Impact of Excessive Usage of Smartphone in Kids

**Hafiz Rabeet Ahmad[1], Muhammad Waseem Iqbal[2], Tayyaba Farhat[3], Muhammad Latif[4],
Syed Khuram Shahzad[5], Muhammad Adeel[6], Muhammad Raza Naqvi[7]**

[1]Department of Information Technology, Superior University, Lahore, Pakistan. msit-f19-008@superior.edu.pk
[2]Department of Software Engineering, Superior University, Lahore, Pakistan. waseem.iqbal@superior.edu.pk
[3] Department of Software Engineering, Superior University, Lahore, Pakistan. tayyabafarhat@superior.edu.pk
[4]Department of Computer Science, Superior University, Lahore, Pakistan. mscs-f19-038@superior.edu.pk
[5]Department of Information and Systems, University of Management and Technology, Lahore, Pakistan.
syed.khuram@umt.edu.pk
[6]Department of Computer Science, Superior University, Lahore, Pakistan. madeelsandhu@gmail.com
[7]Department of Computer Science, Superior University, Lahore, Pakistan. razisyed4@gmail.com

ABSTRACT

Excess of anything leave negative impact so is the excessive use of smartphone effected health of kids. This research presents usage and impact of smartphone in kids. To analyze addiction and impact of smartphone on kids' health, this study focused on three different age groups in particular. From literature we choose sleep deprivation, anxiety/depression and social interaction as primary health issue to study under this research. We conducted an experiment on 1500 school going kids and asked them to fill a survey having several questions on usage of smartphones. Results shown addiction of smartphone in most of the kids while dividing addiction in three levels; low, average and high. Results revealed 737 kids use smartphone at low level addiction, 454 kids use smartphone at average level and 352 kids found in the addiction of smartphone usage. Kids with high level of smartphone addiction have found to sleep depreciated, had anxiety and social issues. On major issue discovered was social anxiety which kids shown having social gatherings and even uncomfortable in communication with family and parents.

Key words: Smartphone, Addiction, Kids

1. INTRODUCTION

Smartphone has proven to improve quality of life by summing up all the application in handheld devices. According to literature, about one third of the world's users use mobile phones, and major users of smartphones are young people [1]. Smartphone usage has been raised in current era not only in terms of number but also about human dependency on smartphone to achieve tasks including calculation, socializing, handling businesses, sending emails, online shopping, sending/receiving audios/videos and playing games [2]. Youths is prone to get addictive to technology as compared to elderly whether it's about gaming, socializing, movies or use of internet, but addiction of anything has a detrimental impact on various aspects of wellbeing [2]. According to [3], Technology addiction is becoming a major public health issue for kids all over the world. To foster healthier behaviors against technology, an interconnected cultural system with a cross approach that identifies health risks at different levels is needed [4]. Apart from usefulness and benefits, researchers have identified potential for harms of smartphones taking stress, sleep disturbances, and abuse educational practice particularly in consideration [5].

As per report published by the Chinese Academy of Social Sciences, 64.2 percent of primary school students' own smartphones. Between 2006 and 2017, the period at which Youngsters first networked decreased, and by the close of 2017, the ratio of seven-year-olds (attending school) linked to the Web had reached 27.9%. Since primary schoolchildren's resistance to radiation is smaller than that of adults, when they use a smartphone, their bodies consume more radiation than older people. Thus, mobile phone radiation destroys primary schoolchildren's brain nerves, resulting in headaches, memory loss, and sleep disturbances [6]. For years, the American Academy of Pediatrics (AAP) discourage use of smartphone for kids less than 2 years. The AAP recommend a certain amount of time for kids for using smart devices with approximately 1 hour for kids from 2 to 5 years.

Smartphone cause unhealthy habits like excessively playing online gaming, social networking sites, or gambling expresses itself in symptoms like effort to stay away from the phone, constant checking of the phone, and disrupted sleep habits due to excessive smartphone use [7,8]. Less concentration on education and sleep deprivation which resultantly increase stress, rigidity and muscle discomfort, as well as ocular ailments such as Computer Vision Syndrome, which manifest as exhaustion, dryness, blurry vision, agitation, or ocular redness [9,10,11]. Easy access and low rate internet packages to internet and social media application made 92% to admit going online o regular bases as a big

chunk of technology users [12].Youth is more prone to get bound with screens causing intolerance, withdrawal, mood dysregulation, cravings, and loss of control, all of which are typical symptoms of behavioral addictions, have been linked to problematic smartphone use [13,14,15,16].

Depression in school-aged children is a common problem, with rates ranging from 1.5 percent to 19 percent. Stress is thought to be Physical, cognitive, and/or behavioral disabilities are the second leading cause of impairment over many years of life that can cause learning disabilities, cognitive impairments, and sleep disturbances [17]. Sleep patterns have been linked to anxiety in adolescents. Sleeping less than 6 hours a day has been linked to an increased incidence of anxiety in adolescents, according to previous studies. Short sleep onset latency and sleep deprivation were found to be significant regardless of hypotheses regarding extreme anxiety disorders in one research. Furthermore, several studies have found a connection between sleep patterns and anxiety. Adolescents with severe depressive disorder, as per a situational, have poor sleep patterns, including excessive sleeping, insomnia, and hypomanic symptoms. In comparison to adults, depressed adolescents show more sleep loss, sleep delay, and difficulty falling asleep [18]. The use of smartphones affects teenagers' sleep. Similarly, it has been found that excessive use of smartphones can shorten sleep times and lead to poor lifestyle choices (such as lack of workout & exercise) [19].

