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Original article

Effect of social media use on learning, social interactions, and sleep duration among university students☆

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ABSTRACT

Background: Social networking sites are widely used by university students. This study investigated the purposes for which social networking sites are used and their effects on learning, social interaction, and sleep duration.

Material and methods: A cross-sectional study was conducted among 300, 17–29-year-old female students at Prince Sattam bin Abdul Aziz University. A questionnaire was used to collect data. Chi-squared (Fisher's exact test) test was used to analyze the data.

Results: The results showed that 97% of the students used social media applications. Only 1% of them used social media for academic purposes. Whereas 35% of them used these platforms to chat with others, 43% of them browsed these sites to pass time. Moreover, 57% of them were addicted to social media. Additionally, 52% of them reported that social media use had affected their learning activities, 66% of them felt more drawn toward social media than toward academic activities, and 74% of them spent their free time on social media platforms. The most popular applications (i.e., based on usage) were Snapchat (45%), Instagram (22%), Twitter (18%), and WhatsApp (7%). Further, 46% and 39% of them reported going to bed between 11 pm and 12 am and between 1 am and 2 am, respectively. Finally, 68% of them attributed their delayed bedtime to social media use, and 59% of them reported that social media had affected their social interactions.

Conclusions: A majority of the participants reported prolonged use of social networking sites for nonacademic purposes. These habitual behaviors can distract students from their academic work, adversely affect their academic performance, social interactions, and sleep duration, and lead to a sedentary lifestyle and physical inactivity, which in turn can render them vulnerable to non-communicable diseases and mental health problems.

1. Introduction

Social networking sites and applications are widely used by students. They spend a lot of their time on these sites as a part of their daily lives. Studies revealed that among the various age groups of students, university students are among the most using social networking (Azizi et al., 2019). Social networking sites play a very important role in education. Indeed, students are afforded multiple opportunities to improve learning and access the latest information by connecting with learning groups and other educational systems (Greenhow and Robelia, 2009). Students can also exchange information by connecting with different individuals. This can have a positive impact on student learning outcomes (Yu et al., 2010). Social media also has an impact on student mental health; which refers to their emotional, psychological, and social well-being. University students spend a lot of their time on social media both during the day and at night, and it can be contended that such technologies play an important role in their daily lives. However, despite their tremendous contributions to knowledge acquisition, there is a need to determine whether such technologies are being

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used to gain knowledge or for other purposes that may lead to the harmful effects of technology misuse."

Social media has more adverse effects than positive ones (Woods and Scott, 2016). Since students tend to spend more time on social media other than educational purposes; this tends to cause distraction from the learning environment, affecting their academic progress (Bekalu et al., 2019; Hettiarachchi, 2014). Further, spending a lot of time on social networking sites can lead to a sedentary lifestyle and a decrease in daily physical activity levels, which in turn can render them vulnerable to noncommunicable diseases such as obesity, diabetes, and hypertension (Melkevik et al., 2015; Zou et al., 2019; Hu et al., 2001). Additionally, social media use has negative effects on mental health and can lead to depression and anxiety. Therefore, because of the growing numbers of such sites and high demand for social media among university students, it is important to examine the purposes for which social networking sites are used. This study aimed to examine social media use patterns among students. Specifically, we sought to examine the following aspects in this study:

1. Duration of time spent on social media platforms during the day and at night
2. Purposes for which social media platforms are used and the percentage of students who use social media
3. Bedtime, sleep duration, and the time of departure to college
4. Effect of social media use on learning and distraction from learning activities
5. Effect of social media use on relationships with family members and friends

