



Study on Anxiety and Depression in Students Performance due to Excessive Usage of Smartphones

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ABSTRACT

Smartphones are now have become everyone's basic need. Because of their amazing features and functions, smartphones are now growing worldwide. Everyone is using a smartphone from a child of age 05 to an old man of age 70+. Smartphones are no doubt very useful but they have also effects on health especially youngers in simple words university students. This paper represents anxiety and depression symptoms in university students and their effects on their academic performance because of smartphone's excessive usage. The research has to lead to some interesting facts and about the usage of smartphones in university students. Surveys have been conducted using questionnaires and the results were analyzed. From the analysis of the results, it shows that many male and female university students are addicted to the smartphone and they have symptoms of anxiety and depression.

Keywords: Smartphones, Anxiety, Depression

I. INTRODUCTION

By 2020, estimates suggest that smartphone holders would 6.1 billion, which is double 70 percent of the people in the world. All of these have been potential users are newly come from developing nations through greater ones smartphone Accessibility, growing markets, and young, increasing communities [1]. Ultimately, smartphones will exceed then the telephone lines worldwide with this rise besides rapidly approach personal computer ownership [2], [3].

Smartphones have been common around the World, and have become the maximum used devices. To perform the roles according to its usage criteria, consumers bring them everywhere throughout the whole time. About 6.3 billion mobile subscriptions are expected to be accessible in 2021[4]. Currently, the best common operating systems (OS) are "Android (Google)" and "iPhone (Apple)", all of which provide a wide range of applications with a variety of functions [5], [6].

In today's society, smartphones are pervasive worldwide. (PRP) reveals that 72 percent of Americans possess a smartphone, utilizing a 43 percent global average possession [1]. For several individuals, however, the troublesome use of smartphones has adverse consequences. A study, for example, suggests risky results for problematical smartphone use containing disrupting drivers and walkers [7], [8]. Impacts on musculoskeletal fitness, poor physical activity, and academic deficits [9]–[11] are additionally affected. Therefore, it is of great public health interest to research tricky smartphone use. In this paper, our emphasis is on associations, psychopathology, dysfunctional self-, and emotional processes, and mechanisms of PSU. Awareness and satisfaction of social besides tactile needs [12].

While some mobile applications can help fix behavioral issues, the use of smartphones can in itself convert a behavioral problem. 46% of the smartphone users said they thought they cannot survive without their smartphone, 30% said they felt that their cell phone was a "leash," limiting their independence, and 19% sensed that their phone existed as an economic burden [2]. In addition, the author developed an instrument evaluating the use and perceptions of media besides the technology (MTUAS) where undergraduates over 18 years of age are were surveyed on their habits and opinions in technology. The time consuming because of the phone was set up to be positively linked to anxiety regarding not checking in with technology frequently enough [3]. In their second study the MTUAS findings showed that there were 6 negative attitudes towards (e.g., technology) creates life more complex, technology creates so much time spent by people, and technology creates people more alone) more clinical indications of depression were expected [12]. This may suggest that quantitative smartphone usage may not permanently problematic for consumers; though, smartphone use coupled with adverse behavior and expectations of dependency and technology anxiety may rise negative results related to Smartphone use, especially the risk of anxiety and depression for smartphone users.

Decreased emotive self-control, or emotive dysregulation, is another important build within the thoughtless road to

smartphone usage. Two procedures decreased cognitive reassessment, and improved emotional repression are also characterized by dysregulated emotion [13]. Problematic mobile users are likely to overuse their phones due in part to an incapability to control their feelings. In addition, smartphone use can be a strategy to cope with or suppress negative emotions (although ineffective). In reality, in a study through undergraduates, the normal use of emotive repression was related to a more severe lack of specific Entertainment and data content dimensions of the use of smartphones [14]. A crowd of studies has shown that emotional deregulation mediates the association between problem habits and related mental disorders. They were especially concerned about the emotional deregulation mediates relationships between issues with smartphone usage in depression accounting besides anxiety accounting [15].

II. BACKGROUND AND LITERATURE REVIEW

HCI is a study that provides contact among humans as well as smartphones that plays an important role in estimating user performance, especially user reply time [16].

