, scored 1–6 (max score: 60). 116 responses received; 20 excluded. Digital Addiction Scale (DAS): 20 items, scored 0–5 (max score: 100). 119 responses received; 23 excluded. Cognitive Failures Questionnaire (CFQ): 25 items, scored 0–4 (max score: 100). 130 responses received; 34 excluded. After exclusions, 96 participants (57 males, 39 females), aged 17–27, were included. Informed consent was obtained, and data were analyzed statistically.

Results-Findings indicated that daily smartphone use of 3–5 hours was associated with mild-to-moderate effects on cognition, short-term memory, and quality of life. Most participants were at low risk for smartphone or digital addiction, yet a moderate risk of cognitive failures was noted. These findings suggest a significant correlation between smartphone use and cognitive performance in young adults.

Conclusion-Despite low levels of smartphone addiction, many young adults experienced moderate-to-high digital engagement and frequent cognitive lapses. The study highlights a clear link between digital addiction tendencies and cognitive challenges, supporting existing literature on the adverse effects of excessive digital device usage. These results emphasize the importance of mindful technology use to maintain mental and cognitive well-being in youth.

Keywords-Smartphones, Cognition, Quality of Life, Short-Term Memory, Behavior, Social Media.

I. Introduction

Mobile devices have been used as a research instrument as well as aResearch aim. The mobile, in particular, is become an essential Component of our daily lives. These phones have gotten closer to the Original goal of ultra-mobile interpersonal connectivity as they have grown “smarter”—incorporating capabilities from other devices, such as a laptop Computer, GPS receiver/navigator, timer/alarm clock, MP3 player, and Personal digital assistant (PDA)With the advent of smartphones, computing Has become centralized within a compact, handheld device. This device Integrates functions such as voice and text communication, image handling, Navigation, information retrieval, music pal goal of ultra-mobile interpersonal connectivity as they have grown “smarter”—incorporating capabilities from other devices, such as a laptop Computer, GPS receiver/navigator, timer/alarm clock, MP3 player, and Personal digital assistant (PDA)With the advent of smartphones, computing Has become centralized within a compact, handheld device. This device Integrates functions such as voice and text communication, image handling, Navigation, information retrieval, music playback, gaming, and even alarm Clock features, all within a single unit.[1]

This challenges Norman’s argument that single-function technologies or appliances would dominate over more complex, multifunctional devices.Instead, each of us has a single ‘pad’ that is used for numerous purposes, and although smart phoneshave features relevant for sharing, they are ultimatelypersonal devices. In fact, our study of smartphones indicates that they align more closely with Bell and Dourish’s concept of “messiness.[2]

Smartphones have become an increasingly ubiquitous element in modern life, while simultaneously enhancing their ability to support or even replace a variety of cognitive functions. With capabilities such as serving as phonebooks, appointment calendars, internet browsers, tip calculators, navigation tools, gaming devices, and more, smartphones appear capable of facilitating an extensive array of cognitive tasks and addressing numerous emotional needs. Nevertheless, some sensationalist media articles, such asthose titled, “Are Smartphones Making Us Dumber?”, raise concerns about their impact on our cognitive abilities.[3] and, “Is Your Smartphone Making You Fat and Lazy?”[4] This growing dependence on smartphones and similar technologies has led some to argue that rather than enhancing mental functioning, it is undermining our cognitive abilities. Critics suggest that reliance on these devices may negatively affect our capacity to think critically, retain information, sustain attention, and regulate emotions. These concerns are often fueled by the observation that smartphones offer constant distractions, foster reliance on external devices for memory, and may reduce our ability to engage in deep, focused thought, potentially impairing essential cognitive processes.Some have argued

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VII, July 2025

that the pervasive nature of modern connectivity is "rewiring our brains," fostering a continuous desire for instant gratification. This shift in cognitive patterns is seen as a significant societal threat, with some claiming it is nearly as critical as issues like climate change in terms of its long-term impact on individual and collective well-being.The 21st century has ushered in a wide range of technological innovations that significantly influence how we engage with the world. In this paper, we do not aim to explore every emerging technology in detail, nor do we seek to address all the psychological implications associated with these technologies.[5]