2. Material and methods

This study was conducted among 300 women, who were students at Prince Sattam bin Abdul Aziz University in Wadi Addawasir. A questionnaire was used to collect data across 4 months (i.e., September to December 2019). The participants provided consent before responding to the survey. This study was conducted among full time students who were willing to participate in the study and honestly answer all the questions. The questions were simple, easy, and translated in Arabic language for a better understanding of the questions. The objective was to obtain accurate information from non-English speaking students. Students who did not respond to the questions appropriately were excluded from the study. Prior to data collection, they were informed about the objectives and methods of the study. The researcher distributed the questionnaire to the students and requested them to read the questions carefully and answer all the questions accurately and honestly. The collected data were kept confidential. The questionnaire assessed the following variables: age, time spent on the internet to use social media (hours), most frequently used social networking site, sleep duration, purposes for which social media platforms were used (academic purposes, chatting, gaming, or movie viewing), time at which college starts, effect of social media use on relationships with family members and friends, social media preoccupation and distraction from academic or learning activities.

2.1. Statistical analyses

Descriptive and inferential statistical analyses were conducted. Continuous variables were examined by computing means, SDs, and ranges, whereas categorical variables were examined by computing frequencies and percentages (%). The significance level was set as 5%. The significance of the difference in categorical variables between two or more groups was examined using the chi-squared test (Fisher's exact test), which is a nonparametric test for qualitative data analysis. Fisher's exact test was used when the cell frequencies were very low. Analysis of variance was used to test the significance of the difference in study parameters between three or more groups. SPSS 22.0 and R version 3.2.2 were used for data analysis, and Microsoft Word and Excel were used to generate graphs and tables.

3. Results

Among 300, a total of 290 students (97%; Fig. 1) reported that they used social media applications. Participant ages ranged from 17 to 29 years. Moreover, 30% (n = 90) of them were aged 17–19 years, and 5% (n = 16) of them were aged 25–29 years. A majority of them were aged 20–24 years (65%, n = 194) (Fig. 2).

With regard to the purposes for which social media platforms were used, only 1% (n = 3, Fig. 3) of the students used social media for academic purposes. In contrast, 35% (n = 105, Fig. 3) of them used social media to chat with others (i.e., WhatsApp, Facebook, Snapchat), and 43% (n = 129, Fig. 3) of them browsed social networking sites to pass time. The other activities in which the students engaged are presented in Fig. 3.

57% (n = 173) (Table 1) of the students reported that they were addicted to social media. They were more likely to use such technologies to have fun and pass time than for learning purposes. These habits substantially affect academic performance, learning, and knowledge acquisition (Abbas et al., 2019). Moreover, 52% (n = 157) (Table 1) of the students reported that social media use had affected their learning activities significantly (p = 0.035), and 66% (n = 198) (Table 1) of them felt more drawn toward social media than toward studies.

59% (n-176, Fig. 4) of the students reported that excessive social media use had exerted a negative effect on their relationships with their family members and friends and rendered face-to-face communication more challenging. Specifically, 74% (n = 222) (Table 2) of them reported that they spent their free time on social media. In this study, the most widely used application was Snapchat (45%), followed by Instagram (22%), Twitter (18%), and WhatsApp (7%) (p = 0.016*) (Fig. 7). Further, during the day, many students spent more than three hours on social media (57%) Fig. 5. Similarly, at night, many students spent more than three hours on social media (34%) Fig. 6.

In this study, 46% (n = 139) (Fig. 10) of the students reported going to bed between 11 pm and 12 am, and 39% (n = 118) (Fig. 10) of them reported going to bed between 1 am to 2 am (p = 0.028). Moreover, 93% (n = 279) (Fig. 9) of them left for college at 8 am in the morning, and 68% (n = 205) (Fig. 8) of them attributed their delayed bed time to social media use.

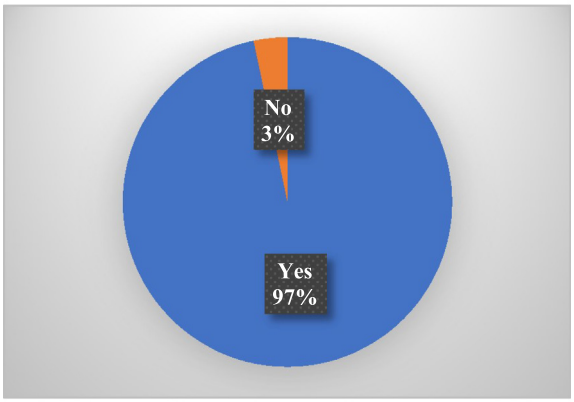

Fig. 1. Percentage of students who reported using social media.

