



A Study To Find Effects Of Smart Phones Usage With Anxiety, Depression, Stress And Sleep Quality In High Secondary School Students- A Cross-Sectional Study.

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Abstract:- In our digital society, the use of smart phones has increased rapidly. There are 3.4 billion smart phone users worldwide. India, a developing nation has the second largest number of mobile phone users in the world, accounting for more than 900 million users with the fastest growing telecom network. The excessive smart phone use is strongly associated with a number of mental health issues, including stress, increased risk of abnormal anxiety, insomnia and depression. The main purpose of this study was to evaluate the relationship between smart phone use and mental health by measuring levels of anxiety, depression, stress and sleep quality among high school students (11th & 12th Science/Commerce/Art) in Surat.

Methodology:- A cross-sectional study was conducted on a total of 100 subjects (both males and females) in Surat. Subjects were asked to complete a self-reported questionnaire, including measures of Depression, Anxiety and Stress scale (DASS), Insomnia assessed using Athene Insomnia Scales (AIS), Smart phone addiction scale – Short version.(SAS-sv).

Result:- Study indicates that sleep quality has positive significant effect with smart phone users. Anxiety and depression symptoms are somewhat more present in adolescents. The results revealed there were high chances of anxiety for cell phone use. Subjects with insomnia had a higher AIS score than those without insomnia. The sleep disturbance measured by the AIS was positively associated with depression and anxiety.

Conclusion:- The positive effect between smart phone use and depression is alarming for school students. The results indicated that the intensity and modality of mobile phone use could be a factor that can influence causal pathways leading to mental health problems in higher secondary school students in the Surat.

Key words:- Mobile phone, Adolescents, Anxiety, Depression, Stress, Sleep.

INTRODUCTION

Internet usage is rapidly increasing worldwide, and it has become an important means of social connection and communication as well as a source of entertainment in our daily lives. With technological advances, internet accessibility and digital learning devices have become more convenient for the younger generation and might be linked to the rise in excessive internet use. Excessive internet use is now recognized as a global public health challenge; in particular, Asian populations present more extreme use than Europeans, Americans, or Africans. Current young generation experiences electronic media as a central part of their lives.^[1]

Smart phones can perform multiple functions such as internet surfing, management of emails; online gaming and social networking.^[2] Mobile phone, a device that was once considered a luxury of the affluent has now become a necessity.^[3] Mobile phones are spreading in popularity; young people, especially, increase their social communication frequency and expand their opportunities for making social relationships using this technology.^[4]

In our digital society, the use of smart phones has increased rapidly. There are billion smart phone users worldwide.^[5] India, a developing nation has the second largest number of mobile phone users in the world, accounting for more than 900 million users with the fastest growing telecom network.^[6] In many of western and some far-east countries appear a continuous rise in youth's digital media consumption.^[7] With more than 75% of families owning some mobile device, use of smart phones and other Internet-enabled small devices is rising.^[8]

Additionally, In Asian cultures, youth often face conflicts between social and personal identity formation. For example, high school students in Surat often use the internet to cope with stress due to their academic burdens. In addition to mental health, evidence suggests that poor sleep quality or short sleep duration is common in children and adolescents who exhibit excessive internet use.^[9] However, most existing studies were conducted in developed areas or countries where internet access is widely available. Little is known about the relationships between hours of internet use and health-related problems among adolescents in developing countries.^[10]

Despite the social networking advantages and productivity enhancements from using mobile phones – smart phones in particular - a growing literature finds many people overuse their phones in ways that interfere with their daily lives.^[11] High school students are at risk of mobile phone dependence as they are the quickest adopters of mobile phone technologies.^[12] Young people readily develop attachment toward phones, seeking the proximity of mobile phones and experiencing distress on separation.^[13]

The excessive smart phone use is strongly associated with a number of mental health issues, including stress and an increased risk of abnormal anxiety.^[14] Along with advantages associated with access to information and fast communication, in recent years many studies associated screen exposure to health and psychological problems among infants, children, and adolescents.^[15]

The number of studies reporting detrimental effects of smart phones on mental and physical health is constantly growing.^[16] A systematic review showed that depression, anxiety, and chronic stress were related to problematic smart phone use or smart phone addiction.^[17] Even though connectivity is generally believed to be increased by touching their smart phones rather than engaging in person.^[18] Smartphone usage can lead to not only physical, but social and psychological problems as well.^[19]

