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# CONTEMPORARY SOCIETY AS A DIGITAL SOCIETY – THE PHENOMENON OF EXCESSIVE USE OF THE INTERNET AND SMARTPHONES

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**ABSTRACT**

**Introduction:** The pervasive utilisation of smartphones in contemporary society exerts a substantial influence on individuals' cognitive, emotional, and social functioning. The objective of this study was to analyse the consequences of intensive use of mobile devices in terms of attention span, working memory, emotional self-regulation and the quality of interpersonal relationships. A review of the extant literature indicates that excessive smartphone use is associated with impaired concentration, increased susceptibility to distraction, shallower learning processes, and an increased tendency towards media multitasking. Furthermore, a correlation has been identified between the compulsive utilisation of electronic devices and elevated levels of stress, anxiety and depressive symptoms, a phenomenon that is partially attributable to dopaminergic reward mechanisms. Within the social sphere, smartphones have been shown to contribute to the fragmentation of communication and a weakening of the sense of closeness. The most efficacious strategies for safeguarding well-being are moderate restrictions on digital stimuli and the cultivation of mindfulness and self-regulation. The results of the study emphasise the need for conscious and sustainable use of technology.
**The aim of the study:** the aim of this article is to examine the impact of intensive smartphone use on cognitive functioning, emotional well-being, and interpersonal relationships. The paper focuses on mechanisms related to attention fragmentation, media multitasking, dopaminergic reward pathways, and the resulting effects on concentration, memory, self-regulation, and the quality of social interactions.
**Material and Methods of Research:** The literature was collected through searches in the PubMed and Google Scholar databases, as well as by reviewing the reference lists of initially selected articles. Keywords included smartphone use, media multitasking, cognitive function, digital well-being, digital detox and mental health. Additionally, statistical data on global smartphone and internet use were obtained from reputable research and analytics platforms,
including Paw Research Center, Global Overview Report, Gallup and HarmonyHit. These sources were used to provide up-to-date epidemiological context and quantify the scale of smartphone adoption in the general population.
**Conclusion:** The reviewed evidence indicates that intensive and poorly regulated smartphone use may contribute to diminished attention control, reduced memory efficiency, heightened emotional dysregulation, and a decline in the quality of interpersonal interactions. These effects appear to be mediated by mechanisms of attentional fragmentation and dopaminergic reward sensitivity, which promote habitual and compulsive patterns of device engagement.
Developing strategies that support self-regulation, digital awareness, and intentional use of technology is therefore essential for maintaining cognitive balance, emotional well-being, and healthy social functioning in the digital environment.

**KEYWORDS**

Smartphone Use, Media Multitasking, Cognitive Function, Digital Well-Being, Digital Detox and Mental Health

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## Introduction:

In recent decades, the world has witnessed unparalleled advancements in technology, the most evident of which is the pervasive digitisation of daily life. Digital devices, such as computers, tablets and smartphones, have become an integral part of modern life. This phenomenon is of a civilisational nature, impacting all aspects of life – from education to mental health, from interpersonal relationships to the attention economy.[1,2] The challenge for the coming years is not so much to fight technology as to learn to coexist with it in a way that promotes the well-being of individuals and communities. The phenomenon of widespread digitisation is of a global nature. It is estimated that 5.56 billion people worldwide use the internet, representing 68% of the global population. Furthermore, the number of mobile phone users has exceeded 5.78 billion. [3] Research has indicated a marked increase in the average daily time spent using a smartphone, with the current figure standing at over five hours per day.

This increase is particularly pronounced among younger generations, with Generation Z reporting average daily use exceeding six hours.[4] The advent of artificial intelligence and the proliferation of social media platforms such as YouTube and TikTok are collectively engendering novel models of communication and cultural participation. Concurrently, concerns regarding privacy are waning, and there is an upsurge in acceptance of the integration of private life with the digital sphere. [3] A significant proportion of the population asserts a profound attachment to smartphones, with approximately half of the surveyed population categorising themselves as addicted. Consequently, the phenomenon of apparent social presence has come to the fore, whereby physical presence does not necessarily translate into emotional involvement in relationships. Furthermore, the results of the survey indicate that more than half of respondents believe that their loved ones are less present during meetings because of their smartphone use.[5] Moreover, the evidence indicates that demographic disparities in smartphone utilisation and dependency underscore the heterogeneity of digitalisation, which is concomitant with challenges pertaining to digital inclusion. It has been demonstrated that younger people with lower levels of education and income are more likely to exhibit dependence on mobile devices. This increased dependency can lead to a heightened vulnerability to detrimental health and social consequences. This phenomenon is referred to as 'smartphone-only dependency' and is particularly prevalent among young people with lower incomes and lower levels of education.[2] This phenomenon is also associated with an increasing percentage of health problems related to excessive screen use, such as eye strain, neck and shoulder pain, sleep disorders and anxiety symptoms.

