A Comprehensive Review on Smartphone Overuse: Analysing Its Influence on Physical Health and Social Relationships in the Digital Age

Abstract: The aim of this paper is to analyse trends by reviewing the growing body of research on smartphone overuse in humans. This literature review focuses exclusively on original research articles. It begins by explaining key concepts, such as the levels and symptoms of smartphone usage excessively. There is a term “Nomophobia” which is frequently linked to poor mobile technology use. It, often known as "no-mobile-phone phobia," is the anxiety of not being able to use or reachable via one's cell phone. Additionally, it highlights the fundamental challenges and methodological issues discussed in the existing studies. The paper explores the relationship between student smartphone overuse and academic performance. While some researchers have identified gender differences in smartphone usage, others have found minimal correlation between gender and smartphone use. Several studies also link smartphone usage pattern to musculoskeletal problems. Moreover, research indicates that mobile phone use while driving is a major contributor to road accidents today. Also, it is crucial to understanding the impact of negative side of mobile phone usage on mental health, academic performance, and social interactions. Researches on this topic helps in developing effective interventions and policies to promote healthier usage habits. Therefore, raising awareness about smartphone overuse and its consequences is crucial. Parents should actively monitor their children’s schedules to help prevent them from developing a dependency on mobile devices.

Key words: smartphone overuse, Physical Health, Digital Age, Social media

Introduction

The smartphone is one of the most widely used and necessary devices among today's youth. Smartphones are used and obsessed with for a variety of reasons, including their small, high-resolution cameras, GPS navigation apps, easy and quick access to email and messages, cutting-edge media players, social media, and mobile gaming (Abdulwahab *et al.*, 2017). These days, a single touch may cure any problem. For this reason, they have become essential to modern life and people cannot live without them. Social media and entertainment are two more use for it. It is a source of enjoyment and connectivity of all kinds. People, particularly students, become addicted to it as a result, which affects their academic performance, moral principles, and mental and physical well-being (Raza *et al.*, 2020). However, smartphones have also made life easier for students because they can learn and obtain any type of knowledge on them, as well as access school material through electronic and mobile learning (Singh *et al.* 2018). As per the findings of a recent research done in the USA, 46% of smartphone users claim they "cannot live without" their device. In the USA, smartphone usage increased significantly between 2011 and 2014, rising from 35% to 64% (Samaha and Hawi 2016).

Smartphones have many positive effects on students, but they also have a lot of drawbacks and detrimental effects that should not be overlooked. Potential dangers of musculoskeletal pain have increased as a result of the rise in smartphone use. Using a smartphone for extended periods of time requires the user to look at the tiny screen and execute repetitive motions in an uncomfortable position, which can lead to musculoskeletal diseases. A study carried out in India found that 46.9% and 29.2% of students, respectively, said that prolonged use of smartphone caused them to have neck and thumb pain. Additionally, internet addiction is likely to coexist with physical and mental health issues in smartphone users (Porter, 2010). Despite the physiological disruptions, excessive mobile phone use causes a number of psychological issues that affect our society, such as addiction, emotional instability, and a sense of inattention. One definition of a mobile phone addict is someone who is constantly checking their phone, and whose obsession with doing so gets so bad that they are unable to stop themselves. They become fixated on the idea that their phone is ringing, even when it is not. A mobile phone addict always has their phone with them and uses it for a variety of purposes, including studying, eating, and driving, as well as in unsuitable settings including churches, classrooms, laboratories, and dangerous locations like gas stations (Bhutia and Tariang, 2016). So, to identify the major issues of overuse of mobile phone, more than fifty research articles were critically analysed.

Usage pattern of smartphone

To analyse the usage pattern of mobile phone, related recent articles were critically analysed. Study of Jahagirdar *et al*., (2021) revealed that, 820 million Indians will own mobile phones by 2022, making it the country with the second-highest number of mobile phone users worldwide, behind China. Overuse of mobile devices is a taught, compulsive behaviour that wastes time and money. Even though the consequences are known, this behaviour keeps becoming worse. Further, Devey and Devey (2014) concluded that, between 39% and 44% of people were addicted to their mobile phones, according to an Indian meta-analysis, which came to the conclusion that the widespread use of smartphones as a major form of leisure is to blame for the increase in smartphone use.