Depression is a mood disorder characterized by listlessness and slow thinking, which can be accompanied by psychomotor retardation symptoms including a loss of interest in normal activities.^[20] Depression is a psychological condition that is heterogeneous and frequently associated with other illnesses. These correlations often tend to be bidirectional. Depression stems from a dynamic interaction of social, psychological and biological causes, according to the World Health Organisation.^[21]

Depressive and anxiety disorders are two main common disorders that are highly prevalent globally, as over 300 million people are estimated to suffer from depression, which is equivalent to 4.4% of the world's population.^[22] Depression and emotional regulation can occur when students begin to overuse smart phones, leading to a large scale addiction.^[23]

Smart phone addiction can cause mental health problems such as anxiety and depression that will cause critical barriers in relationships, activities, physical and mental well-being. Higher the person addicted to smart phone, their anxiety and depression is higher.^[24] These individuals tend to get upset and anxious if they do not get a response or do not respond to any calls or messages. In a study conducted, it was reported that traits of anxiety and depression were higher in smart phone users.^[25]

Generally speaking, stress means pressure or strain. Life constantly subjects us to pressures. Individuals vary in their ability to cope with stress.^[26] Stress plays an important role in the emergence of depression.^[27] Stress has been found to be positively effect with addictive behaviors such as substance addiction and Internet addiction. Research has also illustrated that stress is a strong predictor of mobile phone usage. Individuals who perceive more stress are more inclined to engage in mobile phone usage.^[28]

Depression, anxiety, and stress are the most common mental illnesses among youth.^[29] Studies have found that there was a relationship between smartphone usage with anxiety and depression.^[30] Sleep is a basic necessity that constitutes almost one-

third of the hours in a human's lifetime. It is a state of reversible unconsciousness, where the body and mind are renewed, repaired, and developed. Sleep is a cornerstone of adolescent development.^[31]

Mobile phone is one of the important environmental factors that can affect the sleep quality if overused.^[32] Sleep quality is affected from several factors such as lifestyle, environmental factors, work, social life, economic situation, general health status and stress.^[33] It is reported that mobile phone use in bed at night. This may be due to exposure to bright light from electronic devices, disturbing the circadian rhythms and then sleep quality.^[34]

Sleep disorders may trigger serious physical and mental issues.^[35] Insomnia is a common sleep disorder affecting a significant proportion of the general population. People with insomnia often report having difficulties with initiating and maintaining sleep, early morning awakenings, and sleep that is not refreshing.^[36] Sleep quality disturbances can be one of the consequences of smart phone excessive usage.^[37]

To better understand the relationships between the amount of internet use and depression, anxiety, and sleep quality in Vietnamese adolescents, the current study aimed to investigate the distributions of depressive symptoms, anxiety symptoms, sleep quality, and internet use among high school students in Surat, and examine the relationships of internet use with depression, anxiety, and sleep quality among these students.^[38]

AIMS

- To evaluate smart phone overuse among the high secondary school students and find effects of smart phone overuse with anxiety, depression, stress and sleep quality in Surat.

OBJECTIVES

- To measure the effect of smart phone usage on Anxiety, Depression, Stress and Quality of Sleep higher secondary school students in Surat.

METHODOLOGY

STUDY DESIGN:

- Cross-sectional study

STUDY POPULATION:

- 15 to 18 years old High secondary school students

SAMPLE SIZE:

- 100 subjects

STUDY DURATION:

- 6 months

CRITERIA FOR SELECTION:

Subjects for the study were selected based on the following criteria.

INCLUSION CRITERIA:

1. Students who are willing to participate in study.
2. Age between 15 to 18 years old High secondary school students (10th, 11th & 12th Science/Commerce/Art).
3. Both Male & female students.
4. Minimum use of mobile phone > 4 hour / day with active internet connection.

EXCLUSION CRITERIA:

1. Incomplete response on following scales:

- i) SAS – sv
 - ii) DASS – 21
 - iii) AIS.
2. Subject not willing to participate
 3. Chronic medical condition (e.g., asthma, congenital heart defects, diabetes, or cancer) were receiving psychiatric care, or were taking antidepressants or antipsychotic medications.