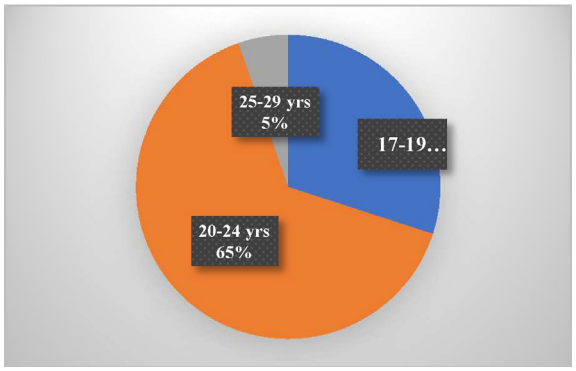

Fig. 2. Age distribution of the sample.

4. Discussion

4.1. Use of social media for academic purposes, addiction, preoccupation with social media use for nonacademic purposes.", and distraction from learning or academic activities

Social networking site use is prevalent among university students because of the availability of smartphones and easy access to such sites through home computers. Social media use reduces the amount of time that students spend on academic activities. In this study, only 1% (Fig. 3) of the students used social media for academic purposes, and a majority of them (35–43%) used social media for nonacademic purposes to chat with others (i.e., WhatsApp, Facebook, Snapchat) and browsed social networking sites to pass time Fig. 3. At present, social media platforms can be used to retrieve necessary information that serves educational purposes. However, social media use negatively affected the academic progress, and studies have shown a strong positive relationship between social media use and academic performance. Most participants used social media platforms to chat rather than for academic purposes. Past studies have found that students who spend more time on social media sites are likely to demonstrate poor academic performance. This is because they spend time chatting online and making friends on social media sites instead of reading books. This has a negative effect on their academic performance (Owusu-Acheaw and Larson, 2015; Abbas et al., 2019). Therefore, it is important to determine the duration of time that they spend on social media sites and the proportion of time that is spent on social media sites for academic purposes. 57% and 52% of the students reported that they were addicted to social media, and has significantly affected there learning activities ($p = 0.035$), and 66% of them are more attracted towards social media than studies (Table 1). University students, especially those who feel addicted to social networking sites, access these platforms through their smartphones not only at home but also on campus. Social media plays an important role in education. However, because several social networking sites exist, students spend more time chatting, watching movies, shopping, and playing games rather than on educational activities (Abbas et al., 2019). Because they felt drawn toward new social media platforms, they felt compelled to quickly complete their academic assignments and spend their remaining time playing games or chatting with others through social media platforms. Instead of spending their free time on fun in social media activities, students should use social media platforms for academic purposes or to search for new information and gain more knowledge to improve their academic performance. Failure to do so can have adverse effects on knowledge assimilation and lead to poor performance in competitive examinations. Social media use has increased substantially among university students. Social media use has both positive and negative effects. However, the negative effects are more pronounced because students tend to use such platforms to have fun and pass time rather than for academic purposes. This may distract them from learning and academic activities. This study determined the percentage of students who felt more drawn toward social media than toward academic activities and prioritizing of using social media for fun than academic purposes. The findings underscore the importance of creating awareness about the negative effects of such habits on academic performance among students. This will help students excel in academics and gain adequate knowledge, which in turn will enhance their performance in competitive examinations.

4.2. Effect of social media use (duration of use) on relationships with family members and friends.

In the present study 57% and 34% of the students spend more than three hours on social media during day and night (Figs. 5 and 6), thus majority of the students spent a total of six hours on social media every day. Although spending a lot of time on one's mobile phone is not considered to be an abnormal behavior pattern. However, prolonged social media use has mental health effects and young adults are the most vulnerable one.

