The correlation between smartphone overuse and disturbance of sleep habits among university students. A survey study on a sample of students from the department of information and Communication Sciences – university of Jijel -

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Abstract:

Research findings indicate that the overuse of smartphones may lead to a number of symptoms such as headache, less time in bed, impaired concentration and memory, later bedtimes. The present study was designed to investigate whether sleep disturbances among students may be associated with the overuse of smartphones. The questionnaire was designed specifically for this study and contained items regarding habits of using smartphone at night; less time in bed due to smart phone use as well as fluctuation in bedtime due to smartphone use The findings revealed that the majority of the students use smartphone every day (91%); before they started using smartphone, they slept for more than seven hours at night, which mean 3.72 and std deviation 1,16898; they use excessively mobile phone at night (mean 3,3408, Std. d,74689). the mean of decreasing of sleep hours due to smartphone use was (3,3408) which consider high level; a fluctuation in bedtime due to smartphone use. which mean 3.83 and std deviation 1,12627. A large number of students use the smartphone excessively at night. Positive correlations were found between the overuse of smartphone Scale scores and many disturbances in students' sleep habits. Furthermore, the study found that students with depression also tend to have sleeping disorders.

Keywords: problematic smartphone overuse; sleep disturbance; students.

1. INTRODUCTION:

Smartphones are popular devices capable of processing more information than other phones; they include many features such as games, access to the Internet and social networks, messaging, videos, multimedia, and navigation, in addition to their use for communication. Access to the Internet is increasingly easy due to improvements in mobile technology and the prevalence of smartphones. In one study, it was suggested that there are over 1.5 billion smartphone users around the world, and it has been estimated that more than1 billion smartphones will be sold in 2016. (International Data Corporation, 2013). The booming use of smartphones and the fact that these phones encompass many features have raised the issue of

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smartphone addiction. (Kwon, Kim, Cho & Yang, 2013). Nowadays, students are using smartphones for study purposes due to the multitasking facilities and faster internet speed, which has become an acceptable phenomenon. Despite its undeniable benefits, mobile phone use has been linked to a variety of risky or even worrisome behaviors In recent years, the proliferation of electronic devices (EDs) such as computers and smartphones has been implicated in the poor sleep of young people. Surveys have recognized a positive correlation between the more presence of smartphones in the bedroom and later bedtimes, less time in bed, shorter sleep duration and daytime sleepiness (Mindell JA,2009; Van den Bulck J,2004; Li S, Jin X et al. 2007). A 2010 review of 36 youth studies from around the world linked use of such devices prior to sleep with late sleep and wake times and short sleep duration (Cain & Gradisar, 2010).Various theories have been proposed to explain the mechanism of sleep disturbance due to excessive use of electronic media devices like smartphones - interference with sleep through increased psychophysiological arousal, through bright light exposure which may delay the circadian rhythm, exposure to electromagnetic radiations and physical discomfort caused by prolonged media use (Hysing M, et al.2015). Several studies have demonstrated that individuals can become get addicted to online activities, particularly those that have psychological and emotional problems such as depression, anxiety, loneliness, distraction and lack of sleep (Griffiths.MD,1998; Demirci, K ,et al.2015; Rehbein, F, et al.2015; Lam, LT. 2014). Over the past decade, the use of smartphones has become the norm rather than the exception among all the income groups of people around most parts of the World.(Percy Okae, 2018). There are predicted to be around 4.5 billion mobile phones in the world by the end of 2019, meaning around 63% of us will have a mobile phone. And alongside that rapid growth in phone ownership comes the sinister problem of smartphone addiction (Sandra Henshaw, et al.2020). Furthermore, 70% check their phones in the morning within an hour of getting up.56% check their phones before going to bed.48% check their phones over the weekend.51% constantly check their phones during vacation.44% reported they would feel very anxious and irritable if they did not interact with their phones within a week. (Perlow, Leslie A.2012) Therefore, the present study was designed to investigate a link between smartphones usage and the disturbance of sleep habits among university students studying in the department of information and communication sciences at the University of Mohamed Essedik Ben Yahia – Jijel -.