Research in Asia involving 210 females from Korea who are students of university ages was around 22-25 years showed It was 30.5 percent had a high risk of mobile addiction in Asia [17]. Another survey undertaken by the Department of Gender Equity and Families in Korea in 2013 found that is 17.9% of Korea's teens were addicted to smartphones [18]. A survey directed Among 414 students of the university whom age was around 19 to 26 years, 13.5 percent of the people were found as addicted to smartphones [19].

Another research steered in Turkey showed that 319 students of Turkish universities age between 19.5 to 20.5 years old. According to that survey, 39.8 percent of peoples were smartphone addicts and extreme smartphone users [20]. In another single study conducted in Lebanon proves that 44.6% of the students whose quantity was 249 and their ages between 19.05 to 20.96 years were excessive smartphone users [21]. Another study in the US, where they have gathered data of around 200 students of the university named Stanford found 10% of them almost completely addictive to smartphones and 34% of them were excessive users of iPhones, respectively [22]. In Africa, around 276 students of college ages between 17 to 30 were excessive users of smartphones 11.2% of the whole college [23].

The authors discuss three common options accessible via mobile phone in an additional study: music, text, and social media, and their Interference when doing homework or learning. A recent study found that quick 30 seconds or less of visual inspection spaced across the day was common among users of mobile phones. Such constant usage of a smartphone can grow into a habit when combined with poor self-regulation, resulting in bad academic results. Our primary objective is therefore to investigate the connection

between multitasking practices linked to mobile phones This interferes with the analysis and self-reporting of "loss of control behaviors" resulting from lacking self-regulation. In addition, they create and test 3 multitasking measures given the lack of existing multitasking measures: frequency of rushed multitasking, the regularity of pairwise multitasking, besides attention allocation inside a multitasking package [24].

PSU can be affected by several pathways. Psychopathology or pathways to mental wellbeing are based on a single line of study. Recent research shows that PSU severity in U.S. participants is mild to reasonably associated with anxiety also depression severity [25]. Although PSU may produce psychopathology less, they address the more recognized theoretical concept that psychopathology leads to PSU.

More recent readings have analyzed, In comparison to further negative, PSU effect-related factors, in adding to examining PSU's association with depression as well as anxiety intensity. In particular, the magnitude of PSU relates to meditation and concern [26]. That is also linked to dysregulation of feelings and anxiety [27].

An additional related variable is FOMO - the anxiety of missing satisfying interactions, and a resulting desire to remain persistently linked with one's social network [28]. FOMO encompasses negative effects from unmet needs for social interaction and contributes to the intensity of depression/anxiety [29]. FOMO has prospectively been associated with negative affect for one week [30]. FOMO relates to the use of extreme social network (SNS) sites and the intensity of PSU. One reading found that FOMO was associated with increased [7]use of social smartphones [25], While an additional found that FOMO was more closely linked to non-social use of smartphones.

Research shows a lower incidence of depression due to increased usage of social smartphones such as collective networking, whereas increased psychopathology related to anxiety still relates to procedure use [31]. Moreover, [32] Social stress was found more linked to the use of procedures. In addition, FOMO relays to improved social use, however with stronger ties to the use of procedures [33] It found that while more psychological well-being was associated with personalized SNS contact, one-click experiences connecting little online socialization (e.g. liking/distribution contented) were not. Generally, the phase of smartphone use tends to be more closely associated with symptoms of psychopathology than through social use [27].

While few revisions examined the self-governing predictive consequence of depression besides anxiety on mobile phone obsession in college undergraduates, they fell dumpy simultaneously, monitoring of various sociodemographic, lifestyle, characteristics, personality academic, religious practice, besides smartphone associated variables (what was the age of first use, an interval of usage per weekday, the intent of using a smartphone) in the sample studied [20].

Additionally, it was restricted to quarantined sociodemographic and/or academic. Mobile phone use linked variables when researchers accounted for the impact of confusing variables when determining the independent influence of dejection Smartphone addiction or anxiety in students of the university. Given the extraordinary smartphone penetration rate in Lebanon country, the correlation of mobile phone use with compulsion and adverse health results and the probability of smartphone addiction as core independent risk issues may have dejection or anxiety; thus it is important to measure smartphone-related addictive indications and determine potential depression contribution. This research purpose was to 1) examine the prevalence of social, mental, and physical health symptoms of Smartphone dependence, in addition, 2) investigate like depression instead of anxiety among a trial of Lebanese students individually contributes to the degree of Mobile phone addiction, while at the same time controlling for other self-determining variables [22].

