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SOCIAL MEDIA ADDICTION AND SLEEP PROBLEM: A STRUCTURAL EQUATION MODELLING

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***Abstract**: A good sleep is important for all students and also for dentistry students who have a very intense course schedule. The purpose of this research study is to find relation strength between social media addiction and sleep problem of dentistry students. After delivering a detailed literature review, the authors administer a 37-item online questionnaire to dental students (N=146). This study examines social media usage statistics, digital game addiction, social media addiction, amount of sleep, sleepy in course, sleep problem and differences among gender and forms; and it presents a new model, Digital Game Addiction – Social Media Addiction – Amount of Sleep – Sleepy in Course Model (GSAS model) showing relationship between amount of sleep, sleepy in course, digital game addiction and social media addiction. Recommendations to improve quality of sleep are given by the authors. Unexpectedly, female students are found to be more socially addicted and 1st- 2nd form (GR1) students are found to have more sleep problems than 3rd-4th form (GR2) students. In this research students described themselves as social media addicted, digital game addicted, alcohol addicted and tea/coffee addicted. Therefore, this study is limited with 146 students' self-evaluations. More studies related with, GSAS model is recommended.*

***Keywords:** Sleep Problem; social media addiction; dentistry students; structural equational modelling.*

I. INTRODUCTION

Dental education includes a combination of knowledge, attitude, psychomotor and communication skills and requires high levels of concentration, cognitive performance, and motor dexterity that professionals are equipped to deal with the challenges of tomorrow, and how we educate our dental specialists who will decide the future of our oral health [2,18]. Dental education which requires multiple examination continues for five years that is associated with high levels of stress [18]. Dental profession has been widely acknowledged as being associated with high levels of stress [12]. The stress related to clinical items was generally more for working on patients. The students in the fourth year and fifth year were needed to complete certain quotas in terms of patients treated to qualify for the final exams that is associated with increased levels of stress [1].

Dentistry students have about 30 hours of course each week and 420 hours course in a semester. They need long studying and practical hours, which might enhance the poor quality of sleep that is called sleep problem which are a group of conditions that affect the ability to sleep well regularly. Their performance can be negatively affected with poor quality of their sleep or sleeplessness [2]. Source of stress such as time and scheduling pressures, managing uncooperative patients, commercial issues, and the highly technical and intensive nature of work may lie in the process of dental education. Fatigue, tension, dizziness, sleeplessness, tachycardia, irritability and anxiety have been indicated as stressors associated with dentistry [1].

Many dental students face with sleep problem like difficulty falling or staying asleep which result in mental illness and poor academic attainment [11]. Good quality sleep and circadian functioning are important for good health, brain health and body functions [2,6]. Young and midlife adults should have 7 or 9 hours of sleep per night [14]. Sleep problem like insufficient sleep duration are mostly result in daytime sleepiness [15,17] and serious poor health outcomes. What is more it also negatively affects cognitive performance, mood, immune function, cardiovascular risk, weight, and metabolism [3,8,13]. Sleep problems effect both physical and mental health of individuals and society [4]. Example of these problems can be given as nervousness and physical and mental weakness [6].

The time spent on Internet and Social Media can be very productive and compulsive however internet usage can be a bad influence on the life with the work and student's relationships within their family and friends [19]. Some studies found that students' sleep problem is related to their over using social media. There were consistent substantial and progressive associations between social media use and sleep disturbance [16]. Nonetheless, the use of social networking sites late at night can lead to sleep-related problems that extend into the next day [5]. Social media usage may have the following effects on sleep [7]: It may reduce amount of sleep. For example, many people stay awake late in the night and they text to their friends or post pictures on social media. Social media usage may make people more engagement in daily life. Sometimes this may be positive, or sometimes this may be negative and keep them awake in the night. The stimulating and rewarding nature of social media devices, for example bright light emitted by social media devices, may delay circadian rhythms [10].