To provide focus for this review, we start with the assumption that smartphones represent a particularly influential technological advancement, owing to their multi-functionality, portability, and widespread adoption. As a result, the scope of our analysis is confined to research directly related to the impacts of smartphone use. Furthermore, instead of concentrating on "problem" behaviours associated with smartphone technology, we aim to examine broader effects. [6]

Previous research on the relationship between smartphone technology and cognitive abilities has also investigated a form of media-related divided attention known as "media multitasking," which involves using multiple media technologies simultaneously, often through smartphone. Although closely related to studies on divided attention, research on media multitasking typically does not focus on the immediate effects of media engagement on concurrent cognitive tasks. Instead, these studies primarily examine the correlation between individuals' fundamental cognitive abilities and their propensity to engage in simultaneous media-related activities.[7]

Reliance on smartphones has been linked to a form of psychological dependency, and this reliance has detrimental effect on our affective 'mood' states. For example, feelings of anxiety when one is separated from their smartphones can interfere with the ability to attend to information. We need to consider the relationship between cognition and emotion to understand how frequent mobile phone use affects memory e.g. memory consolidation. Some empirical findings have shown that anxious individuals have attentional biases toward threats and that these biases affect memory consolidation.Further, emotion-cognition interaction affects efficiency of specific cognitive functions, and that one's affective state may enhance or hinder these functions rapidly, flexibly, and reversibly [8]

This discrepancy was even more prominent in the elderly and individuals with mild cognitive impairments. In addition to the stated effects of smartphone usage or its mere presence, previous studies show that being separated form once smartphone negatively affects mental shifting, inhibitory control, and working memory, which is mediated by anxiety. Especially those individuals with a high symptom severity of what the authors called "smartphone addiction" performed worst in the inhibitory control task. However, symptom severity had no effect on findings of mental shifting.[9]

Since many people put their smartphones on their desk during work and have no awareness of its subtle and potentially negative effect on work performance, Sincecognitive resources are limited, the attentional resources absorbed by the smartphone consequently lead to a reduced performance in the primary task at hand. The cognitive costs induced by smartphone presence were amplified for people scoring high on a smartphone dependency measure, possibly because the smartphone is even more important and its presence more distracting.[10]

As users increasingly depend on their devices for information, the brain's natural memory functions may decline, resulting in a reduced capacity to remember recent events or details. Overall, while smartphones provide convenience, they can compromise memory performance.[11]

Excessive use can lead to physical issues like eye strain and sleep disturbances, as well as mental health challenges, including anxiety and social isolation. While they offer entertainment and learning opportunities, over-reliance on smartphones may diminish face-to-face interactions and focus. Ultimately, balanced usage is key to maximizing their benefits while minimizing adverse effects on overall well-being[12]

II. Methods

This observational study was conducted via an online platform over a duration of five months. A total of 100 subjects who met the selection criteria were included using convenient sampling. Data was collected directly by the primary researcher. Participants were recruited after obtaining informed consent, ensuring they met all inclusion criteria, which required individuals to be between 17 and 27 years of age, with daily cell phone use of at least 3–5 hours, and experiencing sleep disturbances and memory problems. Both male and female participants were included. Subjects were excluded if they had visual or hearing impairments, insufficient language skills, physical or neurological disorders, were drug users, pregnant women, or had blood pressure issues

Ethics

The ethical consent for the experimental study has been granted by the Ethical Student Committee of Career Point University, Kota. Rajasthan.

Procedure

A total of 107 subjects were selected based on inclusion and exclusion criteria using online questionnaires: SAS, DAS, and CFQ. The SAS has 10 questions scored from 1 to 6, with a maximum score of 60. Out of 116 SAS responses, 20 were excluded due to not meeting criteria or incomplete forms. DAS consists of 20 questions scored 0 to 5 (0–100 total score); from 119 responses, 23

