How to Cite:
Saied, H., Mohamed, N. B., & Abd Elrazek, F. A. (2022). Smartphone addiction and its relation with bullying, sleep quality, and depression among children. *International Journal of Health Sciences*, *6*(S9), 4568–4583. https://doi.org/10.53730/ijhs.v6nS9.13840

Smartphone addiction and its relation with bullying, sleep quality, and depression among children

Hala Saied
Lecture of Pediatric Nursing, Faculty of Nursing, Cairo University, Assistant Professor, King Saud Bin Abdulaziz University for Health Sciences, College of Nursing
Coressponding author email: halasaid@hotmail.com

Nora Behery Mohamed
DNSC. in Community Health Nursing, Colleague in Menoufia University Hospital, Egypt
Email: noramohamed201445@yahoo.com

Fatma A. Abd Elrazek
Assistant Professor of Pediatric Nursing, Faculty of Nursing, Menoufia University, Egypt
Email: fatma.ahmed13@nursing.menofia.edu.eg , elzahra_fatma@yahoo.com

***Abstract*---**Smartphone addiction has emerged as a major concern among children over the past few years and incredibly increase with the outbreak of COVID-19, making a greater threat to their physical and mental health. This study aimed to assess the prevalence of smartphone addiction and its relation to bullying victimization, sleep problems, and depression among children. Sample: a total of 300 children (102 boys and 198 girls), 9-14 years old participated in the study. Setting: This study was conducted at two schools (Salka primary school, and 'Salka' preparatory school) in Salka village, Shpin Elkom city, Menoufia Governorate, Egypt. Tools: Four tools were used for data collection. Tool 1 consists of two parts. Part one was sociodemographic data questionnaire and part two was Smartphone Addiction Inventory Scale. Tool two: Children's Sleep Habits Questionnaire (CSHQ). Tool three: School Bullying/Victimization Scale. Tool four: Center for Epidemiologic Studies Depression Scale (CES-D). Results: According to the cut-off level on the smartphone addiction, sleep quality, depression, and bullying scales, of the 300 children, 209(69.67) were addicted to smartphones and 246 (82%) have poor sleep quality, 264 (88%) were depressed and 249 (84.41%) were bullied. Depression was positively correlated with smartphone addiction ($r = -0.30$, $p \leq .01$), bullying ($r = 0.41$, $p \leq .01$) and sleep

quality ($r = 0.34$, $p < .01$). Conclusion and recommendations: smartphone addiction can increase level of depression, sleep quality, and bullying among children. Healthcare workers including pediatric and community nurses need to assess children smartphone use and formulate health education programs that target chidden and their parents to raise their awareness about the protentional effect of smartphone addiction on children sleeping quality and mental health.

***Keywords*---**Addiction, bullying, children, depression, sleep quality, smartphone.

1 Introduction

Today, the use of smartphones has become a global phenomenon. Billions of people carry smartphones to connect and also access cyberspace, with the rapid rise of mobile device spread, Smartphones have become an essential part of the lives of children and teens, the tablet considers being the most popular device for going online, used by 68% of 5-15 years old children in 2019. The proportion of 5-15 years old children using a mobile phone to go online has also increased since (from 50% to 55%) the increase in mobile phone users going online was driven by increased use among 8-11 years old children from (41% to 49%) (Ofcom, 2020). Over the past few years, there is an incredible increase in the use of smartphones by children and adolescents with the outbreak of COVID-19 (Nasution, 2021). To assesses the prospective of smartphone addiction and its association with bullying victimization, sleep problems, and depression among children

The existence of smartphones in this era of development cannot be avoided more and more children and teens own mobile devices and use them until bedtime, In addition to the positive impact on children, it also has a negative impact, it threatens their development with suitable access to information through smartphones, children become addicted to their smartphones, because smartphones can provide services and media that attract children's attention, and usually increase children's enjoyment (Nasution, 2021; Nie et al., 2020)

Smartphone addiction is defined as excessive, compulsive, uncontrolled use of mobile phones leading to psychological dependence on the device, with removing the phone or not being able to use it can lead to withdrawal or intense feelings of distress. (Kwon et al, 2013).

