INCREASE IN SCREEN TIME DUE TO SARS-CoV-2 PANDEMIC AND ITS EFFECT ON MENTAL HEALTH

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Abstract

The purpose of this paper is to discuss the findings on increased screen time and its effect on mental health due to this pandemic. For data collection, there were 13 questionnaires distributed on social media, out of which 59 responded. The finding reveals that the majority of students, 19 feel unhappier, 12 less connected with friends, 22 negative impacts on their attitude, whereas 9 full-time respondents only feel the negative effect on their attitude majority of them do not feel any difference. The finding also reveals that most 25(42.37) had low energy and 58(98.31) felt increased screen time in the past month. The smartphone was the primary medium of screentime during weekends and weekdays for students, whereas the laptop/computer was the primary medium of screentime during weekdays for full-time users. There is no utilization seen in tablets and very low in television screens during weekends and weekdays. Finally, analysis shows that many feel that increasing screen time impacts their mental health, and screen time utilization per day is around 13.48 hours. Global evidence shows that screen time is associated with multiple health outcomes in different population groups.

Keywords: Screen Time, Digital gadgets, Mental Health, SAR-CoV-2

Introduction

When the first case of SARS-CoV-2 in January 2021, reported in India, society had to undergo a challenging time for the next few months. The central government of India announced the total lockdown, aiming to control the spread of this virus in society. This lockdown has shown everyone the flip side of life. Every company asked their employee to work from home also schools were shut down. In this lockdown, everyone seems bored staying inside the house to safeguard themselves from the SAR-CoV-2 virus.

On the other hand, everyone knowingly or unknowingly started utilizing their time watching television, playing video games, accessing smartphones, laptops/computers for various reasons like working for the office, taking classes online, and some time to reduce boredom. Above utilization of digital gadgets increased screen time for individuals. Screen time refers to watching television, playing video games, and working on laptops/computers. Research done by Jean M. Twenge and W. Keith Campbell studying associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study that high users of screens were also significantly more likely to have been diagnosed with anxiety or depression. This study was restricted to the 2 – 17 age group, whereas the current study will bring light to the 20 – 55 age group if there is an increase in screen time due to the SARS-CoV-2 pandemic and is there any effect on mental health.

Background of the Study

There is more research on sedentary lifestyle and mental health rather than Screen time and mental health. It is essential to understand screen time for adults and their mental health. Due to the SAR-CoV-2 pandemic, there is believe that increase in screen time. This study will help understand if there is an increase in adults and the effect on mental health.

Objectives of the Study

The following objectives of the study are:

- To find out whether the pandemic has led to an increase in screen time.
- To find out the frequency of digital gadgets utilization amongst full-time employees and students.
- To identify screen time for the various digital gadgets.
- To examine the difference between weekends and weekdays on using these digital gadgets.
- To determine if respondents feel connected with friends.
- To study users energy levels.
- To identify respondents happiness levels.
- To explore the impact on respondents attitudes.
- To find out screen time utilization with guideline and suggestion.
- To find out whether an increase in screen time is impacting respondents mental health.
- To identify any relationship between the increase in screen time due to the pandemic and screen time impacting their mental health.

Methodology

The present study sent a list of questionnaires to various social media like WhatsApp group and Linkedin. Adopted method of the survey in this research. This survey was sent to approximately 2000 users. An assumption of 2000 users was made by counting the social media group members of various social media like WhatsApp group and Linkedin. The tool used to collect the studying data was survey planet. The survey was sent during October 2021, and a response was given one week. The analysis of data presented in the subsequent sections is based on the responses received from the respondents.

RESULTS AND DISCUSSIONS

1. Demographic information

The user's demographic profiles reveal employment status, age group, area users currently reside in, and country summarized below (Table 1). There were 59 responses to the survey.

Most users were students by 40(67.80%), followed by full-time employers by 17(28.81).

This survey was restricted to a minimum age group of 20 to a maximum of 55 age group.