3. METHODOLOGY

A. Aim

We have studied the symptoms of psychopathology (Correlation of depression, academic performance, and anxiety) associate with public and smartphone excessive Usage, as well as how such usage corresponds to psychopathology symptoms. We were mostly interested in academic performance as a potential intermediate variable among both anxiety and depression with smartphone

excessive use as current work promotes such intermediate relationships, intensity [34]. This research is essential in enhancing the understanding of the relationship to smartphone excessive use severity, such as academic performance, and the position of how individuals use their smartphones.

B. Objectives of the study

The current research explored the relations between smartphone addiction issues and interventions. There was a consideration of the severity of smartphone addiction among male as well as female students. There are also recommendations for improving the constructive use of the smartphone, the positive and the negative consequences of smartphone addiction by students at the university level.

C. Study design

The design of the study describes the steps found in the title quest also shown in figure 1 On 20 October 2020, using Google Scholar, and provided 60 results. That number was reduced to 46 outcomes after applying the evaluation determination criteria. Again, certain papers must be omitted to remain within the limits of the study field. The remaining number of documents then declined to 40. The application of similar reporting criteria to significant sources in retrogressive hunting out of those seven findings yielded another three papers, taking the collection to 37. However, a forward search has attempted to produce no extra significant results within the limits of the characterized requirements for incorporation and prevention.

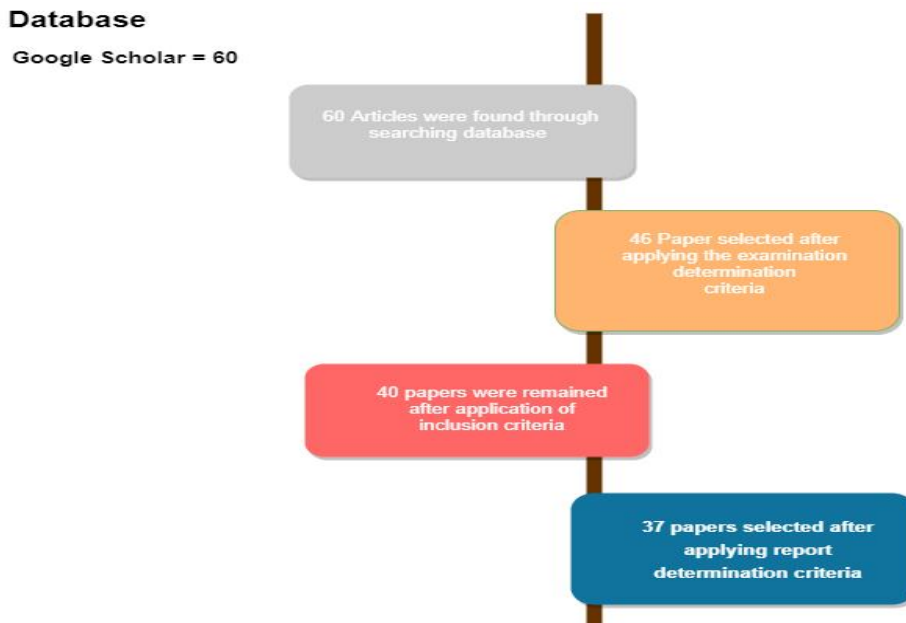


Figure:.1 Selection of Articles

A. Research instruments

In this research, smartphone users who are using it for almost 1 year and more were participants. In direction to discover the interconnected and significant literature, a questionnaire was generated to examining the appropriate participants for the best user’s experimentation. Before the start of the questionnaire, participants were told the intention of the research, the participation protocols, the risks, the advantages of testing, confidentiality, and the opportunity to withdraw at any phase from the analysis for the purpose to continue the research. 10 questions were included in the questionnaire that was carefully recruited in compliance with the mindset of students at the university level. The questionnaire was clear and easy to comprehend, which clarify each question so that students could clearly understand and address them.