The smartphone addiction phenomenon has become a notable social problem. Smartphone addictions present with symptoms of psychological anxiety, poor social adaptations, communication avoidance, and sometimes accompanied withdrawal symptoms similar to drug or alcohol addiction, the smartphone is easy to use, so it is often found to exacerbate internet or online gaming addictions, because smartphones can be frequently used, the related addiction is not easy to hold. The addiction symptoms are serious because they are observed in adolescents and even elementary school students (Cha& Seo, 2018).

Children's activities and daily behavior patterns change after the extreme use of smartphones. Smartphone addiction has been associated with several health risks that include an increased time of sedentary activities lower levels of physical activity, and also increase mental health problems such as lower levels of emotional intelligence, depression, and anxiety which in turn in poor sleep quality (Cho& Lee, 2017; Elhai et al., 2017).

In recent research conducted by Oliviero et al. (2021) sleep pattern has been affected by using social media. The inappropriate use of smartphones can lead to poor sleep and low-quality sleep, and the sleep efficiency value was calculated as 97.9% of studied children. Also, it was determined that increased social media addiction among students increases the risk of the potential emergence of health and sleep problems and decreases prosocial behaviors (Sümen & Evgin, 2021). Smartphone addiction has a greater association with sleep problems, otherwise may prompt and exacerbate rumination as a result of the frequent use of social networks. Moreover, mobile phone addiction can cause negative emotions such as depression and anxiety (Liu et al., 2017)

The study by Chen et al. (2016), has documented that mobile phone addiction would bring about negative impacts on mental and physical health as well as poor socialization, academic problems, interpersonal problems, depression, anxiety, and sometimes suicidal ideation excessive use of smartphones is associated with addiction among students. In addition, the levels of stress, anxiety, and depression increased as the number of hours spent on smartphone use (Buabbas et al., 2021). In the same line, a European study on children and adolescents found an association between the magnitude of internet use and poor mental health, depression, stress, and anxiety (Hökby et al., 2016). It became clear today, Internet addiction plays a central role in the association between cyberbullying victimization and psychological and physical symptoms, consequently(Lin et al,2020), it was obvious, one of the major consequences of victim's bullying is a psychological disturbance, the child had exposed to lower self–esteem than children who didn't expose to bullying (Abd Elrazek & Hanaa, 2019). The spread of mobile technologies and the uses of social media between children and adolescents have greater adverse health and psychosocial outcomes from cyberbullying victimization (Lozano-Blasco et al., 2022). Based on the realization of the smartphone uses phenomenon, nurses and other health professionals should be working more effectively in promoting children's well-being and promoting healthy behaviors, and preventing smartphone addiction, especially in Primary Health Care (de Freitas et al., 2021).

Significance of the study

The prevalence rate of smartphone addiction was (53.86%) which was relatively high. children spent more than 6.85 hours per day on their smartphones (Mokhtarinia et al., 2022) The use of smartphones by children and adolescents has increased in the last few years. and it usually carries greater risk factors such as personality problems (low self-esteem, negative emotion, loneliness) social problems, and depression, smart phone-related adverse events are growing rapidly, especially among children and adolescents. Children and adolescents who lack the ability to self-regulate run the risk of utilizing smartphones for

extended periods of time (Shin, 2017). It's important to discover and detect the prevalence of smartphone addiction and its consequence on children's health.

The aim of the study:
To assesses the prevalence of smartphone addiction and its association with bullying victimization, sleep problems, and depression among children

Research questions:
1) What is the prevalence of smartphone addiction, bullying victimization, sleep problems, and depression among studied children?
2) Is there a relationship between smartphone addiction and sleep problems among children?
3) Is there a relationship between smartphone addiction and depression among children?
4) Is there a relationship between exposure to bullying and sleep problems and depression among children?

2 Methods

Research design:
A descriptive correlational cross-sectional design was used.

Settings:
This study was conducted at shpin Elkom city, Menoufia Governorate, which represented two schools (Salka primary school, and 'Salka' preparatory school) at Salka village.

Sample:
A multistage stratified random sample of 300 children including 102 boys and 198 girls between the age of 9-14 years participated in the study. In the first stage, a random selection of Shipin Elkom city from nine cities in Menoufia Governorate, Egypt. In the second stage, the schools stratified then a simple random selection of two schools Salka primary school, and 'Salka' preparatory school. The third stage involved the selection of one class from grade four to grade nine.

