

SMARTPHONE ADDICTION AND SLEEP QUALITY AMONG STUDENTS

ZAVISNOST OD PAMETNIH TELEFONA I KVALITET SPAVANJA KOD STUDENATA

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Abstract

The use of smartphones and accompanying apps has significantly improved communication, but it has also raised concerns about device dependence and overuse. The term “smartphone addiction” was introduced to describe the excessive and dysfunctional use of smartphones, evocative of behavioural addictions. Since smartphones are used for various purposes and are always connected to the Internet, they can significantly affect daily activities. Excessive and problematic smartphone use is associated with poor sleep, fatigue, difficulty falling asleep, and shorter sleep duration. It has been demonstrated that the addictive use of smartphones is commonly accompanied by depression, anxiety, and stress. Additionally, the lack of sleep is strongly associated with academic underperformance. Therefore, maintaining healthy sleep patterns is essential for young people and improves their academic performance as well as physical and mental health. As “smartphone addiction” becomes a growing challenge in numerous countries, preventive measures need to be implemented, as well as measures to help reduce the consequences of excessive smartphone use.

Keywords:

smartphone addiction,
sleep quality,
students

Sažetak

Upotreba pametnih telefona i aplikacija značajno je unapredila komunikaciju, ali je ujedno dovela i do zabrinutosti zbog njihove prekomerne upotrebe, kao i do pojave zavisnosti od ovih uređaja. Termin „zavisnost od pametnih telefona“ uveden je da opiše prekomernu i disfunkcionalnu upotrebu pametnih telefona koja podseća na bihevioralne zavisnosti. Pošto se pametni telefoni koriste u različite svrhe i uvek su povezani sa internetom, oni mogu značajno uticati na svakodnevne aktivnosti. Prekomerna i problematična upotreba pametnih telefona povezana je sa lošim spavanjem, umorom, otežanim uspaljivanjem i kraćim trajanjem spavanja. Pokazano je da je zavisnost od upotrebe pametnih telefona obično praćena depresijom, anksioznošću i stresom. Pored toga, nedostatak spavanja je povezan sa lošijim akademskim uspehom. Stoga je održavanje zdravih obrazaca spavanja od suštinskog značaja za mlade ljude jer poboljšava njihov akademski učinak, kao i fizičko i mentalno zdravlje. Kako „zavisnost od pametnih telefona“ postaje sve veći izazov u mnogim zemljama, potrebno je implementirati preventivne mere, kao i mere koje bi pomogle u smanjivanju posledica njihove prekomerne upotrebe.

Ključne reči:

zavisnost,
pametni telefon,
kvalitet spavanja,
mladi

Introduction

Since 2008, the use of smartphones has been steadily growing. By the end of 2020, almost 80% percent of the world's population were smartphone users (1). Due to the fact that a lot of individuals own more than one mobile device, the quantity of smartphone accounts is greater than the number of people who use them. As of now, there are over 6 billion smartphone subscriptions, and this figure is forecasted to rise to 7.7 billion by 2027 (1). Numerous users are oblivious to the amount of time they spend on their phones every hour, which adds up to a significant amount at the end of the day. The data on smartphone usage indicates that the average person uses their phone for almost 3 hours every day and checks their devices 63 times a day (2). With the advent of smartphones and their apps, the manner of communication has been transformed, however, it has also caused worries about the overuse and addiction to devices. Not only their extensive use is causing concern, but also the potential undesirable outcomes associated with problematic usage. That is why researchers are stressing the significance of examining this behavior, especially among young people.

“Smartphone addiction”

The ever-increasing popularity of smartphones and the strong bond people seem to have with their phones have highlighted the possibility of “smartphone addiction”. There have been various studies on tech addiction, with a major focus being on smartphone addiction. Although the possibility of “smartphone addiction” has been studied for years, there is no universal consensus on its definition. Despite the fact that the majority of studies have demonstrated that smartphones can be addictive, “smartphone addiction” is not still included in the Diagnostic and Statistical Manual of Mental Disorders as published by the American Psychiatric Association (3) nor in the International Classification of Diseases (ICD-11) (4).