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VII, July 2025

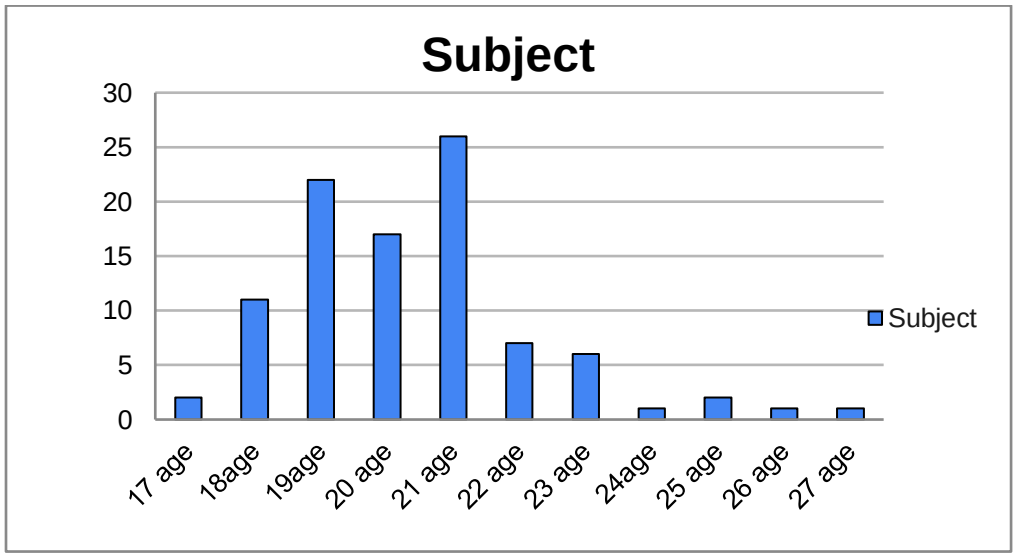
were excluded. CFQ includes 25 questions scored 0 to 4 (0–100 total score); of 130 responses, 34 were excluded. Reasons for exclusion included not fulfilling criteria or not completing all forms. A final total of 96 eligible participants were selected—39 females and 57 males. Informed consent was obtained during the first interview. Subjects were assessed using an assessment and data collection form. After completing all scales, the forms were compiled and the data was sent for evaluation.

Data Analysis

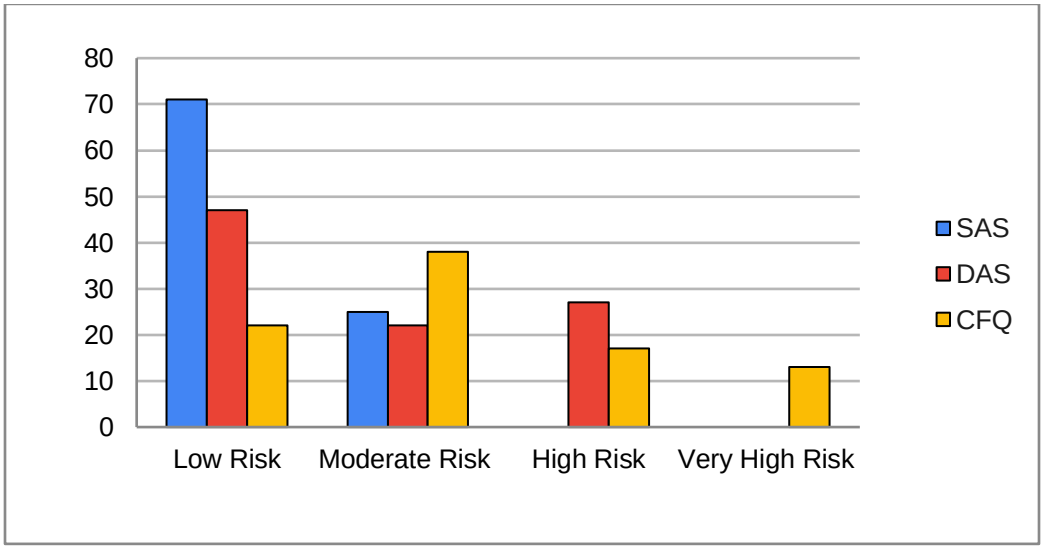
The data was coded and entered into Microsoft Excel Spreadsheet. Analysis was done using Microsoft Excel. Descriptive statistics included mean, mean difference and standard deviation. Data collected from each patient within the same group

III. Result

The study utilized the Smartphone Addiction Scale (SAS), Digital Addiction scale(DAS), and Cognitive Failures Questionnaire (CFQ) to evaluate the impact of smartphone usage among 96 participants aged 17 to 27. Results revealed that the majority were categorized as lowrisk for smartphone addictions scale (71/96 participants) and for Digital Addiction scale(47 /96 participants), and moderate risk for cognitive failure questionnaire (38/96 participants) . The analysis suggests that individuals using smartphones for 3 to 5 hours daily may experience mild to moderate effects on cognition, short-term memory, and overall quality of life. These findings validate the alternative hypotheses, indicating a significant relationship between smartphone usage and both quality of life and cognitive functioning.