Sample size: The actual prevalence of smartphone addiction and bullying was unknown; the probability of its occurrence was estimated to be equal to that of its nonoccurrence (p=q = 0.5) and a value of 0.05 was chosen as the acceptable limit of precision (D). Using the following equation: n = (z2 ×p × q)/ D2, the sample size was estimated to be 325 children. A total of 325 interviewer-based questionnaires were distributed. Among the chosen children, 25 of them refused to share in the study, returning a total of 300 questionnaires with a response rate of 95.1% for final analysis.

Inclusion Criteria:
Children aged from 9 to 14 years old.

Exclusion criteria:
- Children with intellectual and visual disabilities.

- Children with reported psychological problems
- Children under a behavior modification program.
- Children reported being exposed to physical abuse or domestic violence.

Data collection Tools:
Fives tools were used for data collections
Tool one: it consists of two parts
Part one: -Demographic characteristics of studied children: and parents It includes questions about the children's age, sex, academic performance, grades, and father and mother education, income.

Part two: -Smartphone Addiction Inventory scale, was used to assess smartphone addiction, which was adapted from Lin et al. (2017). The scale contains 10 items to assess symptoms of smartphone addiction it contains a question. Factor 1 "Compulsive behavior "Although using a smartphone has brought negative effects on my interpersonal relationships, use a smartphone for a longer period, I try to spend less time on my smartphone". Factor 2: Functional impairment "I feel aches and soreness in the back, I make it a habit to use a smartphone, to use a smartphone has exercised certain negative effects on my schoolwork. Factor 3: Withdrawal "I feel restless and irritable when a smartphone, I feel uneasy once I stop smartphone". Factor 4: Tolerance "I find that I have been hooked on the smartphone, I have increased substantial amount of time using smartphone" children rated items using a 4-point Likert- scale that ranged from "(strongly agree=4, agree =3,disagree=2, strongly disagree=1) The total score on the scale ranged from 10 to 40. Children who got a score of 25 or higher were considered as having a smartphone addiction. The reliability was done using Alpha Cronbach's test (r= 0.81)

Tool two: Children's Sleep Habits Questionnaire (CSHQ): was adapted from *(NICHD SECCYD, 2014;* Owens et al,2000*)* to assess sleep problems, The CSHQ consisted of 22 items. These questionnaires were collected primarily by asking the parents/caregivers or old child to recall sleep patterns and behaviors (e.g., bedtime habits include nine items)(sleep behavior includes 7 items) (waking during the night includes 2 items)(morning wake-up includes 4 items). Items of the CSHQ-A are rated on a three-point scale ranging from (rarely 1 time =1) (sometimes from 2 to 4time= 2)(usually from 5–6 times=3).
A total score of more than 41 on CSHQ was taken as abnormal and indicative of sleep problems.

Tool three: School bullying/victimization scale: it was adapted from US Behavioral Youth Risk Behavior Surveillance Questionnaire (US CDC, 2016).to assess exposure to bullying it includes 4 items (How often has someone hit you in school or outside school, excluded you from their group, made threats to you, and stolen or damaged your property at school) Items of the scale are rated on a 3 point scale "Never," (never occurring in the past year, a few times within a year, a few times monthly, and a few times weekly) If the child answered "a few times within a year" or more frequently for any items of the scale, they were categorized as having experienced school bullying/victimization.

Tool four: Center for Epidemiologic Studies Depression Scale (CESD) (Yang et al., 2004; Radloff, 1977): the CESD contains 20 items that assess the presence of depressive symptoms. children asked how often they experienced feelings in the past week like this:("things that don't normally bother me bother me, I don't want to eat, I have a poor appetite etc.) response options for each item include the following: "very little or no time (< 1 day)" (score= 0), "sometimes or rarely (1-2 days)" (score =1), "occasionally or moderately often (3-4 days)" (score=2) and "most or all of the time (5-7 days)" (score=3). Total score from 0 to 60. Child rating 16 or older are classified as depressed. The reliability of this tool was done to determine the extent to which items were related to each other by Cronbach's co-efficiency alpha for the questionnaire. It was (a = 0.87) which indicates that the instrument was highly reliable to meet the objectives of the study.

Validity: Instruments were reviewed and tested for content validity by a jury (5) of professors and medical experts (2 professors of pediatric nursing, one professor of psychiatric nursing, one professor of pediatrics, and a psychiatrist.

Pilot study: -A pilot study was carried out on 10% of children to assess the clarity, and feasibility of the study tools and the time needed to fill instruments. The necessary modifications were done as revealed in the pilot study. The sample of the pilot study was excluded from the total sample to assure the stability of the results.