Studies have shown that social media use is associated with mental disorders, including depression and anxiety (Hu et al., 2001). Although. Social media helps individuals connect with others and develop new relationships. However, such relationships

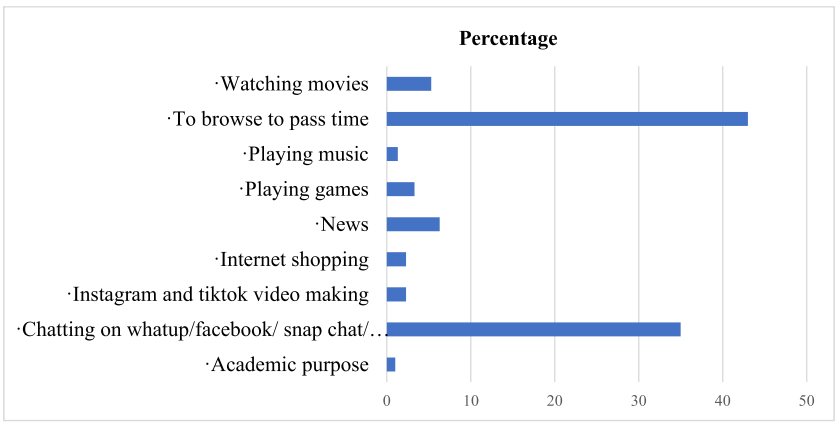

Fig. 3. Purposes for which social media platforms were used by the students.

Table 1
Effect of social media on study time and attraction towards social media than studies.

Do you think use of social medial has affected your study timing?	No of students (n = 300)	%
• No	143	47.7
• Yes	157	52.3*
Do you feel more attracted towards social media compared to study	No of students (n = 300)	%
• No	102	34.0
• Yes	198	66.0
Do you consider yourself addicted to social media	No of students (n = 300)	%
• No	127	42.3
• Yes	173	57.7

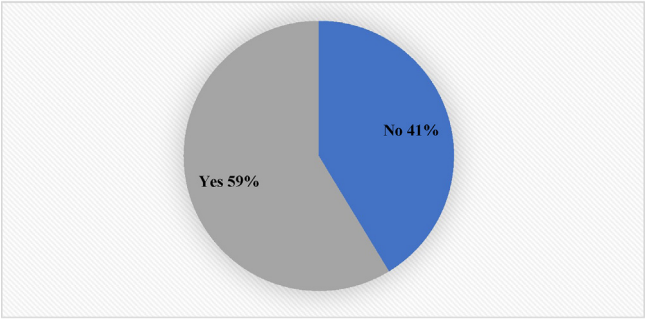

Fig. 4. Percentage of students who reported that social media use had affected their relationships with their family members and friends.

Table 2
The time spent by students on social media.

When do you access social media	No of students (n = 300)	%
• Any spare moment	222	74.0
• During social occasions	1	0.3
• During free time	72	24.0
• Meal times	1	0.3
• Whilst at school	4	1.3

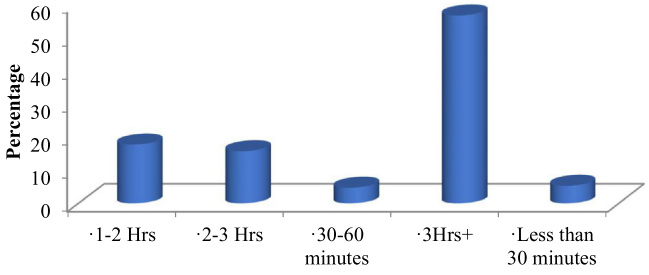

Fig. 5. Time spent on social media during the day.