Here are a few studies that provide light on the time spent on mobile devices and usage patterns. Bansal and Mahajan (2017) found that 130 students (28.8%) in the Marathwada region of Maharashtra used their phones for more than four hours, while 194 students (43.1%) used them for one to three hours. While 35.0% of respondents watched films on U-Tube and 104 (25.1%) browsed the internet, the bulk of students (42.5%) were using their mobile devices to play games. Additionally, Mongkonkansa *et al*. (2022) found that 70.81 percent of students used their smartphones for more than 60 minutes per day. As people aged, they used smartphones for longer periods of time. Twelve-year-olds were the age group that used smartphones for the longest. The vast majority of parents (59.22%) have guidelines regarding the use of smartphones. According to the findings, school-aged youngsters most frequently use their smartphones when sitting (47.21%). Furthermore, study of Ammati *et al*., (2018) showed that, every participant in the study had a smartphone. However, 14% and 46% of students, respectively, reported using their phones for seven to nine hours every day. 41% of the students used their smartphones for study, games, entertainment, news, social networking, and voice and text messaging. On the other hand, 46% of students use social media apps including WhatsApp, Instagram, Facebook, and Twitter on their smartphones. Less number of students (8%) were using it to play games. After going to bed at night, 51% of the students admitted to

checking their phones. Sixty percent of students reported feeling nervous if they left their phones at work. Moreover, 256 (16.9%) of the 1,519 students had smartphone addiction, according to Haug *et al*. (2015). Longer average daily smartphone use, a shorter time before morning smartphone use, and the conviction that social networking was the most personally significant smartphone function were all linked to smartphone addiction. Smartphone addiction was more prevalent in younger adolescents (15–16 years old) than in young adults (19 years and older.

However, according to the National Commission for Protection of Child Rights' Report from 2021, 52.9% of respondents said that children prefer to use or enjoy using chat on smartphones or other internet devices, specifically through instant messaging apps like WhatsApp, Facebook, Instagram, and Snap Chat. Despite smartphones being the most widely used internet-enabled device, just 10.1% of students opt to utilize them for online learning and education. A recent study on mobile phone usage found that among people with mobile phone addiction, the mean amount of time spent on weekdays and weekends differed statistically significantly. On a typical workday, women work 2.9±1.6 hours, while boys work 3.0±1.5 hours. On the weekends, there was no statistically significant difference in the amount of time spent by boys and girls, who spent the same amount of time 3.9 hours per day. The study also revealed that both boys and girls used their phones more on the weekends than they did during the week (Gangadharan *et al*., 2022). Higher education students were also reliant on their mobile phones, with some saying they could not function without them because they were always waiting for calls, texts, or emails from their peers, according to a 2015 study by Kibona and Mgaya. In order to respond immediately to WhatsApp messages from their groups or from other sources, they set their smartphones to vibrate during class.

According to additional study, 27.2% of the 2367 survey respondents said they used their smartphones for more than eight hours per day. Seventy-five percent used at least four programs every day, primarily for news consumption and social networking. In addition to 30% leading unhealthy lifestyles (eating more fast food, gaining weight, and exercising less), at least 43% of smartphone users reported having less sleep and feeling exhausted the next day, and 25% claimed that their academic performance had decreased as a result. The four study variables, the number of hours per day spent using mobile phones, and the adverse lifestyle and academic outcomes associated with smartphone use all exhibit statistically significant positive relationships (Alosaimi *et al*., 2016).

Additionally, the study of Machado *et al*. (2023) showed that the most preferred app was WhatsApp 155 (57.40%). 213 people (78.90%) reported using their smartphones primarily for entertainment. 196 (72.6%) of the individuals had a moderate dependence on their smartphones. Of those who participated, 109 (40.2%) reported having a headache, while 83 (30.6%) reported having eye strain.

Sleep disturbances, depression and aggression due to overuse of smartphone

Despite the fact that smartphone use has been increasing across all age and economic groups, university students have been regarded as one of the most important target groups and the largest consumer group for smartphone services. Excessive usage of cell phones is increasingly associated with physical and mental health issues. Research has indicated a link between sleep issues and mobile phone addiction. Mobile phone addiction was shown to raise the risk of poor sleep quality but not short sleep duration in a study including 1125 South

Korean teenage students (Lee *et al*., 2017). In a sample of Iranian high school students (N=1034), frequency of daily messages and being awakened at night for mobile phone use were significantly associated with poor mental health, and 63% of the students reported having poor mental health. (Mahmoodi *et al*., 2018). Further, over 24% of participants reported that they usually didn't fall asleep within 30 minutes, according to Alshobaili and AlYousefi (2019). About 90% of the employees did not use any sleep aids during this time, and 2.4% of participants said they had very bad sleep quality, while 50% said they had generally decent sleep quality. However, according to Maurya *et al*. (2022), 23.5% of girls and approximately 15.6% of boys reported experiencing sleep difficulties during their teens. Among young adults, these percentages were greater (18.4% for men and 33.24% for women). Teenagers and young adults who used their smartphones for more than two hours a day were more likely to report experiencing sleep problems than those who hadn't used one in the previous twenty-four hours.