Concurrently, there is an increasing cognisance of the deleterious consequences of excessive technology usage. A significant proportion of respondents expressed a desire to curtail the time spent in front of a screen, citing enhanced mental well-being, superior time management, and improved sleep quality and concentration as their primary motivations.[4] These data confirm that, in addition to its obvious benefits, digitalisation also has serious psychophysical consequences that pose a challenge to public health and education. Despite these challenges, the majority of users believe that smartphones have significantly improved their quality of life, illustrating the paradoxical nature of digital integration. It is technology that was supposed to facilitate life, but which is increasingly becoming a problem central part of it and a source of stress.

**The impact of smartphones on cognitive function**

Recent studies have indicated that the active use of smartphones and the mere presence of these devices in the environment can result in a significant decline in concentration and an increase in distraction. [6-9]This phenomenon is referred to as the "brain drain effect" which can be defined as a reduction in the cognitive resources available for current tasks due to the stimulating or emotional presence of a smartphone in an individual's field of attention.[6,8] Subjects who self-reported higher levels of smartphone dependency demonstrated a more pronounced decline in cognitive performance, indicating that their sensitivity to digital distractions is, at least in part, influenced by their degree of technological dependence.

However, the effect is not uniform – areas related to memory and attention control show much greater susceptibility to disruption than domains requiring simple operations, such as spelling recognition. Furthermore, geographical disparities were evident, with participants from Asian countries demonstrating a more pronounced decline in cognitive function compared to those from North America and Europe.[6] The mere physical presence of the device in close proximity to the subjects was found to have a detrimental effect on their performance in tasks that measured information processing speed, concentration, and the efficiency with which they maintained their attention. The underlying mechanism of this phenomenon is the result of an additional cognitive load, which arises from the unconscious monitoring of the possibility of interaction with the device. This load has been demonstrated to reduce available cognitive resources, leading to a decrease in efficiency in tasks requiring concentration. A straightforward yet efficacious method of mitigating the adverse impact is to remove the smartphone from view, thereby restoring a portion of the attention resources available to the user.[8] A growing body of research has indicated that an increased reliance on mobile technologies can result in a persistent decline in cognitive abilities, particularly in contexts that necessitate continuous information processing. [6] Furthermore, individuals who habitually engage in media multitasking demonstrate a heightened prevalence of attention lapses, which is concomitant with diminished episodic memory performance.

Electrophysiological (EEG) data and measurements of pupil size indicate that episodes of forgetting are preceded by a characteristic decrease in brain activity associated with attention and goal encoding processes. This finding serves to substantiate the notion that the loss of attention at critical junctures during the information processing cycle invariably results in impaired subsequent recall, with elevated levels of media

multitasking having been demonstrated to exacerbate the prevalence of this phenomenon. Consequently, the present study hypothesises that multitasking plays a mediating role in the relationship between exposure to digital stimuli and impaired memory and concentration. [9] Recent studies utilising functional magnetic resonance imaging (fMRI) have demonstrated that individuals who engage extensively in media multitasking exhibit a distinct pattern of neural activity in the networks responsible for cognitive control. Reduced grey matter density was identified in the anterior cingulate cortex (ACC) – an area that plays a pivotal role in attention management, conflict control and cognitive resource allocation. Reduced ACC density has been demonstrated to be associated with an increased difficulty in ignoring distractors and impaired control of attentional processes. Conversely, fMRI studies during tasks requiring divided attention demonstrate that individuals with high levels of media multitasking must engage greater activity in the frontal regions of the brain (including the lateral and medial frontal gyri) to achieve a similar level of cognitive efficiency in distracting conditions. This mechanism is interpreted as the need to mobilise attention resources more intensively in situations where the networks controlling focus are less effective.[10] It is evident that neurobiological changes caused by intense exposure to digital stimuli also have long-term implications for brain plasticity. It has been demonstrated that frequent alternation between diverse informational sources can result in the establishment of superficial and fragmented processing methodologies, thereby impeding the capacity to engage in profound and selective information processing. These consequences assume particular significance during the developmental period, when the neural networks of attention and memory are susceptible to environmental influences.[11,12] In summary, the empirical data collected consistently indicate that both the mere presence of a smartphone and the multitasking associated with its use lead to distraction, a reduction in cognitive resources, and an increase in the frequency of interruptions in concentration. These phenomena pose a significant challenge to an individual's cognitive functioning in educational and professional environments, where the ability to maintain focus is crucial for effective learning and productivity. Consequently, the development of self-regulatory and environmental strategies, such as the limitation of the physical presence of smartphones during cognitive work, appears imperative in order to minimise the effects of distraction.