This study tends to explore impact of smartphone on school going kid ranging between 8 to 16 years. Only a few studies have focused on school going kids despite the fact that they also had a great share in smartphone usage and are been provided smartphones by adults to distract them as an easy escape. For this purpose, we explored the literature to get clear picture of aftereffects of smartphone addiction, evidences of smartphone impacting quality of life of kids and ratio of kids been affected. Under this study, we surveyed 1500 school kids and studied their behavior measuring level of addiction, dependency o smartphone for task completion, sleep patterns and time spent on smartphones. Results from survey suggest a linear increase in addiction of smartphone and considered health issue.
Further paper consists of following sections; literature review, methodology (how research is being conducted), Sampling data and Experimentation and finally we have section for results and conclusion.

2. LITERATURE REVIEW

In this section, literature is stated to study relation of smartphone usage by kids which tends to have impact on their sleep pattern, anxiety and social interaction. To find relation, ee divided literature in to following sub sections:
- Smartphone usage
- Smartphone addiction
- Smartphones & Anxiety
- Social Interaction and smartphone

2.1 Smartphone Usage

Smartphones, first exhibited by Motorola in 1973, and designed sold since 1984. In recent years, smartphones have become an integral part of our lives. The number of smartphone subscribers is increasing every year. In 2016, there were more than seven people worldwide, of whom they spent billions. This percentage of Internet usage increased from 6.5% to 43% between 2000 and 2015. The share of family circle with access to the Internet similarly increased from 18% in 2005 to 46% in 2015. [22,21]. Smartphones can process many data and information than other mobile phones, it includes many apps like sports, internet and social media access, messaging, video, multimedia and travel, about using them meant for communication. While mobile technology is increasing day by day therefore access to the internet and other technologies are very easy for common people [22].

Elia Abi-Jaoude discussed in this paper, Utilization of smartphone is growing in the general population, but how much more among young people going to school remains to be seen. The author's main goal is to determine the prevalence of smartphone use in Oman, specifically how many primary and secondary school students use smartphone in various locations (e.g. School and Home). In Cycle 1 & II, they surveyed 1852 participants with a paper-based questionnaire regarding smartphones use, what applications they use, and how long their parents track their use of mobile phones during the day. Mobile phones are used by 91 percent of According to the report, 86% of high school students and 86% of elementary students are overweight. Students in the primary section often use their phones to play video games, while students in the secondary section mostly use their phones to access the internet. When comparing primary and secondary school students' perceptions of their parents' awareness of their smartphone use, 86.7 percent of primary students said their parents are very well aware of their smartphones use, compared to 83.4 percent of adolescents. In Oman, the number of people who own and use mobile phones in schools and other places has increased in recent years, and this trend is continuing. According to one report, 35 percent of children aged 7 to 12 in the United Kingdom and 22 percent in France own a smartphone. According to the GSMA in 2014 and 2015, the average age group for children to get their first smartphone is between the ages of two and ten [20].

2.2 Smartphone Addiction

Mercedez Sanchez-Martinez et al state that the average age (1,328 kids) of the research sample 46.3 percent of males and 53.7 percent of females were 15.7 years old (range 13–20). 96.5 percent of people had their own devices (80.5 percent had it, and 15.9 percent had 2 or more). The percentage of females with a mobile phone was higher (98.2%) than the percentage of males (94.8 percent). Around 28.4% said they purchased their first smartphones when they were twelve

years old, while 79.3% said they were thirteen years old. More than half of the students (54.8%) said they brought their phones to school; females (61.3%) were more likely than males to do so (47.1 percent). 83 percent of those who brought their mobile phone to school kept it during class, with the same percentage of males and females. Around 76.3 percent of teenagers with smartphones send text messages, and 18.2 percent send four or more every day. The age of the group did not show any major variations. 63.8 percent of respondents use a prepayment scheme, and 36.2 percent have a contract when it comes to payment.

This is one of the few researches on mobile use and dependence in teenagers and other groups performed in Spain. Character teens who considered in this research were like young people in the majority of Spaniards. Smoking, alcohol abuse, and depression were imminent results from the research, which showed that 33% of young people aged 16 to 24 smoking, drinking 76%, suffering 14% of people over the age of 16 from depression.29 Regarding academic failure, about 29% of high school students have this issue in Spain, 30 years, fully agrees with the data of our research (31.8%).

There are many different causes of sleep disturbance. Research by medical staff has shown that: 1) the effects of smartphone use affect sleep quality, 2) sleep disturbs health, and if you feel unwell, it leads to weight loss, diabetes, insomnia [23]. It was discovered in an earlier finding of mobile use and sleeping that smartphone addiction triggers drowsiness and makes studying at school or in the classroom difficult. Sleep accounts for a third of an individual's health and is a critical factor that has a major effect on life quality. In addition, sleep deprivation causes concentration issues, memory loss, and exhaustion during the day. Daytime sleepiness may result from sleep disturbances, and students often fall asleep Students' cognitive abilities and academic success are closely linked to the consistency and quantity of their sleep. [24, 25].

Smartphone have been related to extreme eye disorders in infants, and smartphones have been shown to worsen asthenia, trigger tear film weakness, as well as oxidative stress in tears and on the surface of the skin roof of the mouth in adolescents. Before bed, using light-emitting electronic reading devices has been shown to increase sleep time, delay the circadian clock, and improve memory [26]. Excessive mobile phone Sedentary behavior, poor sleep, and exhaustion have all been attributed to marijuana use. A recent large-scale research among Norwegian teenagers found that electronic devices used during the day and during sleep deprivation are related to sleep disorders by altering the imaginary mechanism that lights up the smartphone screen, removing melatonin, and disrupting sleep [27].

2.3 Smartphones & Anxiety

According to Kevser Tari Selcuk's article, risk factors for depression are related to ADHD (attention deficit hyperactivity disorder), anxiety, depression, and anxiety, but

not to sleep length. Many cognitive functions, such as memory and attention span, are impaired by insufficient sleep, and are defined as one of the options. Young people's desire to learn and succeed. Although some findings indicate that mobile use is linked to sleep length, extended sleep delay latency, shorter sleep duration, increased sleep disruptions, and poor sleep efficiency, there is no conclusive evidence in the literature. Lee et al. found that smartphone addiction is linked to poor sleep quality but has no impact on sleep time in their long-term study from Korea. Maintaining a safe sleep schedule and avoiding activities that disrupt sleep are examples of good grooming habits.