Ethical Consideration:
An approval of the faculty of the nursing institution's ethical research committee was obtained. For the protection of children's rights the researchers obtained written informed consent from children parents and assent form the children with an emphasis on the study being voluntary and anonymous and that confidentiality of responses would be respected. Parents and children had the full right to refuse to participate in the study at any time.

Procedures for data collection:
- Study period: Data collection began in February of October 2021 and ended in December 2021.
- Formal approval was obtained from the head of the directorate of education and the directors of the school in the studied setting after submitting official letters from the Faculty of Nursing about the purpose of the study and the method of data collection.
- The study was conducted 3 days per week.
- Children take approximately 25-30 minutes to complete each questionnaire The purpose of the study was informed before data collection.
- To answer the questionnaire, the children were interviewed individually the researcher helps children by explaining some statement meanings.

Data analysis

Statistical analysis: Results were statistically analyzed by SPSS version 22(SPSS Inc., Chicago, IL, USA). Student's t-test was used to indicate the presence of any significant difference between two normally distributed means. Chi-Squared (x2) was used for qualitative variables. Spearman Correlation analysis was used to

show the strength and direction of association between one quantitative variable and an ordinal qualitative variable. P value at a level of <0.05 was set to be significant.

3 Results and Discussions

Results:

Table1
Demographic characteristics of studied children and parents

Variable	N	%
Gender		
Male	102	34.00
Female	198	66.00
Age		
Mean± SD	12.34 ±1.10	
Academic Performance		
Below average	35	11.67
Average	144	48.00
Good	121	40.33
Marital status of the parent		
Married	294	98.00
Divorced	3	1.00
Widowed	3	1.00
Parent's income		
Lower/median	20	6.67
Median/upper	280	93.33
Mother education		
Illiterate	12	4.00
Primary	7	2.33
Secondary	154	51.33
University	127	42.33
Father education		
Illiterate	28	9.33
Primary school	8	2.67
Secondary school	111	37.00
University	153	51.00

Table 1 shows demographic characteristics of studied children and parents, as indicated in table three hundred students were included in this study. The mean age of the students was 12.34 (SD= 1.10). Most of the students were female (66%). The academic performance of the students was average and good at 48.00%, and 40.33 % consequently. A total of 98% of students reported that their parents were married. 93.33% of the participants reported that their income was of the median or upper class. In addition, most of the participants' mothers hold a secondary school certificate (51.33%) while 61.00% of the fathers are university graduates.

Table 2
Prevalence of smartphone addiction, sleep problems, depression, and bullying among study participants

Variable	N	%
Smartphone addiction		
Addict	209	69.67
Nonaddict	91	30.33
Sleep Quality		
Poor sleep quality	246	82.00
Good sleep quality	54	18.00
Depression		
Depressed	264	88.00
Not depressed	36	12.00
Bullying		
Bullied	249	84.41
Not bullied	46	15.59

Table 2 Shows the Prevalence of smartphone addiction, sleep problems, depression, and bullying among study participants. As illustrated in the table According to the cut-off level on the smartphone addiction, sleep quality, depression, and bullying scales, of the 300 children, 209(69.6%) were addicted to smartphones and 246 (82%) have poor sleep quality, 264 (88%) were depressed and 249 (84.41%) were bullied.

Table3
Relationship between smartphone addictions, sleep problems, bullying, and depression correlation matrix of the study variables

Variable	1	2	3	4
1. Smartphone addiction	1			
2. Bullying	0.41**	1		
3. Sleep Quality	0.34**	0.14**	1	
4. Depression	0.30**	0.54**	0.12**	1
Mean	25.57	1.80	39.94	25.71
SD	6.47	0.99	5.20	9.83

Note. N=300 $*p < .05$; $**p < .01$

Table 3 Explains the relationship between smartphone addictions, sleep problems, bullying, and depression**,** the table represent presents Pearson correlations for the study. Almost all the correlations between the study variables and depression as an outcome variable were significant. Smartphone addiction had a positive correlation with depression ($r = -0.30$, $p \leq .01$), bullying had a positive correlation to depression ($r = 0.41$, $p \leq .01$) and sleep quality had also significant positive correlations with depression ($r = 0.34$, $p < .01$).