Smart Phones and Internet, are effecting brain development and are having problems in learning and at school. Attention Deficit Hyperactivity Disorder symptoms are more prevalent in those who play digital games for more than one hour per day [9] than in those who do not. Social media addiction results in mental health problems and has been connected to symptoms such as depression, social withdrawal and dysfunctional behaviour [21]. Although we know that the side effects of social media in our daily life we cannot avoid it. Smartphones as the carrier of the internet has a strong influence on our health and unfortunately it is widely used by scholars at home and at abroad [22]. From the literature, we understand that social media has some good and some bad facilities in human beings' life. Aim of this research study is to find if there is any relation between social media addiction and sleep problem of dentistry students. This is a significant research study because it offers a new model Digital Game Addiction – Social Media Addiction – Amount of Sleep – Sleepy in Course (GSAS Model).

II. MATERIAL AND METHOD

This research study is delivered in University to all the dentistry 1^{st}- 4^{th} form students. Sleep problem Questionnaire and Social Media Addiction Questionnaire are used to get information about students Sleep-Social Media Behaviours. In total 146 students have attained to this research study and there were significant differences between 1^{st}- 2^{nd} form or 3^{rd}-4^{th} form students' sleeping problems. An online questionnaire is used for finding students' reasons of sleeping problems and finding the effect of Social Media on it. The questionnaire was prepared using SurveyMonkey.com and it is sent to students via Schools WhatsApp Group. Some examples from the questionnaire are:

1. How many hours should a student sleep?

a)2-3 hours b)4-5 hours c)6-7 hours d)More than 7 hours

2. Have you ever slept during course?

a)Very Often b)Often c)Sometimes d)Rare e)Very Rare f)Never

3. How often do you use Facebook?

a)More than 4 hours, b)2-3 hours, c)1-2 hours, d)Less than 1 Hour, e)Never

The figure 1 illustrates the correlation graph drown by DAGitty environment. This proposed model claims to have relations between the following variables: *Difficulty in Sleeping, Amount of Sleep, Sleepy in Day, Slept in Course, Talking in Sleep, Alcohol*

Addiction, Difficulty Waking Up, Medicine for Sleep, Grinding in Sleep, Nightmare, Sleepy in Course, Digital Game Addiction, Social Media Addiction (figure 1).

In the Results part sleep problem is restricted with 8 factors: "*Difficulty in Sleeping", "Sleepy in Day", "Slept in Course", "Talking in Sleep", "Difficulty Waking Up", "Medicine for Sleep", "Grinding in Sleep" and "Nightmare"*