Study of Kim *et al*., (2015) showed that among college students, smartphone addiction was associated with depression, aggressiveness, and impulsion. Whereas, in a study by Yan *et al*., (2017) on in Chinese students, it was showed that playing video games for two to four hours ($p = 0.039$) on days off from school and watching less than an hour of television ($p = 0.001$) on school days were positively connected with getting more sleep. Less than an hour of video viewing per day on school days was negatively associated with longer sleep duration ($p = 0.041$). A study on adults in Flanders, Belgium, found that those who talk on their phones right before bed had much worse sleep, are more tired, and wake up later. (Exelmans and Van 2016). Further, a cross-sectional study of undergraduate students at SKIMS Medical College in Srinagar, Jammu & Kashmir, was conducted between October and December 2017. Compared to low users (5.19), high users had mean PQSI scores that were higher than the cutoff of 5 points (6.48). As a result, they were called lousy sleepers. Likewise, the mean SAS scores of poor sleepers were higher (28.86) than those of good sleepers (22.13) (Nowreen and Ahad 2018). Furthermore, no apparent gender differences were observed by the Pittsburgh Sleep Quality Index (PSQI). 8:00 AM and 11:00 PM were the most popular times for women and men to wake up and go to bed, respectively. Sleep duration was 7.26 ± 0.93 hours on average. On average, 8.12 ± 0.83 hours were spent in bed. Of the participants, only 38.33% slept for eight hours or more each night, and 25.4% slept for 6.5 hours or less. The number of competitors with the best sleeper was 68. Twenty individuals reported having poor sleep, and 26 reported having borderline sleep quality, based on the PSQI assessment.

According to the Nighttime Media Use Questions, almost all respondents have a tablet or smartphone in their bedroom, and most of them use it as an alarm. A functional cell phone was absent from nine participants' rooms. (Whipps *et al*., 2018). Whereas, Durusoy *et al*., (2017). claimed that the participants' use of mobile phones was split between 129 (6.0%) and 2021 (94.0%). 49.4% of users chatted for less than ten minutes each day, whereas 51.2% of users sent or received 75 or more messages. The prevalence of headache, fatigue, and sleep disturbances was 1.90 (95% CI 1.30-2.77), 1.78 (1.21-2.63), and 1.53 (1.05-2.21) times higher among mobile phone users. In addition to symptoms like headache, difficulty concentrating, fatigue, and sleep disturbances overall, as well as local symptoms like flushing and warming of the ear, it was discovered that there were dose-response relationships between exposures like the number of calls made daily, the duration of those calls, the number of texts sent daily, the position and status of the mobile phone at night, and making calls while it was charging. Additionally, the study of Verma *et al.* (2024) reveals that the amount of time students spend

using smartphones and the age at which they begin using them have a big influence on their mental health. Those in the younger generation who use smartphones for longer periods of time and initially are more likely to experience mental health issues linked to smartphone dependency.

Impact on academic performance

Few empirical studies have examined the prevalence of technostress among the younger population, especially among students. Technology stress can put more load on higher education institutions by making students less productive, dropping out, and ignoring their studies. Investigating the prevalence of technostress among students and its consequences is therefore essential.

Study of Ishii *et al*., (2020) examined the relationships between kids' academic performance and their use of screens during downtime and physical exercise. They found that Japanese children with lower screen usage had 2.0–2.7 times higher odds of having great academic achievement, regardless of their level of physical activity. This demonstrates that screen usage is strongly correlated with academic performance independent of physical activity. Further, Kibona and Magaya (2015) The results showed that the majority of respondents (48%) spend an average of 5–7 hours a day on social smartphone usage, which is excessive for students to spend on social rather than academic issues. This ultimately impacts academic performance because social interactions like Facebook chatting (uploading new images using smartphone), Twitter, WhatsApp, and other social network sites nearly take up the time that students need to focus on their studies. Furthermore, Study of Ng (2017) demonstrates that even while smartphones are used for educational reasons, the results suggest a significant but weak inverse relationship between the academic CGPA of this sample of tertiary students and smartphone usage for eight of the school-related activities evaluated in the study. This indicates that these students' CGPA decreased as they used their smartphones more for academic activities.

Additionally, a current study of Mengi *et al*., (2020). occurred in Nalhar, Nuh, Haryana, at SHKM GMC. The Pearson's chi square analysis revealed that the majority of academic performance variables, including deteriorating study habits and grades, decreased concentration, and tiredness, had a statistically significant association with nomophobe score, with the exception of one variable, increased missed classes (P = 0.474). Similarly, over half of the respondents (50.4%) had a low score for the sleep quality measure, which showed a statistically significant connection with the nomophobe score. In general, nomophobia refers to the fear or anxiety people feel when they are unable to use their phones. It also includes the worry they have when there is no mobile signal, no talk time, or a phone with a low or discharged battery, all of which significantly impair their ability to focus. Nomophobia is considered the most common mental disorder of the twenty-first century. Since mobile gadgets have a significant impact on people's emotions, nomophobia is categorized as a mental illness (King et al 2013).