B. Data analysis

To assess the data, the students' responses were converted to a numerical scale as follows: “Agreed = 5”, “Strongly Agreed = 4”, “Undecided = 3”, “Disagreed = 2”, and “Strongly Disagreed = 1”. The study of each topic resulted in a common portrayal of the degree of smartphone usage

satisfaction between University level students.

C. Tools Used

After scenario questionnaire (ASQ) standard was followed to develop the questionnaire which consists of 10 questions that are finalized after a deep study of anxiety and depression symptoms in the academic performance of students.

The questionnaire was developed on google forms.

The data gathered from the students using the questionnaire was entered in MS Excel and results appear as rates and tables.

SA scale was analyzed from the results.

Depression and anxiety scale. The reason for this article was disclosed to the members and the educated assent was acquired.

Percentage, as well as standard deviation, were used to assess the results. For the overall study, a particular table was developed.

D. Data collection

By using questionnaires, we have collected data for our study, we have requested consent from these students.

Age:

270 responses

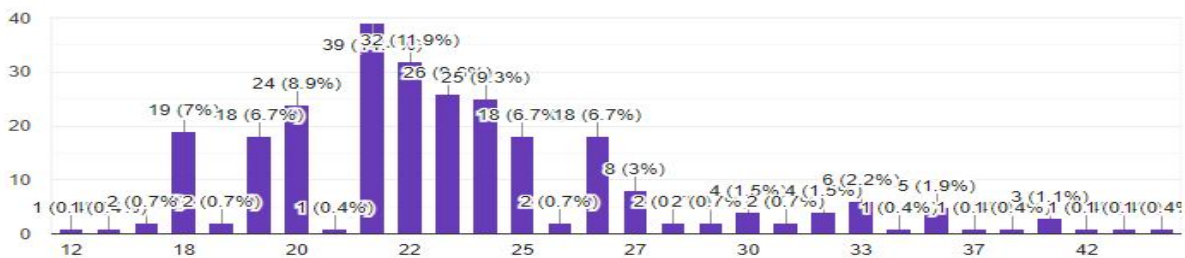


Figure:2: Selection of Participants on the base of Age

The collecting of data continued from February 08 to March 12, 2021, and the respondents were students from universities. Initially, 270 respondents were categorized via a questionnaire. 04 participants from these were rejected in the first phase because their ages are below 18 years. Explicitly 08 participants were considered over aged because their ages are above 30. The remaining 258 contributors were picked for the analysis. A particular analysis containing 114 females and 155 males’ participants was allocated to each group. In comparison with anxiety, depression symptoms, and without these symptoms, all participants were analyzed on the symptoms criteria. The ages of the 258 participants ranged between 18 and 35 years.

A. Smartphone addiction

Smartphone addiction is assessed using the SA Scale. It consists of 6(1, 2, 3, 4, 5, 7) questions in the research paper and the results were analyzed and completely based on these 6 questions mentioned in the questionnaire. A higher score

indicated an increased seriousness of the SA scale.

B. Attachment anxiety

Anxiety from the results of questions 6 and 10. Results were analyzed and completely based on these questions. From the

analysis we have found out the percentage of peoples can be in the range of anxiety disorders.

C. Depression

Depression from the results of question no 2 and 9 the results were analyzed and perform experimentation on them to find out the percentage of peoples feels hopeless and can be in the range of depression disorder.

D. Academic performance

Academic performance effects measure from the results of question no (5, 6, 8). The results were analyzed and get the final analysis of who is more affected by the smartphone's excessive usage male or female.

III. RESULTS

As shown in Figure 2 we have collected around 270 responses from university students. In our research, there are 114 (42.2%) females and 155 (57.4%) males have participated. The ages of these students were between 18 to 35 the mean of the ages 25.6 ± 1.91 .

$$\text{Mean} = \bar{X} = \frac{\sum_{i=1}^n X_i}{n} \quad (1)$$

After analysis, we have generated the final results. Figure 3 shows that 95 (35.5%) of the students are happy with the excessive usage of the smartphone. 71 (26.3%) of the students feel depressed when they are unable to use a smartphone because of low charging. 58 (21.5%) of the students don't think to live without a smartphone. 84 (31.5%) of the university students have anger issues when they have misplaced their smartphones. 128 (47.4%) of the student's waste too much time on smartphones sometimes in hours on daily basis. 92 (34.4%) of the students like to use smartphones alone so that no one can disturb them while using a smartphone. These students are smartphone-addicted.