OUTCOME MEASURES:

1. Smart phone addiction scale – short version [SAS – sv]
2. Depression , Anxiety and stress scale-21 [DASS-21]
3. Athens Insomnia scale [AIS]

1) SAS-sv (Smartphone Addiction Scale – Short Version):

The SAS was originally developed by Min kwon, Lee, et al. (2013) which was consisting of total 33 items. It was revised to a short form for adolescents containing 10 items known as SAS-sv. Each item was scored on 6 point scale: 1 = “Strongly disagree” to 6 = “Strongly agree” and range of the total score is 0 to 60.

The rating scale is as follow:

1. Strongly disagree
2. Disagree
3. Weakly disagree
4. Weakly agree
5. Agree
6. Strongly agree

The total scores were summated, then converted to percentage mean score (PMS), where higher levels of smart phone usage. In the original scale of SAS, the cut- off point was not reported. A cut off point at of 31/60 in males and 33/60 in females was utilized in the short version SAS by one Spanish-Belgium study. Since no gender differences were reported between these cut off points, a cut-off point of score 32/60 or PMS = 53.3% was accounted in this study with subjects having PMS > 53% classified as exercise users or probably addicts.^[39]

2) DASS-21 : (Depression, Anxiety and Stress Scale – 21):

The Depression Anxiety and Stress Scale – 21 Items (DASS-21) is a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress. DASS is designed to be measuring all present and clinically significant used for further defining, understanding and emotional states. Each of the three DASS-21 scales contains 7 items, divided into subscale with similar content.

1. The depression scale: assesses dysphoria, hopelessness, devaluation of life, lack of interest.
2. The anxiety scale: assesses autonomic arousal, skeletal muscle effects, situational anxiety and subjective experience of anxious affect.
3. The stress scale: is sensitive to levels of chronic non-specific arousal.
4. It assesses difficulty relaxing, nervous arousal and being easily upset / agitated, irritable / over-reactive and impatient.

The scales contains total 21 items and the range of total score is 0 to 63. The student were asked to marks from 0 [Did not apply to me at all] to 3 [Applied to me very much or most of the time] the extent to which they have experienced each of the listed conditions during the previous week. The score results of depression, anxiety and stress were calculated by adding the points for each relevant scale.

The rating scale for each item is as follows:

0. Did not apply to me at all

1. Applied to me to some degree or some of the time
2. Applied to me to considerable degree or a good part of time
3. Applied to me very much or most of the time.

	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely	28+	20+	34+

Recommended cut-off scores for conventional severity labels (normal, moderate, severe)
(Scores on the DASS-21 will need to be multiplied by 2 to calculate the final score)

The DASS-21 is based on a dimensional rather than a categorical conception of psychological disorder. The assumption on which the DASS-21 development was based is that the differences between the depression, anxiety and the stress experienced by normal subjects and clinical populations are essentially differences of degree.^[40]

3) AIS (Athens Insomnia Scale):

This scale is widely used as a useful tool to assess insomnia. The scale assesses the severity of insomnia using diagnostic criteria set forth by the International Classification of Diseases.