Age-wise break up depicts that 43(72.88) majority belongs to the age group of' 20-29.', there are a mix of users 8(13.56), 6(10.17) who belong to the age group of' 30-30' and' 40-49'.

On the other hand, most of the users are from urban 42(71.19) and 9(15.25), 8(13.56) users are from suburban and rural.

As a result of sharing this survey with the Whatsapp group, 3(5.08) were outside India, and the rest, 56(94.92) was from India.

Table 1: Demographic information

Variable	Category	Fequency (N = 59)	%
Employment Status	Student	40	67.80
	Full-Time	17	28.81
	Unemployed	1	1.69
	Other: Teacher	1	1.69
Age	20-29	43	72.88
	30-39	8	13.56
	40-49	6	10.17
	50-59	2	3.39
Area	Urban	42	71.19
	Suburban	9	15.25
	Rural	8	13.56
Country	India	56	94.92
	Other than India	3	5.08

2. The pandemic has led to an increase in screen time

Respondents were asked if they felt whether the pandemic had led to an increase in screen time.
The majority, 58 (98.31), felt that there was an increase in screen time.
Only one student felt that pandemic did not lead to a rise in screen time in table 2.

Table 2: Increase in screen time (Yes/No)

Do you feel whether the pandemic has led to an increase in screen time?						
Employee Status	Yes	%	No	%	Total (n = 59)	%
Student	39	67.24	1	100	40	67.80
Full-Time	17	29.31	0	0	17	28.81
Unemployed	1	1.72	0	0	1	1.69
Other: Teacher	1	1.72	0	0	1	1.69
Total	58	100	1	100	59	100

3. Digital gadgets utilization amongst full-time employees and students

Respondents were asked that In the past month, Screen use on an average weekday. Thinking of an average weekday (from when they wake up until they go to sleep),

how much time they spend using each of the following screen types as the primary activity.

The majority of screen time(8 hours) spend by students during weekdays is using smartphones. On the other hand, full-time users have low usage (6 hours) of smartphones compared with student's activities.

The majority of screen time(8 hours) spent full-time during weekdays is using a laptop/computer. On the other hand, student users have low usage (7 hours) of smartphones compared with full-time user's activities.

From table 3, Most screen time comes from smartphones and very low utilization of television during weekdays.

It is also observed from table 3 that no users utilize tablets during weekdays.

Table 3: Digital gadgets utilization by weekdays

Employee Status	Count (n = 59)	Television screen (In average hours)	TV-connected devices (e.g., streaming devices, video game consoles) (In average hours)	Laptop/ computer (In average hours)	Smartphone(In average hours)	Tablet(In average hours)
Unemployed	1	4	2	6	8	0
Other:Teacher	1	2	0	0	10	0
Full-Time	17	1	1	8	6	0
Student	40	1	1	7	8	0

a. Identifying the relationship between Television Screen vs. Smartphone screen utilization (if any)

This kind of study will help identify if responded is migrating from television screen to smartphone screen for their daily utilization.