Main question: is there positive correlation of smartphone overuse with sleep disturbances among university students?

Sub-questions: To answer and elaborate on the main question the following study Sub-questions are added:

- What are the levels of use of smartphones among university students?
- Is There correlation between student's sleep disturbances and excessive smartphone use?

Hypotheses:

- University students use smartphones excessively.
- There is positive correlation between student's sleep disturbances and excessive smartphone use.

2. Literature review:

To date, associations between smartphone use and sleep habits have been explored by many studies, and Various among them have reported that the addiction or overuse of electronic devices, Internet and smartphone have a negative effect on sleeping habits; as instance we mentioned the following :

The first study was conducted by "Unsal Alaettin" and others *(Internet Addiction and Sleeping Quality among College Students in West Turkey)* 2016. This study concluded that there is a positive correlation between Internet addiction of 538 students studying in 02 colleges and poor quality of sleep. as the researchers stated that they use the Internet at night for various purposes such as communication and training, and this leads to a change in their sleep habits, and this is what statistics revealed, so as the use of the Internet increases at night, the disturbance in student sleep times increases (Unsal Alaettin1, et al.2016). The second study *(Internet overuse and excessive daytime sleepiness in adolescents.)* conducted by Kwisook Choi; and others (2009), have found evidence that time spent by A total of 2336 high school students in South Korea on digital game-playing and problematic Internet use are associated with sleep delays, irregular sleeping patterns and excessive daytime sleepiness (Choi, et al. 2009). According to Spear, L, (2000). In his study entitled *(The adolescent brain and age-related behavioral manifestations)*, one psychophysical mechanism that may help to explain the negative impact of problematic Internet use on sleeping habits may be that night-time computer usage leads to a state of high arousal, thus interfering with the calming processes that are necessary for sleep (Spear, 2000). A recent review by Cain and Gradisar noted shorter, late, and/or more disrupted sleep in adolescents who have greater television watching, computer/ Internet/electronic games use, or mobile phone use in the evening before bed time. These adolescents also tend to have more day time sleepiness or disruptive behavior (Cain & Gradisar, 2010). Jan Van den

Bulck confirmed that Children who spent more time using the Internet went to bed significantly later during the week and during the weekend. They got up later on weekend days. They spent less time in bed during the week and reported higher levels of tiredness. Going out was also significantly related to sleeping later and less (Bulck, 2004). Sara Thomée For women, high combined use of computer and mobile phone at baseline was associated with increased risk of reporting prolonged stress and symptoms of depression at follow-up, and number of short message service SMS messages per day was associated with prolonged stress. Also online chatting was associated with prolonged stress, and e-mailing and online chatting were associated with symptoms of depression, while Internet surfing increased the risk of developing sleep disturbances. For men, number of mobile phone calls and SMS messages per day were associated with sleep disturbances (Thomée, et al. 2011). According to Raija-Leena Punamäki in her study with others, The Intensive computer usage forms a risk for boys', and intensive mobile phone usage for girls' perceived health through the mediating links. Girls were vulnerable to the negative consequences of intensive mobile phone usage, as it associated with perceived health complaints and musculoskeletal symptoms both directly and through deteriorated sleep and increased waking-time tiredness (Punamäki, et al. 2007). Mahesh D.Kurugodiyavar in his study *(Impact of smartphone use on quality of sleep among medical students)* with others showed that that medical students especially males who are addicted to smartphone have poor quality sleep (Mahesh, et al. 2018). A another study conducted by Yafei Tan, Ying Chen, Yaogui Lu and Liping Li to (*explore the Associations between Problematic Internet Use, Depressive Symptoms and Sleep Disturbance among Southern Chinese Adolescents*) demonstrated the high prevalence of problematic Internet use, depression and sleep disturbances among Chinese adolescents, and shed light on the fact that problematic Internet use is associated with depression and sleep disturbance and depression is associated with sleep disturbance (Yafei, et al. 2016). Moreover, smartphone overuse may lead to some mental or behavioral problems. It may cause maladaptive behavioral difficulties, interfere with school or work, reduce real-life social interaction, and lead to relationship disorders. (Kuss & Griffiths, 2011).