However, the term “smartphone addiction” was created to describe the excessive and dysfunctional use

of smartphones, evocative of behavioral addictions (5). Numerous studies have demonstrated that smartphone use can be linked to a range of issues such as interpersonal (6) and academic dysfunction (7), as well as mental health issues, including depression, anxiety, and stress (8-10). Hence, the concept of problematic use of smartphones is based on adverse health effects. According to Billieux, problematic mobile phone use is the inability to control the usage that leads to negative impacts on one's everyday life (11). Carbonell and Panova (12) believe that although “smartphone addiction” is not as serious as addictions to substances such as nicotine or heroin, it still has a negative impact on an individual's life. Since there is no better word to describe behavior characterized by loss of self-control, dependence, overuse, and negative consequences, “addiction” was an applicable term. The two authors propose that the use of the term “addiction” could be deceptive regarding the severity of the issue and suggest using the phrase “problematic smartphone use” instead. Despite the ongoing debate regarding the terminology of “smartphone addiction”, in the existing literature it is the most frequently used phrase to specify the overuse of smartphones that detrimentally influences everyday activities.

Due to growing worries about the known and unknown impacts of smartphone use, a number of efforts have been made to identify, classify and evaluate smartphone dependence. Scales are frequently used to assess smartphone use habits and frequency (13). Up to now, various scales have been created to identify smartphone over-attachment, problematic smartphone use, and smartphone addiction. An impressive number of even 78 scales were covered in a review article by Harris and his team (14). Even though the construct that these scales assess may vary, many of them share a common theoretical basis, even in terms of the items they contain. Some of the scales have been widely used after being translated and validated in other languages. The use of validated scales to assess “smartphone addiction” facilitates the interpretation of results and makes them comparable.

The prevalence of “smartphone addiction” among students varies around the globe, between countries,

and between different age groups. It goes from 16,9% in Switzerland (15) up to 71,9% in Saudi Arabia (16). Studies showed that smartphone addiction was more prevalent in younger adolescents compared with young adults (13) and in younger-aged users compared to older age (17). In some studies, there was no statistical significance in smartphone addiction prevalence among genders (18), while others showed higher prevalence in females (16, 19).

Quality of sleep

The amount of sleep a person gets has a major influence on health and well-being, as well as their everyday performance. It is estimated that nearly a third of one's life is spent asleep. An individual's biological development, personal relationships, and social and physical environment all have an impact on their sleeping habits. The amount of sleep needed varies according to age and lifestyle. For school-age children, 9 - 12 hours of sleep are recommended, for teens 8 - 10 hours while adults are recommended 7 or more hours of sleep at night (20). Despite being aware of its importance, people do not make sleep a priority and do not get the recommended eight hours. Numerous causes, including sleep disorders, illnesses, and mental health issues, can contribute to both insufficient sleep and poor sleep quality. People of all ages struggle with sleep problems, and they can have serious consequences. This is especially true for students who tend to get less sleep than other groups of people.

A good night's sleep is characterized by feeling rested, awake, and capable of being completely productive throughout waking hours. The term "sleep quality" has been widely in use in psychology and medicine. Although sleep quality is a well-acknowledged clinical concept, it is hard to define and measure objectively. It is composed of both subjective and objective aspects of sleep. Subjective aspects of sleep quality are "depth" or "restfulness" of sleep. On the other hand, objective aspects of sleep, that could be quantified, are sleep duration, sleep latency, and the number of awakenings (21). Still, individual differences may exist in components of sleep quality and their importance. The construct of sleep quality is important because sleep disturbances are quite common and poor sleep quality can be a significant indication of many medical and sleep disorders (21).