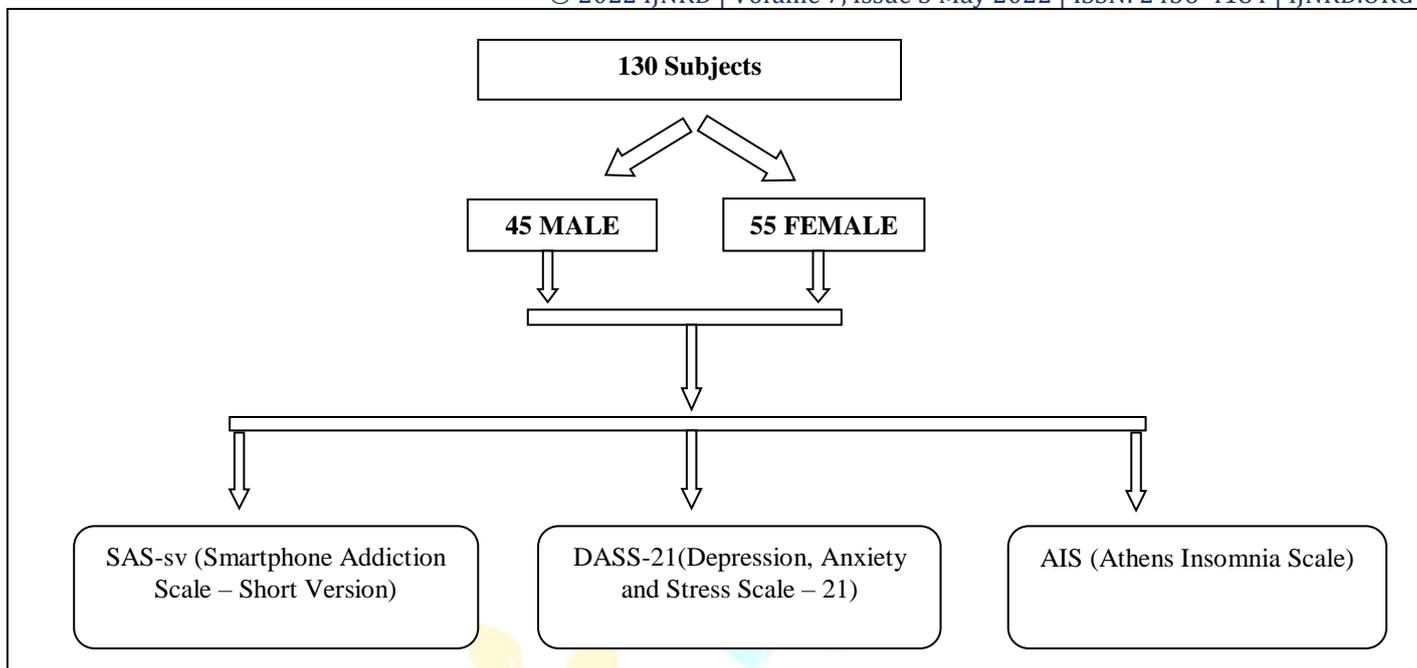
This scale consists of eight items:

1. Sleep induction time it takes you to fall asleep after turning off lights.
2. Awakenings during the night.
3. Final awakening earlier than desired.
4. Total sleep duration.
5. Overall quality of sleep [no matter how long you slept].
6. Sense of well – being during the day.
7. Functioning [physical and mental] during the day.
8. Sleepiness during the day.

Each item is rated on a scale of 0 (no problem) to 3 (serious problem), and the range of the total score is from 0 to 24. Severity level is categorized as no insomnia (0 to 7), sub-threshold (mild) insomnia (8 to 14), moderate insomnia (15 to 21), and severe insomnia (22 or more).^[41]

PROCEDURE:

A total of 130 subjects of both male and female from the age group of 15-18 years were taken. A written informed consent from each of the subjects was taken in which the subjects would agree to participate in this study. SAS-sv (Smartphone Addiction Scale – Short Version), DASS-21 (Depression, Anxiety and Stress Scale – 21) and AIS (Athens Insomnia Scale) scale was given to them for filling and data was collected. Out of 130 subjects 30 subjects were excluded from study based on inclusive and exclusive criteria and the collected data was used for statistical analysis.



RESULT

The present study was conducted to investigate the effect of smart phone use on anxiety, depression, stress and quality of sleep of higher secondary school students of Science, Commerce and Arts stream. The data was collected and distributed according to severity level of affected and percentage of that was taken.

<u>Gender</u>	<u>Science</u>	<u>Commerce</u>	<u>Arts</u>
Male	19	15	11
Female	22	17	16

Table 1:- Subjects distribution according to gender and stream

SCALE 1:- SAS-SV (Smart phone addiction scale):-

The total scores of all 100 subjects were summated and converted to percentage mean score, where 56% of subjects are found with mild usage of smart phone and 44% with over usage.

<u>Variable of SAS-sv</u>	<u>Subject</u>	<u>Percentage</u>
Mild use	56	56%
Over use	44	44%

Table 2: Demographic Distribution of Level of smart phone addiction SAS-sv

SCALE 2:- DASS-21(Depression, anxiety, stress scale) :-

Subjects were screened and distribution of data was done based on level of severity and percentage was calculated for each component of DASS-21.

Variable Of Depression	Subject	Percentage
Normal	07	07%
Mild	10	10%
Moderate	61	61%
Severe	19	19%
Extremely severe	03	03%

Table 3: Demographic Distribution of Depression

In our study (07%) are normal, (10%) subjects having mild symptoms of depression, (61%) subjects having moderate symptoms of depression, (19%) subjects having severe symptoms of depression, (03%) subjects having extremely severe symptoms of depression.