tend to be more formal and transient. Social media users tend to not share close and trusting relationships with their online friends. Moreover, these relationships cannot be compared to the relationships that are developed with friends and family members through face-to-face interactions. 59% of the students reported that excessive time spending on social media has negative impact on their relationship with family and friends. Relying solely on social media (i.e., without physical proximity) to build and maintain relationships can lead to loneliness, alienation, and depression (Owusu-Acheaw and Larson, 2015). Smartphones create a psychological distance between individuals by decreasing face-to-face interactions between family members and friends; and this can negatively

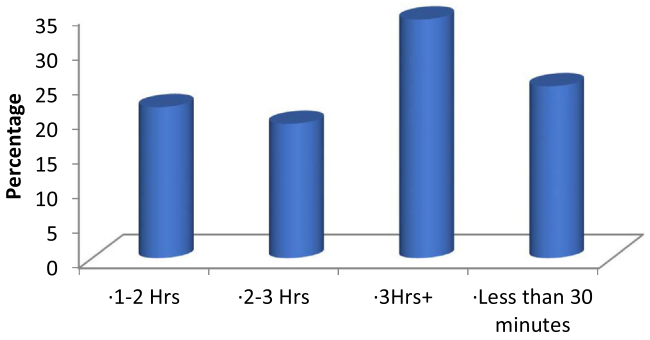

Fig. 6. Time spent on social media at night.

affect the quality of time spent on these relationships. This can have a significant effect on social well-being and satisfaction among friends (Abbas et al., 2019). These changes have important behavioral and social implications. Face-to-face interpersonal communication is an important determinant of well-being. Therefore, individuals should spend their free time with their friends and families in person rather than through social media. This may have a more positive impact on mood, enhance psychological satisfaction, and prevent loneliness and depression. 74% (n = 222) (Table 2) of them reported that they spent their free time on social media. In this study, the most widely used application was Snapchat (45%), followed by Instagram (22%), Twitter (18%), and WhatsApp (7%) (p = 0.016*) Figure −7. Further, extensive smartphone use can cause addiction and hamper one's ability to enjoy his or her free time with family members and friends (https://www.nationalelf-service.net/mental-health/depression/social-media-good-bad-experiences-impact-depression/). In addition, the continuous flow of information through nonstop use of social media can alter sensory perception because constant sensory overload affects learning and memory (Rotondi et al., 2017). Spending one's free time on social media is not only related to mental health problems but also decreases physical activity levels. This can lead to a sedentary lifestyle and increase one's risk of developing non-communicable diseases such as diabetes, obesity, and hypertension (Melkevik et al., 2015; Zou et al., 2019; Hu et al., 2001).

Among adults, social media use leads to reduced physical activity and increased sitting durations. These changes in turn have a greater impact on the physiological mechanism. This is associated with impaired lipid profiles and glucose uptake, greater energy intake, higher waist circumferences, and greater mortality risk (Sobaihy, 2017; Healy et al., 2008b, 2007). Social media use increases sitting durations. As a result, sedentary behaviors are commonly observed. Past studies have found that such behaviors lead to increased caloric intake, reduced energy expenditure, and increased adiposity (Bowman, 2006). This leads to the development of the biomarkers associated with cardiometabolic risk factors and an increase in the cardiovascular disease mortality rate. Additionally, weight gain, type 2 diabetes mellitus, some types of cancers, abnormal glucose metabolism, metabolic syndrome, and other cardiovascular risk factors are also associated with physical inactivity among adults. Moreover, it has been reported that there is a progressive increase in mortality rate for each 1-hour increment in sedentary time, and [this] is related to lipoprotein lipase activity (Howard et al., 2008; Hu et al., 2003; Dunstan et al., 2005, 2010; Jakes et al., 2003; Healy et al., 2008c; Hamilton et al., 2007). Physical inactivity and sedentary behaviors caused by prolonged sitting are associated with decreased skeletal muscle contractility, lipoprotein lipase activity, high-density lipoprotein levels, and reduced glucose uptake. Lipoprotein lipase hydrolyzes plasma triglycerides in lipoproteins and is involved in promoting