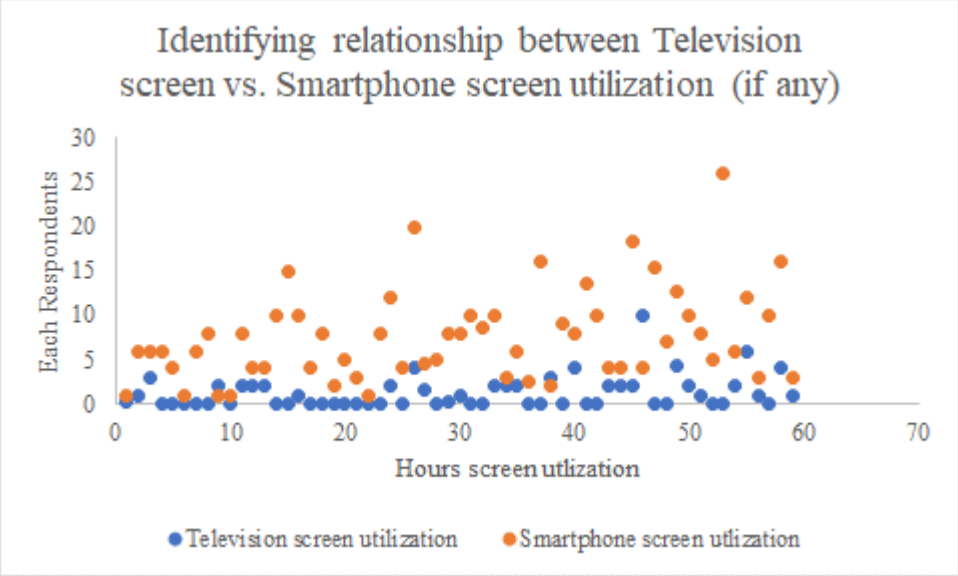
Correlation coefficients are used to measure how strong the relationship is between two variables. Pearson's. Pearson's correlation is used to identify any connection between the television screen and smartphone utilization.

Pearson's correlations formula:

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\, n\Sigma x^2 - (\Sigma x)^2 \,][\, n\Sigma y^2 - (\Sigma y)^2 \,]}}$$

There are no co-relationships between the two variables (Figure 1). Correlation is (0.08559), which is close to 0, which means there isn't a positive or negative increase for every increase. The two just aren't related.

Figure 1: Visualize the relationship between two variables.



Respondents were asked that In the past month, Screen use on an average weeknight. Now, thinking of an average weeknight (from when they return from work/online classes until they go to sleep), how much time do they spend using each of the following types of Screen as the primary activity.

After returning from the working day or online classes, most users(3 hours full-time, 9 hours students) are connected with a smartphone. The general tendency would be watching television screens after working days or completing online classes, which is not observed from the below data.

It is also observed from table 4 that no users utilize tablets during a weeknight.

Table 4: Digital gadgets utilization by weeknight

Employee Status	Cou nt (n	Television screen (In	TV-connected devices (e.g.,	Laptop/ comput	Smartph one(In	Tablet(In

	= 59)	average hours)	streaming devices, video game consoles) (In average hours)	er (In average hours)	average hours)	average hours)
Unemployed	1	6	2	0	2	0
Other: Teacher	1	2	0	0	12	0
Full-Time	17	1	1	2	3	0
Student	40	1	2	4	9	0

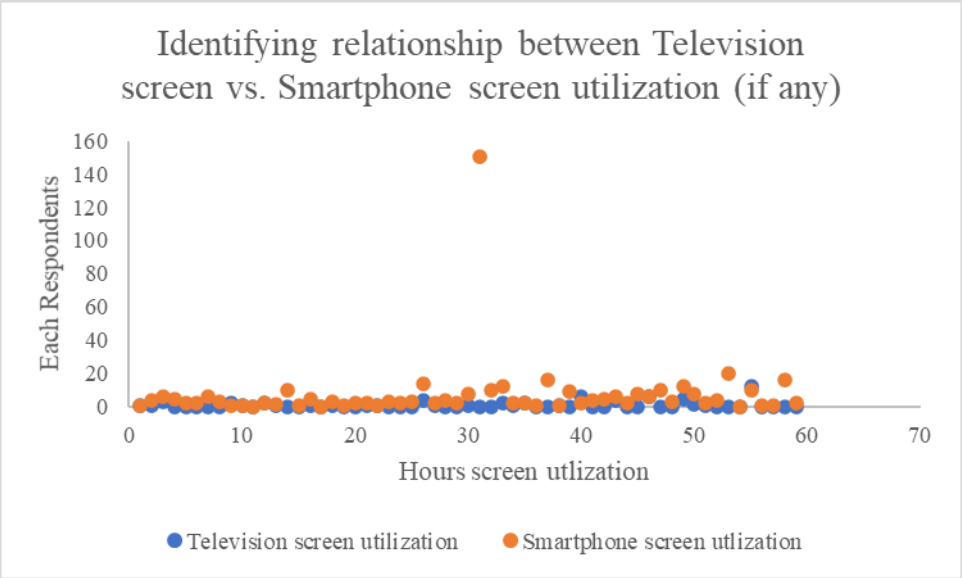
a. Identifying the relationship between Television Screen vs. Smartphone screen utilization (if any)

This kind of study will help identify if responded is migrating from television screen to smartphone screen for their daily utilization.