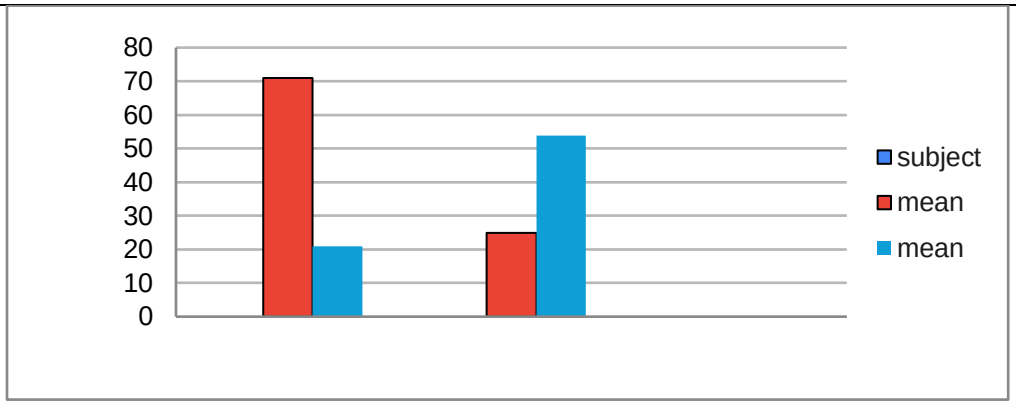


Showing age of subject

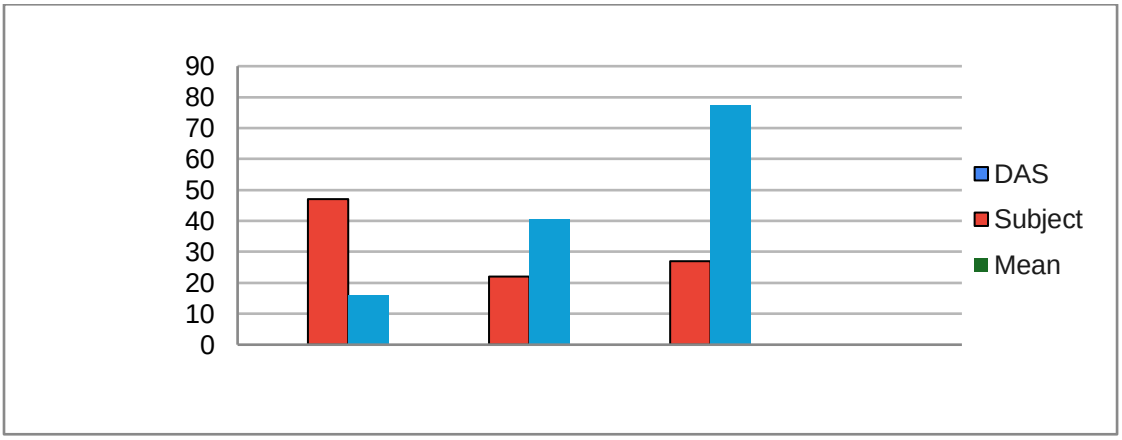


Showing Score of scales

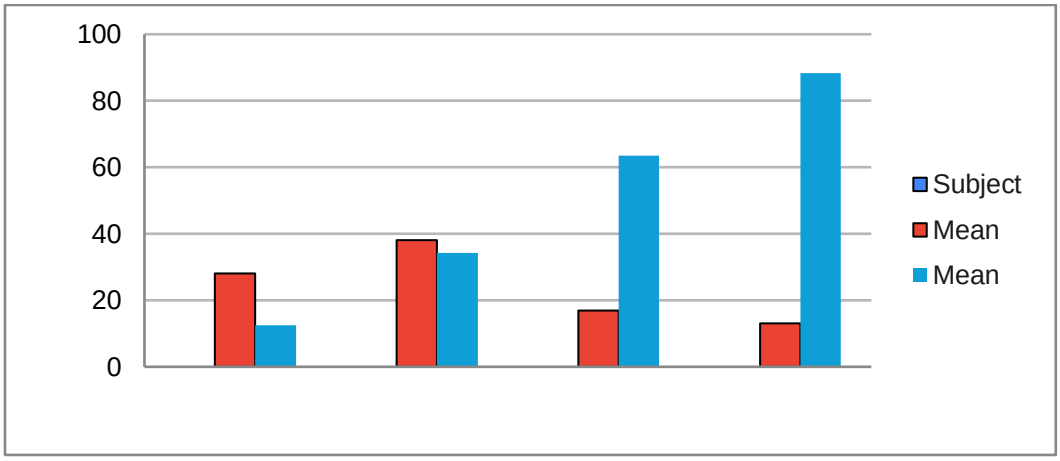
ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VII, July 2025



Showing Scores of SAS



Showing Scores of DAS



Showing Scores of CFQ

IV. Discussion

The primary aim of this research was to investigate the impact of smartphone use on cognition, specifically short-term memory (STM) and quality of life (QOL), in young adults.This chapter presents a comprehensive discussion of the findings from the study, interpreting the results obtained from the Smartphone Addiction Scale (SAS), Cognitive Failures Questionnaire (CFQ), and Digital Addiction Scale (DAS) in relation to the established literature and the study's hypotheses.

The study included a sample of 96 young adults (aged 17-25 years), comprising 39 females and 57 males, recruited via an online platform. The data collected through the SAS, CFQ, and DAS questionnaires revealed varying levels of smartphone addiction risk, digital addiction risk, and cognitive failures among the participants.

Analysis of the SAS scores indicated that a majority of the participants (approximately 78%, n=75) fell into the low-risk category for smartphone addiction (scores ≤40). A notable proportion (approximately 22%) exhibited a moderate risk of smartphone

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VII, July 2025

addiction (scores 41-60). No participants scored in the high-risk category (scores 61-80), suggesting that while a segment of the young adult population may experience moderate addictive tendencies, severe addiction was not prevalent within this specific sample.

The CFQ results provided insights into the frequency of self-reported cognitive failures. Approximately 25% (n=24) of participants reported infrequent cognitive failures (scores 0-25). A larger group, roughly 41% (n=39), experienced occasional cognitive failures (scores 26-50). Concerningly, about 22% (n=21) reported frequent cognitive failures (scores 51-75), and approximately 12.5% (n=12) indicated very frequent cognitive failures (scores 76-100). These findings suggest that a significant portion of young adults in the sample experience some degree of cognitive lapses in their daily lives.