Table 4
Comparison among the smartphone addiction groups in terms of sleep quality, depression, and bullying according to study scales cut-off point

	Smartphone addict group n=209	Smartphone nonaddict group n=91	*p*
Sleep Quality			
Poor sleep quality	207(99.04%)	40 (93.96 %)	<.01
Good sleep quality	2(.09%)	51(56.04 %)	
Depression			
Depressed	189(90.43%)	76(83.52%)	<.05
Not depressed	20(9.57%)	15(16.48%)	
Bullying			
Bullied	187(89.47%)	69(75.82%)	<.01
Not bullied	22(10.53%)	22(24.18%)	

Table4 shows a comparison among the smartphone addiction groups in terms of sleep quality, depression, and bullying according to the study scales cut-off point. As indicated in the table a significantly higher proportion of the smartphone addict group reported poor sleep quality (p = 0.01) and depression (p = 0.05) than the smartphone nonaddict group. Also, the smartphone addict group is bullied more than the smartphone nonaddict group (p <.01).

Table 5
Relationship between study variables and participant's demographic variables

	Sleep Quality Mean(SD)	95% CI	Depression		Bullying		Smartphone addiction	
Gender								
Male	39.61(5.14)	38.60- 40.62	24.36(10.15)	22.36-26.35	1.68 (1.04)	1.48-1.72	25.19 (6.61)	23.89-26.49
female	40.11(5.24)	39.38-40.85	26.40 (9.61)	25.05-27.75	1.86 (0.95)	1.89-1.99	25.77 (6.40)	24.87-26.67
Academic performance								
Below average	43.85(5.81)*	38.85-42.85	25.08(9.32)	21.8828.28*	2.50(1.11)*	1.61-2.38	26.60(5.28)	24.78-28.41*
Average	39.61(5.13)	38.76-40.45	25.36(9.52)	23.79-26.93	1.80(087)	1.66-1.95	24.09(6.76)	23.97-26.20
Good	40.08(5.12)	39.16-41.00	16.29(0.37)	24.42-28.16	1.7(1.07)	1.55-1.93	25.85(6.42)	24.7-27.01
Parental marital status								
Married	39.92(5.23)*	39.32-40.52	25.81(9.90)*	24.68-26.95	1.80(0.99)*	1.69-1.92	25.61(6.47)*	24.87-26.35
Divorced	38.33(38.33)	30.74-45.92	19.66(2.30)	13.92-25.40	2.00(0.0)	2-2	18.33(4.93)	6.07-30.58
Widowed	44.00 (1.00)	41.51-46.48	21.00(0.0)	21-21.1	1.00(0.00)	1-1	29.00(0)	
Parent's Income								
Low/median								
Median/upper	39.10(6.21	36.19-24.00	17.2(9.15)*	23.55(6.99)	0.55(1.09)*	0.03-1.06	23.55(6.99)	20.27-26.82
	40.00(5.13)	39.40-40.61	26.31(9.61		1.89(0.92)	1.78-2.00	25.72(6.42)	24.96-26.47
Mother education								
Illiterate	46.08(1.91)	37.86-46.30	24.16 (6.36)	20.12-28.21	1.41(0.99)	0.78-2.04	20.83(2.75)	19.08-22.58
Primary	43.57(3.55)	40.28-46.85	25.00 (6.58)	18.91-31.08	0.42(0.53)	0.06-0.92	17.71(3.40)	14.56-20.86
Secondary	39.64(5.00	38.85-40.44	25.37(6.37)	24.36-26.39	1.89(0.93)	1.74-2.04	26.26(10.31)	24.62-27.90
University	39.90(0.47)	38.97-40.83	25.98(6.63)	24.81- 27.14	1.80(1.023)	1.62-1.98	25.93(9.63)	24.24-27.62
Fathers Education								
Illiterate Primary	41.60(5.25)	39.56-43.64	22.35(7.81)	19.32-25.38	1.92(0.89)	1.57-2.27	25.32(6.53)	22.78-27.85
Secondary	42.50(5.73)	37.70-47.29	27.12(10.93)	17.98-36.26	1.75(1.38)	0.58-2.91	27.00(8.60)	19.80-34.19
University	39.60(5.34)	38.59-40.60	27.60(9.55)	25.80-29.40	2.01(0.97)	1.83-2.20	25.52(6.55)	24.28-26.75
	39.75(5.03)	38.95-40.56	24.87(10.11)	23.25-26.49	1.62(0.972)	1.47-1.78	25.58(6.34)	24.57-26.60