Sleep deficiency is said to be more common among young men in Turkey than among young people. In a recent study, the risk of addiction to a smartphone was not related to bedtime, with approximately 80% of participants being women college students. In this study, bedtime was assessed by asking students: "On average, how many hours of sleep do you get in 24 hours?" When participants answered this question, they may have included not one, uninterrupted bedtime, but also sleep and sometimes sleep within 24 hours, or they may have been unaware of the delay in sleep, waking up, and so on, Shortens the total duration of sleep. Therefore, the conclusion regarding sleep over time in our study should be interpreted wisely. ADHD (attention deficit hyperactivity disorder) is a neurodevelopmental disorder that starts in puberty and develops quickly in development, with manifestations of deprivation, instability, and instability, and is influenced by genetic, social, and physical causes. In the text, continuous screen viewing, rapid graphical changes, temporary enjoyment, and a desire to maintain that happiness forever have been seen in the virus addiction as well as the "digital addiction game" described in DSM 5, which could lead to ADHD (attention deficit hyperactivity disorder) and the relationship between Apple addiction. and ADHD (attention deficit hyperactivity disorder) can explain why teens use smartphones (sports tips, internet browsing and quick jumps from the floor to the classroom). In a recent study, smartphone addiction was found to be one of the strongest hypotheses for ADHD (attention deficit hyperactivity disorder), consistent with the results of other studies [28].

In this article, Fu Guifang claims that 14.97 percent of primary school students are addicted to smartphone. 34.9 percent of primary school students with smartphones choose to rebound from it, which is less than Yang Li's preparation. The number of experiments in this sample is estimated to be minimal, and the model is not entirely representative. As a result, mobile phone addiction was shown to be adversely associated with academic success in this study. The author also mentions the connection between smartphone addiction and high school students' academic success. According to research, the more smartphones usage, the higher the risk of

absenteeism and poorer grades, and hence the effect of school poverty. Mobile phone usage was found to be closely related to smartphones use in our research, bolstering the correlation between smartphones addiction and school success. Furthermore, they have shown that mobile phone use can distract from a student's ability to focus on their research. This suggests that if students spend a lot of time on their mobile phones browsing the Internet, they would have less time to learn. This past research back up the current results, indicating that there is a connection between phone addiction and academic success.

One of the key targets of primary school students who use smartphone communication, among other things. Mobile networking app is faster and less costly than most communication devices. Furthermore, telecommunications allow primary school students to feel at ease and enjoy peer-to-peer conversation. You must also provide elementary school students with electronic, private, and portable material. As a result, they want a closer interaction with the outside world, and the smartphones serves as a portable medium for interacting with it. However, using a smartphone to share other people's interests can be a disadvantage. According to the author, smartphone is replacing social networks among young people due to a lack of contact platforms. Low self-esteem has been linked to phone addiction in another research. Furthermore, elementary school students often use inanimate life resources, reducing the contact cycle between primary school students. Some students have also developed an addiction to the natural world, which is cut off from culture and reality, resulting in student isolation. The author discovered that smartphone addiction can affect public opinion and social networking. As a result, parents and schools must communicate with children using common sense while still developing a beautiful and harmonious collaborative group connectivity.

The key explanation for the prevalence of mobile phone addiction in colleges and universities, according to the author, is that certain students from wealthy families present themselves in front of their peers to satisfy their boredom. Giving the idea that they have particular needs and expectations is a simple way to infect those around them. The risk of phone addiction will rise as a result of these activities. Furthermore, findings have found that while students from wealthy backgrounds are unable to use their mobile phones, they exhibit greater emotional control.

2.4 Social Communication & Mental Health

Noreen Aleem et al in this article, the authors published a study to assess the importance of the effect of mobile phone use on youth, based on whether parents allow their children to keep their chosen until age 18. Chi-square test results show that, according to the rule, the alpha P value is 0.041, ultimately below 0.05, which indicates that parents allow their children to have their mobile phone after 18 years. Thus, another assumption is accepted.

About 200 respondents tried to complete the questionnaire, each of whom had a child at home from toddlers up to the age of 18. 90% of respondents used a smartphone, which provided a large number of responses. Among the 200 respondents, 60% of children were under ten, and children between the ages of 11 and 18 were 40 percent. 60% of children use telephone communication mainly for 1 to 2 hours, while the remaining 31% and 9% of children spend their days from three to five and five to seven hours on mobile phones, respectively.

According to study, 60% of all respondents, their children use mobile phones in their spare time, surfing the web, playing online games, watching cartoons, reading stories, etc., while the remaining 40 percent want to play outdoor games, watch TV. and read the article collection. In many cases, the study reveals the fact that the use of mobile phones has led young people to discriminate in the community. Today in Karachi, 91% of children avoid events and avoid contact with relatives due to increased interest in telephone activities.

Fear of parents and guardians causes abuse of their children due to their exposure to explicit and inappropriate behavior. 93% of the majority voted that mobile phone use affects children's education. Furthermore, when parents resist and overreact to the use of a smartphones, parents must deal with the unrelenting pressure that forces them to treat their children with impunity.

This study also shows that the increased use of smartphone has led to some behavioral changes in children. Smartphone use from childhood might result in exacting habits, impatience, and many children are said to lose interest in all other activities except the mobile phone [29].

Stress among teenagers has been linked to other activities such as substance usage, online media use, mobile device use (PMPU), and so on, according to research. As a result, the quest for stress-related relationships, sleep styles, and PMPUs has increased significantly [30,31]. Social health problems raised due to the additive use of smartphone which are characterized by behavioral addiction, including courage, mood swings, meditation, impatience, social conflict, social reunion, and relapse, as well as a Lack of discipline, side effects, deception, overuse, and a loss of appetite are all symptoms of addiction. [32,33]. Global anxiety, mental tension, and anxiety were found to be higher in the category of smartphone users than in the group of frequently used smartphones in a survey of smartphone users. [34,35].