There are no co-relationships between the two variables (Figure 2). Correlation is (-0.0127), close to 0, which means there isn't a positive or negative increase for every increase. The two just aren't related.

It is also observed from figure 2 that there is one outlier in the responded data.

Figure 2: Visualize the relationship between two variables.



Respondents were asked that In the past month, Screen use on an average weekend day. Now, thinking of an average weekend day (Saturday or Sunday), how many hours over the whole day (from when they wake up until they go to sleep) do they spend using each of the following types of Screen as the primary activity.

Below mentioned table 5 shows there is no increase in television screentime during the weekend, and users still want to utilize smartphones.

It is also observed from table 5 that no users utilize tablets during a weekend.

Table 5: Digital gadgets utilization by the weekend

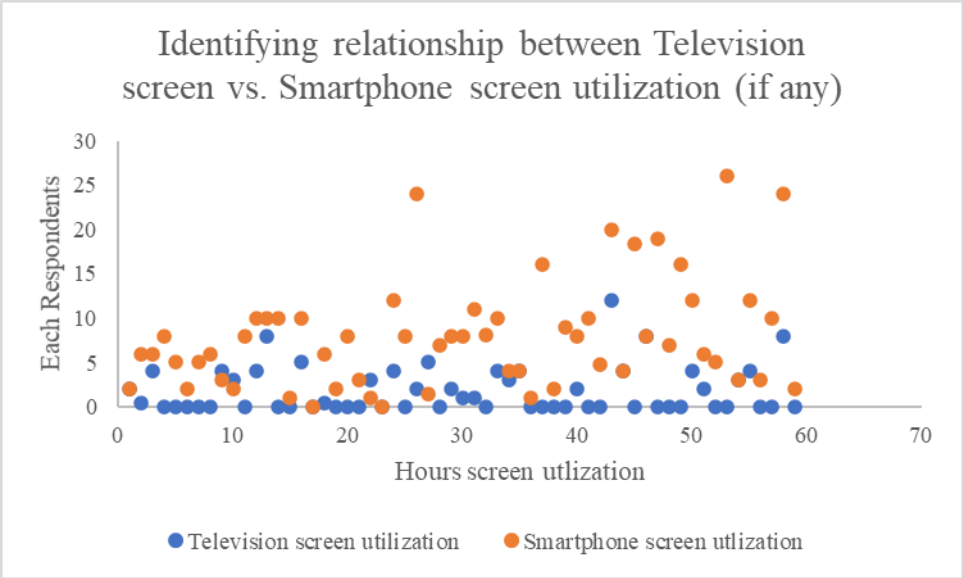
Employee Status	Count (n = 59)	Television screen (In average hours)	TV-connected devices (e.g., streaming devices, video game consoles) (In average hours)	Laptop/ computer (In average hours)	Smartphone(In average hours)	Tablet(In average hours)
Unemployed	1	2	0	0	8	0
Other: Teacher	1	4	0	0	10	0
Full-Time	17	2	3	2	5	0
Student	40	2	1	5	9	0

a. Identifying the relationship between Television Screen vs. Smartphone screen utilization (if any)

This kind of study will help identify if responded is migrating from television screen to smartphone screen for their daily utilization.

There are no co-relationships between the two variables (Figure 3). Correlation is (0.2509), close to 0, which means there isn't a positive or negative increase for every increase. The two just aren't related.

Figure 3: Visualize the relationship between two variables.