**Media Multitasking and Memory and Learning Efficiency**

A fundamental aspect of contemporary cognitive functioning in the digital age is the phenomenon of media multitasking, defined as the simultaneous use of multiple sources of information and devices, such as smartphones, computers and television. Empirical research has indicated that media multitasking is a significant factor in the reduction of cognitive abilities, including memory, selective attention and cognitive control. [13,14] Individuals who are heavily involved in media multitasking (hereafter referred to as heavy media multitaskers, HMMs) have been shown to have clear deficits in cognitive control. In comparison to individuals who engage in multitasking less frequently (i.e. light media multitaskers, LMMs), HMMs demonstrate an increased propensity to experience cognitive interference and encounter difficulties in filtering out stimuli that is not relevant to the task at hand. Contrary to popular belief, frequent switching between activities does not necessarily result in superior multitasking abilities. The subjects exhibit a cognitive style that is described as 'breadth-biased attention', characterised by reduced selective attention and limited ability to concentrate. [15] Consequently, multitasking has been demonstrated to be associated with cognitive costs, including slower processing speeds, an increase in errors, and a decrease in learning efficiency.[16] The act of multitasking has been demonstrated to result in attention lapses, which in turn have been shown to reduce the efficiency of encoding and retrieving information in episodic memory. Neurophysiological (EEG) and physiological (e.g., measurement of pupil diameter) studies demonstrate that immediately preceding episodes of forgetting, there is a decrease in activity in the areas of the brain responsible for maintaining goals and controlling attention. This suggests that multitasking not only diverts attention but also disrupts the processes involved in consolidating information in long-term memory. This phenomenon is of particular importance in the field of education, where pupils and students who use digital media while learning are at risk of reduced memory quality and greater susceptibility to forgetting.[9] The ability to multitask has been demonstrated to be associated with a decline in the capacity to delay gratification and to sustain concentration, which, in turn, has been shown to result in a reduction in cognitive performance. In the long term, frequent attention switching has been shown to promote the development of shallow processing strategies. Users have been found to focus more on the number of stimuli than on their meaning [17] This phenomenon of external transfer of memory functions is referred to as the Google Effect. The internet, regarded as a supernormal stimulus, has been shown to encourage users to delegate the process of memorisation to external sources. Consequently, metamemory –

defined as the ability to monitor and evaluate one's own knowledge – is weakened, and motivation for deeper learning declines. It is evident that the advent of the internet has facilitated the dissemination of information with unprecedented ease.

Consequently, users are becoming increasingly disinclined to engage in the process of internalising such information. While this strategy may prove beneficial in the short term, it has the potential to result in less profound information processing and diminished knowledge retention. [18] The findings of the research indicate that multitasking and reliance on digital sources of information lead to two related phenomena: weakened attention control and reduced memory quality. The act of multitasking instigates a perpetual cycle of attention shifting, thereby impeding the process of profound information encoding and, concomitantly, fostering the development of superficial learning capabilities. Concurrently, the reliance on constant internet access and smartphones has been demonstrated to diminish memory strategies, resulting in the external delegation of memory. [9,13-16] Empirical research findings indicate that multitasking among students is correlated with poorer academic performance, decreased memory retention, and limited ability to maintain attention in tasks requiring deep information processing. [20] The 'switch-load' theory posits that each switch incurs cognitive costs in the form of time losses and reduced quality of information encoding in working and long-term memory. [18] A comprehensive analysis of multitasking types enables the discernment of potentially harmful from neutral forms. Multitasking that is unrelated to the process of learning, for example the use of social media, instant messaging or entertainment services during class or independent study, has been shown to have a particularly negative impact. These activities divert cognitive resources away from the primary task, resulting in distraction and impaired transfer of content to long-term memory. [19,20] Conversely, multitasking that is pertinent to academic tasks – for instance, the concurrent utilisation of educational materials, notes or online resources – can exert a neutral or positive influence, particularly in individuals who possess high self-regulation and effective attention control. Mobile technologies have the capacity to facilitate the organisation of work and teaching communication in this regard. [21]