Students are known to frequently experience a lack of sleep and impaired quality of sleep. Regardless of the required wake times, emotional development and growth in college students may result in later bedtimes (22). A student's sleep-related behaviours are influenced by the shift from living at home with parents to living on or off campus with peers (22). Irregular schedules and heavy academic burdens often characterize student life. Challenging academic demands together with the consumption of alcohol and recreational drugs make students particularly vulnerable to adverse consequences of inadequate sleep and poor sleep quality. This can lead to exhaustion, decreased focus, impaired memory, lower academic achievement,

psychological instability, and diminished quality and contentment with life (22-25). Sleep deprivation has been associated with an increased risk for chronic diseases such as insulin resistance, diabetes, hypertension, obesity, and fatal and nonfatal injuries (22).

"Smartphone addiction" and quality of sleep

As technology becomes more available and utilized, research has been conducted to explore the effects of devices such as television, computers, and phones on sleep and sleep quality. Since smartphones are used for a variety of purposes and are always linked to the Internet, they can have a notable impact on the person's ability to fall asleep and have more difficulty staying asleep. Internet addiction significantly associates with poorer subjective sleep quality, prolonged sleep latency, shortened sleep duration, more sleep disturbances, use of sleep medication, and daytime dysfunction (26). In the same way, excessive and problematic smartphone use correlates with poor sleep, fatigue, difficulty falling asleep, and shorter sleep duration (27, 28). In the study by Chung and collaborators (28) *at-risk* smartphone users showed 2.3 times higher daytime sleepiness scores than *low-risk* users. In a study conducted in London on 1043 students, a large proportion of participants (61.6%) had poor sleep quality. Of those who were smartphone addicts, 68.7% had poor sleep quality, compared to 57.1% of those who were not addicted. In other words, smartphone addiction was associated with poor sleep quality (OR = 1.41, 95%CI = 1.06 - 1.87) (9). What is particularly interesting in this study is that the association remained significant even after adjusting for daily screen time, which, on the other hand, was not predictive when adjusted for smartphone addiction. In other words, findings from the study by Sohn et al. (9) suggests that the association between poor sleep and smartphone addiction is not just a function of exposure time.

The following factors are most likely the underlying causes of these associations between screen-based media use and sleep quality: time displacement (i.e., replacing sleep and other activities with screen time), media-based psychological stimulation, and the impact of light from devices on circadian rhythms, sleep physiology, and alertness (29, 30). Especially the use of smartphones immediately before going to sleep affects the circadian rhythm and the total sleep time (26, 31). Exposure to electromagnetic fields and blue light from smartphones, which may influence melatonin levels, are potential explanations for the causes (32-34). The brain's function, particularly that of the pineal gland, may be impacted by electromagnetic field exposure at night, changing cerebral blood flow and brain electrical activity, which can result in poor sleep quality (35). In a review that examined associations between screen time and sleep parameters more screen time was linked to later bedtimes and less overall sleep for kids and teenagers in > 90% of included studies (36).

Another way smartphone can negatively affect sleep quality is by sleep interruption. Nowadays, practically

everyone has a smartphone, which makes us accessible almost anywhere and at any time. The opportunity to communicate with others does not end at bedtime, and young adults are starting to experience the “sleep texting” phenomenon. This is known as “sleep texting” when someone responds to or sends a text message online while dozing off. The duration and quality of the person’s sleep are negatively impacted by this action, which might take place just once or repeatedly during the sleep cycle. Each notification and answer add to an overall sleep debt that becomes longer each night. In a study by Dowdell and Clayton (23), 93% of students said they slept with their phone nearby. Moreover, 25.6% of students in the sample reported texting while asleep, associated with having poor sleep quality and their cell phone affecting their sleep. Students who text while they sleep were more likely to report sleep interruption, to sleep with their phone, to forget they texted (72%), and to forget what they texted (25%). College students who sleep text claim that the majority of their texts are meaningless ramblings that contain more gibberish than real words (23). In other words, messages being sent are more humiliating than harmful. On the other hand, sleep texting among the working population may lead to a different experience and a distinct set of consequences depending on what was texted and to whom.

