



THE EFFECTS OF SOCIAL MEDIA USE ON SLEEP QUALITY AND SCHOOL PERFORMANCE AMONG FEMALE HIGH SCHOOL STUDENTS IN EASTERN PROVINCE, SAUDI ARABIA

Medicine

Dr Reham Zabar AL Anzi R3 Family medicine resident, National Guard Health Affairs-Dammam, Eastern Province, Saudi Arabia.

Dr Tahani Mofareh Asiri R3 Family medicine resident, National Guard Health Affairs-Dammam, Eastern Province, Saudi Arabia.

Dr Shaher AL Qahtani Family medicine consultant, National Guard Health Affairs-Dammam, Eastern Province, Saudi Arabia.

Dr. Najla Abdulaziz AL Dossary R3 Family medicine resident, family medicine post graduate program in Eastern Province, Saudi Arabia

Dr. Afnan Abdullah Al Awad R3 Family medicine resident, family medicine post graduate program in Eastern Province, Saudi Arabia

ABSTRACT

Social media is becoming a major part of adolescents' lives; however, excessive use could affect sleep quality and school performance. This research aimed to evaluate effects of social media on sleep quality and school performance among female high school students in Eastern Province, Saudi Arabia. In a cross-sectional study, 717 female high school students in Khobar and Jubail cities in Eastern province, Saudi Arabia, completed self-administrated questionnaires. The most used social media application was Snapchat (39.7%). Furthermore, 36.8% of participants used social media more than 6 hours/day, whereas only 2.4% used these applications less than 1 hour/day. For sleep duration, 37.2% of participants sleep for 5-6 hours. For school performance, half of the participants (50%) who use social media more than 6 hours/day have failed. Social media use negatively impacts female high school students' sleep quality and school performance. Strategies to raise awareness about these effects are needed.

KEYWORDS:

Social media, sleep, school

Introduction:

Social Media is 'the platform that gives individuals the opportunity to interact, using two-way communication, and lets anyone who has online accounts share opinions with other social media users' (El-Badawy & Hashem, 2014). The use of social media has a variety of advantages and disadvantages, especially for students. One of the advantages is that social media improves social interaction and family connection (Abu-Shanab & Al-Tarawneh, 2015). Another advantage is that students can use social media in communicating with each other for school homework and projects (Boyd, 2008). For example, some schools successfully use blogs as method of teaching, and some social media applications (e.g. Facebook) help students to exchange ideas about their shared homework (Victor, 2017).

On the other hand, social media has many disadvantages, mainly concerning sleep quality, school performance, and mood disturbances in adolescents. Most studies state that adolescents need about eight to ten hours of sleep each night (National Sleep Foundation, 2015). Sleep duration is important for general health in adolescents as it can affect physical and psychological well-being (Dahl & Lewin, 2002; Redeker, Ruggiero, & Hedges, 2004). There are numerous lifestyle habits that can influence sleep quality among adolescents, such as drinking alcohol, smoking, eating breakfast, and recently the use of mobile phones as communication tools (Kaneita et al., 2006; Ohida et al., 2004; Wolfson & Carskadon, 1998).

As mentioned, social media influences school performance. Although studying involves multi-tasking, students experience continuous distractions while studying because of receiving social media notifications. Hence, this may have a negative influence on their academic performance (Hunley et al., 2005).

Literature review:

The latest updates obtained from Internet World Stats in 2017 showed that internet users are mostly located in North America with an 88.1% penetration rate and the fewest in Africa with a 27.7% penetration rate, while the Middle East has a 56.7% penetration rate (Internet World Stats, 2017a). For Saudi Arabia, there was an increased number of internet users from 200,000 in 2000 to 20,813,695 in 2017 with a

63.6% penetration rate (Internet World Stats, 2017b). Recent statistics collected in 2016 about social network penetration in Saudi Arabia showed that the most popular social network application was YouTube with a 65% penetration rate, followed by Facebook with a 57% penetration rate, Instagram with a 52% penetration rate, and Twitter with a 50% penetration rate (Statista, 2016).