**The impact of smartphone notifications on cognitive processes and self-regulation.**

The disruption to cognitive functioning and the ability to self-regulate attention that can be caused by even a single notification generated by a smartphone is significant. Notifications, defined as unpredictable stimuli with high emotional and social significance, act as micro-distractions, effectively competing for the user's cognitive resources. Consequently, these conditions have been shown to result in diminished concentration levels, augmented susceptibility to disruption, and impaired maintenance of continuous thought processes. [17, 22, 23] The impact of audible or vibrating notifications on performance in tasks requiring concentration, even in the absence of a behavioural response, is a subject of considerable interest. This phenomenon can be attributed to the activation of an involuntary tendency to redirect attention towards the source of the stimulus, leading to the generation of thoughts that are not pertinent to the current task (i.e., mind wandering). This process often results in disruptions in the processing of information. A decline in work efficiency can be observed in educational and professional environments, particularly in instances of interruption, regardless of the duration of the interruption. [22] Consequently, there is a diminution in the capacity to defer gratification, a weakening of cognitive control, and an elevated degree of susceptibility to distraction. An excess of information stimuli from mobile devices has the potential to overload the attention system, resulting in deficits in cognitive and emotional self-regulation, even in individuals who do not have a diagnosed concentration disorder. These symptoms have been observed to bear a resemblance to those exhibited by individuals diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). However, it is imperative to emphasise that these observations do not serve as a cause for the disorder in a clinical context. [23] The impact of notifications on attention and self-regulation extends beyond the behavioural level to encompass neurobiological mechanisms. This phenomenon pertains to the reward system, dopaminergic stimulation, and the neural networks responsible for detecting salient stimuli (saliency network). It has been demonstrated that each interaction with a notification (e.g. sound, vibration, light notification) generates a short burst of dopamine, thereby stimulating reward pathways in the brain in a manner analogous to the mechanisms known to be involved in addiction. This phenomenon is described as intermittent reinforcement, whereby the unpredictability of the stimulus increases motivation to check the device, thereby generating a cycle of anticipation and reward.[24] Neuroimaging (fMRI, EEG) has demonstrated that the processing of notifications involves structures belonging to the salience system, including the insula, the anterior cingulate cortex (ACC), and the anterior frontal lobe. These stimuli are processed by the brain as signals requiring an immediate response, which competitively engage the resources of the executive network and impair the ability

to sustain concentration over a protracted period of time. [25] Increased activation of these regions has been shown to result in increased impulsivity and decreased cognitive control efficiency. Research has demonstrated that even a brief respite from smartphone usage can lead to a stabilisation of dopamine levels and an enhancement in the functionality of the reward system. This, in turn, results in an augmentation of cognitive clarity, motivation, and improved concentration. A synopsis of the aforementioned results suggests that notifications and the concomitant constant cognitive readiness impose a significant strain on the attention system. This mechanism is understood as the constant switching of mental resources between tasks, which generates a cost in terms of time and energy and hinders deep information processing.

Consequently, the capacity to sustain attention, formulate plans, modulate impulses, and regulate emotions deteriorates. [26]

**The impact of smartphones on mental and emotional health**

The advent of mobile technologies, and more specifically the ubiquity of smartphones, has engendered a profound metamorphosis in the quotidian functioning of the human species. This transformation has exerted an influence not solely on cognitive processes, but also on mental and emotional well-being. [13,14,27] Recent studies have indicated a correlation between extensive utilisation of mobile devices and a decline in overall well-being, alongside increased levels of stress, anxiety and depression. Furthermore, these findings suggest a concomitant deterioration in emotional regulation. Conversely, some authors posit that the manner in which technology is utilised has the capacity to either exacerbate mental health concerns or promote well-being, contingent upon being accompanied by a deliberate and contemplative approach. Mindfulness can be defined as the ability to experience the present moment consciously and non-judgmentally, thus promoting emotional and mental well-being. The association between this trait and a reduced propensity for ruminating and being distracted, along with enhanced emotional regulation and cognitive control skills, is well-documented. Consequently, individuals who possess elevated levels of mindfulness demonstrate an enhanced capacity to cope with stress, expeditiously relinquish detrimental thought patterns, and sustain emotional equilibrium, even in circumstances characterised by information inundation.[27] In relation to smartphone usage, low levels of mindfulness have been shown to promote the development of automatic, compulsive patterns of device use.

This has been demonstrated to exacerbate phenomena such as behavioural addiction, anxiety and feelings of cognitive overload. A paucity of mindful presence has been demonstrated to precipitate a tendency towards impulsive reactions to notifications and digital stimuli in users, thus giving rise to a fragmentation of attention and an incapacity to regulate emotions.