The sight of children dressed and using a smartphone is common these days. To do this, you need to find out what parents think about children using smartphone at such a young age. The results show that about 63% of children have a mobile phone, but most of them are between the ages of 15 and 18, while the remaining 30 percent do not have a smartphone, but use their parents' mobile phones. entertainment and entertainment.

Reflecting on one research site, 90% of parents expressed their opinion about the growing use of smartphones that has affected children. increasing social instability as well as treatment [36]. According to the writers, parents of students from better families are better prepared to fulfil their children's needs through providing a simple or laissez-faire foster care and family atmosphere, which can contribute to their children's confidence. The study's key finding is that primary school students' smartphone addiction has a direct effect on their academic success. Students in elementary school are often used in the same class period; if they spend more time on their phones, they spend less time studying, and their academic success suffers. Smartphone addiction decreases students' desire to learn and their academic success. As a result, parents, schools, and neighborhoods should pay close attention to the prevalence of addiction in elementary school students. Encourage students to put down their phones, concentrate on their studies, and change their learning outcomes. [37]. Use either SI (MKS) or CGS as primary units. (SI units are strongly encouraged.) English units may be used as secondary

3. METHODOLOGY

To conduct or research on impacts of smartphones on school going kids, we started from the base and dig deep in literature of see depth of causes and impacts of smartphone. After exploring, we identified significance of this research.

3.1 Significance

Smartphone addiction have been under observation by many researchers, who found users to be only happy while using smartphone, a sign of addiction, lacking interest in socializing with family and find it expedient to communicate through social media apps, playing games and watching videos **[28].** We found only a few researches on school going kids about usage of smartphone and its level of addiction. Its significant to find hitches at primary stage to cure it.

3.2 Problem Statement

Every facility come with few of side effects; similar is the case with smartphones. Emerging technology has helped students to learn smartly using portable devices specially during covid-19 all educational institutes have shifted education online. Excess of everything is hazardous to health. Smartphone use has shown sleep deprivation, anxiety, and issues of social interaction among kids [38, 39]**.**

3.2.1 and Experimentation

To validate problems identified, due to use of smartphone in kids, this research initiated an experiment to conduct on school going kids ranging from 8 years to 16. We divided kids into 3 groups depending upon their age. Each group was presented with a number of questions we prepared to analyze level of addiction and issues kids are facing in their daily life. **[34]**.

3.2.1 Measurements, Sampling and Task Allocation

As research on the children's required a lot of time, cost, effort, and special meetings for kids to share their real experience of using smartphones. For our experiment we selected school students and had meetings with the Head / Principals of the schools for taking the permission about research purpose.

To validate problems identified, due to use of smartphone in kids, kids ranging from 8 years to 16 were selected as subjects. We divided kids into 3 groups depending upon their age. Each group was presented with a number of questions we prepared to analyze level of addiction and issues kids are facing in their daily life. So, 1500 kids were reached for experimentation. 51% (n=765) of the students are female and 49% (n=735) are male. 13% (n=195) of them are class 3rd, 12% (n=180) of them are 4th class, 11% (n=165) of them are 5th class, 15% (n=225) of them are 6th class, 11% (n=165) of them are 7th class, 10% (n=150) of them are 8th class, 15% (n=225) of them are 9th class, 13% (n=195) of them are 10th class. Participation in the research was entirely voluntary. Table 1 shows the distribution of the test sample based on statistical variables.

Table 1 Allocation of Categories of Research Sample According to the Gender, Age, Grade / Class wise

Variable	Category	Number	%
Gender	Female	765	51
	Male	735	49
Age	8-10 years' old	535	36.16
	11-13 years' old	540	35.97
	14-16 years' old	425	27.87
Grade / Class of Study	3rd	195	13
	4th	180	12
	5th	165	11
	6th	225	15
	7th	165	11
	8th	150	10
	9th	225	15
	10th	195	13

3.3 Research Questions

The following questions are addressed in this research.

Question 1: What age of child mostly start usage smartphone?
Question 2: Does smartphone use in kids leading to the addiction?
Question 3: Does usage of smartphone effect on the behavior of children?
Question 4: Effect of usage of smartphone on sleep and social interaction of children?

3.4 Search Query

Coordinating a proficient inquiry question as far as populace, difference, activity, and result is fundamental. Proper distributions were found by assembling a search inquiry dependent on the examination questions expressed before. The search queries used to search literature are

- Excessive Smartphone use
- Kids Using smartphones Mobile
- Effect of Excessive Usage of smartphone in kids
- Effect of Excessive Usage of smartphone in adolescents
- Health issues in Kids by using smartphone
- Smartphone misuse by kids" OR "Mobile Addiction in Kids
- Mobile Addiction Causes Health Issues in Kids
- Sleep Problem and Depression in Kids by Using Smartphone excessively

3.5 Usability Evaluation

Effectiveness, reliability, and satisfaction are three metrics that can be used to assess usability output **[31]**. To assess the efficacy / effectiveness, performance and efficiency the standard use worldwide is ISO 9241-11 **[32].** The After Scenario Questionnaire (ASQ) is used to assess the user's satisfaction after the assignment is completed. Unintentional behaviour, slips, errors, or omissions made by a user while attempting a task are examples of errors.