Variable of Anxiety	Subject	Percentage
Normal	07	07%
Mild	04	04%
Moderate	13	13%
Severe	23	23%
Extremely severe	53	53%

Table 4: Demographic Distribution of Anxiety

In our study (07%) are normal, (04%) subjects having mild symptoms of anxiety, (13%) subjects having moderate symptoms of anxiety, (23%) subjects having severe symptoms of anxiety, (53%) subjects having extremely severe symptoms of anxiety.

Variable of Stress	Subject	Percentage
Normal	28	28%
Mild	30	30%
Moderate	34	34%
Severe	08	08%
Extremely severe	0	0

Table 5: Demographic Distribution of Stress

In our study (28%) are normal, (30%) subjects having mild symptoms of stress, (34%) subjects having moderate symptoms of stress, (08%) subjects having severe symptoms of stress, not single subjects having extremely severe.

SCALE 3:- AIS (Athens Insomnia Scale):-

Variables of AIS	Frequency	Percentage
Normal sleep	26	26%
Mild insomnia	71	71%
Moderate insomnia	03	03%
Severe insomnia	0	0

Table 6: Demographic of distribution of Insomnia- AIS

In our study (26%) are normal, (71%) subjects having mild insomnia, (03%) subjects having moderate insomnia, and not single subject having severe insomnia

DISCUSSION

The purpose of this study was to investigate the effect of smart phone use on anxiety, depression, stress and quality of sleep. With the growing popularity of smart phone technology among young adults, it is important to understand predictive factors of stress, depression, anxiety and quality of sleep to prevent negative outcomes.

Today, the rate of mobile phone use and acceptance of new technologies is higher for adolescents than for older adults adolescents use mobile phone technologies not only for taking or text messaging but also many other reasons such as looking up information on the internet, entertainment, passing the time, relaxation, taking photos, shooting videos, broad casting their personality and achieving a better social position.

In this study, by using three standard questionnaires (SAS-sv, DASS-21, and AIS), the relationship between cell phone overuse and anxiety, depression, stress and sleep quality was assessed among adults (high school students). Various studies have found that SMS users were more likely to be neurotic, depressed, or anxious, indicating the possibility of disturbance in sleep quality. Mobile phones are spreading in popularity; young people, especially increase their social communication frequency and expand their opportunities for making social relationships using this technology.

In our study (56%) subjects are mild usage and (44%) are over usage. In present study it has been found that majority of higher secondary students are having moderate symptoms of depression (61%), extremely severe symptoms of anxiety (53%), and moderate symptoms of stress (34%) with mild insomnia (71%). Studies shows that people who more experience depressive symptoms more often suffer from social media over use.

One of the recent study showed that women tend to have a higher average of daily usage times and dependency score for smart phones compared to men. The negative consequences for health in the group of phone and smart phone addicts are similar to those of internet and gaming. Over usage of smart phones causes problems with attention and focusing, as people are more likely to show more functional impairments that interfere with school, work and family life.

Adolescents experience faster physiological growth but slower psychological development in the transition period, which leads to relatively low levels of psychological maturity. In overuse smart phone, research has found a relationship between smart phone use and mental health such as sleep deprivation and attention deficits. Smart phone users tend to neglect their work, isolate themselves from family and depend on the smart phone in order to communicate with others.

CONCLUSION

The main purpose of this study was to find out effect of smart phone usage and various components like stress, anxiety, depression and sleep quality. There was highly significant positive relation between smart phone use and anxiety, also found mild relation between smart phone use and sleep quality. Apart from this, moderate relation was found between smart phone use and depression as well as between smart phone use and stress.