Conversely, the cultivation of mindfulness has been shown to offset these processes, thereby enhancing an individual's capacity to utilise technology reflexively and sustain mental equilibrium. The present study hypothesises that intensive use of mobile devices can lead to a deterioration in social relationships and feelings of loneliness, despite apparent 'hyperconnectivity'. [14] The paradox of digital interactions is that frequent virtual contact does not necessarily result in tangible emotional support; rather, it can exacerbate self-presentation pressures and the inclination to compare oneself to others, thereby having a detrimental effect on self-esteem and overall well-being.

**The relationship between the intensive use of mobile technologies and symptoms of anxiety, depression and stress.**

A growing body of research documents the relationship between problematic smartphone use and deteriorating mental health, particularly in terms of anxiety, depression and stress.

Individuals demonstrating this pattern of use are distinguished by elevated levels of anxiety and diminished life satisfaction. The relationship in question is complex, involving both individual factors (e.g., personality traits) and social factors (e.g., pressure to be constantly available). The problematic use of technology is more prevalent among individuals who exhibit high levels of neuroticism. For these individuals, the device serves as a coping mechanism to manage negative emotions. Consequently, rather than alleviating tension, it is the opposite effect that is produced, which, in the long term, can result in chronic stress and mood disorders. [28- 30] The phenomenon of FOMO (fear of missing out on important events) plays a significant role, resulting in increased checking of social media and increased psychological tension. A substantial corpus of research has been conducted on the relationship between digital communication and mental health, with a particular focus on the correlation between high exposure to digital communication and increased levels of stress and anxiety.

This correlation has been found to be especially pronounced in cases of addictive use. It is important to note that this relationship intensifies over time, which may be indicative of the growing impact of mobile media on mental health. [28] Studies employing objective measures of digital activity have observed stronger links with negative mental health indicators, underscoring the significance of methodological rigour in analysing this phenomenon. Despite the correlational nature of the data, the results are consistent – intensive use of mobile devices is associated with reduced well-being and increased depressive symptoms. [29] It has been demonstrated that young people who allocate more than five hours of their day to online activities are subject to diminished levels of mental well-being, elevated risk of depression, suicidal ideation and diminished life satisfaction. The most significant deterioration is observed during the transition from moderate to heavy use, suggesting the existence of a threshold beyond which the negative effects intensify rapidly. This phenomenon persists even when demographic factors are taken into consideration, thereby confirming its universality.[30] These results correspond with research on digital stress and smartphone addiction, indicating that the constant need to be online leads to emotional overload, sleep disturbances and difficulty in mental rest. These mechanisms bear a resemblance to those observed in behavioural addictions, as they are founded upon the reward system, which serves to reinforce the compulsive utilisation of the device. To summarise, there is a growing body of evidence to suggest that excessive and frequent use of digital media is associated with a deterioration in mental health and an increase in symptoms of anxiety, depression and stress. The mechanisms behind this phenomenon include individual factors (e.g. FOMO) and environmental factors (e.g. social pressure, excess of digital stimuli). While moderate use of technology may be neutral, exceeding a certain intensity threshold can lead to adverse effects on mental health.

**The impact of smartphones on well-being, life satisfaction and emotional wellbeing**

The effect of smartphones on subjective happiness, life satisfaction and mental wellbeing is complex and depends on the manner, intensity and context of use of these devices. The utilisation of these substances has the potential to result in either an enhancement or a deterioration in subjective mental wellbeing. [27, 31-33] The utilisation of a smartphone, even for a brief period, has the potential to exert a detrimental influence on cognitive function and overall well-being. Participants who utilised their mobile phones for a duration of 45 minutes exhibited elevated levels of mental fatigue and drowsiness in comparison to the control group who viewed a documentary film. Furthermore, a decline in alertness and reaction inhibition was observed, which resulted in diminished performance on tasks requiring concentration and self-control. [31] It is becoming increasingly evident that constant exposure to digital stimuli, notifications and social media has a detrimental effect on an individual's ability to maintain mindfulness. This, in turn, has been shown to result in a reduction in emotional self-awareness and an increase in rumination. Consequently, excessive smartphone use has been demonstrated to impair the ability to self-reflect and regulate emotions which directly correlates with lower life satisfaction and a greater sense of mental overload. [27] The three primary mechanisms through which smartphones impact well-being, as outlined in the integrative theoretical model, are the substitution, interference and complementarity hypotheses. The initial perspective posits that smartphones have the potential to supplant significant activities, including face-to-face interactions, sleep, and leisure activities, thereby precipitating a decline in overall well-being. The interference hypothesis refers to the disruption of attention and interruption of activities requiring concentration, resulting in decreased productivity and increased frustration. Conversely, the complementarity hypothesis posits that under specific circumstances, smartphones have the capacity to enhance well-being by facilitating social interaction, access to knowledge, and entertainment. The impact of these devices on well-being is therefore two-way and depends on the context and manner of use – conscious, controlled and purposeful use promotes positive emotions, while impulsive and excessive use leads to a decline in them. [32] The most adverse effects are observed in the use of social media, especially when the dominant mechanism is comparison with other users.