Effectiveness is defined as the number of goals that can be met, and it is calculated as follows:

$$Effectiveness = \frac{\text{Total number of tasks completed successfully}}{\text{Total number of tasks undertaken}} * 100$$

Performance refers to the amount of time, money, or mental work that must be expended in order to produce the desired results. It can be measured as follows:

$$\text{Time based Efficiency} = \frac{\sum_{J=1}^{R} \sum_{i=1}^{N} \frac{n_{ij}}{t_{ij}}}{NR}$$

Where
N = The total number of tasks (goals)
R = The number of users
nij = The result of task i by user j; if the user successfully completes the task, then
Nij = 1, if not, then Nij = 0 tij =
The time spent by user j to complete task i. If the task is not successfully completed, then time is measured till the moment the user quits the task

The degree to which a customer considers the use of a product tolerable is used to determine satisfaction. The context in which a product is used, as well as the particular circumstances in which it is used, determines its usability. The user's mission, hardware, software, and components all contribute to the user's context of usage. Many post-task assessment techniques (such as SEQ, UME, and SMEQ) are usable. However, in this analysis, satisfaction is calculated using the ASQ method. The ASQ is a short questionnaire that takes little time, is simple to understand, and has a lot of practical aspects for usability studies. There are three questions of seven points scale (strongly disagree=1, disagree=2, somewhat disagree=3, neither agree nor disagree=4, somewhat agree=5, agree=6, strongly agree=7) of significant importance user satisfaction with the system's usability. The first question examines the aspect of task completion ease, the second question examines the aspect of task completion time, and the third question examines the level of satisfaction with the capacity of support details **[33]**.

4 RESULTS

Experiment conducted on school students was supposed to check impact of smartphone addiction. In this section we discuss the relationship of smartphone usage, Sleep Problem, Mental Health Issues and anxiety in Kids through the graphically. First, we discuss about the smartphone usage in kids from initial to addiction level. The kid who uses smartphone between 0-1 hr is the normal smartphone users. They just use it in leisure time or play some random games for fresh their mind as the activity. Their parents give them smartphone happily. In the second category kids uses smartphone from 1-2 hrs. These kids are the average smartphone users. Whether they play games or watching the videos. The category kids are the addicted smartphone users. They use smartphone 2-3,4 hrs. They spent more time on the device. These kids mostly are not involving in social activities. They are nervous, aggressive and give less attention to their family members and friends.
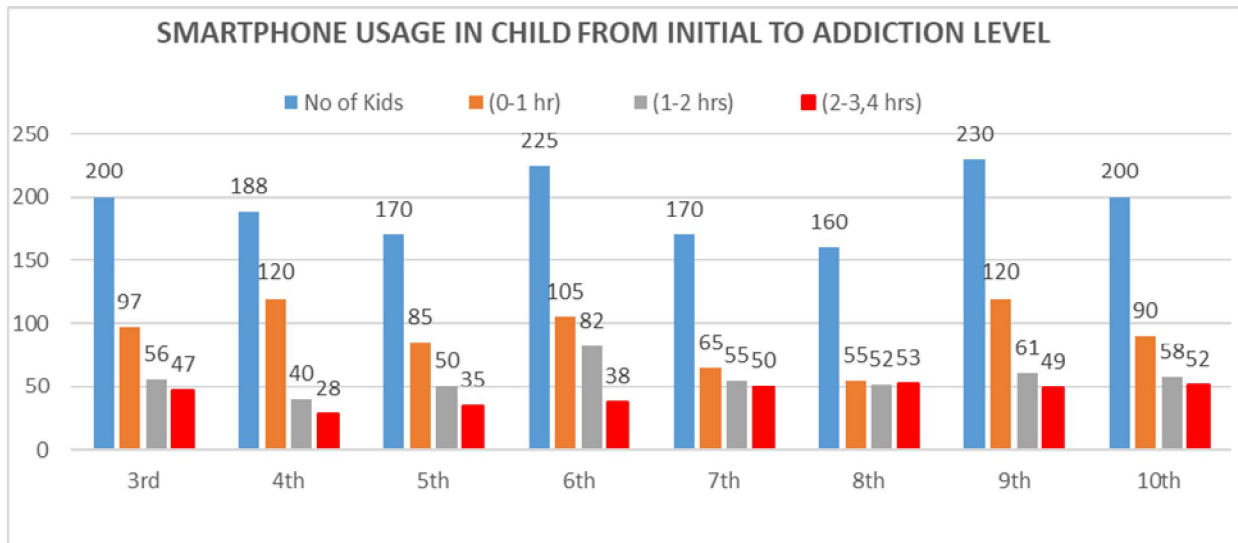
Figure 1. Smartphone usage in Child from intial to addiction level

It is also to check the Sleep issues in the kids who fall in the smartphone addiction and others who are not. No of kids we survey are different numbers and the age group. Mostly it is to be seen the kids in which addiction is found mostly having the sleep issues. We ask them they the sleep come easily at night? Different answers were come from the children. On the basis of that we make the graph as below.
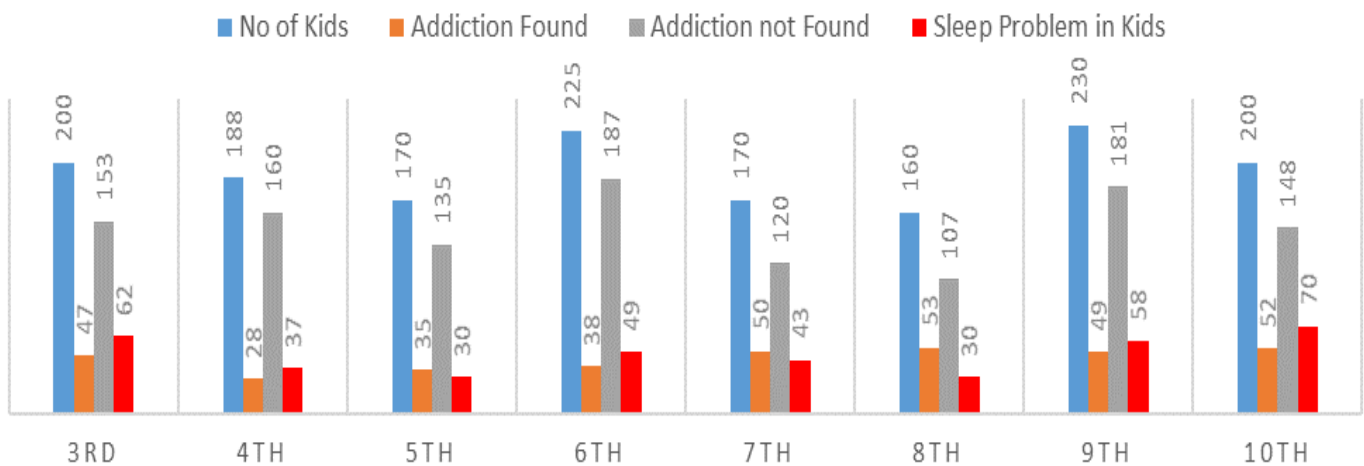