A review of electronic media use and sleep in school-aged children and adolescents identified 36 papers that have investigated the relationship between sleep and use of electronic media in school-aged children and adolescents. It showed that delayed bedtime and shorter sleep duration were mostly related to media use (Cain & Gradisar, 2010).

A US study showed that greater social media use was significantly associated with disturbed sleep in young adults (Levenson, Shensa, Sidani, Colditz, & Primack, 2016). According to a cross-sectional study in Peru, Facebook-dependent undergraduate students had a greater prevalence of poor sleep quality than non-dependent students (Wolniczak et al., 2013). Another study in Australia showed that participants with problematic social networking had significantly poorer sleep quality and stronger dissatisfaction with school achievement (Vernon, Barber, & Modecki, 2015). A study in China among undergraduate students, showed that using social media before bedtime impacts many aspects of daily life, especially during the daytime in which more than half of respondents experienced fatigue and upset feelings, which would affect the students' learning ability and academic achievement (Xianglong, Zhu, Sharma, & Zhao, 2015). Another study in China, about the impact of media use on sleep patterns and sleep disorders among school-aged children showed correlations between later bedtimes, later awakening times, shorter sleep duration, and at least two types of sleep disturbances, with media use and their presence in bedrooms (Li et al., 2007).

A cross-sectional study in Tokyo, Japan, found an association between mobile phone use after lights out and all forms of sleep disturbance in Japanese adolescents (Munezawa et al., 2011). A cross-sectional study in Korea found a strong association between Internet overuse and excessive daytime sleepiness in adolescents (Choi et al., 2009). A study in Taiwan showed a positive relationship between adequate sleep

among adolescents and maintaining a healthy lifestyle (Chen, Wang, & Jeng, 2006).

A study among students in Pakistan found a linear correlation between Facebook addiction and anxiety as well as depression. However Facebook addiction was not correlated with loneliness or academic performance (Zaffar, Mahmood, Saleem, & Zakaria, 2015). A study in Turkey conducted at Sakarya University found a linear correlation between mobile phone addiction level and deterioration of sleep quality in students (Sahin, Ozdemir, Unsal, & Temiz, 2013).

A study in Pakistan showed that the more time spent on the internet, the greater the effect on university students' academic performance (Asdaq, Khan, & Rizvi, 2010). Similarly, a study in Jordan concluded that time spent on Facebook, was significantly associated with lower GPA in high school students (Abu-Shanab & Al-Tarawneh, 2015).

In contrast to the previous studies' findings, a cross sectional study in Cairo, Egypt found no effect of social media use on school students' academic performance (El-Badawy & Hashem, 2014).

Lastly, a study in Saudi Arabia, conducted at King Saud University, about the impact of social media on academic performance, showed that Twitter was the most commonly used social media platform among Saudi students, followed by Facebook and Instagram (Alwagait, Shahzad, & Alim, 2015).

As the literature shows, few studies have explored the relationship of social media use with both sleep quality and school performance at the same time among high school students, especially in the Eastern province of Saudi Arabia. Therefore, this study will explore the effect of social media on sleep quality and school performance, as it is an important issue in high school students' lives, especially in this era of technology.

Methodology:

Study design and setting:

This is a cross-sectional study that was conducted in female high schools located in Khobar and Jubail cities in the Eastern Province of the Kingdom of Saudi Arabia.

Study population:

The target population of the study was high school female students in Khobar and Jubail cities.

Inclusion criteria:

All Saudi and non-Saudi nationality female high school students over 15 were eligible to participate.

Exclusion criteria:

Female students below 15 years of age were excluded.

Sampling:

Sample size and sampling technique:

Total sample size for Jubail and Khobar cities was calculated to be 708 students, with a 5% margin of error, and a 95% confidence interval.

Measures:

The main tool for the study was a self-administered questionnaire given to the participants between classes and composed of 4 parts. The first part covered socio-demographic data; the second part, questions about social media application use (what applications the student has in her phone, what is the most used one, timing of use, total time/day of usage, reason for use, and subjective assessment of amount of social media use). The third part included questions about sleep quality (bed time, total hours of sleep/night, subjective assessment of sleep quality in the previous month, difficulties falling asleep, feeling sleepy during the daytime, usage of social media applications before bedtime, and usage of social media all night long). Lastly, the fourth part included questions about school performance (grades, missing school, distraction during studying, difficulty concentrating in morning classes).