This process has the potential to result in a number of psychological consequences, including lower self-esteem, feelings of inadequacy and intensified negative emotions such as jealousy or frustration. It is evident that factors such as a sense of belonging, peer support and the ability to critically evaluate digital content have the capacity to mitigate the aforementioned negative effects. However, the well-being of young people is more closely linked to other factors, such as sleep quality and physical activity, than to the amount of time spent online.

The integration of the results of the aforementioned studies suggests that smartphones have an impact on well-being and emotional well-being through cognitive and emotional mechanisms. The utilisation of the substance in question for a limited duration has been demonstrated to engender a state of cognitive fatigue and diminished levels of alertness. In the longer term, its use has the potential to impede the capacity for mindfulness and introspection. The ultimate outcome is contingent on the individual's capacity for self-regulation and the judicious utilisation of technology.

**The Addiction to Smartphones and Its Psychological Consequences**

The phenomenon of addiction to smartphones is becoming increasingly apparent in today's information society. This addiction can have a number of negative consequences for an individual's mental health and social functioning. Individuals who possess a high level of self-control are likely to experience fewer conflicts between goals, demonstrate superior emotional management skills, and exhibit a reduced propensity for compulsive behaviour. It has been demonstrated that individuals who engage with technology in a more restrained manner tend to exhibit reduced impulsivity and a diminished propensity for compulsive technology use. In addition, they demonstrate an increased capacity to establish and maintain meaningful interpersonal relationships. [34] The mechanism in question is based on the ability to avoid impulses for immediate gratification and to ensure that decisions are consistent with long-term values. Within the context of mobile device utilisation, this denotes an enhanced capacity to resist the allure of digital stimuli, including notifications, social media, and mobile games. Conversely, an absence of restraint can foster behavioural addiction, engendering a perception of loss of control and a concomitant decline in emotional well-being.[35] A significant escalation in symptoms of depression, suicidal behaviour and suicide attempts has been observed at the population level since 2010, a phenomenon that has been concomitant with an increase in the amount of time spent by individuals perusing mobile device screens. It has been demonstrated that young people who use digital media intensively exhibit diminished levels of mental well-being. Conversely, participation in offline activities – such as sports, social interaction or household chores – is associated with a reduced risk of depression. This phenomenon can be interpreted as the consequence of the substitution of face-to-face interaction for digital relationships, resulting in feelings of social isolation and diminished self-esteem, particularly pronounced among female adolescents. [36]

Self-reported measures of internet and smartphone use are frequently subject to substantial error. Users who exhibit low levels of actual activity tend to overestimate their reports, while those who utilise these technologies extensively underestimate their usage. This suggests that the actual level of technology abuse is frequently underestimated. In order to reliably assess the relationship between intensity of use and addiction, it is necessary to employ objective measurement methods, such as tracking device activity.[37] To summarise, an absence of effective regulatory mechanisms in the context of technological behaviour can result in a state of persistent cognitive overload, the onset of mood disorders, and the deterioration of social relationships. A high level of self-control is an important protective factor against the development of addiction and its negative effects.