REFERENCES

1. Stalin P, Abraham SB, Kanimozhy K, Prasad RV, Singh Z, Purty AJ. Mobile phone usage and its health effects among adults in a semi-urban area of southern India. *Journal of clinical and diagnostic research: JCDR*. 2016 Jan;10(1):LC14.
2. Zhang G, Yang X, Tu X, Ding N, Lau JT. Prospective relationships between mobile phone dependence and mental health status among Chinese undergraduate students with college adjustment as a mediator. *Journal of affective disorders*. 2020 Jan 1;260:498-505.
3. Lissak G. Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental research*. 2018 Jul 1;164:149-57.
4. Stalin P, Abraham SB, Kanimozhy K, Prasad RV, Singh Z, Purty AJ. Mobile phone usage and its health effects among adults in a semi-urban area of southern India. *Journal of clinical and diagnostic research: JCDR*. 2016 Jan;10(1):LC14.
5. Namwongsa S, Puntumetakul R, Neubert MS, Boucaut R. Factors associated with neck disorders among university student smart phone users. *Work*. 2018 Jan 1;61(3):367-78.
6. A model of the relationship between psychological characteristics, mobile phone addiction and use of mobile phones by Taiwanese university female students. *Computers in human behaviour*. 2012 Nov 1;28(6):2152-9.
7. Lissak G. Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental research*. 2018 Jul 1;164:149-57.

8. Lissak G. Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental research*. 2018 Jul 1;164:149-57.
9. Kim YJ, Jang HM, Lee Y, Lee D, Kim DJ. Effects of internet and smartphone addictions on depression and anxiety based on propensity score matching analysis. *International journal of environmental research and public health*. 2018 May;15(5):859.
10. Lissak G. Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental research*. 2018 Jul 1;164:149-57.
11. Elhai JD, Dvorak RD, Levine JC, Hall BJ. Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology. *Journal of affective disorders*. 2017 Jan 1;207:251-9.
12. Zhang G, Yang X, Tu X, Ding N, Lau JT. Prospective relationships between mobile phone dependence and mental health status among Chinese undergraduate students with college adjustment as a mediator. *Journal of affective disorders*. 2020 Jan 1;260:498-505.
13. Liu QQ, Zhou ZK, Yang XJ, Kong FC, Niu GF, Fan CY. Mobile phone addiction and sleep quality among Chinese adolescents: A moderated mediation model. *Computers in Human Behaviour*. 2017 Jul 1;72:108-14.
14. Legan M, Zupan K. Prevalence of mobile device-related musculoskeletal pain among working university students: a cross-sectional study. *International Journal of Occupational Safety and Ergonomics*. 2020 Oct 14:1-9.
15. Lee SY, Lee HK, Choi JS, Bang SY, Park MH, Jung KI, Kweon YS. The Matthew Effect in Recovery from Smart phone Addiction in a 6-Month Longitudinal Study of Children and Adolescents. *International journal of environmental research and public health*. 2020 Jan;17(13):4751-16 | Ivanova A, Gorbaniuk O, Błachnio A, Przepiórka A, Mraka N, Polishchuk V, Gorbaniuk J. Mobile phone addiction, Phubbing, and depression among men and women: A moderated mediation analysis. *Psychiatric Quarterly*. 2020 Mar 7:1-4.
16. Youn H, Lee SI, Lee SH, Kim JY, Kim JH, Park EJ, Park JS, Bhang SY, Lee MS, Lee YJ, Choi SC. Exploring the differences between adolescents' and parents' ratings on adolescents' smart phone addiction. *Journal of Korean medical science*. 2018 Dec 24;33(52).
17. Lissak G. Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental research*. 2018 Jul 1;164:149-57.
18. Lee SY, Lee HK, Choi JS, Bang SY, Park MH, Jung KI, Kweon YS. The Matthew Effect in Recovery from Smart phone Addiction in a 6-Month Longitudinal Study of Children and Adolescents. *International journal of environmental research and public health*. 2020 Jan;17(13):4751.
19. Sankar UG, Monisha R. Evaluation of Smartphone Addiction and Quality of Sleep among School Children. *Biomedical and Pharmacology Journal*. 2020 Sep 25;13(3):1409-13.
20. Zhang Y, Chen Y, Ma L. Depression and cardiovascular disease in elderly: current understanding. *Journal of Clinical Neuroscience*. 2018 Jan 1;47:1-5.