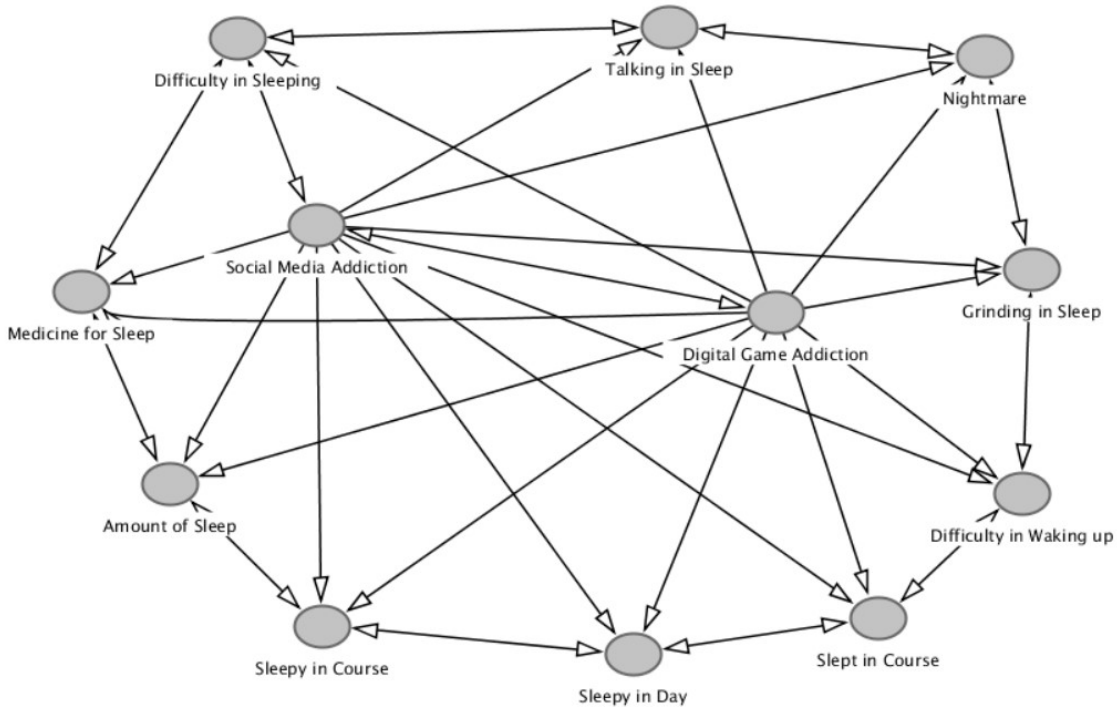

Figure no. 1. Proposed model in DAGitty

III. RESULTS AND DISCUSSION

Results are represented in 4 sections: In section 1 Digital Game Addiction - Social Media Addiction - Amount of Sleep - Sleepy in Course (GSAS Model) is presented; in section 2, Independent t-test among GR1 and GR2; in section 3 Independent t-test among Male and Female; in section 4 Social Media Frequent Users and Sleep problem Statistics.

3.1. Digital game addiction - social media addiction- amount of sleep- sleepy in course model (GSAS Model)

Proposed model in figure 1 is drawn in IBM SPSS AMOS 26 Graphics and the correlations among variables are calculated. The relations which are not significant like "*Difficulty in Sleeping", "Sleepy in Day", "Slept in Course", "Talking in Sleep", "Alcohol Addiction", "Difficulty Waking Up", "Medicine for Sleep", "Grinding in Sleep", "Tea/Coffee Addiction", "Nightmare"* in figure 1 are deleted.

There is a negative relationship between Amount of Sleep and Digital Game Addiction ($p=0.027$), a negative relationship between Amount of Sleep and Social Media Addiction ($p<0.01$). On the other hand, there is a positive relationship between Sleepy in Course and Amount of Sleep($p<0.01$). These are shown in table 1.

			Estimate	S.E.	C.R.	P
Amount of Sleep	<---	Digital Game Addiction	-0.195	0.088	-2.212	0.027
Amount of Sleep	<---	Social Media Addiction	-0.617	0.11	-5.626	***
Sleepy in Course	<---	Amount of Sleep	0.458	0.082	5.59	***

Table no. 1. GSAS model Variable Coefficients

The resulting Digital Game Addiction - Social Media Addiction - Amount of Sleep - Sleepy in Course (GSAS Model) model is shown in figure 2. The insignificant parameters were removed from the proposed model and a valid model was obtained [20]. In this model, the variables which are related to each other are shown and the variables in the questionnaire and their correlation coefficients is shown. The structural equation model (SEM) of the valid model shows a perfect fit. Chi-square values of the valid model (χ^2=1.843; df=2, p=0.398) and fit indices (RMSEA=0.00; GFI=0.994; AGFI=0.969; CFI=1.000) show that the model is valid.

According to figure 2, there is a high positive correlation between Social Media Addiction and Digital Game Addiction (r=7.35; p<0.05), a high negative correlation between Social Media Addiction and Amount of Sleep (r=-0.62; p<0.05), a negative correlation between Digital Game Addiction and Amount of Sleep (r=-0.19; p<0.05) and a positive correlation between Amount of Sleep and Sleepy in Course (r=0.46; p<0.05).