Musculoskeletal problems among people

It's interesting to take into account that millennials largely use mobile devices. (McCasland 2005). By 2021, 3.8 billion of these gadgets are anticipated to be used globally

(Statista 2020). Recently, people have had access to a huge display screen with few physical keys because of the surface of mobile touch-screen devices (Yatani and Truong 2009). As the features and designs have changed, many people have been addicted to using them. This addiction can result in irresistibility and a lack of self-control when using touchscreen mobile devices. (Toh *et al*., 2017). Users can use MTSDs (mobile touch screen devices) while lounging on the sofa or while taking public transit, as opposed to the traditional technique of utilizing them at home or at work, which entails sitting in a chair and placing the device on a desk. These new positions present a number of musculoskeletal risks when the neck is flexed. (Werth and Babski 2014). Additionally, using mobile touch-screen gadgets leads to weaker hand and pinch grips (Osailan 2020). Study of Lee and Ogbolu (2018) showed that the strongest indication of musculoskeletal pain among children in grades 1–6 was smartphone use. Similarly, students who use their smartphones for more than 60 minutes a day have a tenfold higher risk of developing musculoskeletal disorders (MSDs) than students who use them for less than 60 minutes. The findings indicated that children who use smartphones for extended periods of time without parental supervision may become depressed and have sleep issues. According to the study of Verma *et al*., (2023). The average person checks their phone every 6.30 minutes throughout a 16-hour awake cycle. At least 10% of those between the ages of 20 and 25 run the danger of becoming hurt by smartphones and computers. These patients are usually upwardly mobile and always slumped over their phones. They complain of text neck, stooping, and stiffer backs in addition to the tendons in their thumbs hurting while they type. Tendon injuries, carpal tunnel syndrome, radiation-related problems, inattentional blindness, and computer vision syndrome are among the common ailments brought on by excessive mobile use.

Further, the association between SAS and NDI was evaluated using Spearman's correlation coefficient, which was applied to survey responses from professional college students, both male and female. There were 23.5 percent of men and 76.5 percent of women among them. A relatively positive association was found between the smartphone addiction scale and the neck disability score, as indicated by Spearman's coefficient of determination (r=0.484, p.). The study's overall findings unequivocally showed that professional college students frequently suffer from musculoskeletal diseases as a result of their constant smartphone use (Arima *et al*., 2020). Recent study of Mustafaoglu *et al*., (2021), demonstrated the connection between musculoskeletal pain and smartphone addiction. showed that over the course of a year, the upper back (70.3%), neck (65.9%), wrists/hands (68.7%), and shoulders (56.6%) had the highest prevalence of discomfort. Similarly, the most common body areas experiencing difficulty within the past week were the neck (45.4%), upper back (51.0%), and wrists/hands (58.2%). Participants who experienced neck (16.9%), wrist/hand (18.5%), lower back (22.5%), or upper back (22.5%) pain reported being unable to do their daily activities at work or at home for at least one day. With the exception of the elbow (P = 0.104) and lower back (P = 0.221), people who experienced pain had considerably higher SAS scores than people who did not, and lower

Furthermore, a study of Xie, *et al.*, (2018) said that 37% of the 100 samples had no addictions, while 63% were either at high risk or had smartphone addictions, which is concerning for college students. According to this poll, every student in the sample had a smartphone. People's disability is further made worse by the way they use their smartphones, as they tend to adopt a flexed spinal position when messaging. This is the posture that most commonly results in neck

pain, according to study. Another study done by Gandhi *et al.* (2023) showed that 38.5% of individuals experienced neck musculoskeletal pain as a result of using smartphones, followed by wrist/hand pain 29.0%. Similarly, people hold themselves in uncomfortable posture for extended periods of time while staring at their mobile phone. Over time, the amount of time spent using a smartphone and flexing one's neck caused pain and discomfort in the neck area. (Namwongsa *et al*.,2018)

Additionally, the study by Eardley *et al*. (2018) found that sitting and lying down produced the most movement, respectively. With symptoms in the upper arm (10%) and lower arm (5%), this raised the ergonomic risk. When using a smartphone while lying down, the mean upper arm angle was higher than when using it while sat (sitting-17.64, supine-24.77, and prone-78.33). The person is lying with their shoulders up to make utilizing the smartphone easier. The smartphone can be brought closer to the eye by adjusting the arm angle while the elbow is supported in the supine position. Raising your arms and shoulders for long periods of time might become exhausting. Whereas result of the study of Ahmed *et al*., (2022), showed that the musculoskeletal issues may have been prevented by taking specific safety measures and using smartphones sparingly. Repetitive stress is the cause of these illnesses. Simple lifestyle changes can prevent those symptoms, like maintaining good posture and avoiding extended smartphone use. After using a smartphone for a long period of time, a 20-minute break is required to avoid negative consequences and the development of pain.