**The impact of smartphones on social relations and interpersonal communication.**

The analysis of the data collected indicates that the time spent interacting with mobile devices is replacing traditional forms of social contact, such as face-to-face conversations, spending time together or activities based on co-presence. The excessive utilisation of smartphones has been demonstrated to have deleterious effects on psychological well-being, with studies indicating that it can result in the deterioration of emotional bonds, the onset of feelings of loneliness, and a decline in the quality of communication. From the perspective of interpersonal communication, smartphones encourage fragmentation of attention during interactions and the phenomenon of 'phone snubbing' (ignoring the conversation partner because of being busy with the phone), which negatively affects the perceived closeness and trust in relationships. [32, 38] The presence of smartphones in a social context, even when not actively being used, has been demonstrated to have a detrimental effect on the depth of conversations, thereby hindering the development of empathetic listening and authentic emotional engagement. Consequently, interpersonal relationships become less profound and more utilitarian in nature. The phenomenon of digital notifications has been demonstrated to engender mental fatigue in individuals who are perpetually anticipating these alerts. This has been shown to have deleterious effects on interpersonal relationships, leading to elevated levels of tension and diminished satisfaction with these relationships. [32] The advent of mobile technologies, and more specifically the ubiquity of smartphones, has engendered a novel dynamic in human interactions, the deleterious effects of which are designated "technoference". This term denotes the spontaneous, frequently unconscious disruption of direct, face-to-face contact. The utilisation of mobile phones during shared activities has been demonstrated to engender tension within interpersonal relationships, thereby creating the perception that one's partner is less available and engaged. This phenomenon encompasses both overt utilisation of the device, for instance, the act of checking notifications during an in-person conversation, and the more subtle consequences of its presence, which can unconsciously diminish the quality of emotional exchange. [38] The human brain has evolved in small, intimate social groups based on trust, mutual commitment and self-awareness. These adaptations were instrumental in facilitating survival by fostering close bonds among the group. The contemporary use of

smartphones and social media facilitates access to extensive and diffuse networks of contacts, thereby activating adaptive mechanisms in contexts for which they were not originally designed. Conversely, mobile devices have been shown to facilitate communication with geographically distant individuals, support the establishment of social support networks, and assist in the maintenance of relationships within peer groups.

This enables users to compensate for the deficits of traditional forms of contact and strengthen their sense of belonging. However, the effectiveness of this mechanism is contingent on the quality of interaction; digital communication involving superficial exchanges of content rarely translates into deep emotional bonds. In summary, moderate and conscious use of technology has been demonstrated to promote the maintenance of interpersonal bonds. Conversely, excessive exposure and lack of control over time spent online have been shown to lead to alienation, a decline in empathy and a reduction in real presence in interpersonal relationships. The maintenance of equilibrium in the utilisation of smartphones is imperative for the preservation of intimate bonds and the cultivation of salubrious social relationships.

**Growing interest in the phenomenon of digital detox and its effects**

The dynamic development of mobile technologies, especially smartphones, has led to the emergence of digital stimulus overload and chronic information overload. In response to the aforementioned issues, there has been a marked increase in interest in the concept of digital detox – the deliberate, temporary reduction or cessation of digital device use. This encompasses a wide range of practices, from brief periods of abstinence from social media, to the limitation of notifications, to the complete abstinence from digital devices. A mounting body of research suggests that a well-planned disengagement from technology can yield substantial benefits for mental well-being, cognitive abilities and quality of life. [39-42] A review of the extant scientific literature indicates that the effects of digital detox vary and are contingent on the context and characteristics of the participants. The greatest benefits are observed in adolescents and young adults, who are particularly vulnerable to the negative effects of technology abuse and, concomitantly, respond more quickly to controlled restrictions. It has been demonstrated that women are more likely to experience positive outcomes from regulated social media use. This finding indicates a need for gender-differentiated approaches. Although the efficacy of digital detox in reducing symptoms of depression and problematic internet use is well-documented, the impact on overall well-being and life satisfaction is less consistent and requires further research, especially in terms of long-term effects. [39] A comparative analysis was conducted, in which the total abstinence from smartphones was contrasted with a moderate reduction in usage time, amounting to one hour per day. The findings of this study indicated that both strategies were effective in reducing problematic device use and enhancing well-being. However, the long-term benefits were more pronounced in the 'reduction' group, where participants exhibited reduced levels of depression and anxiety, elevated levels of life satisfaction, and increased physical activity. It is also noteworthy that this group exhibited a decline in other detrimental habits, such as smoking. The findings of this study indicate that a deliberate reduction in technology usage, aimed at achieving a balance between digital connectivity and well-being, is a more efficacious approach than complete disconnection.[40] An alternative strategy that has been employed by some is to group notifications into regular intervals, for example, three times a day. This approach has been demonstrated to enhance well-being and concentration, whilst concomitantly mitigating the stress associated with frequent interruptions in the workplace. It is noteworthy that the complete disablement of notifications has been observed to result in an escalation of anxiety in certain instances, a phenomenon often referred to as the Fear of Missing Out (FoMO). The findings of this study indicate that the implementation of meticulously formulated notification management strategies, as opposed to the complete eradication of notification practices, is the most effective course of action for the enhancement of mental health. These intermittent 'short breaks' from notifications can be a pragmatic approach to enhancing well-being without the need for complete abstinence from one's mobile device. [41] The restriction of access to mobile internet for a period of two weeks resulted in a substantial decline in screen time, accompanied by an enhancement in sustained attention, an increase in life satisfaction, and an improvement in positive emotional states. Concurrently, anxiety and depression levels experienced a decline. This finding lends further credence to the hypothesis that periodic disconnection from mobile internet can effectively support concentration and emotional balance, thereby enhancing cognitive functioning. The integration of digital detoxification with alternative activities, such as mindfulness, physical exercise or social engagement, has been demonstrated to enhance emotional resilience and mitigate the inclination towards compensatory screen use. [42] A review of contemporary research suggests that the increasing interest in digital detox is driven by two key factors. Firstly, there is a growing recognition of the need to regain control over technology. Secondly, there is a strong emphasis on protecting mental health. The most efficacious