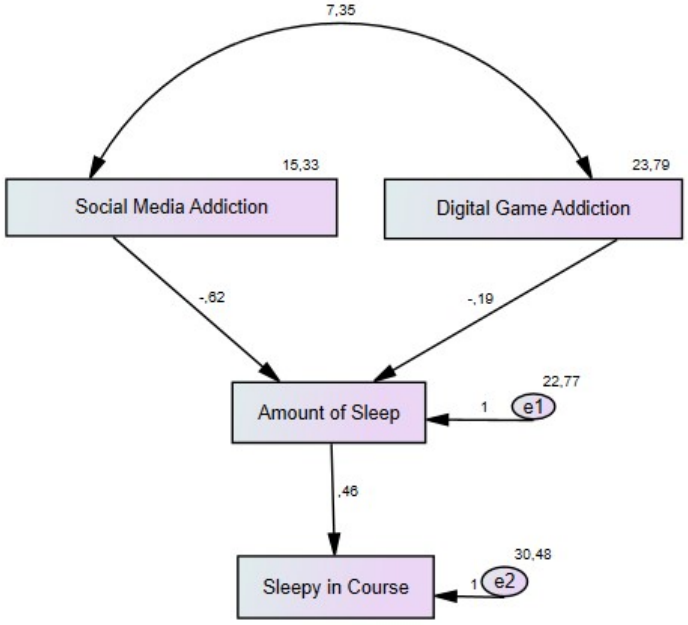

Figure no. 2. GSAS model

3.2. Differences between GR1 and GR2

3.2.1. Sleep problem: Independent t-test results between GR1 and GR2

Forms	N	Mean	Std. Deviation	Std. Error Mean
GR1	73	**37.43**	7.31	0.85
GR2	73	33.35	6.13	0.71

Table no. 2. Difference between GR1 and GR2 students

The following Independent t-test results (Mean, Std. Deviation and Std. Error Mean) and whether the students sleep problem that they have reported differed among GR1 and GR2 is shown in table 2.

To find out whether the students sleep problem that they have reported differed between GR1 and GR2, normality graphs is drawn and frequencies are calculated. Two independent groups with normal distribution, so Independent t-test is carried out and result was t(146)=3.68, p=0.01. This shows that there is a significant difference between GR1 and GR2. Mean, Std. Deviation and Std. Error Mean are given in table 2. According to table 2, **GR1** (M=37.43, SD=7.31) ***students have more sleeping problem*** than GR2 (M=33.35, SD=6.13) students.

3.2.2. Addiction problem: Independent t-test results between GR1 and GR2

It was interesting to find out there was not significant differences between addiction problems of GR1 and GR2 students. Independent t-test statistics show that ***there is not any significant difference*** between their social media addiction (p>0.05), tea/coffee addiction (p>0.05), digital game addiction (p>0.05) and alcohol addiction (p>0.05) between GR1 and GR2. This situation is illustrated in Addiction Map in figure 3.