Accidents and neurological problems

These days, people are far more likely to have accidents and other health problems as a result of smartphones. The effects could be lifelong, despite the fact that it just takes a few seconds. Texting while driving may seem harmless enough, yet each year thousands of innocent drivers and passengers are killed due to the carelessness of other drivers. One form of distracted driving is texting and driving, in which the driver's focus is diverted from the road to their handheld device. This kind of behaviour is dangerous since safe driving necessitates constant attention, even at stoplights. Report of The Zebra (2023) claimed that nearly 60% of respondents (57.65%) believe texting is more dangerous than talking on a cell phone while operating a motor vehicle. Women (52.4%) admitted to texting while driving at a higher rate than males (47.6%).

One study conducted by Kim *et al*., (2017) showed that a variety of incidents, including traffic accidents, falls, slips, bumps, and collisions, getting trapped in a subway car, impalement, cuts and exit wounds, burns, and electric shocks, are linked to smartphone addiction. The study discovered a substantial correlation between smartphone addiction and self-reported accident experience. The effects of smartphone addiction on the nervous system were reported by two studies. One study found alterations in the integrity of the white matter, while another showed a reduction in the volume of grey matter. Young adults with smartphone addiction were examined using a high-resolution magnetic resonance imaging approach by Hu *et al*., (2017), who discovered that those who were smartphone addicts had considerably worse white matter integrity. According to research by Lee *et al*., (2019), people who were dependent on their smartphones had considerably less grey matter volume (GMV) in the right lateral orbitofrontal cortex (OFC). Further, Dokur *et al*., (2018) discovered that the average age of the 159 cases (dead and injured) out of the 111 occurrences or accidents that were investigated. In one year,

22 people were injured and 137 people died. In these instances, we found that there were more men than women.

According to a 2014 TIME Magazine study, "The Selfiest Cities in the World" were identified (The Definitive Ranking of The Selfiest Cities in the World 2017). While none of the Indian cities were in the top 100 selfie-friendly locations to live, discovered that India had the highest number of selfie-related injuries and fatalities on our list. This implies that there is little to no correlation between the cities that are listed as the top 100 places to live and the locations where the majority of accidents and fatalities connected to selfies actually take place (Davey and Davey 2014**)**. The security of the surroundings when taking a selfie would be a more important factor. However, the prevalence of smartphone addiction, the size of India's teenage and adolescent population, and their easy access to smartphone technology could all be viewed as risk factors for accidents and fatalities involving selfies (Saroshe 2016). According to a news article, a total of 1997 traffic accidents happened in 2021 as a result of using mobile phones while driving, proving that this practise still claims lives (The Times of India 2023).

These studies collectively underscore the profound impact of excessive smartphone use on both physical and mental health, particularly among young adults, teenagers, and university students, who are the largest consumer group. Excessive smartphone usage is strongly linked to sleep disturbances, including poor sleep quality, delayed sleep onset, and fatigue, as well as mental health challenges such as depression, anxiety, and impulsivity. Factors like prolonged screen exposure, late-night usage, and frequent messaging exacerbate these issues. Additionally, early initiation of smartphone use and prolonged daily usage heighten the risk of dependency-related mental health problems. These findings emphasize the urgent need for interventions promoting balanced smartphone use to safeguard physical well-being and mental health

Conclusion

The detrimental impacts of smartphone addiction were underscored by several studies. The purpose of this study was to investigate the possibility of smartphone addiction. The extensive use of smartphones has raised concerns about the social and psychological effects of excessive smartphone use, especially among Indian teenagers, according to our analysis of the literature on smartphone addiction. Because mobile phones have made mobile connectivity so accessible, today's Indian generations misuse them. Teenagers are more likely to abuse and become addicted to smartphones since they may download and utilize a wide range of programs on them even when they are not connected to the Internet.

Some associated scholars conducted study and analysis to gain a better knowledge of mobile phone usage patterns. Although both are required, the majority of research has focused on either the frequency of exhibiting symptoms of addiction or the amount of time spent using the device by tracking calls, calls received, messages sent, and messages received. It's crucial to keep in mind that studies show a number of problems are associated with smartphone use. Excessive smartphone use has been connected in correlational studies to a number of mental health conditions, such as stress, anxiety, and depression. (Elhai et al., 2016; Panova & Lleras, 2016) These are the detrimental or adverse consequences of excessive smartphone use. According to the findings of recent studies, people's health suffers when they spend more time on social media, online messaging, and gaming. A small number of additional research

discussed issues like hostility, behavioural changes, smartphone addiction, and sleep difficulties. According to recent research, people's physical and mental health suffers when they use social media, online messaging, and gaming more frequently.

Students who are addicted to their smartphones do poorly in school and exhibit poorer levels of focus, according to a number of studies that have looked into the connection between smartphone addiction and academic performance. Additionally, studies have connected poor physical health and joint issues to smartphone use. Addiction to smartphones keeps people from realizing how important it is to operate their gadgets with proper posture. However, the results of the Ahmed *et al*., (2022) study indicated that if certain precautions had been taken and smartphone use had been restricted, the musculoskeletal problems might have been avoided. Additional research concentrated on the accidental effects of smartphone addiction. The number of accidents brought on by being distracted by calls and messages has increased recently. Selfies in dangerous settings that could threaten their life are a problem for teenagers. People who are traveling should follow the rules and refrain from using their phones while riding or walking on a busy road.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2. chat GPT and quillbot was used for editing

3.