21. Michel Shaw (2021) Editorial: Chronic Diseases Associated with Depression. *J Dep Anxiety* 10:387
22. Alhassan AA, Alqadhib EM, Taha NW, Alahmari RA, Salam M, Almutairi AF. The relationship between addiction to smart phone usage and depression among adults: a cross sectional study. *BMC psychiatry*. 2018 Dec; 18(1):1-8.
23. Sankar UG, Monisha R. Evaluation of Smartphone Addiction and Quality of Sleep among School Children. *Biomedical and Pharmacology Journal*. 2020 Sep 25;13(3):1409-13.
24. Ithnain N, Ghazali SE, Jaafar N. Relationship between smartphone addiction with anxiety and depression among undergraduate students in Malaysia. *International Journal of Health Science Research*. 2018 Jan;8:163-71.
25. Sankar UG, Monisha R. Evaluation of Smartphone Addiction and Quality of Sleep among School Children. *Biomedical and Pharmacology Journal*. 2020 Sep 25;13(3):1409-13.
26. Bruce McEwen, Robert Sapolsky, Stress and Your Health, *The Journal of Clinical Endocrinology & Metabolism*, Volume 91, Issue 2, 1 February 2006, Page E2.
27. Ivanova A, Gorbaniuk O, Błachnio A, Przepiórka A, Mraka N, Polishchuk V, Gorbaniuk J. Mobile phone addiction, phubbing, and depression among men and women: A moderated mediation analysis. *Psychiatric Quarterly*. 2020 Mar 7:1-4.
28. Liu QQ, Zhang DJ, Yang XJ, Zhang CY, Fan CY, Zhou ZK. Perceived stress and mobile phone addiction in Chinese adolescents: a moderated mediation model. *Computers in Human Behaviour*. 2018 Oct 1;87:247-5.
29. Al Omari O, Al Sabei S, Al Rawajfah O, Abu Sharour L, Aljohani K, Alomari K, Shkman L, Al Dameery K, Saifan A, Al Zubidi B, Anwar S. Prevalence and predictors of depression, anxiety, and stress among youth at the time of COVID- 19: An online cross-sectional multicountry study. *Depression research and treatment*. 2020 Oct 6;2020.
30. Ithnain N, Ghazali SE, Jaafar N. Relationship between smartphone addiction with anxiety and depression among undergraduate students in Malaysia. *International Journal of Health Science Research*. 2018 Jan; 8:163-71.
31. KALITESI AC. THE EFFECT OF MOBILE PHONE USAGE ON SLEEP QUALITY IN ADOLESCENTS.
32. Mohammadbeigi A, Absari R, Valizadeh F, Saadati M, Sharifimoghadam S, Ahmadi A, Mokhtari M, Ansari H. Sleep quality in medical students; the impact of over-use of mobile cell phone and social networks. *Journal of research in health sciences*. 2016; 16(1):46.
33. Sahin S, Ozdemir K, Unsal A, Temiz N. Evaluation of mobile phone addiction level and sleep quality in university students. *Pakistan journal of medical sciences*. 2013 Jul;29(4):913.
34. Tamura H, Nishida T, Tsuji A, Sakakibara H. Association between excessive use of mobile phone and insomnia and depression among Japanese adolescents. *International journal of environmental research and public health*. 2017 Jul;14(7):701.
35. Sankar UG, Monisha R. Evaluation of Smartphone Addiction and Quality of Sleep among School Children. *Biomedical and Pharmacology Journal*. 2020 Sep 25;13(3):1409-13.
36. Manzar MD, Noohu MM, Salahuddin M, Nureye D, Albougami A, Spence DW, Pandi-Perumal SR, Bahammam AS. Insomnia Symptoms and Their Association with Anxiety and Poor Sleep Hygiene Practices Among Ethiopian University Students. *Nature and Science of Sleep*. 2020;12:575.

37. Sankar UG, Monisha R. Evaluation of Smartphone Addiction and Quality of Sleep among School Children. Biomedical and Pharmacology Journal. 2020 Sep 25;13(3):1409-13.
38. Lissak G. Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. Environmental research. 2018 Jul 1;164:149-57.
39. Kwon M, Lee JY, Won WY, Park JW, Min JA, Hahn C, Gu X, Choi JH, Kim DJ. Development and validation of a smartphone addiction scale (SAS). PloS one. 2013 Feb 27;8(2):e56936.
40. Lovibond SH, Lovibond PF. Manual for the depression anxiety stress scales. Psychology Foundation of Australia; 1996.
41. Soldatos CR, Dikeos DG, Paparrigopoulos TJ. Athens Insomnia Scale: validation of an instrument based on ICD-10 criteria. Journal of psychosomatic research. 2000 Jun 1;48(6):555-60.