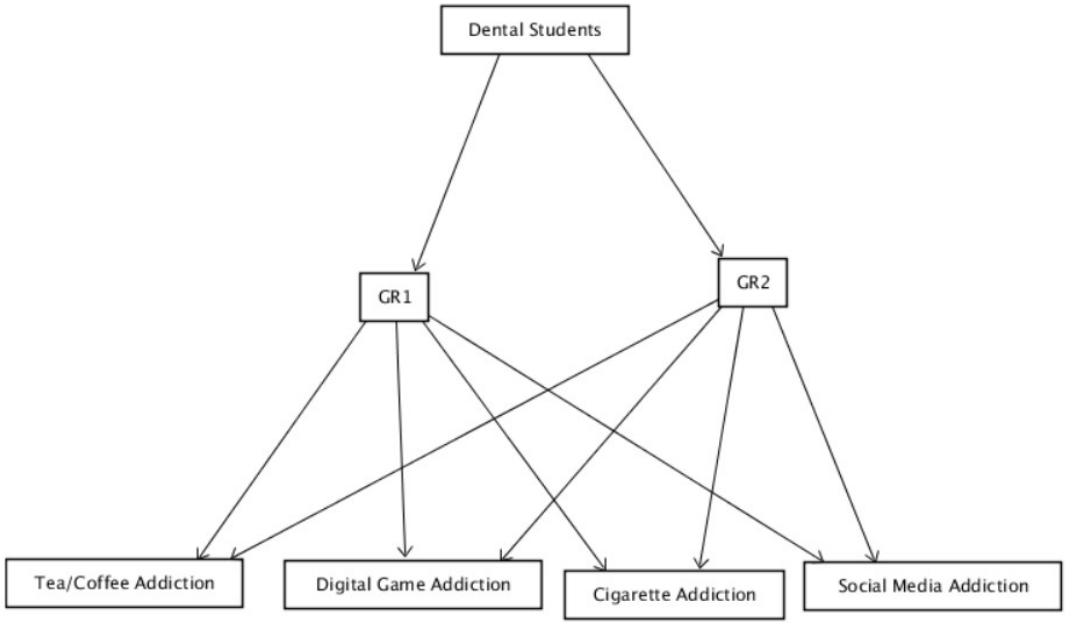

Figure no. 3. Addiction map

3.2.3. Sleep problem factors: Independent t-test results between GR1 and GR2

Sleep Problem is investigated in 10 factors: "***Slept in Course", "Sleepy in Course", "Sleepy in Day", "Difficulty in Sleeping", "Sleepy during the Day", "Difficulty in Waking-up", "Grinding Teeth" "Nightmare" and "Medicine for Sleep"***. *Nightmare* and *Medicine for Sleep* usage frequency was very low in dental students, the other six factors were observed. Independent t-test were calculated to find if there were differences between GR1 and GR2. There was a significant difference between GR1 Students (M=4.41, SD=1.45) and GR2 Students (M=3.86, SD=1.56) who said "*they have slept during course*" and this difference was statistically meaningful; t(146)=2.185, p=0.03. Also, there was a significant difference between GR1 Students (M=3.11; SD=1.40) and GR2 Students (M=2.35, SD=1.28) who said "*they get sleepy during course*" and this difference was statistically meaningful; t(146)=3.44, p=0.01. Similarly, there was a significant difference between GR1 Students (M=4.07, SD=1.57) and GR2 Students (M=3.53 SD=1.52) who said "*Do you have any difficulty falling asleep at night?*" and this difference was statistically meaningful; t(146)=2.126, p=0.035.

There was a significant difference between GR1 students (M=2.78, SD=1.29) and GR2 students (M=2.30, SD=1.26) who said "*Do you feel tired and sleepy during the day?*" and this difference was statistically meaningful; t(146)=2.133, p=0.021. There was a significant difference

between GR1 Students (M=2.97, SD=1.76) and GR2 Students (M=2.24, SD=1.16) who said "*Do you find it difficult to wake up in the mornings*" and this difference was statistically meaningful; t(146)=2.185, p=0.03. There was a significant difference between GR1 Students (M=4.91, SD=1.67) and GR2 Students (M=4.23, SD=1.76) who said "*Do you have teeth grinding during your sleep?*" and this difference was statistically meaningful; t(146)=2.396, p=0.018 (table 3).

Item	Form	N	Mean	Std.Deviation
Slept in the Course	GR1	73	**4.41**	1.45
	GR2	73	3.86	1.56
Sleepy in the Course	GR1	73	**3.11**	1.40
	GR2	73	2.35	1.28
Difficulty in Sleeping	GR1	73	**4.07**	1.57
	GR2	73	3.53	1.52
Sleepy during the Day	GR1	73	**2.78**	1.29
	GR2	73	2.30	1.26
Diffuculty in Waking-up	GR1	73	**2.97**	1.76
	GR2	73	2.24	1.16
Grinding Teeth	GR1	73	**4.91**	1.67
	GR2	73	4.23	1.76

Table no. 3. Difference of sleep problems between GR1 and GR2

GR1 mean of all the factors "*Slept in the Course", "Sleepy in the Course", "Difficulty in Sleeping", "Sleepy during the Day", "Difficulty in Waking-up" and "Grinding Teeth" are bigger than* GR2 mean of all 6 factors.