Gender:

270 responses

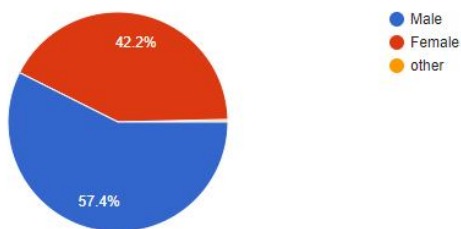


Figure.3 Participants gender-wise analysis

Attachment anxiety was analyzed and from the results, In Table .1 that 93 (34.4%) of the university students feel tiredness. 97 (35.9%) of the students stayed restless and feel lazy after excessive usage of smartphones and that much usage leads to anxiety disorder.

Attachment depression was assessed by the results and we have found out that 93 (34.4%) of the students are too much attached to the smartphone. 63 (23.3%) of the students use a smartphone while eating and drinking. We have found that they are victims of depression.

Academic performance was assessed after the deep analysis of the results. 128 (47.4%) of the student's waste too much time on smartphones and sometimes forgot their important work. 93 (34.4%) of the students feel tired after using a smartphone so they cannot pay attention to lectures. 77 (28.5%) of the students even forget about their sleep while using a smartphone as entertainment. These are all the factors that lead to spoiling their academic performance. So, we have analyzed from the results that smartphone addiction, anxiety, and depression disorders are somehow correlated to each other.

Table 1: Results of Smartphone usage satisfaction by university students are shown below. (n=270)

Sr	Statements	5	4	3	2	1
1.	Does smartphone use make you happy?	95 (35.2%)	08 (40%)	49 (18.1%)	8 (3.4%)	10 (3.7%)
2.	Have you ever feel depressed when your smartphone battery is low and the facility of charging is not available?	71 (26.3%)	3 (34.4%)	44(16.3%)	29 (10.7%)	33 (12.2%)
3.	Do you feel you cannot live without a smartphone?	58 (21.5%)	62 (23.0%)	55 (20.4%)	52 (19.3%)	43(15.9%)
4.	When your smartphone misplaced do you ever feel angry at yourself?	84 (31.5%)	81 (30%)	48 (17.1%)	31 (11.5%)	26 (9.6%)
5.	Do you think that you waste unexpected time which is in hours on a smartphone daily?	128 (47.4%)	74 (27.4%)	41 (15.2%)	18 (6.7%)	9 (3.3%)
6.	Have you ever feel tired after using a smartphone continuously?	93 (34.4%)	93 (34.4%)	39 (14.4%)	22 (8.1%)	23 (8.5%)
7.	Do you like to use smartphones alone?	92 (34.1%)	83 (30.7%)	57 (21.1%)	23 (8.5%)	15 (5.6%)
8.	Have you ever forget that you are hungry, your need to sleep, and your imp work because of the smartphone?	65 (24.1%)	86 (31.9%)	44 (16.3%)	26 (9.6%)	49(18.1%)
9.	Have you ever feel like missing your smartphone	63 (23.3%)	77(28.5%)	45 (16.7%)	34 (12.6%)	51(18.9%)
10.	Do you stay restless and feel lazy because of Excessive smartphone usage?	97 (35.9%)	94 (34.8%)	32 (11.9%)	23 (8.5%)	24(8.9%)

4. RECOMMENDATIONS

As we are not against technology but we are against the negative usage of technology. So we suggest some factors to decrease the usage of smartphones and these recommendations can help students to regain their health and performance as well.

- Students should spend free time in physical activities like workouts or exercises.
- Students need to stop using smartphones while eating.
- Make sure to use a smartphone for only a good purpose.
- You should control and stop yourself from the usage of smartphones for negative use like scrolling every time just for entertainment instead of learning.