References

1. Ahmed, S., Akter, R., Pokhrel, N., and Samuel, A. J. (2021). Prevalence of text neck syndrome and SMS thumb among smartphone users in college-going students: a cross-sectional survey study. *Journal of Public Health*, *29*, 411-416.
2. Ahmed, S., Mishra, A., Akter, R., Shah, M. H., and Sadia, A. A. (2022). Smartphone addiction and its impact on musculoskeletal pain in neck, shoulder, elbow, and hand among college going students: a cross-sectional study. *Bulletin of Faculty of Physical Therapy*, *27*(1), 5.
3. AlAbdulwahab, S. S., Kachanathu, S. J., and AlMotairi, M. S. (2017). Smartphone use addiction can cause neck disability. *Musculoskeletal care*, *15*(1), 10-12.

4. Alosaimi, F. D., Alyahya, H., Alshahwan, H., Al Mahyijari, N., and Shaik, S. A. (2016). Smartphone addiction among university students in Riyadh, Saudi Arabia. *Saudi medical journal*, *37*(6), 675.
5. Alshobaili, F. A., and AlYousefi, N. A. (2019). The effect of smartphone usage at bedtime on sleep quality among Saudi non-medical staff at King Saud University Medical City. *Journal of family medicine and primary care*, *8*(6)
6. Ammati, R., Kakunje, A., Karkal, R., Nafisa, D., Kini, G., and Chandrashekaran, P. (2018). Smartphone addiction among students of medical university in South India: A cross-sectional study. *Annals of International Medical and Dental Research*, *4*(2), 1-4.
7. Bansal, S., and Mahajan, R. C. (2017). Impact of mobile use amongst children in rural area of Marathwada region of Maharashtra, India. *International Journal of Contemporary Pediatrics*, *5*(1), 50.
8. Bhutia, and Tariang (2016). Mobile Phone Addiction among college going students in Shillong. *International Journal of Education and Psychological Research.* 5 (2)
9. Davey, S., and Davey, A. (2014). Assessment of smartphone addiction in Indian adolescents: A mixed method study by systematic-review and meta-analysis approach. *International journal of preventive medicine*, *5*(12), 1500.
10. Dokur, M., Petekkaya, E., and Karadag, M. (2018). Media-based clinical research on selfie-related injuries and deaths. Ulus Travma Acil Cerrahi Derg, 24(2): 129-135
11. Durusoy, R., Hassoy, H., Özkurt, A., and Karababa, A. O. (2017). Mobile phone use, school electromagnetic field levels and related symptoms: a cross-sectional survey among 2150 high school students in Izmir. *Environmental Health*, *16*(1), 1-14.
12. Eardley, R., Roudaut, A., Gill, S., and Thompson, S. J. (2018). Investigating how smartphone movement is affected by body posture. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 1-8.
13. Elhai, J. D., Levine, J. C., Dvorak, R. D., and Hall, B. J. (2016). Fear of missing out, need for touch, anxiety and depression are related to problematic smartphone use. *Computers in Human Behavior*, *63*, 509-516.
14. Exelmans, L., and Van den Bulck, J. (2016). Bedtime mobile phone use and sleep in adults. *Social Science and Medicine*, *148*, 93-101.
15. Gandhi, K., Sukumar, M., Mahaver, D., Shandilya, A., and Bhagat, O. L. (2023). Analysis of Correlation between Anthropometry of Hand and Smartphone Overuse on Musculoskeletal Pain in Thumb/Wrist in Medical Students: A Cross Sectional Study at Tertiary Care Center of Central India. *International Journal of Kinanthropometry*, *3*(1), 47-57.
16. Gangadharan, N., Borle, A. L., Basu, S., Navya, G., and Borle, A. L. (2022). Mobile phone addiction as an emerging behavioral form of addiction among adolescents in India. *Cureus*, *14*(4), 1-9.
17. Haug, S., Castro, R. P., Kwon, M., Filler, A., Kowatsch, T., and Schaub, M. P. (2015). Smartphone use and smartphone addiction among young people in Switzerland. *Journal of behavioral addictions*, *4*(4), 299-307.
18. Hu, Y., Long, X., Lyu, H., Zhou, Y., and Chen, J. (2017). Alterations in white matter integrity in young adults with smartphone dependence. *Frontiers in human neuroscience*, *11*, 532.
19. Ishii, K., Aoyagi, K., Shibata, A., Javad Koohsari, M., Carver, A., and Oka, K. (2020). Joint associations of leisure screen time and physical activity with academic performance in a sample of Japanese children. *International journal of environmental research and public health*, *17*(3), 757.
20. Jahagirdar, V., Rama, K., Soppari, P., and Kumar, M. V. (2021). Mobile phones: Vital addiction or lethal addiction? Mobile phone usage patterns and assessment of mobile addiction among undergraduate medical students in Telangana, India. *Journal of Addiction*, 1-6.