3. Methods:

3.1 Study design and participants

A survey using a self-administered questionnaire was conducted among the students of the department of information and communication Sciences – university of Jijel - between 01 janaury 2021 and 01 february 2020. A total of 873 students are educated within this department in the campus of Mohamed Essedik ben Yahia University. In this study, the sample size was calculated as

267 students by using the sample size formulation when the size of target population is known. To determine the sample size; we applied the "Stephen Tampson" equation (Yafei, et al. 2012), which takes the following formulation:

$$n \quad \frac{P \times P\,(1 - P)}{N\text{-}1 \times (d^2 \div Z^2) + P(1\text{-}P)}$$

Where:

- n : sample size (267)
- N: population size (873)
- Z : confidence level at 95% (1.96)
- d: error proportion (0.05)
- p: probability (50%)

A final sample of **267** randomly selected students was included in the study. A self-administered questionnaire was conducted; including the questions on the problematic smartphone Use Scale.

3.2 Tool used:

Smartphone addiction scale (SAS) consisted of 03 factors and 15 items with a five-point Likert scale. SAS is a relatively valid and reliable scale with Cronbach's alpha of 0.967.

degree	Weighted mean	Level
Strongly agree	From 1 to 1.80	**low level**
agree	*From 1.81 - 2.60*	
neutral	*From 2.61 - 3.40*	*Average level*
disagree	*From 3.41 – 4.20*	*High level*
Strongly disagree	*From 4.21 – 5.00*	

Table 1: five-point Likert scale

The purpose of this research was explained to the participants and the consent was obtained. Data was collected using above mentioned instrument maintaining confidentiality.

Likert scale	interval	Difference	Description
1	1.00 – 1.79	0.79	Strongly disagree
2	1.80 – 2.59	0.79	Disagree
3	2.60 – 3.39	0.79	Neutral
4	3.40 – 4.19	0.79	agree
5	4.20 - 5	0.79	Strongly agree

Table 2: five-point Likert scale

4. **Results:**

Out of the 267 copies distributed among the students, the same number of copies (100%) was completed (10.5% by males and 89.5% by females) and were eventually subject to analysis. The percentage of males is less than the percentage of females as well because in the department of information and communication Sciences the number of females outnumber the number of males as their percentage exceeds 70% of the total number of students.

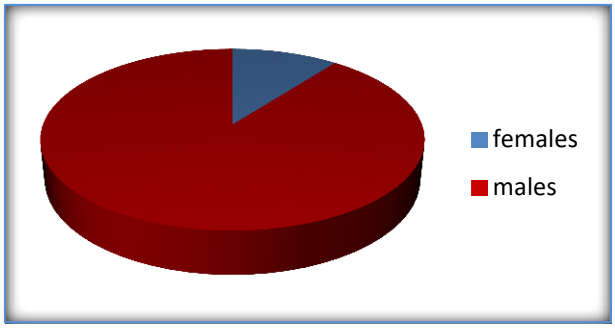

Figure 1: Distribution of students by sex.

All respondents (100%) expressed that their smartphones are connected to the Internet, Also, a large percentage of them (43.8%) spend more than three hours a day using their smartphones while the percentage of those who spend two hours a day was (29.2%); this reflects the excessive use of smartphones among university students.