“Smartphone addiction”, quality of sleep, depression, anxiety and stress

Numerous studies have proven the correlation between smartphone addiction and various psychological and physical disorders. It has been demonstrated that addictive use of smartphones is commonly accompanied by depression, anxiety, and stress, indicating that there is a substantial link between them (10,37). Excessive use of smartphone results in a person staying up late at night, thus leading to even greater depression, irritability and stress since sleep is a biological process that is linked to mood regulation. Moreover, sleep quality mediates the relationship between smartphone usage and depression, i.e. problematic smartphone use contributes to depression due to its negative impact on sleep quality (**figure 1**) (38).

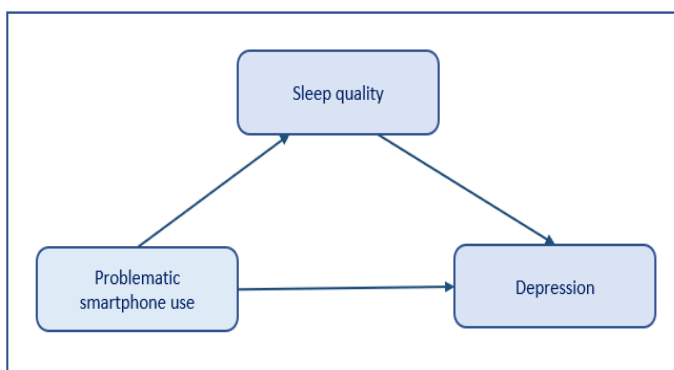


Figure 1. Mediation effects of sleep quality on problematic smartphone use and depression. Modified according to Zou et al (38).

According to studies, the circadian rhythm plays a key role in the development of affective illnesses like bipolar disorder and depression (38,39). In a meta-analysis by Sohn et al., problematic smartphone use was a risk factor for poor sleep quality (OR = 2.6), depression (OR = 3.17), anxiety (OR = 3.05), and higher perceived stress (OR = 1.86) (8). Another meta-analysis of 14 studies by Young and his team (27) found significantly increased risks of low sleep quality (OR = 2.19), depression (OR = 2.88), and anxiety (OR = 3.50) in people with problematic smartphone use. They observed a significant correlation between problematic smartphone use and sleep quality in both developed (OR = 1.95) and developing countries (OR = 2.01). Thomée and collaborators (40) study included 4156 young adults of 20 - 24 years who responded to a questionnaire at baseline and 1-year follow-up. They found a correlation between high mobile phone use and stress, sleep disturbances, and symptoms of depression in men and women. The correlation was present even after excluding persons reporting mental health symptoms at baseline.

Quality of sleep and academic performance

For the best cognitive performance, people need enough sleep. Students’ efforts to succeed academically might be impaired by a lack of sleep. College students who were sleep deprived for 24 hours outperformed non-deprived students on a difficult cognitive task (41). What’s important is that students are not aware of the extent to which sleep deprivation impairs their ability to complete cognitive tasks successfully (41). In a study on 1845 college students, students at risk for sleep problems were overrepresented among students who were struggling academically (25). Several factors could account for the link between sleep disturbances and academic performance. Daytime tiredness, a consequence of insufficient sleep, is associated with decreased attention, poor memory, and poor decision-making. On the contrary, an adequate amount of undisturbed sleep may enhance memory and cognitive performance, which indicates that sleep is crucial for memory consolidation (25). Lack of sleep may affect learning through decreased motivation, depressive mood and weakened overall health.

Conclusion

Smartphone overuse has been linked to numerous psychiatric issues, delayed time of sleep onset, and interrupted sleep, which may affect sleep quality. The quantity and quality of sleep may impact an individual’s physical development, emotional stability, and cognitive function. As a result, maintaining healthy sleep patterns is essential for young people and improves their academic performance as well as physical and mental health. Young adults should be educated about good sleep practices like regular bedtimes and wake-up times, as well as staying away from screen-related media in the bedroom. Early intervention for students with problematic smartphone use

is highly significant, particularly for those with sleep issues. Standard approaches to prevent or address “smartphone addiction” must be established and evaluated because it is a growing challenge in numerous countries.

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