Validity and reliability of the questionnaire:

The validity of the questionnaire was tested by asking two consultants with considerable experience in conducting and supervising research to give suggestions about the suitability of the questions in both the Arabic and English versions. The reliability as measured by

Cronbach's alpha was .724.

Data processing and analysis:

Data was entered into a personal computer using the Statistical Package for Social Sciences version 22.0. Frequency tables were used to present descriptive statistics to explore the findings of the research. All quantitative variables (e.g. age) were presented by measures of central tendency and dispersion. Percentage and frequency were reported for all qualitative variables (e.g. gender). Cross tabulation was used for the dependent and the independent variables. Chi-square tests were used to find significance with 95% confidence (p value $\leq .05$)

Ethical consideration:

Permission to conduct the study was obtained from the concerned authority. Before participation, all participants were informed about the aim of the study and the confidentiality of their information.

Results:

Descriptive statistics:

Demographic Data:

A total of 717 participants were enrolled in the study, 363 of them were taken from Al-Khobar city (39.5% from governmental schools and 11.6% from private schools) and 354 from Jubail city (47.6% governmental and 1.4% private). Eighty-eight percent of participants were Saudis and 12% non-Saudis. The mean age was 16.5 years. For the school class level, 34.4% represented the 1st level, 32.9% represented the 2nd level, and 32.6% represented the 3rd level.

Social media usage:

As shown in (table 1) the most frequently used social media application among the female high school students was Snapchat (39.7%) followed by Instagram (18.7%). Concerning reasons for using social media applications, 86.8% of participants use them for fun, 65.9% for communication with friends, 38.1% for family communication, 22.6% for making relations, 47% for school homework and studying and 1% of participants use the applications for other reasons like reading and searching for new information.

Table 1: Most frequently used social media application:

		Frequency	%	Valid %	Cumulative %
Valid	Twitter	78	10.9	10.9	10.9
	Facebook	15	2.1	2.1	13.0
	WhatsApp	117	16.3	16.3	29.3
	Instagram	134	18.7	18.7	48.0
	Snapchat	285	39.7	39.7	87.7
	BBM	18	2.5	2.5	90.2
	Keek	2	.3	.3	90.5
	Telegram	1	.1	.1	90.7
	YouNow	11	1.5	1.5	92.2
	Path	7	1.0	1.0	93.2
	YouTube	40	5.6	5.6	98.7
	Other	3	.4	.4	99.2
	None	6	.8	.8	100.0
Total	717	100.0	100.0		

As shown in Table 2, 36.8% of participants use social media applications for more than 6 hours/day whereas only 2.4% use them for less than 1 hour/day. For continuous usage of the applications, as shown in Table 3, the highest percentage was for those who continuously using for 1-2 hours (31.5%) and the least was for those using for more than 6 hours (7.3%). Using manual calculations, we found that the average duration spent on social media applications / day was 5 hours and 25 minutes and 3 hours and 22 minutes as a continuous session. Table 4 shows that the most usual time for using social media applications (42.8%) was from 08:00 pm to 12:00 am.

Table 2: How many hours/day do you spend browsing these social media applications?

		Frequency	%	Valid %	Cumulative %
Valid	< 1 hour	17	2.4	2.4	2.4
	1-2 hours	86	12.0	12.0	14.4
	3-4 hours	188	26.2	26.2	40.6
	5-6 hours	156	21.8	21.8	62.3
	> 6 hours	264	36.8	36.8	99.2
	none	6	.8	.8	100.0
	Total	717	100.0	100.0	

Table 3: During a 24-hour period, how many hours do you spend on social media applications as a continuous session?

		Frequency	%	Valid %	Cumulative %
Valid	< 1 hour	79	11.0	11.0	11.0
	1-2 hours	226	31.5	31.5	42.5
	3-4 hours	209	29.1	29.1	71.7
	5-6 hours	145	20.2	20.2	91.9
	> 6 hours	52	7.3	7.3	99.2
	none	6	.8	.8	100.0
	Total	717	100.0	100.0	

Table 4: At what time of the day do you mostly use social media applications?