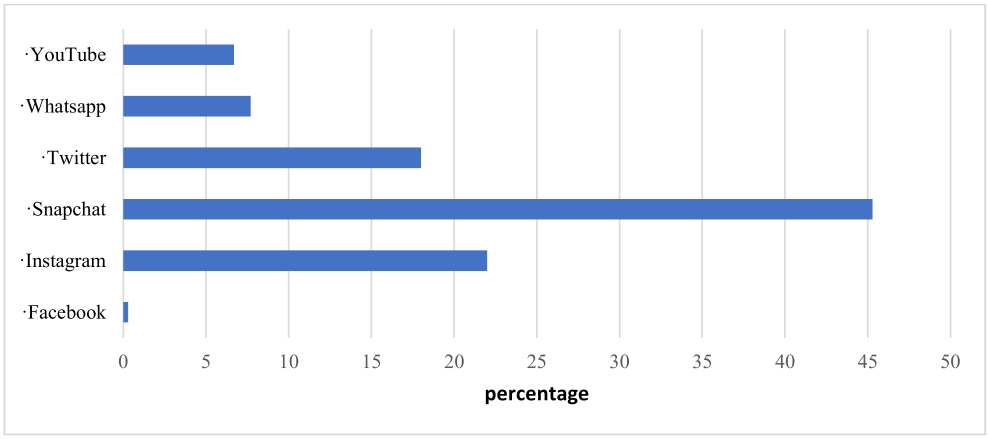

Fig. 7. Most popular social media platforms among the students.

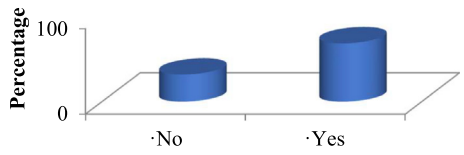

Fig. 8. Student perceptions of the effects of social media use on bedtime.

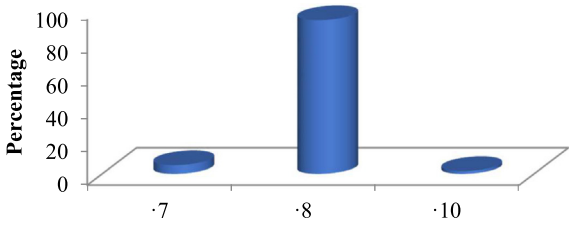

Fig. 9. Student responses regarding the time at which their college starts.

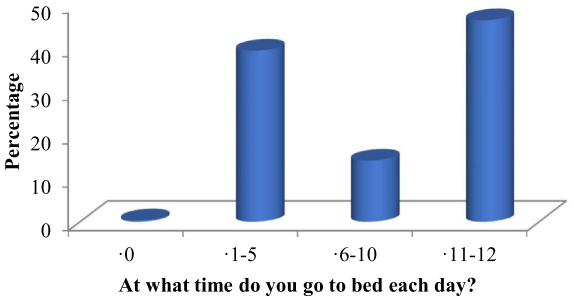

Fig. 10. Student responses regarding their bedtime.

triglyceride cellular uptake. Reduced plasma lipoprotein lipase leads to decreased peripheral utilization of plasma triglycerides by adipose tissues, skeletal muscle tissues, and lactating mammary glands, which in turn leads to metabolic consequences because of increased plasma triglyceride levels and decreased high-density lipoprotein cholesterol concentrations (Healy et al., 2008a, 2008c; Hamilton et al., 2007). Further, prolonged sitting halts the contractile actions of the large skeletal muscles in the legs, back, and trunk, which are involved in body movement. Thus, physical inactivity leads to low levels of skeletal muscle contraction and decreased calorie spending (Hamilton et al., 2004; Bey and Hamilton, 2003).