Figure 2 Smartphone addiction with reference to sleep problems in kids

Now we will talk about the results of smartphone addiction and their relationship with the Anxiety and Depression. We ask they feel depressed after using the smartphone. The kids who use the smartphones at the addiction level having the anxiety and depression issues. In the graph below this can be seen.
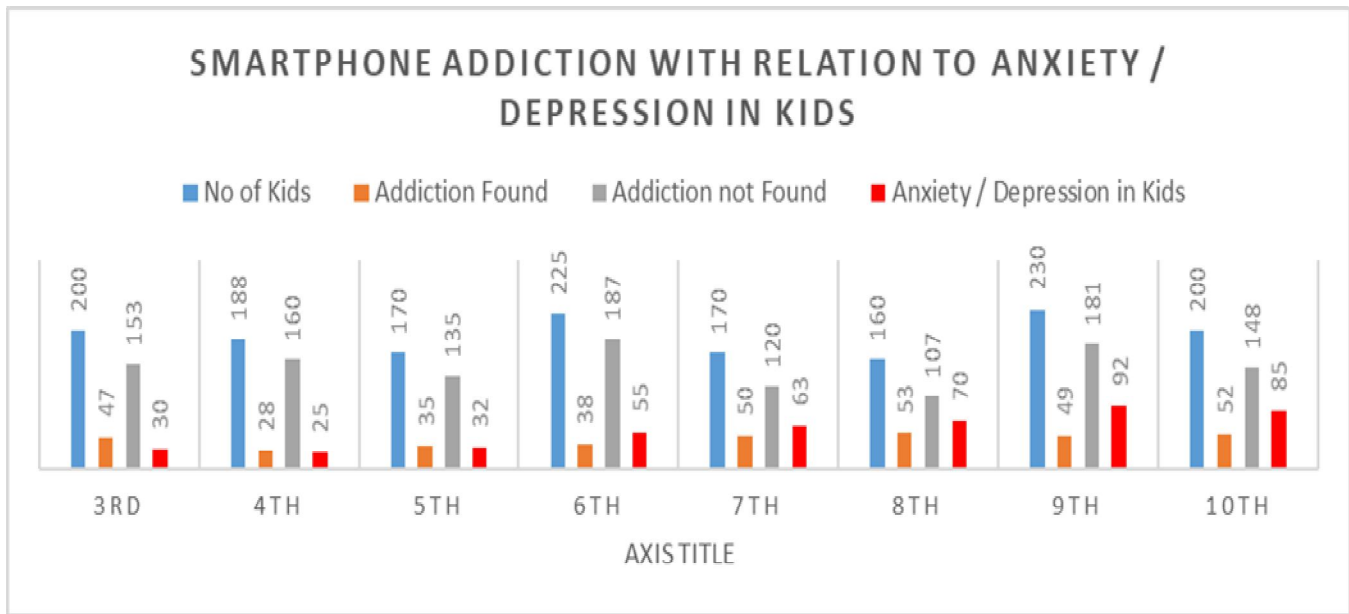
Figure 2 Smart phone addiction with relation to anxiety/depression in kids

We can see the mental health in the kids of different level of smartphone users. The kids in which addiction is found having some health issues. They are not involving socially with the family and friends. Loss of interest in different situations They have extremely high and low moods. This can be seen in the graph below.
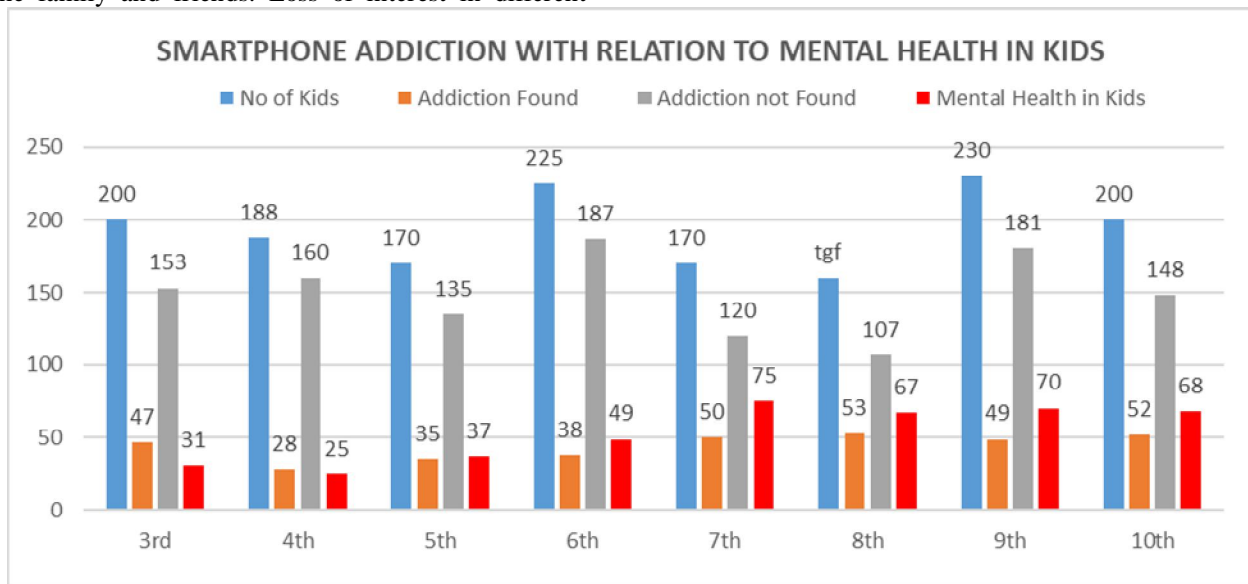

Figure 3 Smart phone addiction with realtion to mental health in kids

5 CONCLUSION

In terms of demographic factors, the aim of this research was to analyze and compare smartphone use and its effects on children's health. According to the results of the study, there is a connection between mobile addiction in children and various issues such as sleep problems, anxiety, and depression in children.