		Frequency	%	Valid %	Cumulative %
Valid	8am-12pm	6	.8	.8	.8
	12pm-4pm	66	9.2	9.2	10.0
	4pm-8pm	276	38.5	38.5	48.5
	8pm-12am	307	42.8	42.8	91.4
	12am-4am	54	7.5	7.5	98.9
	4am-8am	2	.3	.3	99.2
	None	6	.8	.8	100.0
	Total	717	100.0	100.0	

Furthermore, 40.6% of participants think they use social media applications too much and 50.5% feel out of touch when not logged into their accounts.

Sleep quality:

For participants' usual bed time, 22.3% of them retire at 10:00 pm while 21.5% retire at 12:00 am. As shown in Table 5, 37.2% of participants sleep for only 5-6 hours and 16.9% sleep for more than 8 hours. Although 42.7% have difficulties falling asleep, 36.1% say that they have good sleep, while 9.2% have bad sleep, and 4.5% have very bad sleep. For night-long usage of social media, 30.3% report that they sometimes use the applications all night long while 7.7% of them always use them during this time. For daytime sleepiness, 44.5% reported that they sometimes feeling sleepy during the daytime. For usage of social media before bedtime, 43.5% use the applications for 1-2 hours, 8.8% use them for more than 4 hours, in comparison to only 1% who never use them before bedtime.

Table 5: How many hours on average have you slept at night during the previous month?

		Frequency	%	Valid %	Cumulative %
Valid	< 5 hours	112	15.6	15.6	15.6
	5-6 hours	267	37.2	37.2	52.9
	7-8 hours	217	30.3	30.3	83.1
	> 8 hours	121	16.9	16.9	100.0
	Total	717	100.0	100.0	

School performance:

For school performance, 31.1% of students sometimes became distracted by social media usage while studying and 13.2% were always distracted.

For missing school due to bad sleep the previous night in the last month, results showed that 61.4% never missed school, 22.5% missed for 1-2 days, and 4.6% missed school for more than 6 days. For morning concentration, 32.4% of participants experienced difficulty concentrating sometimes, and 9.2% reported always.

Regarding the negative effect of social media applications on school performance, 48% thought that it had no negative effect, 33.8% thought it did, while the remaining 18.3% said they did not know.

For school performance as shown in Table 6, 50.2% had excellent grades, 11% had good grades, and .6% had failed in the last semester.

Table 6: What was your average school grade last semester?

		Frequency	%	Valid %	Cumulative %
Valid	excellent	360	50.2	50.2	50.2
	very good	259	36.1	36.1	86.3
	good	79	11.0	11.0	97.4
	fair	15	2.1	2.1	99.4
	fail	4	.6	.6	100.0
	Total	717	100.0	100.0	

The effect of social media use on sleep quality:

1- Association between sleep duration and usage of social media all night long:

As shown in Table 7, 25.5% of participants who sleep less than 5 hours said that they always use social media applications all night long and 36.8% of those who sleep between 7-8 hours never use them (p = 0.012).

Table 7: How many hours on average have you slept at night during the previous month? * How often did you use the social media all night long? Cross tabulation

			How often did you use social media after lights out?					Total
			never	seldom	sometimes	often	always	
How many hours on average have you slept at night during the previous month?	< 5 hours	Count	18	27	32	21	14	112
			13.2%	12.3%	14.7%	23.6%	25.5%	15.6%
	5-6 hours	Count	52	89	83	27	16	267
			38.2%	40.5%	38.2%	30.3%	29.1%	37.2%
	7-8 hours	Count	50	72	63	22	10	217
		36.8%	32.7%	29.0%	24.7%	18.2%	30.3%	
> 8 hours	Count	16	32	39	19	15	121	
		11.8%	14.5%	18.0%	21.3%	27.3%	16.9%	
Total		Count	136	220	217	89	55	717
			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	25.586 ^a	12	.012
Likelihood Ratio	24.854	12	.016
Linear-by-Linear Association	.021	1	.886
N of Valid Cases	717		

2- Association between daytime sleepiness and usage of social media applications all night long:

As shown in Table 8, 29.1% of those who always feel sleepy during the daytime reported that they always use the applications all night long compared to 8.8% of those never feel sleepy during the day and never use the applications all night long (p = 0.000).