21. Kibona, L., and Mgaya, G. (2015). Smartphones' effects on academic performance of higher learning students. *Journal of multidisciplinary engineering science and technology*, *2*(4), 777-784.
22. King, A. L. S., Valença, A. M., Silva, A. C., Sancassiani, F., Machado, S., and Nardi, A. E. (2014). "Nomophobia": Impact of cell phone use interfering with symptoms and emotions of individuals with panic disorder compared with a control group. *Clinical practice and epidemiology in mental health: CP & EMH*, *10*, 28.
23. Kim, H. J., Min, J. Y., Kim, H. J., and Min, K. B. (2017). Accident risk associated with smartphone addiction: A study on university students in Korea. *Journal of behavioral addictions*, *6*(4), 699-707.
24. Kim, M. O., Kim, H., Kim, K., Ju, S., Choi, J., and Yu, M. I. (2015). Smartphone addiction:(focused depression, aggression and impulsion) among college students. *Indian Journal of Science and Technology*, *8*(25), 1-6.
25. King, A. L. S., Valença, A. M., and Nardi, A. E. (2010). Nomophobia: the mobile phone in panic disorder with agoraphobia: reducing phobias or worsening of dependence?. *Cognitive and Behavioral neurology*, *23*(1), 52-54.
26. King, A. L. S., Valença, A. M., Silva, A. C. O., Baczynski, T., Carvalho, M. R., and Nardi, A. E. (2013). Nomophobia: Dependency on virtual environments or social phobia? Computers in HB, 29 (1), 140-144.
27. Lee, D., Namkoong, K., Lee, J., Lee, B. O., and Jung, Y. C. (2019). Lateral orbitofrontal gray matter abnormalities in subjects with problematic smartphone use. *Journal of behavioral addictions*, *8*(3), 404-411.
28. Lee, E. J., and Ogbolu, Y. (2018). Does parental control work with smartphone addiction?: A cross-sectional study of children in South Korea. *Journal of addictions nursing*, *29*(2), 128-138.
29. Lee, J. E., Jang, S. I., Ju, Y. J., Kim, W., Lee, H. J., and Park, E. C. (2017). Relationship between Mobile phone addiction and the incidence of poor and short sleep among Korean adolescents: a longitudinal study of the Korean Children & Youth Panel Survey. *Journal of Korean medical science*, *32*(7), 1166-1172.
30. Arima A. R., Rajan. R., and Mathew A.K. (2020). Correlation of Continuous Use of Smartphone with Musculoskeletal Disorders among Professional College Students, *International Journal of Science and Research*, 9(6). 1345-1348.
31. Machado, J., Pai, R. R., and Kotian, R. R. (2023). The pattern of smartphone usage, smartphone addiction, and associated subjective health problems associated with smartphone use among undergraduate nursing students. *Journal of Education and Health Promotion*, *12*(1), 49.
32. Mahmoodi, H., Nadrian, H., Shaghaghi, A., Jafarabadi, M. A., Ahmadi, A., and Saqqezi, G. S. (2018). Factors associated with mental health among high school students in Iran: Does mobile phone overuse associate with poor mental health?. *Journal of Child and Adolescent Psychiatric Nursing*, *31*(1), 6-13.
33. Maurya, C., Muhammad, T., Maurya, P., and Dhillon, P. (2022). The association of smartphone screen time with sleep problems among adolescents and young adults: cross-sectional findings from India. *BMC Public Health*, *22*(1), 1686.
34. McCasland, M. (2005). Mobile marketing to millennials. *Young Consumers*, 6(3), 8-13.
35. Mengi, A., Singh, A., and Gupta, V. (2020). An institution-based study to assess the prevalence of Nomophobia and its related impact among medical students in Southern Haryana, India. *Journal of family medicine and primary care*, *9*(5), 2303.
36. Mongkonkansai, J., Veerasakul, S., Tamrin, S. B. M., and Madardam, U. (2022). Predictors of Musculoskeletal Pain among Primary School Students Using Smartphones in Nakhon Si Thammarat, Thailand. *International Journal of Environmental Research and Public Health*, *19*(17), 10530.