4.3. Effect of social media on sleep duration

According to the American Academy of Sleep Medicine, a minimum of 7 to 9 h of sleep (on a regular basis) is recommended. Sound sleep is associated with improved attention, behavior, learning, memory, emotional regulation, quality of life, and mental and physical health (Bey and Hamilton, 2003; Paruthi et al., 2016). Sleeping for fewer hours than the recommended duration on a regular basis is associated with attention, behavior, and learning problems. Late-night social media use is prevalent among adults. As a result, they do not get adequate sleep. Past studies have found that sleep disturbances caused by excessive social media use at night adversely affect daytime learning on campus and lead to poor concentration during lectures. Social media use confers many benefits by providing access to a wide range of information sources, which facilitate learning (Greenhow and Robelia, 2009). However, instead of using social networking sites for academic purposes, students tend to be actively involved in online shopping, gaming, and entertainment during the day and at night. These habits distract them from academic activities, minimize their opportunities to gain knowledge, and result in poor academic performance among some students (Yu et al., 2010). Because many students are addicted to social media and use such platforms for nonacademic purposes, it is important to determine the negative effects of social media use. In the present study it was observed that student go to late night sleep, they are deprived of good sleep duration as the college starts at 8 for about 93% of the students, and 68% of the students has reason social media for late night sleep. Sleep deprivation is rapidly becoming prevalent, and it has frequently been linked to late-night use of social networking sites, television viewing, and gaming. Mobile phone use before bedtime is a common habit among many young adults. In this study, 39% to 45% of the students slept for fewer hours than the recommended sleep duration because of late-night social media site use. This can lead to a delayed bedtime, sleep loss, and irregular sleep-wake patterns. Poor sleep quality results in increased tiredness during the day. Sleep has a significant effect on mood, and increasing sleep duration may enhance cognitive performance (Unhealthy, 2009). Sleep restriction may have a negative effect on mood and cognitive function. In addition, social media contents and games may induce pre sleep hyperarousal. Limiting mobile phone use before bedtime may effectively improve sleep by reducing the impact of the light emitted by mobile phones on sleep and reducing the arousal induced by contents browsed on a mobile phone. Past studies have found that restricting mobile phone use at bedtime for four weeks can reduce sleep latency, pre-sleep arousal, and negative affect, increase sleep duration, enhance positive affect, and improve

working memory. Sleep is a restorative process that is important for overall health. Sleep deprivation has a negative impact on health, including mental health, and it affects cognitive functioning, motor processes, and emotional stability. Sleep disturbance is also associated with an increased risk of metabolic disturbances such as obesity, hypertension, and diabetes (Levenson et al., 2016; Hanson and Huecker, 2019; Hershner and Chervin, 2014; Knutson and Van Cauter, 2008). Past studies have found that, in both normotensive and hypertensive individuals, sleep deprivation leads to a significant increase in blood pressure and elevated sympathetic nervous system activity (Gangwisch et al., 2006; Gangwisch, 2009). Elevated sympathetic nervous system activity is related to increased exposure to stress and shorter sleep durations, which in turn can increase salt appetite and suppress renal salt-fluid excretion. This can result in vascular and cardiac complications (Folkow, 2001; Bonnet and Arand, 1998). Other studies have found that elevated sympathetic nervous system activity associated with sleep disturbance causes glucose intolerance and increases the risk of type 2 diabetes (Knutson and Van Cauter, 2008). Long-term treatment with melatonin (i.e., a night hormone that promotes sleep) can reduce blood pressure in hypertensive individuals (Gonzalez-Ortiz et al., 2000; Kawakami et al., 2004; Scheer et al., 2004; Beccuti and Pannain, 2011). Further, a growing body of empirical evidence yielded by laboratory and epidemiological studies suggests that poor sleep also increases the risk of obesity and associated complications (Huang et al., 2003). Physiologic evidence suggests that short sleep durations contribute to weight gain by influencing appetite, physical activity levels, and thermoregulation. Sleep is an important modulator of neuroendocrine function, and sleep loss can result in endocrine alterations such as increased evening concentrations of cortisol, increased levels of ghrelin, and decreased levels of leptin. A decrease in leptin stimulates appetite and decreases energy expenditure, which in turn can contribute to the development of obesity (Jean-Louis et al., 2014). Past studies have found that there is a strong greater relationship between obesity, insulin resistance, and cardiovascular diseases (Vorona et al., 2005; Abbasi et al., 2002; Scheer et al., 2009; Knutson et al., 2006). When circadian misalignment occurs, this combined effect may serve as a mechanism that underlies an increased risk for obesity, hypertension, and diabetes (Kohatsu et al., 2006). Sleep deprivation has a negative effect on health and predisposes individuals to cardiovascular diseases, obesity, and diabetes at an early age. These habitual factors can be avoided or minimized by creating awareness and disseminating information. Adequate sleep can mitigate the health-related risk factors that are associated with sleep deprivation. The habits that contribute to sleep deprivation should be addressed by conducting awareness programs and implementing coordinated strategies in educational institutions. These efforts should be undertaken by healthcare professionals and academicians as well as within the family.