Table 8: Do you feel sleepy during the daytime? * How often did you use the social media all night long? Cross tabulation

			How often do you use social media all night long?					Total
			never	seldom	sometimes	often	always	
Do you feel sleepy during the daytime?	Never	Count	12	6	10	0	2	30
			8.8%	2.7%	4.6%	0.0%	3.6%	4.2%
	seldom	Count	41	38	28	7	4	118
			30.1%	17.3%	12.9%	7.9%	7.3%	16.5%
	sometimes	Count	59	97	105	36	22	319
			43.4%	44.1%	48.4%	40.4%	40.0%	44.5%
often	Count	16	50	45	19	11	141	
		11.8%	22.7%	20.7%	21.3%	20.0%	19.7%	
always	Count	8	29	29	27	16	109	
		5.9%	13.2%	13.4%	30.3%	29.1%	15.2%	
Total		Count	136	220	217	89	55	717
			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	72.240 ^a	16	.000
Likelihood Ratio	71.758	16	.000
Linear-by-Linear Association	46.384	1	.000
N of Valid Cases	717		

3- Association between difficulties falling asleep and usage before bed time:

As mentioned previously, 43.5% of participants use the applications for 1-2 hours before bedtime; 43.9% of this group reported difficulties falling asleep sometimes, as shown in Table 9 (p = 0.009).

Table 9: How many times you had difficulties to fall asleep: * total hours of using before bed time Cross tabulation

		total hours of using before bed time					Total
		< 1 hour	1-2 hours	3-4 hours	> 4 hours	never	
How many times you had difficulties to fall asleep:	never	54	57	11	17	4	143
		21.5%	18.3%	13.1%	27.0%	57.1%	19.9%
	seldom	66	78	21	4	0	169
		26.3%	25.0%	25.0%	6.3%	0.0%	23.6%
	sometimes	102	137	34	31	2	306
		40.6%	43.9%	40.5%	49.2%	28.6%	42.7%
	often	22	30	11	6	0	69
		8.8%	9.6%	13.1%	9.5%	0.0%	9.6%
	always	7	10	7	5	1	30
		2.8%	3.2%	8.3%	7.9%	14.3%	4.2%
Total		251	312	84	63	7	717
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.349 ^a	16	.009
Likelihood Ratio	34.639	16	.004
Linear-by-Linear Association	3.373	1	.066
N of Valid Cases	717		

4- Association between sleep duration and the most time of usage of social media applications:

As shown before, 42.8% of participants use social media applications between 8:00 pm-12:00 am; 41.7% of this group sleep for 5-6 hours only (p = 0.000).

5- Association between sleep duration and total hours of usage:

For those who use the social media applications for more than 6 hours/day, 47.3% of them sleep for less than 5 hours (p = 0.003).

The effect of social media use on school performance:

1- The association between total hours of usage/day and school grade:

As shown in Table 10, half of participants (50%) who use social media applications for more than 6 hours/day failed, compared to those who use them for less than 1 hour/day, with a failure percentage of 0.00% (p = 0.036).

Table 10: How many hours/day do you spend browsing these social media applications? * What was your average school grade last semester? Cross tabulation

		What was your average school grade last semester?					Total	
		excellent	very good	good	fair	fail		
How many hours/day do you spend browsing these social media applications?	< 1 hour	Count	8	6	3	0	0	17
			2.2%	2.3%	3.8%	0.0%	0.0%	2.4%
	1-2 hours	Count	49	29	5	2	1	86
			13.6%	11.2%	6.3%	13.3%	25.0%	12.0%
	3-4 hours	Count	109	63	14	1	1	188
			30.3%	24.3%	17.7%	6.7%	25.0%	26.2%
5-6 hours	Count	87	47	20	2	0	156	
		24.2%	18.1%	25.3%	13.3%	0.0%	21.8%	
> 6 hours	Count	103	112	37	10	2	264	
		28.6%	43.2%	46.8%	66.7%	50.0%	36.8%	
none	Count	4	2	0	0	0	6	
		1.1%	0.8%	0.0%	0.0%	0.0%	0.8%	
Total		Count	360	259	79	15	4	717
			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.718 ^a	20	.036
Likelihood Ratio	35.737	20	.017
Linear-by-Linear Association	12.273	1	.000
N of Valid Cases	717		

2- Association between usage of social media all night long and school grade:

As shown in Table 11, 57.4% of those who achieved excellent grades never use the applications all night long, compared to 30.9% who always use them.