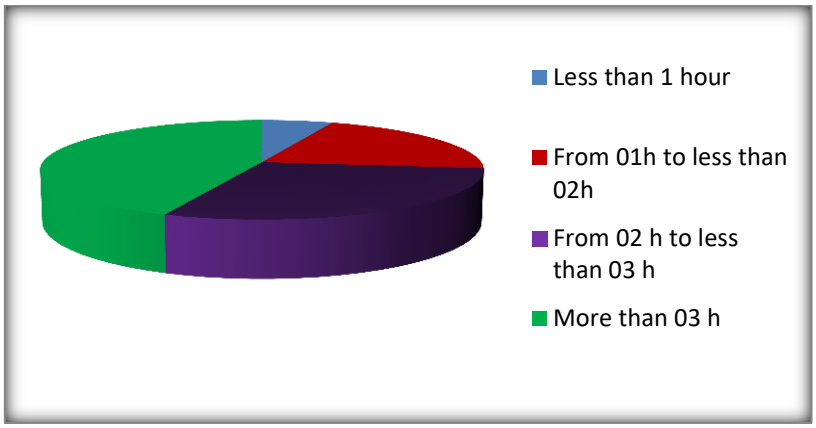

Figure 2: Distribution of students by daily smartphone use.

Table 3: Descriptive statistics for habits of using smartphone at night.

items		Stron agree	agree	Neutral	Disagree	Stron disagree	Mean	Stand deviat	Rank
You use smartphone every day.	N	107	136	11	12	01	4.25	,76867	05
	%	40,1%	50,9%	4,1%	4,5%	04%			
You use smartphone during daytime.	N	131	103	18	100	15	3.13	1,19902	03
	%	11,6%	38,6%	6,7%	37,5%	5,6%			
Usually you use Smartphone overnight.	N	61	162	18	19	09	3.93	,92335	04
	%	22,8%	60,7%	6,7%	6,4%	3,4%			
You use smartphone for more than two hours at night.	N	43	92	22	91	19	3.18	1,25956	03
	%	16,1%	34,5%	8,2%	34,1%	7,1%			
You use Smartphone excessively at night.	N	18	32	17	118	82	3.19	1,19283	03
	%	6,7%	12,0%	6,4%	44,2%	30,7%			
Weighted Mean							3,3408		
Std. deviation							,74689		

Table 03 shows descriptive statistics for habits of using smartphone at night. From which we found that the highest mean was awarded to the item 1: You use smartphone every day, which mean 4.25 and std deviation ,76867, followed by item 3: Usually you use Smartphone overnight which mean 3.93 and std deviation ,92335, followed by item 5: You use Smartphone excessively at night. Which mean 3.19 and std deviation 1,19283, followed by item 4: You use smartphone for more than two hours at night. with strongly agree by percent (40,1%,22,8%,6,7%,16,1% respectively) and agree by percent (50,9%,60,7%,12,0%,34,5% respectively).

The weighted mean of axis (1) was 3,3408 with standard deviation ,74689, which indicated that the trend of (habits of using smartphone

at night.) is (agree), as general trend according to 5-point LICKERT Scale as shown in table 02 since 3,3408 lie in the interval (3.40 – 4.19). So, the mean of habits of using smartphone at night is (3,3408) which consider an average level ; since the intervals of level as follow:

- ***low level*** : [1- 2.60]; ***Average level***: [2.60- 3.40]; ***high level***: [2.60- 3.40]

Table 4: Descriptive statistics for less time in bed due to smartphone use.

items		Strongly agree	agree	Neutral	Disagree	Strongly disagree	Mean	Stand deviat	Rank
Before you started using smartphone, you slept early.	N	83	115	18	43	08	3.53	1,21768	04
	%	31,1 %	43,1 %	6,7%	16,1 %	3,0 %			
Before you started using smartphone, you slept for more than seven hours at night.	N	80	125	15	41	06	3.72	1,16898	04
	%	30,0%	46,8 %	5,6%	15,4%	2,2 %			
The number of hours of sleep at night has decreased since you started using smartphone.	N	72	112	22	51	10	2.39	1,20450	02
	%	27,0 %	41,9 %	8,2%	19,1%	3,7 %			
You are staying up longer because of smartphone use.	N	72	101	20	60	14	3.51	1,20256	04
	%	27,0 %	37,8 %	7,5%	22,5 %	5,2 %			
You no longer feel sleepy enough since you started using smartphone.	N	56	87	22	80	22	2.44	1,27449	02
	%	21,0%	32,6%	8,2%	30,0%	8,2%			
Weighted Mean							3,1243		
Std. deviation							,85618		