strategies are those of moderate restriction, which include reducing usage time, grouping notifications, and blocking mobile internet. These strategies enable users to maintain contact with technology while safeguarding their attention and emotional equilibrium. From the perspective of psychological prevention, digital detox can be considered a valuable element of health policy, provided it is tailored to the individual needs of users and implemented with moderation, as opposed to a radical disconnection from technology.

**Conclusions**

The analyses conducted provide a basis for concluding that smartphones, as one of the most important devices of the digital age, have a multidirectional impact on the functioning of modern humans. Their extensive utilisation has precipitated a re-evaluation of the composition of quotidian life, the manner in which information is processed, social participation, and emotional regulation mechanisms. Consequently, smartphones have evolved from being a mere communication instrument to becoming an integral component of an individual's cognitive environment, exerting a significant influence on their mental and relational processes. The extant literature and research results indicate that excessive or uncontrolled exposure to digital stimuli generated by smartphones leads to a weakening of basic cognitive functions, including, above all, attention span, working memory, and cognitive control abilities. A significant phenomenon that has been observed is the so-called 'cognitive drain effect'. This effect suggests that the mere physical presence of the device in the user's environment engages their attention resources, even when they are not actively using it. The combination of frequent task switching (i.e. media multitasking) has been demonstrated to result in the consolidation of superficial information processing. This, in turn, has been shown to lead to a reduction in the ability to sustain focus over extended periods, as well as to engage in deep learning. The consequences of these conditions are particularly evident in young people, whose nervous systems are highly plastic (i.e. able to adapt easily to new conditions) and whose attention regulation patterns are still consolidating (i.e. still developing and changing). The findings of this study corroborate the hypothesis that smartphones have a substantial impact on an individual's mental and emotional well-being. Intensive, impulsive and, on occasion, compulsive use of the device has been demonstrated to engender elevated levels of stress, anxiety and depressive symptoms. Mechanisms related to the functioning of the reward system play a pivotal role in this context, particularly the irregular dopaminergic reinforcement that accompanies the receipt of notifications. This has been demonstrated to result in the development of habitual and addictive behaviour patterns, which in turn can lead to a gradual loss of control over the utilisation of the device. Concurrently, evidence has emerged that factors such as mindfulness and self-regulation can function as buffers, thereby enabling the user to engage in digital activities in a conscious and deliberate manner. An analysis of interpersonal relationships demonstrates that smartphones have a detrimental effect on the quality of social contacts by modifying the structure of face-to-face interactions. The phenomenon of 'phubbing' and 'technoference' have been identified as factors that contribute to the fragmentation of attention during social interactions, thereby reducing feelings of closeness, mindfulness, and mutual engagement. The paradox of modern hyperconnectivity is that, despite the increased availability of contacts, the subjective sense of support and belonging may be weakened. In light of the analyses carried out, interventions aimed at conscious management of technology use play an important role. Research has demonstrated that the most efficacious strategies are those that moderately restrict exposure to digital stimuli, such as reducing usage time, organising notifications, taking regular breaks from devices, and establishing smartphone-free zones (e.g., during meals, work, or interpersonal interactions). Strategies involving complete abstinence from the device have been shown to be less sustainable and often result in a reactive increase in use after the period of abstinence. This indicates that the objective is not the complete elimination of smartphones from everyday life, but rather the establishment of a balanced equilibrium between digital and offline activities. In summary, smartphones are not inherently detrimental; their potential consequences stem primarily from the manner and intensity of their use. The contemporary challenge, therefore, is not to reject technology, but to cultivate the competencies to utilise it in a reflective, conscious and self-regulated manner. This encompasses both digital education and the cultivation of self-control, mindfulness, and the capacity to establish relationships in a present and engaged manner. When formed in a proper manner, habits concerning the use of smartphones have the capacity to render them as a supportive instrument rather than one that is burdensome. This standpoint is of paramount importance when considering the initiation of preventive, educational and research activities in this domain.

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