The DAS scores revealed that about 50% (n=48) of participants were at a low risk of digital addiction (scores ≤30). Approximately 21% (n=20) showed a moderate risk (scores 31-50), while 10% (n=10) were in the highrisk category (scores 51-75). A substantial 19% (n=18) of the participants

demonstrated a very high risk of digital addiction (scores >75). This indicates a considerable segment of the young adult population in the study is highly susceptible to digital addiction, which encompasses broader internet and digital device use beyond just smartphones.

A crucial observation from the masterchart data, despite the lack of formal statistical analysis, is an apparent trend where participants exhibiting higher scores on the SAS and DAS often concurrently reported higher scores on the CFQ. For instance, individuals with moderate to very high digital and smartphone addiction risks (e.g., G5, B7, B11, B14, B18, G10, G13, G14, B21, B30, B34, B37, G20, G36, B51, B52, G37, B54) frequently presented with high or very high cognitive failure scores.

This preliminary observation suggests a potential positive correlation between increased reliance on smartphones and digital platforms and a higher incidence of cognitive lapses, supporting the alternative hypothesis (Ha) that there shall be a significant relationship between the impact of smartphones and Short Term Memory (as measured by cognitive failures).

The findings of this study align with and expand upon several previous research efforts. The observed link between higher addiction scores and increased cognitive failures resonates with the concerns raised by Upshaw et al. (2022)[11], who highlighted how smartphone notifications can impair cognitive control, including attention and working memory. The frequent cognitive lapses reported by participants with higher addiction scores could be a manifestation of the "cognitive switching" and "attentional cost" described by Liebherr et al. (2020)[8]and Tanil CT and Yong MH (2020)[9], where constant distractions from mobile devices lead to reduced working memory capacity and impaired task performance.