Table 5 Illustrates the relationship between study variables and participant's demographic variables, as illustrated in the table there was no significant difference found between female and male students in all the study variables (sleep quality, depression, bullying, and smartphone addiction variables. Also, there is a significant difference in the mean scores of below-average students compared to average and good academic performance students. The below-average students are suffering from poor sleep quality (F(3, 297)=4.93,p=0.01), bullied (F(3, 297)= 4.12,p=0.02), depressed (F(3, 297)=2.83,p=0.01), and more addict to smartphones. Divorce has a significant relationship with all the study variables The students who came from divorced families are having poor sleep quality (F(3, 297)= 2.32,p=0.03), depressed (F(3,2 97)=5.23,p=0.01), reported the bullying(F(3, 297)=4.33,p=0.01), and more addict to the smartphone (F(3, 297)=3.23,p=0.03). In addition, the results indicated that children who are coming from low/median-income families are more depressed Mean =17.2, SD=(9.15) than children who are coming from median/upper-income families Mean 26.31, SD (9.61). 0.55 (1.09). Also, there is a significant mean difference in bullying between the children who are coming from low/median families mean= 0.55, SD= (1.09) and the children who are coming from median/upper-income families Mean=1.89, Sd=(0.92).

Table 6
Effect of bullying and sleep quality on depression

Regression equation	Significance of regression coefficients					Model fit Index	
Outcome	Independent variable	*β*	*SE*	*t*	*p*	R^2	*F*
Depression	Constant	13.14	1.94	6.76	0.1	0.30	3.95**
	Bullying	5.39**	0.42	11.16	.01		
	Sleep quality	0.47**	0.08	5.46	.01		

SE = standard error ** p < 0.001

Table 6 Shows the effect of bullying and sleep quality on depression. It presents the results of the multiple linear regression analysis that was used to test if bullying and sleep quality significantly predicted depression. The overall regression model was statistically significant (R^2= [0.30], F(3, 297) = [3.95], p = [0.01). Both bullying (β = -5.39, p< 0.001and sleep quality (β = 0.47, p < 0.001) were having a positive relationship and predicted depression in this study.

Discussions

Smartphone use has become predominant in the last few years. in which carry greater concerns about inappropriate and excessive use and potentially harmful uses. smartphone addiction has a potential behavioral problem This study included three hundred children in Egypt this study aimed to assess the prospective of smartphone addiction and its association with bullying victimization, sleep problems, and depression among children.

As regards the current study, three hundred students were included in this study. The mean age of the students was 12.34 (SD= 1.10). Most of the students

were female (66%). The academic performance of the students was average and good and 2% of parents were divorced and widowed, more than half of mothers had secondary education, while more than half of fathers have a university education, this may be referred to the low educational level of the mother play role in guiding children in health ritual habits and appropriate use of the phone.

Regarding the prevalence of Smartphone addiction, the current study clarified that more than two third of studied children were addicted to smartphones. From the researcher's point of view, the high percentage of studied children refers to different factors, it could be due to the spread of the Coronavirus in the past few years, which indirectly led to the presence of children inside the house for long periods, and the only entertainment activities available to them were the use of phones for video gaming or use social media to contact with peers, inadequate accessibility of children outdoor activities in Menoufia governorate, Also, could be due to lack of parent awareness of recommended smartphone time should be used by children, some children indirectly point to parental smartphone habits, and they imitate them in using a smartphone.

In the same line, this result comes in agreement with Yang et al. (2019), who reported smartphone addiction reaches 30–45% in the studied group of children. Also, these results are compatible with CT MoSa (2020), in a national survey of Koreans, the prevalence of smartphone use for all ages was (20.2%). Especially in children and adolescents, the prevalence is (22.9%) and (30.2%), respectively, it is usually an indicator of smartphone addiction. another study was done by Chang et al (2022). revealed that the prevalence of children who have mobile devices increased from 57% in 5th grade to 75% in 6th grade, because more children played online games, and smartphone addiction reach one-sixth of studied children.