For those who failed, 0.00% of them never use the applications all night long, compared to 3.6% who always use them (p value = 0.006).

Table 11: What was your average school grade last semester? * How often did you use social media all night long? Cross tabulation

		How often did you use social media all night long?					Total	
		never	seldom	sometimes	often	always		
What was your average school grade last semester?	Excellent	Count	78	109	118	38	17	360
			57.4%	49.5%	54.4%	42.7%	30.9%	50.2%
	very good	Count	47	78	74	35	25	259
			34.6%	35.5%	34.1%	39.3%	45.5%	36.1%
	good	Count	10	29	20	11	9	79
			7.4%	13.2%	9.2%	12.4%	16.4%	11.0%
fair	Count	1	4	5	3	2	15	
		0.7%	1.8%	2.3%	3.4%	3.6%	2.1%	
fail	Count	0	0	0	2	2	4	
		0.0%	0.0%	0.0%	2.2%	3.6%	0.6%	
Total		Count	136	220	217	89	55	717
			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	33.718 ^a	16	.006
Likelihood Ratio	30.415	16	.016
Linear-by-Linear Association	14.992	1	.000
N of Valid Cases	717		

3- Association between missing school because of bad sleep the previous night and school grade:

Results showed that 73.6% of those who never missed school achieved an excellent grade, compared to only 1.9% with an excellent grade for those who missed school for more than 6 days (p = 0.000).

For those who missed school for more than 6 days, 50% of them had failed in the last semester.

4- Association between usage of social media applications all night long and missing school:

Results showed that 34.5% of those who always use the applications all night long missed 1-2 days of school on average and 16.4% of them missed school for more than 6 days (p = 0.000). For those who never use social media all night long, 75.7% never missed school.

Discussion:

In this research, we demonstrated a relationship between the use of social media applications, sleep quality, and school performance among female high school students in the Eastern province of Saudi Arabia.

1- Social media use and sleep quality:

For sleep quality, the results showed there is an effect of social media usage on all components of sleep (sleep duration, bed time, falling asleep, and daytime sleepiness). The largest effect is on sleep duration since 37.2% of participants sleep for only 5-6 hours. This could be related to time of social media usage (in our study 42.8% of participants mostly use social media between 8:00 pm and 12:00 am which means exposure to artificial light and this may affect circadian rhythms of sleep (Barion & Zee, 2007). Furthermore, this could be related to usage of social media all night long, resulting in decreased sleep duration. *Our results also showed that sleep duration is negatively affected by total hours of social media usage.*

Regarding the effect on bedtime, as shown previously, 21.5% of participants go to sleep at 12:00 am which is late and means they have around 5-6 hours to sleep; this also has an indirect effect on sleep duration.

For difficulties falling asleep, a large number of participants (43.5%) use social media applications before bed time. We noticed that 43.9% of this group reported difficulties falling asleep sometimes. This finding is similar to those of a study on undergraduate students in China, which showed that students who used social media for an average of 0.5–2 hours before bedtime were more likely to have poor sleep quality (Xianglong et al., 2015).

For daytime sleepiness, the results show that almost 30% of those who feel sleepy during the daytime reported that they always use the applications all night long. This may be related to the effect of bright light of the mobile during night-time on sleep circadian rhythms (Barion & Zee, 2007). This resembles the results of a study done in Korea, which showed a strong association between Internet overuse and excessive daytime sleepiness in adolescents (Choi et al., 2009).