The presence of a significant portion of participants with moderate to very high digital addiction risk, as identified by the DAS, further supports the notion that excessive digital engagement can have detrimental effects on mental health and cognitive function. This is consistent with Sela, Rozenboim, and Ben-Gal (2022)[12], who found that excessive smartphone use can lead to diminished quality of life, and Gao et al. (2017)[15], who linked smartphone addiction to increased depression and cognitive impairment,ultimately affecting quality of life. While this study did not directly measure QOL, the presence of digital addiction, which is associated with negative QOL outcomes in the literature, indirectly supports the alternative hypothesis regarding QOL.

The study's results, particularly the prevalence of cognitive failures, also echo the findings of Al-Khlaiwi et al. (2020)[14], who reported that excessive smart mobile phone usage is associated with cognitive function impairment in the Saudi adult population, specifically affecting attention, memory, and information processing.

Conversely, the study's findings do not directly contradict Hartmann et al. (2020)'s argument that the mere presence of a smartphone might not impair cognitive function, but rather its active use. Our study, by assessing addiction levels, implicitly focuses on the active and often excessive engagement with smartphones and digital platforms, which is precisely what Hartmann et al. suggest leads to cognitive costs. The observed cognitive failures in our sample are more likely attributable to maladaptive usage patterns rather than the passive presence of the device.[10]

Wilmer et al. (2017)[6] provided a comprehensive review acknowledging both positive and negative cognitive outcomes of smartphone use. Our study's results lean towards the negative cognitive impacts, particularly when smartphone and digital use veers into addictive patterns, reinforcing the need for balanced usage as suggested by Liebherr et al. (2020)[8]. The "messiness" concept by Bell and Dourish (2007)[2] and "seamfulness" by

Barkhuus and Polichar (2011)[1] highlight the complex integration of smartphones into daily life, where their multi-functionality can both empower and introduce challenges like distraction and dependence, which our findings on cognitive failures and addiction risks underscore

Limitations of the Study

As an observational study, it cannot establish cause-and-effect relationships. While a correlation between addiction and cognitive failures is suggested, it is not possible to definitively state that smartphone/digital addiction causes cognitive failures based on this design.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VII, July 2025

The use of convenient sampling (students from Kota) limits the generalizability of the findings to a broader population. The sample may not be representative of all young adults.

The reliance on self-reported questionnaires (SAS, CFQ, DAS) introduces the possibility of response bias, social desirability bias, or inaccurate self assessment.

The absence of a control group (e.g., individuals with very low smartphone use) makes it challenging to compare the cognitive performance of different usage groups definitively.

The study focused exclusively on young adults (17-27 years), meaning the findings cannot be extrapolated to other age groups.

Conducting the study via an online platform might have introduced biases related to digital access and comfort with online questionnaires.

While the hypotheses mention QOL and STM, the scales used (CFQ) measure cognitive failures which are related to memory, and DAS/SAS relate to addiction which is linked to QOL in literature. Direct, objective measures of STM and comprehensive QOL assessments were not included.

V. Future Research

Future research should aim to address the limitations of this study. Longitudinal studies could help establish causal relationships between smartphone use patterns and cognitive changes. Incorporating objective measures of cognitive function (e.g., neuropsychological tests for working memory, attention, and inhibition) would provide more robust data. Expanding the sample to include diverse age groups and employing more rigorous sampling methods would enhance generalizability. Furthermore, intervention studies designed to reduce problematic smartphone use and assess subsequent changes in cognitive function and quality of life would be highly beneficial. Exploring the mediating roles of factors like sleep quality, physical activity, and social interaction in the relationship between smartphone use and cognition would also provide a more holistic understanding.

VI. Conclusion

This study provides preliminary evidence suggesting a potential link between smartphone and digital addiction tendencies and increased cognitive failures in young adults. While the majority of the sample exhibited low-risk smartphone addiction, a significant portion showed moderate to very high digital addiction and reported frequent cognitive lapses. These findings resonate with existing literature highlighting thedetrimental cognitive impacts of excessive digital engagement. The study underscores the importance of promoting mindful technology use among young adults to safeguard their cognitive well-being and overall quality of life.