We research among the different age group of the children. We selected child from 8 to 16 years and their classes are 3 to 10th. A mobile phone is now a clock, a dictionary, a book, a computer, an interactive guide, a planner, and a tutor in addition to being a communication device. Teenagers use their smartphones to read all types of stories online, and all of them use their smartphones to do their homework. Furthermore, for children, a mobile phone acts as an education tutor. According to the findings, senior students are more likely to be addicted to their smartphones. Depression continues to be prevalent among students who primarily use mobile phones. Between the level of education and smartphone addiction, statistically significant differences were discovered. Differences between genders were statistically important. When we talk about in the percentage with relation to the different issues like sleep problem,

Depression, Mental Health with the smartphone usage. Relationship with Sleep and the addiction of smartphone in the kids. We experiment on the 1543 children of 3rd to 10th class. From the total child's of 1543 we found the 352-child addicted to the smartphone according to the criteria we adopt. It becomes the 22.8% of the 1543 kids. 22.8% is the sum of all classes we experiment on the kids who are serious addicted to the smartphones. In the 3rd, 7th and 10th 31%, 25.3% and 35% respectively having the sleep problem. It is 24.6% of total 1543 kids that have sleep problem. When we talk about the anxiety / Depression we take some sample classes to discuss here 3rd, 7th and 10th there are 15%, 37.1% and 42.5% respectively anxiety/depression found in these kids. It is 29.3% of total 1543 kids who having anxiety / depression. So, after it we conclude about the mental health in the kids of 3rd to 10th classes. As sample I mention here 3rd, 7th and 10th classes there 15.5%, 31.2% and 34% mental health issues in these classes respectively. 25.9% of 1543 kids found the mental health issues.

It is recommended that the causes of smartphone addiction be evaluated in a range of ways in different study categories based on the results of this research. Workshops, forums, and multi-faceted activities are often suggested as ways to reduce smartphone addiction among schoolchildren while also evaluating their spare time.

REFERENCES

1. .Selçuk, K. T., & Ayhan, D. (2020). **The relationship between smartphone addiction risk and sleep duration and psychosocial comorbidities in health professional candidates.** Perspectives in psychiatric care, 56(3), 541-546.

2. N. Pinion, "**A majority of kids have smartphones by middle school, study finds**," June 2021.

3. Ryding, F. C., & Kuss, D. J. (2020). **Passive objective measures in the assessment of problematic smartphone use: A systematic review. Addictive Behaviors** Reports, 11, 100257.

4. Guifang, F., & Yin Jieying, P. (2020). **Mobile Phone Use, Mobile Phone Addiction and Academic Performance in Primary School Students. thinking,** 3(1).

5. De-Sola Gutiérrez, J., Rodríguez de Fonseca, F., & Rubio, G. (2016). **Cell-phone addiction: A review. Frontiers in psychiatry**, 7, 175.

6. Tükel, Y. (2020). **Investigation of the Relationship between Smartphone Addiction and Leisure Satisfaction of University Students.** International Journal of Technology in Education and Science, 4(3), 218-226.

7. [6] Aleem, N., Abro, M. R., Imam, I., & Gillani, A**. H. (2020). SMARTPHONES ADDICTION IN CHILDREN AND ITS IMPACTS ON THEIR PSYCHOLOGY: A COGNITIVE ANALYSIS OF CHILDREN IN PAKISTAN**. Hamdard Islamicus, 43(1..), 358-368.

8. [7] Demirci, K., Akgönül, M., & Akpinar, A. (2015). **Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. Journal of behavioral addictions**, 4(2), 85-92.

9. [8] Yang, X., Zhou, Z., Liu, Q., & Fan, C. (2019**). Mobile phone addiction and adolescents' anxiety and depression: the moderating role of mindfulness**. Journal of child and family studies, 28(3), 822-830.

10. Council on Communications and Media, & MBE. (2016). **Media use in school-aged children and adolescent**s. Pediatrics, 138(5).

11. Valasareddy, M., Wang, W., Abdul-Al, C. F., & Niles, S. P. (2019). **THE IMPACT OF BEDTIME SMARTPHONE USAGE ON SLEEP HEALTH: A PILOT QUANTITATIVE STUDY**. Issues in Information Systems, 20(4).

12. [11] Choi, S. (2019). **Relationships between smartphone usage, sleep patterns and nursing students' learning engagement.** Journal of Korean Biological Nursing Science, 21(3), 231-238.

13. Tao, F., Zou, L., Wu, X., Tao, S., Xu, H., Xie, Y., & Yang, Y. (2019). **Mediating effect of sleep quality on the relationship between problematic mobile phone use and depressive symptoms in college students**. Frontiers in psychiatry, 10, 822.

14. Matsuura, Y., Morita, T., Sekimoto, M., Maeda, A., & Yasui, T. (2020). **Differences in Physical and Psychological Condition, Sleeping Status and Menstruation-Related** Symptoms before and after Smartphones Use in Young Female Students in Japan. Health, 12(04), 407.

15. Lee, P. H., Andy, C. Y., Wu, C. S., Mak, Y. W., & Lee, U. (2020). **Objectively-Measured Smartphone Usage, Sleep Quality, and Physical Activity Among Chine**se Adolescents and Young Adults.