37. Mustafaoglu, R., Yasaci, Z., Zirek, E., Griffiths, M. D., and Ozdincler, A. R. (2021). The relationship between smartphone addiction and musculoskeletal pain prevalence among young population: a cross-sectional study. *The Korean journal of pain*, *34*(1), 72-81.
38. National Commission for Protection of Child Rights (2021). Effects (Physical, Behavioural and Psycho-social) of using Mobile Phones and other Devices with Internet Accessibility by Children, 15-16.
39. Namwongsa, S., Puntumetakul, R., Neubert, M.S., and Boucaut, R. (2018). Factors associated with neck disorders among university student smartphone users, Work, 61(3): 367-378
40. Ng, S. F., Hassan, N. S. I. C., Nor, N. H. M., and Malek, N. A. A. (2017). The Relationship between Smartphone Use and Academic Performance: A Case of Students in A Malaysian Tertiary Institution. *Malaysian Online Journal of Educational Technology*, *5*(4), 58-70.
41. Nowreen, N., and Ahad, F. (2018). Effect of smartphone usage on quality of sleep in medical students. *National Journal of Physiology, Pharmacy and Pharmacology*, *8*(9), 1366-1370.
42. Osailan, A. (2021). The relationship between smartphone usage duration (using smartphone's ability to monitor screen time) with hand-grip and pinch-grip strength among young people: an observational study. *BMC musculoskeletal disorders*, *22*, 1-8.
43. Panova, T., and Carbonell, X. (2018). Is smartphone addiction really an addiction?. *Journal of behavioral addictions*, *7*(2), 252-259.
44. Panova, T., and Lleras, A. (2016). Avoidance or boredom: Negative mental health outcomes associated with use of Information and Communication Technologies depend on users' motivations. *Computers in Human Behavior*, *58*, 249-258.
45. Porter, G. (2010). Alleviating the "dark side" of smart phone use. In *2010 IEEE international symposium on technology and society* (pp. 435-440). IEEE
46. Raza, S. A., Yousufi, S. Q., Rafi, S. T., and Javaid, S. T. (2020). Impact of smartphone addiction on students' academic achievement in higher education institute of Pakistan. *Journal of Education & Social Sciences*, *8*(1), 1-14.
47. Samaha, M., and Hawi, N. S. (2016). Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Computers in human behavior*, *57*, 321-325.
48. Saroshe, S., Banseria, R., Dixit, S., and Patidar, A. (2016). Assessment of selfie syndrome among the professional students of a cosmopolitan city of Central India: A cross-sectional study. *International Journal of Preventive and Public Health Sciences*, *2*(2), 1-4.
49. Singh, M. Kaur K., and Samah, N. A. (2018). Impact of smartphone: A review on positive and negative effects on students. *Asian Social Science*, *14*(11), 83-89.
50. Statista. (2020). *Number of smartphone users worldwide from 2016 to 2021*. Available from: https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide.[Accessed 15 July 2023].
51. The Definitive Ranking of The Selfiest Cities in the World. Available at: www.time.com. Accessed July 3, 2023.
52. The Times of India (2023). https://timesofindia.indiatimes.com/gadgets-news/1040-lives-lost-in-road-accidents-due-to-use-of-mobile-phone-while-driving/articleshow/96678450.cms
53. The Zebra (2023). https://www.thezebra.com/resources/research/texting-and-driving-statistics/
54. Toh, S. H., Coenen, P., Howie, E. K., and Straker, L. M. (2017). The associations of mobile touch screen device use with musculoskeletal symptoms and exposures: A systematic review. *PloS one*, *12*(8), e0181220.
55. Toh, S. H., Howie, E. K., Coenen, P., and Straker, L. M. (2019). "From the moment I wake up I will use it… every day, very hour": a qualitative study on the patterns of adolescents' mobile touch screen device use from adolescent and parent perspectives. *BMC pediatrics*, *19*(1), 1-16.
56. Verma, N., Khan, H., Singh, A., and Saxena, R. (2023). Smartphone addiction in medical students: Association with perceived stress, personality factors and loneliness. *Indian Journal of Public Health*, *67*(1), 15-20.

57. Verma, A., Mukherjee, S., Neogi, S., Chanda, A., and Nag, A. (2024). Smartphone Shackles: Unraveling the Mental Toll of Device Dependency on Indian Undergraduates.
58. Werth, A. and Babski-Reeves, K. (2014). Effects of portable computing devices on posture, muscle activation levels and efficiency. *Applied Ergonomics*, 45(6), 1603-1609.
59. Whipps, J., Byra, M., Gerow, K. G., and Guseman, E. H. (2018). Evaluation of nighttime media use and sleep patterns in first-semester college students. *American journal of health behavior*, *42*(3), 47-55.
60. Xie, Y. F., Szeto, G., Madeleine, P., and Tsang, S. (2018). Spinal kinematics during smartphone texting–A comparison between young adults with and without chronic neck-shoulder pain. *Applied ergonomics*, *68*, 160-168.
61. Yan, H., Zhang, R., Oniffrey, T. M., Chen, G., Wang, Y., Wu, Y., and Moore, J. B. (2017). Associations among screen time and unhealthy behaviors, academic performance, and well-being in Chinese adolescents. *International journal of environmental research and public health*, *14*(6), 596.
62. Yatani, K., and Truong, K. N. (2009). SemFeel: a user interface with semantic tactile feedback for mobile touch-screen devices. In *Proceedings of the 22nd annual ACM symposium on User interface software and technology*, 111-120.