References

1. Barkhuus L, Polichar VE. Empowerment through seamfulness: smart phones in everyday life. Personal and Ubiquitous Computing. 2011 Aug;15:629-39..
2. Bell G, Dourish P. Yesterday's tomorrows: notes on ubiquitous computing's dominant vision. Personal and ubiquitous computing. 2007 Feb;11:133-43.
3. Ellison K. Are smartphones making us dumber. Retrieved April. 2012;16:2015.
4. Morin, M. (2013). Is Your SmartphoneMaking you Fat and Lazy?. Los Angeles, CA:Los Angeles Times.
5. Greenfield S. 2121: A tale from the next century. Bloomsbury Publishing; 2013 Jul 1.
6. Wilmer HH, Sherman LE, Chein JM. Smartphones and Cognition: A Review of Research Exploring the Links between Mobile Technology Habits and Cognitive Functioning. Front Psychol. 2017 Apr 25;8:605. doi: 10.3389/fpsyg.2017.00605. PMID: 28487665; PMCID: PMC5403814.
7. Ophir E, Nass C, Wagner AD. Cognitive control in media multitaskers. Proceedings of the National Academy of Sciences. 2009 Sep 15;106(37):15583-7.
8. Liebherr M, Schubert P, Antons S, Montag C, Brand M. Smartphones and attention, curse or blessing?-A review on the effects of smartphone usage on attention, inhibition, and working memory. Computers in Human Behavior Reports. 2020 Jan 1;1:100005.
9. Tanil CT, Yong MH. Mobile phones: The effect of its presence on learning and memory. PloS one. 2020 Aug 13;15(8):e0219233
10. Hartmann M, Martarelli CS, Reber TP, Rothen N. Does a smartphone on the desk drain our brain? No evidence of cognitive costs due to smartphone presence in a short-term and prospective memory task. Consciousness and cognition 2020 Nov1;86:103033.
11. Upshaw JD, Stevens Jr CE, Ganis G, Zabelina DL. The hidden cost of a smartphone: The effects of smartphone notifications on cognitive control from a behavioral and electrophysiological perspective. Plos one. 2022 Nov 17;17(11):e0277220
12. Sela A, Rozenboim N, Ben-Gal HC. Smartphone use behavior and quality of life: What is the role of awareness?.PloS one. 2022 Mar 11;17(3):e0260637.
13. Çınar D, Karadakovan A, Erdoğan AP. Effect of mobile phone appbased training on the quality of life for women with breast cancer. European Journal of Oncology Nursing. 2021 Jun 1;52:101960

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VII, July 2025

14. Al-Khlaiwi TM, Habib SS, Meo SA, Alqhtani MS, Ogailan AA. The association of smart mobile phone usage with cognitive function impairment in Saudi adult population. Pak J Med Sci. 2020 NovDec;36(7):1628-1633. doi: 10.12669/pjms.36.7.2826. PMID: 33235587; PMCID: PMC7674882.
15. Gao T, Li J, Zhang H, Gao J, Kong Y, Hu Y, Mei S. The influence of alexithymia on mobile phone addiction: The role of depression, anxiety and stress. Journal of affective disorders. 2018 Jan 1; 225:761-6.
16. Thomas S, Benke G, Dimitriadis C, Inyang I, Sim MR, Wolfe R, Croft RJ, Abramson MJ. Use of mobile phones and changes in cognitive function in adolescents. Occupational and environmental medicine. 2010 Dec 1;67(12):861-6
17. Qosimova XT, Ikramova NA, Juraboyeva Dn, Mukhtorova Da. The Adverse Effects of Smartphones on Cognitive Activity in The Educational Process and Ways to Mitigate Them. Inthe Conference Hub 2025 Mar 20 (Pp. 76-79)
18. Nain A. Cognitive Impact of Daily Mobile Phone Usage Duration: A Focus on VisuomotorCoordination and Processing Speed.
19. Lin T, Ping Y, Jing CM, Xu ZX, Ping Z. The efficacy of internet-based cognitive behavior therapy for psychological health and quality of life among breast cancer patients: a systematic review and meta-analysis. Frontiers in Psychology. 2025 Jan 8; 15:1488586.