16. [15] Wang, P. Y., Chen, K. L., Yang, S. Y., & Lin, P. H. (2019). **Relationship of sleep quality, smartphone dependence, and health-related behaviors in female junior college students.** PloS one, 14(4).

17. [16] Elhai, J. D., Yang, H., Fang, J., Bai, X., & Hall, B. J. (2020). **Depression and anxiety symptoms are related to problematic smartphone use severity in Chinese young adults: Fear of missing out as a mediator**. Addictive behaviors, 101, 105962.

18. Mohamed, S. M., & Mostafa, M. H. (2020). **Impact of smartphone addiction on depression and self☐esteem among nursing students**. Nursing Open.

19. Guo, N., Luk, T. T., Ho, S. Y., Lee, J. J., Shen, C., Oliffe, J., ... & Wang, M. P. (2020). **Problematic smartphone use and mental health in Chinese adults: A population-based study**. International journal of environmental research and public health, 17(3), 844.

20. Sánchez-Martínez, M., & Otero, A. (2009). **Factors associated with smartphones use in adolescents in the community of Madrid (Spain)**. CyberPsychology & Behavior, 12(2), 131-137.

21. Siddiqi, N., Kamal, M. H., Moin, F., Rafei, M. A., Al-Shehi, F., & Al-Maqbali, R. (2020). **The Prevalence of Mobile Phone Use in The School Going Children in North Al Batinah Region of Oman:** A Cross Sectional Study. Biomedical and Pharmacology Journal, 13(4), 1993-2002.

22. M. R. Naqvi, M. Arfan Jaffar, M. Aslam, S. K. Shahzad, M. Waseem Iqbal and A. Farooq, **Importance of Big Data in Precision and Personalized Medicine**, International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), Ankara, Turkey, 2020,.

23. Tamura, H., Nishida, T., Tsuji, A., & Sakakibara, H. (2017). **Association between excessive use of mobile phone and insomnia and depression among Japanese adolescents.** International journal of environmental research and public health, 14(7), 701.

24. M. R. Naqvi, M. Aslam, M. W. Iqbal, S. Khuram

25. Shahzad, M. Malik and M. U. Tahir, **Study of Block Chain and its Impact on Internet of Health Things (IoHT): Challenges and Opportunities,** 2020 International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), Ankara, Turkey, 2020.

26. Kılıç, A. O., Sari, E., Yucel, H., Oğuz, M. M., Polat, E., Acoglu, E. A., & Senel, S. (2019). **Exposure to and use of mobile devices in children aged 1–60 months**. European journal of pediatrics, 178(2), 221-227.

27. Lee, J. E., Jang, S. I., Ju, Y. J., Kim, W., Lee, H. J., & Park, E. C. (2017). **Relationship between Mobile phone addiction and the incidence of poor and short sleep among Korean adolescents: a longitudinal study of the Korean Children & Youth** Panel Survey. Journal of Korean medical science, 32(7), 1166.

28. Park, S. Y., Yang, S., Shin, C. S., Jang, H., & Park, S. Y. (2019). **Long-term symptoms of mobile phone use on mobile phone addiction and depression among Korean adolescent**s. International journal of environmental research and public health, 16(19), 3584.

29. Sahu, M., Gandhi, S., & Sharma, M. K. (2019). **Mobile phone addiction among children and adolescents:** A systematic review. Journal of addictions nursing, 30(4), 261-268.

30. Naqvi, M. R., Iqbal, M. W., Shahzad, S. K., Tariq, I., Malik, M., Ehsan, F, Tabassum, N. (2020). **A Concurrence Study on Interoperability Issues in IoT and Decision Making Based Model on Data and Services being used during Inter-Operability**. LGURJCSIT, 4(4), 73-85.

31. Raza, S. A., Yousufi, S. Q., Rafi, S. T., & Javaid, S. T. (2020). **Impact of Smartphone Addiction on Students' Academic** Achievement in Higher Education Institute of Pakistan.

32. Fischer-Grote, L., Kothgassner, O. D., & Felnhofer, **A. (2019). Risk factors for problematic smartphone use in children and adolescents:** A review of existing literature. neuropsychiatrie, 33(4), 179-190.

33. Lee, J. E., Jang, S. I., Ju, Y. J., Kim, W., Lee, H. J., & Park, E. C. (2017). **Relationship between Mobile phone addiction and the incidence of poor and short sleep among Korean adolescents: a longitudinal study of the Korean Children & Youth Panel** Survey. Journal of Korean medical science, 32(7), 1166.

34. Brodić, D., & Amelio, A. (2016, September). **Analysis of the human-computer interaction on the example of image-based CAPTCHA by association rule mining**. In International Workshop on Symbiotic Interaction (pp. 38-51). Springer, Cham.

35. Bevan, N. (1995). **Human-computer interaction standards. In Advances in human factors/ergonomics** (Vol. 20, pp. 885-890). Elsevier.

36. Iqbal, M. W., Ahmad, N., & Shahzad, S. K. (2017). **Usability evaluation of adaptive features in smartphones.** Procedia computer science, 112, 2185-2194.

37. Körmendi, A., Brutóczki, Z., Végh, B. P., & Székely, R. (2016). **Smartphone use can be addictive? A case report**. Journal of behavioral addictions, 5(3), 548-552.

38. Amudhan, S., Prakasha, H., Mahapatra, P., Burma, A. D., Mishra, V., Sharma, M. K., & Rao, G. N. (2021). **Technology addiction among school-going adolescents in India: epidemiological analysis from a cluster survey for strengthening adolescent health programs at district level.** Journal of Public Health.

39. Choksi, S. T. (2021). **A Study to Find Out the Correlation of Mobile Phone Addiction with Anxiety, Depression, Stress and Sleep Quality in the College Students of Surat City**. Int J Cur Res Rev| Vol, 13(08), 137.