Table 4 shows Descriptive statistics for decreasing of sleep hours due to smartphone use. from which we found that the highest mean was awarded to the item 2: Before you started using smartphone, you slept for more than seven hours at night, which mean 3.72 and std deviation 1,16898, followed by item 1: Before you started using smartphone, you probably slept early. which mean 3.53 and std deviation 1,21768, followed by item 4: You are staying up longer

because of smartphone use. Which mean 3.51 and std deviation 1,20256. with strongly agree by percent (30,0%, 31,1%, 27,0 %, respectively) and agree by **percent (46,8 %, 43,1 %, 37,8 %, respectively).**

So, the mean of decreasing of sleep hours due to smartphone use. is (3,3408) which consider high level ; since the intervals of level as follow:
low level : [1- 2.60]; ***Average level***: [2.60- 3.40]; ***high level***: [2.60- 3.40]

Table 5: Descriptive statistics for perturbation in bedtime due to smartphone use.

items		Strongly agree	agree	Neutral	Disagree	Strongly disagree	Mean	Stand deviat	Rank
I had a fluctuation in bedtime due to smartphone use.	N	64	105	18	70	10	3.83	1,12627	04
	%	24,0%	39,3%	6,7%	26,2%	3,7 %			
I didn't sleep right after dinner because of my smartphone.	N	73	118	16	49	11	3.86	1,07677	04
	%	27,3 %	44,2 %	6,0%	18,4 %	4,1 %			
I wake up at night because of my smartphone.	N	24	34	21	133	55	3.69	1,16789	04
	%	9,0 %	12,7 %	7,9%	49,8 %	20,6 %			
Many times I sleep after midnight because of smartphone use.	N	50	129	15	55	18	3.58	1,24557	04
	%	18,7 %	48,3 %	5,6%	20,6 %	6,7 %			
Sometimes I get up early to use my smartphone.	N	25	42	27	107	66	3.28	1,31208	03
	%	9,4 %	15,7 %	10,1 %	40,1 %	24,7 %			
Weighted Mean							3,6524		
Std. deviation							,88187		

Table 4 shows Descriptive statistics fluctuation in bedtime due to smartphone use. we found that the highest mean was awarded to the item 2: I didn't sleep right after dinner because of my smartphone. which mean 3.86 and std deviation 1,07677, followed by item 1: I had a fluctuation in bedtime due to smartphone use. which mean 3.83 and std deviation 1,12627, with strongly agree by percent (27,3%, 24,0%, respectively) and agree by percent (44,2 %, 39,3%, respectively).

5. Discussion:

Cell phone use has dramatically increased in today's world. Since electromagnetic waves are used for data transmission by cell phones, some concerns have been raised about their negative impacts on public health. The effect of cell phone use on sleep quality is among these concerns, which can be evaluated by laboratory methods, epidemiological surveys, and standard questionnaires. (Bayatiani, et al. 2012).The purpose of this study was to examine the relationship between the hours of smartphone use and sleeping disorders among university students. Our study revealed excessive use of smartphones at night among university students, which was expressed by the majority of the respondents, where the average score was reached. Which expresses a positive trend towards the item indicating that? This strengthens the respondents' positive response towards the item related to their use of smartphones for a period of more than two hours at night (mean:**3.93** ;rank: **04**). in turn, the general trend in the first axis was positive (Weighted Mean: **3,3408**), which confirms the achievement of the first hypothesis: University students use smartphones excessively. In this COVID-19 situation, most of the lectures are taken via Zoom or online YouTube video materials. In addition, students are taking long hours of online classes, which may be the reason the data show excessive use of smartphones, but not due to smartphone addictions. Therefore, there is a possibility of not having a correlation between the excessive use of smartphones and sleeping disorders.The research done by (Chokshi et al.2021). on mobile phone addiction with anxiety, depression, stress, and sleep quality among college students of Surat, India has also not found a strong correlation between the excessive use of mobile phone and sleep quality.