3.2.4. Social media addicted and non-addicted: Differences between GR1 and GR2

The number of Social Media Addicted GR2 students who have ***Sleep Problem (n=40),*** is bigger than the number of Social Media Addicted GR2 students who ***don't have Sleep Problem (n=3).*** Similarly, the number of Social Media Addicted GR1 students who have ***Sleep Problem (n=38),*** is bigger than the number of Social Media Addicted GR1 students who ***don't have Sleep Problem (n=2).***

The number of non-Social Media Addicted GR2 students who have ***Sleep Problem (n=25),*** is bigger than the number of non-Social Media Addicted GR2 students who ***don't have Sleep Problem (n=5).*** Similarly, the number of non-Social Media Addicted GR1 students who have ***Sleep Problem (n=30),*** is bigger than the number of non-Social Media Addicted GR1 students who ***don't have Sleep Problem (n=3).***

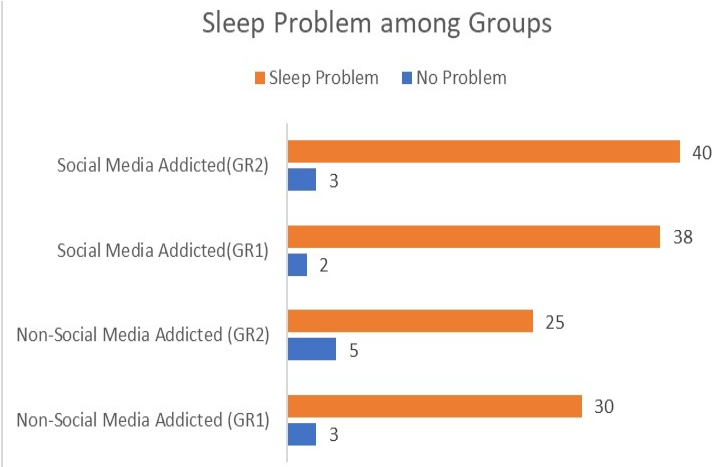

Figure no4. Sleep problem among groups

According to figure 4, GR1 students have less sleep problems than the GR2 students regardless of their being Social Media Addicted or not. What is more Social Media Addicted students have more sleep problems than non-Social Media Addicted students, and Social Media Addicted GR1 students even have more sleep problems than Social Media Addicted GR2 students.

3.3. Differences between male and female

3.3.1. Social media usage: Differences between male and female

Facebook, Google+, Instagram, WhatsApp, Viber, Twitter, SnapChat, Skype and Messenger usage statistics and differences between male and female are represented in figure 5. It is found that Instagram and WhatsApp are preferred more by female than male and Viber, Twitter, SnapChat, Skype was preferred mainly by male.