4. Screen time utilization with guidelines and suggestions

There are clear guidelines on how much screen time kids should have, but how much screen time is healthy for adults? There is no magic number of hours for recommended screen time for adults; however, there is clear evidence that too much screen time can be detrimental to your health. For instance, this study found that those spending six hours or more per day watching screens had a higher risk for depression, and this study found that limiting social media use to 30 minutes per day led to a "significant improvement in well-being." [1]The type and quality of screen time also play a role. Survey results show that` screen time utilization across different digital gadgets is 13.48 hours per day.

There are multiple negative impacts due to much screen time like insomnia, Poor sleep, eye strain, headache, addictive behavior, neck, shoulder, and back pain, changes in cognition, and reduced physical activity levels. [2]

Questioner	Total Hour (Per day)
In past month, Screen use on an average weekday. Thinking of an average weekday (from when you wake up until you go to sleep), how much time do you spend using each of the following types of screen as the primary activity?	3.30
In past month, Screen use on an average weeknight Now, thinking of an average weeknight (from when you return from work/online classes until you go to sleep), how much time do you spend using each of the following types of screen as the primary activity	2.59

[1] How Much Screen Time is Too Much for Adults? | Reid Health | Reid Health
[2] How Much Screen Time is Too Much for Adults? | Reid Health | Reid Health

In past month, Screen use on an average weekend day Now, thinking of an average weekend day (Saturday or Sunday), how many hours over the course of the whole day (from when you wake up until you go to sleep) do you spend using each of the following types of screen as the primary activity?	7.56
Total screen time utilize (Per day)	13.48

5. **Studying users energy level**

Respondents were asked to rate their energy level on a scale of 1 means more minor, and 3 means more energy level; looking at the past month,

Users 25(42.37), 28(47.46) responded, informing less energy and others with no difference.

Mostly only 6(10.17) users were found to be more energetic.

According to the Canadian Mental Health Association, people who experience mental illnesses can increase their susceptibility to developing poor physical health. Mental illness can impact social and cognitive function and **decrease energy levels**, negatively impacting healthy behaviors.[3]

Table 7: Energy level by categories

Energy level (Scale 1 – 3)	User Responded (N = 59)	%
1 (Less energy)	25	42.37
2 (No difference)	28	47.46
3 (More energy)	6	10.17

6. **To determine how well users were connected with friends.**

Respondents were asked to rate their connection with friends during the past months.

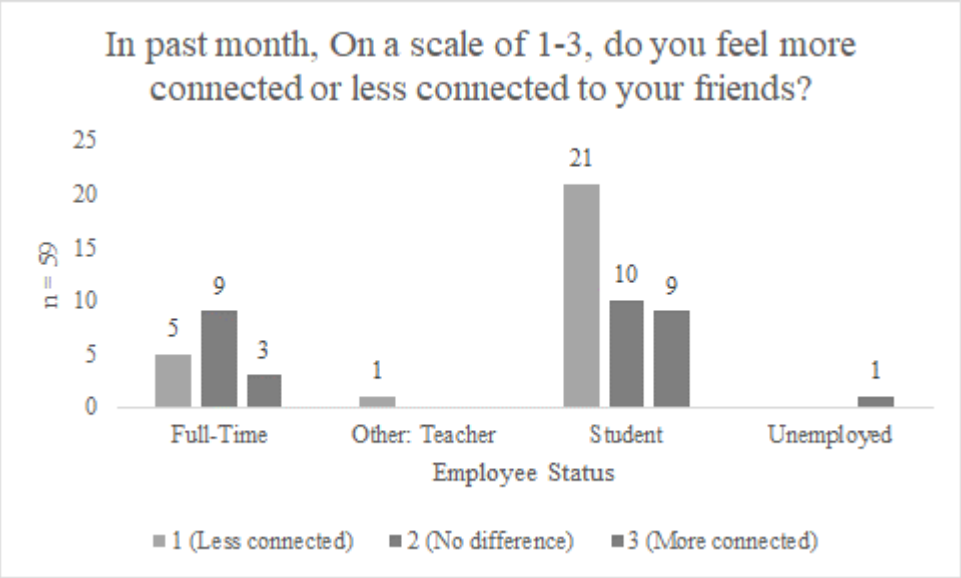
Users 12 who were students responded that they feel less connected with friends; on the other hand, 9 full-time users do not feel any difference.