Based on the present research and some previous studies **(14,16)** there is cell phone overuse among university students. With regard to the relationship between problematic smartphone overuse and sleep disturbance, the current study found that problematic problematic smartphones overuse was positively associated with the level of sleep disturbance, as indicated by analyses, which supported our second prediction. The total scores on the smartphone overuse test were correlated strongly with both waking up at night nd I get up early to use smartphone scores and sleep disturbance. A prior studies (15,16,17) noted shorter, late, and/or more disrupted sleep in adolescents who have greater television watching, computer/ Internet/electronic games use, or mobile phone use in the evening before bed time and other negative symptoms on human health.

6. Conclusions:

A large number of students use the smartphone excessively at night, many disturbances occur in students' sleep habits due to their overuse of smartphone such as sleeping after midnight; waking up at night for using smartphone; Thus, they suffer from poor quality of sleep. The current study demonstrated the high prevalence of problematic smartphone overuse, sleep disturbances among university students. In conclusion, our study expanded the literature to include smartphone overuse and sleep quality in university students. University students displaying high sleep disturbances scores should be attentively monitored for smartphone addiction. Finally, a new complementary qualitative study can be done after collecting nation-wide students' data to explore the relationship between the use of smartphones, more specifically social media and evidence of psychological problems and sleep disorders.

Limitations: Several limitations of the present study should be considered. We may say that the sample size of the present study was comparatively small and was confined only to the department of media and communication at the university of jijel. Longitudinal research is needed to address this problem, and help us better understand the inter-relationship and underlying mechanisms connecting smartphone overuse with sleep disturbances. Moreover, all of the participants were university students, and may not represent the total population. Longitudinal studies and samples with different educational and age backgrounds are needed.

Recommendations:

- More information is needed about the knowledge and attitude of university students towards smartphone.
- decreasing the using time of smart phones at night by university students because of its detrimental effects on their health and the negative disruption it causes in their sleep patterns.

Acknowledgements:

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Conflicts of Interest: The author declares no conflict of interest.

Appendix 01:

Axis 01: habits of using smartphone at night						
n	items	Strongly agree	agree	neutral	disagree	Strongly disagree
01	• You use smartphone every day.	⬭	⬭	⬭	⬭	⬭
02	• You use smartphone more than hour during daytime.	⬭	⬭	⬭	⬭	⬭
03	• You use Smartphone excessively at night.	⬭	⬭	⬭	⬭	⬭
04	• You use smartphone for more than two hours at night.	⬭	⬭	⬭	⬭	⬭
05	• Usually you use Smartphone overnight.	⬭	⬭	⬭	⬭	⬭
Axis 02: decreasing of sleep hours due to smartphone use.						
n	items	Strongly agree	agree	neutral	disagree	Strongly disagree
01	• Before you started using smartphone, you slept early.	⬭	⬭	⬭	⬭	⬭
02	• Before you started using smartphone, you slept for more than seven hours at night.	⬭	⬭	⬭	⬭	⬭
03	• The number of hours of sleep at night has decreased since you started using your smartphone.	⬭	⬭	⬭	⬭	⬭
04	• You are staying up longer because of smartphone use.	⬭	⬭	⬭	⬭	⬭
05	• You no longer feel sleepy enough since you started using smartphone.	⬭	⬭	⬭	⬭	⬭
Axis 03: fluctuation in bedtime among students due to smartphone use.						
n	items	Strongly agree	agree	neutral	disagree	Strongly disagree
01	• I had a fluctuation in bedtime due to smartphone use.	⬭	⬭	⬭	⬭	⬭
02	• I didn't sleep right after dinner because of my smartphone.	⬭	⬭	⬭	⬭	⬭
03	• I wake up at night because of my smartphone.	⬭	⬭	⬭	⬭	⬭
04	• Many times I sleep after midnight because of smartphone use.	⬭	⬭	⬭	⬭	⬭
05	• Sometimes I get up early to use my smartphone.	⬭	⬭	⬭	⬭	⬭

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