In general, our findings are similar to those in other studies; for example, a study in Peru found a higher prevalence of poor sleep quality among Facebook-dependent students compared to non-dependents students (Wolniczak et al., 2013). Our study also supported and showed similar results to a study on Japanese adolescents that showed that mobile phone use after lights on is associated with sleep disturbances (Munezawa et al., 2011). Lastly, a US study showed that greater social media use was significantly associated with disturbed sleep in young adults (Levenson et al., 2016).

2- Social media usage and school performance:

For school performance, we studied three main components that might be affected by social media usage: school grades, missing school, and distraction while studying.

For school grades, the results show that for those who use social media for more than 6 hours/day, 50% failed and 66.7% had fair grades, which are very large numbers. We believe that the more time students spend on social media, the more they become distracted and earn bad grades. These results resemble those of numerous previous studies. For example, a study in Jordan among high school students (similar to our sample), showed the more time students spent on Facebook, the more they neglected their homework, and thus, received lower grades (Abu-Shanab & Al-Tarawneh, 2015).

A second study in Pakistan among university students, showed that internet use is one of the major factors affecting the academic performance and social life of university students. Additionally, this study showed that more time spent on internet is associated with larger effects on academic performance, unless this time is used for studying (Asdaque et al., 2010).

On the other hand, 2 studies measuring the effects of social media on school performance had different findings. The first one, performed in Riyadh with college students, showed no linear relation between time spent on social media and GPA. This study used a different sample from that in our study; college students are more mature and might have good time management skills, which may explain the difference between the findings (Alwagait et al., 2015).

The second study in Pakistan among higher secondary schools and college students, showed a positive correlation between Facebook addiction and anxiety as well as depression, but no correlations between Facebook addiction, loneliness, and academic performance (Zaffar et al., 2015).

Regarding missing school due to bad sleep the previous night, this might be related to usage of social media all night long (34.5% of them missed school for 1-2 days in the last month and 16.4% of them missed school for more than 6 days). Furthermore, this might be related to the time of social media usage, since most usage was between 8:00pm and 12:00am. We believe this represents an indirect effect of social media on school performance through its effect on sleep quality. Missing school means missing lessons, discussions with teachers and classmates, and missing homework and assignments, thus leading to bad grades (50% of those who missed school for more than 6 days/month had failed). We believed that the distraction created by social media usage while studying leads to bad school performance but the results showed this relationship was insignificant ($p = .435$).

3- The most frequently used social media applications:

Our results showed that the most frequently used social media application among high school female students is Snapchat (39.7%)

followed by Instagram (18.7%). A previous study in Riyadh showed that Twitter and Facebook were the most popular applications among university students (Alwagait et al., 2015).

4- Strengths and weaknesses of the study:

One of the strengths of this study is that we used an objective measure of school performance, that is, the student's average grade. Additionally, we measured different aspects of sleep quality (bedtime, sleep duration, daytime sleepiness, and difficulties falling asleep).

To our knowledge, this study might be the first one in our area to measure the effect of both social media applications on sleep quality and school performance on high school female students.

Regarding weaknesses, this is a cross-sectional study that showed an association between the variables but not causality. Further longitudinal studies in this area are needed.

Conclusion:

This study showed that there is a negative effect of social media applications on sleep quality and school performance among female high school students in the Eastern Province of Saudi Arabia.

For sleep quality, all components were affected (late bed time, short sleep duration, difficulties falling asleep, and daytime sleepiness).

For school performance, more time spent on social media/day is associated with bad grades, and the more students use social media all night long, the more likely they are to miss school.

Furthermore, this study showed that the average duration spent on social media applications/day was 5 hours and 25 minutes.

Finally, this study showed that the most popular social media application among female high school students is Snapchat followed by Instagram.

Recommendations:

- 1- Future research is needed in this field and longitudinal designs are needed to identify causation.
- 2- We recommend educational programs to be conducted by school health programs about the effects of social media on sleep quality and their consequent effects on quality of life.
- 3- We recommend workshops in schools about the importance of time management for high school students.
- 4- Parents should have sufficient knowledge to recognize the effects of social media on their children and respond appropriately.
- 5- We recommend more parental control over the time used for browsing social media applications.

Availability of data and materials:

The datasets used and analysed in this study are available from the corresponding author upon reasonable request.

Competing interests:

There are no conflicts of interest.

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