It has been documented in 'open learn'[4] that why friendships are vital to well-being. Loneliness can cause depression and harm health and lifespans, equal to smoke.

It is also observed that 9 students, 3 full-time users feel more connected.

[3] The Relationship between Mental Health, Mental Illness and Chronic Physical Conditions (cmha.ca)
[4] Why friendships are vital to your wellbeing - OpenLearn - Open University

Figure 4: Connected to their friends



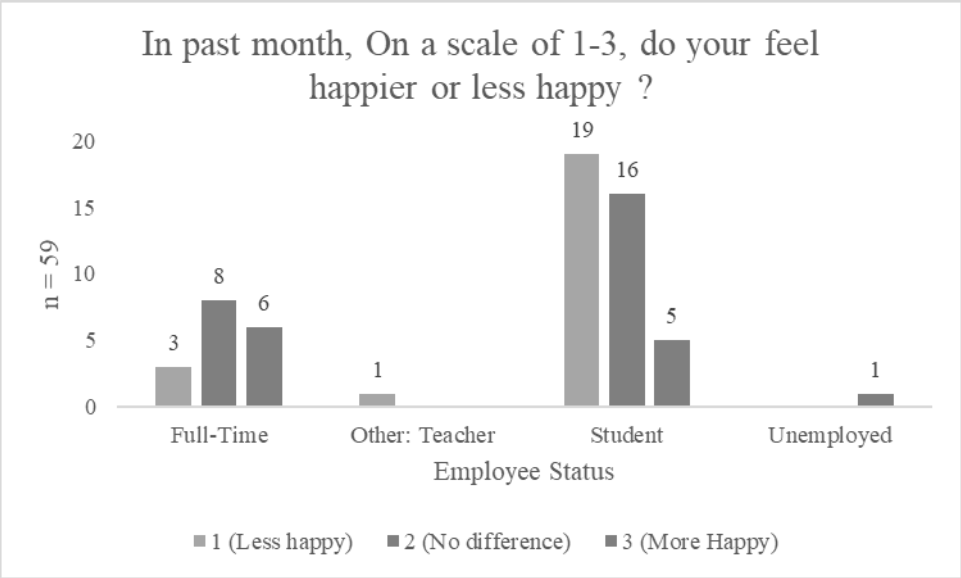
7. To identify happiness level

Respondents were asked to rate their happiness level during the past months.

Users 19 who were students responded that they felt less happy; on the other hand, 8 full-time users did not feel any difference.

It is also observed that 5 students, 6 full-time users feel happier.

Figure 5: Happiness level



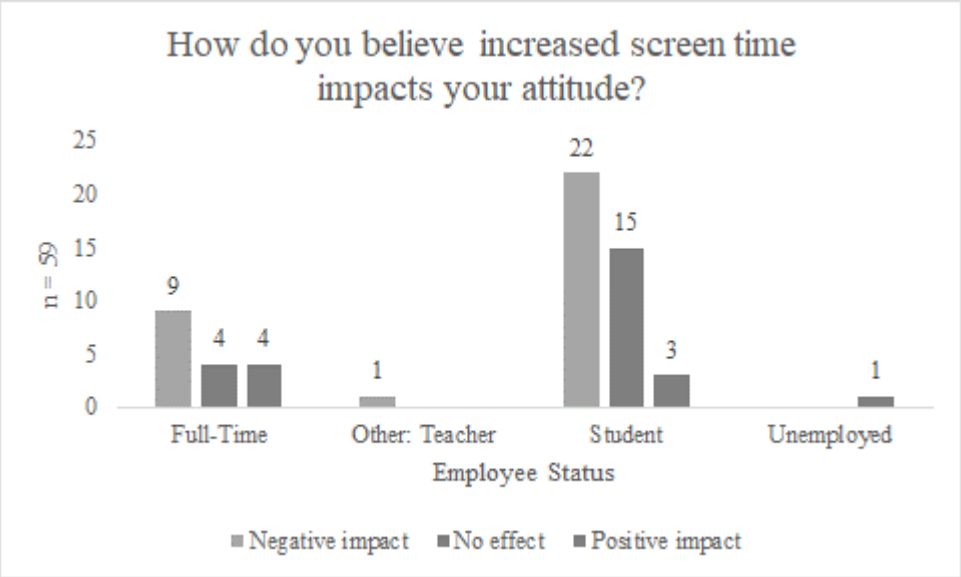
8. To explore the impact on respondents attitudes.