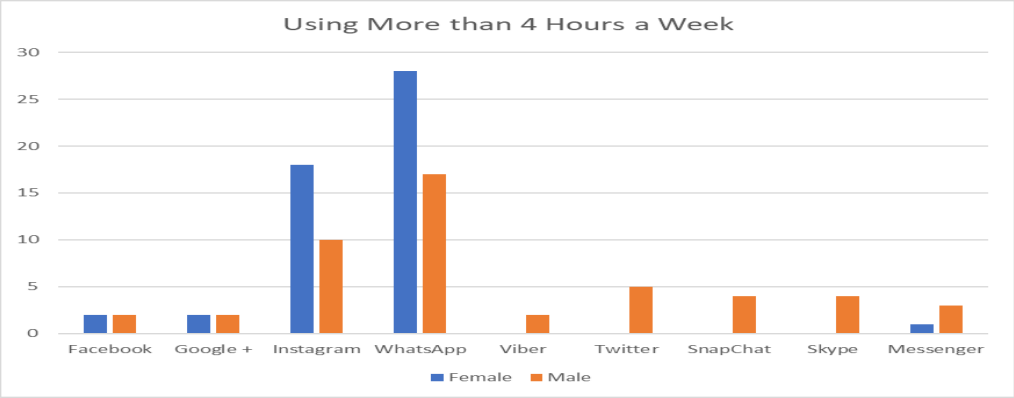

Figure no. 5. Social media usage statistics

3.3.2. Addiction: Differences between male and female

Independent t-test between male and female students show that there was not significant difference between Alcohol Addiction, Tea/Coffee Addiction or Digital Game Addiction. There was a **significant difference** between Female (M=2.29, SD=1.30) and Male (M=1.31, SD=0.76) dentistry students; t(146)=-5.68, p=0.00 (table 4). Female students are more socially addicted than male students.

	M	SD
Female	**2.29**	1.30
Male	1.31	-5.68

Table no. 4. Social media addiction between male and female

3.3.3. Social media frequent users and sleep problem statistics

In table 5, Frequent Social Media users' difficulty in sleep percentages, difficulty wakeup percentages and Medicine for Sleep percentages are shown. Viber, Skype and SnapChat frequent Users statistics were below 5% and they were deleted from the table.

Instagram frequent users reported that they have *difficulty in sleep* (37.67%), Instagram frequent users said that they have *difficulty at waking up* (67.81%) and they *needed medicine for sleep* (8.22%). The second important effect of Social Media on students' sleep was WhatsApp. WhatsApp frequent users reported that they have *difficulty in wake-up* (62.33%) said that they have *difficulty in sleep (35.62%)* and of them needed medicine for sleep (6.16%). YouTube frequent users reported that

they have *difficulty wake-up* (51.37%), they have difficulty in sleep (27.40%), and some of them needed *medicine for sleep* (6.16%).

Frequent Social Media User	DifficultyinSleep(%)	DifficultyWakeup(%)	MedicineforSleep(%)
Instagram	37.67	67.81	8.22
WhatsApp	35.62	62.33	6.16
YouTube	27.40	51.37	6.16
Google	8.22	10.27	2.05
Twitter	5.48	10.96	2.05
Facebook	4.11	7.53	0.00
Messenger	3.42	6.85	1.37

Table no. 5. Frequent social media users and sleep problems' percentages.

IV. CONCLUSION

In this research study, there are significant differences between 1st- 2nd (GR1) form or 3rd-4th (GR2) form students ; and female or male students. It is found that; GR1 *students have more sleeping problem* than GR2 students. This finding is parallel with some other findings in the literature like "Social Media use may negatively affect sleep quality and total amount of sleep" [23]. This study is significant by offering a new model, the GSAS model. According to this model, there is a high positive correlation between Social Media Addiction and Digital Game Addiction, a high negative correlation between Social Media Addiction and Amount of Sleep and negative correlation between Digital Game Addiction and Amount of Sleep. Instagram and WhatsApp were among the social media who had highest effect. Frequent users of these social media reported that they have *difficulty in sleep*, *difficulty at waking up* and even some *needed medicine for sleep*. Also, it is found that Instagram and WhatsApp are preferred more by*female* than Male and Viber, Twitter, SnapChat, Skype was preferred mainly by Male.

In conclusion, *female* dental students are more socially addicted than *male* dental students; and this difference is statistically meaningful. Non-users of Social Media have less sleep problem than Social Media users. Nonetheless, this research study is limited with the 146 Dentistry students and students' own answers to their addiction status. Also, sleep problem is limited with the mentioned 8 factors in the questionnaire. It is recommended that this research study is also delivered with more variables in other departments. In future studies, authors are planning to deliver same study in other countries and to test GSAS model being valid or not in them also.

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