5. CONCLUSION

We concluded that there is a huge no of students who have become smartphone-addicted and they waste too much time on smartphones. Excessive usage leading them to the actual victim of anxiety and depression symptoms. And because of that, they can't focus on their studies because they feel tired and remain lazy all the time. We have also found that students want to use smartphones alone because they don't want anyone to disturb them. And that much usage affects very badly on their academic performance. Anxiety, depression symptoms, and their effects on university students are correlated to each other.

REFERENCES

[1] Africa, A.D.M., Asuncion, F.X., Tiberio, J.L. and Munchua, R.M.F.A., 2019. **Sensor-based traffic control network with neural network based control system.** International Journal of Advanced Trends in Computer Science and Engineering, 8(4), p.983.

[2] M. Samaha and N. S. Hawi, “**Relationships among smartphone addiction, stress, academic performance, and satisfaction with life,**” *Comput. Hum. Behav.*, vol. 57, pp. 321–325, 2016.

[3] L. D. Rosen, K. Whaling, L. M. Carrier, N. A. Cheever, and J. Rokkum, “**The media and technology usage and attitudes scale: An empirical investigation,**” *Comput. Hum. Behav.*, vol. 29, no. 6, pp. 2501–2511, 2013.

[4] I. Andone, K. Błaszczewicz, M. Eibes, B. Trendafilov, C. Montag, and A. Markowetz, “**How age and gender affect smartphone usage,**” 2016, pp. 9–12.

[5] S. K. Shahzad, D. Ahmed, M. R. Naqvi, M. T. Mushtaq, M. W. Iqbal, and F. Munir, “**Ontology Driven Smart Health Service Integration,**” *Computer Methods and Programs in Biomedicine*, vol. 207, p. 106146, Aug. 2021.

[6] M. W. Iqbal, N. Ahmad, and S. K. Shahzad, “**Usability evaluation of adaptive features in smartphones,**” *Procedia Comput. Sci.*, vol. 112, pp. 2185–2194, 2017.

[7] F. Cazzulino, R. V. Burke, V. Muller, H. Arbogast, and J. S. Upperman, “**Cell phones and young drivers: a systematic review regarding the association between psychological factors and prevention,**” *Traffic Inj. Prev.*, vol. 15, no. 3, pp. 234–242, 2014.

[8] L. L. Thompson, F. P. Rivara, R. C. Ayyagari, and B. E. Ebel, “**Impact of social and technological distraction on pedestrian crossing behaviour: an observational study,**” *Inj. Prev.*, vol. 19, no. 4, pp. 232–237, 2013.

[9] M. Umair, N. Chalabianloo, C. Sas, and C. Ersoy, “**A Comparison of Wearable Heart Rate Sensors for HRV Biofeedback in the Wild: An Ethnographic Study,**” presented at the 25th annual international CyberPsychology, CyberTherapy & Social Networking Conference, 2020.

[10] A. Lepp, J. E. Barkley, and A. C. Karpinski, “**The relationship between cell phone use, academic performance, anxiety, and satisfaction with life in college students,**” *Comput. Hum. Behav.*, vol. 31, pp. 343–350, 2014.

[11] M. J. Rebold, T. Sheehan, M. Dirlam, T. Maldonado, and D. O'Donnell, “**The impact of cell phone texting on the amount of time spent exercising at different intensities,**” *Comput. Hum. Behav.*, vol. 55, pp. 167–171, 2016.

[12] L. D. Rosen, K. Whaling, S. Rab, L. M. Carrier, and N. A. Cheever, “**Is Facebook creating ‘iDisorders’? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety,**” *Comput. Hum. Behav.*, vol. 29, no. 3, pp. 1243–1254, 2013.

[13] J. J. Gross and O. P. John, “**Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being.,**” *J. Pers. Soc. Psychol.*, vol. 85, no. 2, p. 348, 2003.

[14] 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,** 2020 International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), Ankara, Turkey, 2020,

[15] J. D. Elhai, J. C. Levine, R. D. Dvorak, and B. J. Hall, “**Fear of missing out, need for touch, anxiety and depression are related to problematic smartphone use,**” *Comput. Hum. Behav.*, vol. 63, pp. 509–516, 2016.