The present study revealed that more than a quarter of studied children have poor sleep quality, and there is a positive correlation between sleep disturbance and smartphone addictions. These findings could be due to the indirect consequence of inappropriate use of a smartphone, spending a long time on the phone and internet without direct supervision from parents, which disturbs the daily sleep routine of children. The same result was found by Cheung et al. (2019), who documented a positive correlation between smartphone addiction and sleep problems among children and adolescents. In the same direction Tymofiyeva et al. (2020), has indicated that smartphone addictions could be linked to aberrations in brain networks, sleep disturbances, and depression. Also, another study done by Faizin et al. (2021), reported that The prevalence of sleep disturbances among school-age children ranged from (25.1% - 44.8%), and this indirectly connects to one of the causes of sleep disturbance, which is the use of smartphones. The same result was found in another study by Chang et al, (2022) who found that one-fifth of the children who participated in the study reported inadequate sleep and poor sleep quality in the 5th and 6th grades, The influences of smartphone addiction, and cyberbullying, and school bullying/victimization indirectly causes sleep problems.

As regard bullying, the current study revealed that the majority of children are exposed to bullying, and there's an appositive correlation between bullying and

smartphone addiction, these finding could be due to the consequence of inappropriate use of a smartphone, which decreases children's communication, and socialization and expose them to cyberbullying. This is following Cook's (2021), who found that the prevalence of bullying was reported by (47.7%) of children aged 6-10 years, and (56.4%) of children aged 11-13 years, and (59.9%) of children aged 14-18 years. Many studies found that, with extensive use of the internet cyberbullying and victimization levels increases, there was a strong, correlation between internet addiction, cyberbullying, and victimization (Cerniglia et al., 2017). Also, This result was congruent with Lin et al (2020) who found that victims of bullying had significantly higher rates of smartphone addiction than non-bullying victims, with previous studies demonstrating that bullying victimization has positively related to phone addiction. Also in the same line Lozano-Blasco et al. (2022), who reported a high rate of bad uses of the Internet and smartphone by children, as well as the correlation study, show how the behavior of cyber-bullies is mediated by (14.6%), lack of control smartphone by (63.3%) for escape and social problem video games, and by victims bullying by (35.9%).

Concerning depression prevalence and association with the other variable, the current study revealed a high prevalence rate of depression and a positive association between depression and smartphone addiction, exposure to bullying, and sleep disturbance. from the researcher's point of view, the finding could be due to usage of smartphone and internet without direct supervision from a parent, and easy access to any sites, may expose them to inappropriate information exceed the level of cognitive development, also spending a too long time in phone decreases children's communication and socialization. These results come inconsistent with those (Eales et al., 2021) who found that during the COVID-19 outbreak, middle school students have been less likely to meet their friends due to the risk of spreading the coronavirus with the reduced frequency of meeting with friends, students may be more likely to become addicted to using their smartphones. Along the same line Lee et al. (2021), reported that smartphone addiction has been associated with increased depression among children and adolescents, with reduced personal contact between children, they tend to be more isolated, leading to an increased risk of depression. Also, another study (Hong et al., 2021) found that there is a positive correlation between smartphone addiction and multiple factors, such as interpersonal relationships, depression, psychological factors, and stress.

Concerning the relationship between study variables and participants' demographic variables, the current study clarified there is a significant difference in the mean scores of below-average students compared to average and good academic performance students. The below-average students suffer from poor sleep quality, are bullied, depressed, and more addicted to smartphones. Also, the students who came from divorced families are having poor sleep quality, depression, reported bullying, and are more addicted to the smartphone, from the researcher's point of view, this may indicate the possibility of a psychological stressor, pushing children to use smartphones as a defense mechanism, or as a way to escape for stressors by engaging in social network sites. These results come in agreement with (Chang et al., 2015; Chiang et al., 2019) who found girls

and boys who are depressed and stressed considerably transition to high smartphone addiction statuses.

4 Conclusion

Based on the results of the present study, it can be concluded that the great majority of the studied have a high prevalence of smartphone addiction which is accompanied by a high prevalence of depression, sleep problems, and exposure to bullying. There was a positive correlation between smartphone addiction and sleep problems, depression, and bullying, with a marked, increase in the use of smartphones, in the same line increase in the level of depression, increase sleep disturbance, and more exposure to bullying.

Recommendation:

- Raising awareness among children about the consequences of inappropriate use of smart phone.
- It is important to promote parent awareness about major health problems of smartphone addiction such as depression, sleep problem.
- Establish the recommendation of the American academy of pediatric for the use of smartphones and video games.
- Further studies on community screen should be done to allow generalizability of the result.

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