5. Conclusions

A majority of the students used social networking sites. Excessive social media use for non-academic purpose distracted them from their learning and academic activities and delayed their bed time, which in turn reduced their sleep duration. Further our study reported that, excessive social media use decreases social face to face interaction. This has a negative impact on social well-being and can lead to depression, anxiety, and mood swings. Additionally, late-night social media use reported in the present study can lead to chronic sleep restriction, which plays a significant role in the etiology of diseases associated with metabolic syndrome. Modern lifestyle habits are incompatible with the intrinsic attributes that we inherit. Therefore, interventions should educate individuals about healthier sleep-hygiene practices and help them modify their maladaptive sleep habits. Furthermore, spending a lot of time on social media can increase sitting durations and lower physical activity levels, which in turn can lead to a sedentary lifestyle. This can increase one's risk of developing metabolic syndrome and chronic non-communicable diseases such as diabetes, hypertension, and obesity.

6. Adverse effects of social media during the coronavirus disease (COVID-19) pandemic

Prolonged social media use for non-academic purposes, addiction of social media, distraction from learning, a lack of sleep, and decreased social interactions were reported by the participants of this study. These findings are more concerning at present because of the ongoing COVID-19 pandemic. Because educational institutions have been closed to curb the spread of COVID-19, colleges and universities have adopted new teaching methods. Traditional teaching methods have been replaced with collaborative multimedia distance learning techniques. Consequently, universities have adopted distance learning strategies.

Traditional teaching methods (i.e., those adopted prior to the COVID-19 outbreak) require students to attend lectures in college. As a result, they spend lesser time on social networking sites, have shorter sitting durations, and engage in some level of physical activity. However, since the outbreak of COVID-19, online learning methods have been adopted. This has prolonged the duration of use of mobile devices and computers, which in turn have increased sitting durations and decreased physical activity levels. These changes may increase one's risk of developing metabolic syndrome and non-communicable diseases. Additionally, the outbreak of COVID-19 precluded them from engaging in social interactions with their friends in college. This has also could have a negative effect on their mental health and resulting in loneliness and depression. Thus, the COVID-19 pandemic has a major impact on physical activity, face-to-face social interactions, and mental health and resulted in tremendous stress and anxiety. Excessive social media use, caused by the COVID-19 pandemic, could have a negative effects on learning. These changes can adversely affect the psychological health of students. Therefore, communities and families should pay more attention to mental health problems, physical inactivity, and social interactions among students to prevent depression and sedentary lifestyle and lower their risk of developing non-communicable diseases such as obesity, hypertension, and diabetes. These health problems can further strain the medical system, which is already combating a public health emergency. Therefore, to prevent non-communicable diseases and psychosocial stress, individuals should engage in home-based physical activities to ensure that they do not lead a sedentary lifestyle. During this pandemic period, staying active and engaging in routine physical exercise will play an essential role in maintaining mental and physical health. Thus, it is recommended to prevent the COVID-19 pandemic from generating unfavorable mental health issues and cardiovascular consequences due to acute cessation of physical activity.

7. Data availability

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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