[16] D. Brodić and A. Amelio, “**Analysis of the human-computer interaction on the example of image-based CAPTCHA by association rule mining,**” 2016, pp. 38–51.

[17] J. Lee, B. Cho, Y. Kim, and J. Noh, “**Smartphone addiction in university students and its implication for learning,**” in *Emerging issues in smart learning*, Springer, 2015, pp. 297–305.

[18] M. R. Naqvi, M. Aslam, M. W. Iqbal, S. Khuram 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.

[19] M. Bian and L. Leung, “**Linking loneliness, shyness, smartphone addiction symptoms, and patterns of**

smartphone use to social capital,” *Soc. Sci. Comput. Rev.*, vol. 33, no. 1, pp. 61–79, 2015.

[20] K. Demirci, M. Akgönül, and A. Akpınar, “**Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students,**” *J. Behav. Addict.*, vol. 4, no. 2, pp. 85–92, Jun. 2015, doi: 10.1556/2006.4.2015.010.

[21] N. S. Hawi and M. Samaha, “**To excel or not to excel: Strong evidence on the adverse effect of smartphone addiction on academic performance,**” *Comput. Educ.*, vol. 98, pp. 81–89, 2016.

[22] J. Matar Boumosleh and D. Jaalouk, “**Depression, anxiety, and smartphone addiction in university students-A cross sectional study,**” *PloS One*, vol. 12, no. 8, p. e0182239, 2017.

[23] E. B. Lee, “**Too much information: Heavy smartphone and Facebook utilization by African American young adults,**” *J. Black Stud.*, vol. 46, no. 1, pp. 44–61, 2015.

[24] P. David, J.-H. Kim, J. S. Brickman, W. Ran, and C. M. Curtis, “**Mobile phone distraction while studying,**” *New Media Soc.*, vol. 17, no. 10, pp. 1661–1679, 2015.

[25] C. A. Wolniewicz, D. Rozgonjuk, and J. D. Elhai, “**Boredom proneness and fear of missing out mediate relations between depression and anxiety with problematic smartphone use,**” *Hum. Behav. Emerg. Technol.*, vol. 2, no. 1, pp. 61–70, 2020.

[26] T. Naz, M. Akhtar, S. K. Shahzad, M. Fasli, M. W. Iqbal, and M. R. Naqvi, “**Ontology-driven advanced drug-drug interaction,**” *Computers & Electrical Engineering*, vol. 86, p. 106695, Sep. 2020.

[27] J. D. Elhai, E. F. Gallinari, D. Rozgonjuk, and H. Yang, “**Depression, anxiety and fear of missing out as correlates of social, non-social and problematic smartphone use,**” *Addict. Behav.*, vol. 105, p. 106335, 2020.

[28] P. Wang *et al.*, “**Envy and problematic smartphone use: The mediating role of FOMO and the moderating role of student-student relationship,**” *Personal. Individ. Differ.*, vol. 146, pp. 136–142, 2019.

[29] 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.

[30] A. Holding, N. Hope, J. Verner-Filion, and R. Koestner, “**In good time: A longitudinal investigation of trait self-control in determining changes in motivation quality,**” *Personal. Individ. Differ.*, vol. 139, pp. 132–137, 2019.

[31] D. Rozgonjuk, J. D. Elhai, T. Ryan, and G. G. Scott, “**Fear of missing out is associated with disrupted activities from receiving smartphone notifications and surface learning in college students,**” *Comput. Educ.*, vol. 140, p. 103590, 2019.

[32] M. R. Naqvi, S. K. Shahzad, M. W. Iqbal, M. Ahmed, M. U. Tahir, and B. A. Khan, “**Need for Computational and**

Psycho-linguistics Models in Natural Language Processing for Web Documents,” 2020 4th International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT), Oct. 2020.

[33] M. Burke, J. Cheng, and B. de Gant, “**Social Comparison and Facebook: Feedback, Positivity, and Opportunities for Comparison,**” 2020, pp. 1–13.

[34] Ullah, M. R., Shahzad, S. K., Naqvi, M. R. (2019, February). Challenges and Opportunities for Educational Data

Mining in Pakistan. In 2019 International Conference on Engineering and Emerging Technologies (ICEET) (pp. 1-6). IEEE.