Respondents were asked to rate their attitude based on increased screen time.

Users 22 students and 9 full-time responded that increased screen time had a negative impact on their attitude.

A low number of user feels that increased screen time had a positive impact.

Figure 6: Impact on attitudes

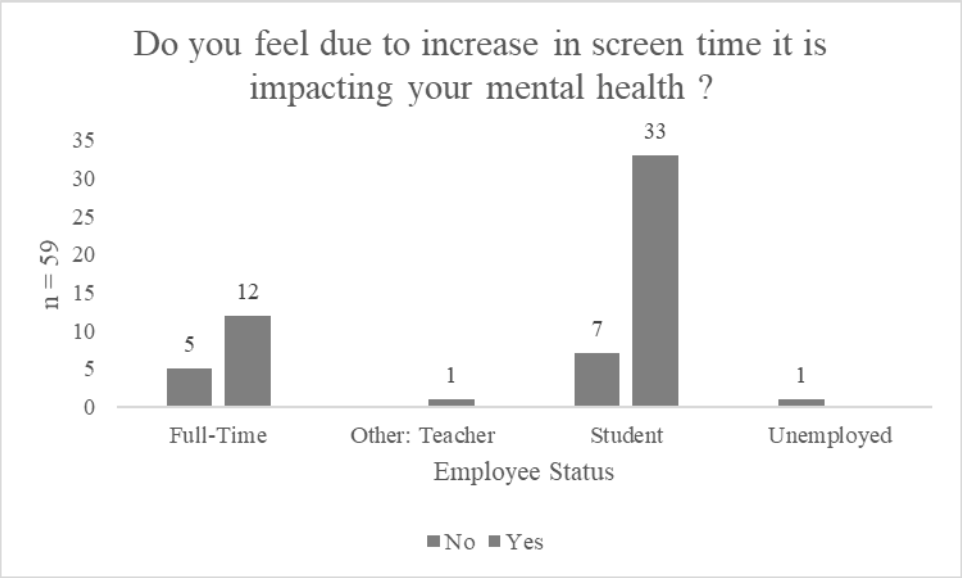


9. Screentime impacting mental health

Respondents were asked if they feel that increased screen time is impacting their mental health.

Users 33 students and 12 full-time responded that increased screen time had an impact on their mental health.

Figure 7: Screen time impacting their mental health



10. Identify the relationship between the increase in screen time due to the pandemic and feeling about more or less energy.

The Chi-square testing method was used to ascertain the relationship between two categorical variables. A Chi-square test is a hypothesis testing method, which involves checking if observed frequencies in one or more categories match expected frequencies.

Chi-square testing formula:

Formula

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

χ^2 = chi squared
O_i = observed value
E_i = expected value

Data were summarized in a contingency table.

Table 7: Contingency table for actuals and expected values

Do you feel whether the pandemic has led to an increase in screen time?	In past month, On a scale of 1-3, does you have more energy or less energy ?			
	1 (Less energy)	2 (No difference)	3 (More energy)	Total
No	0 – Actuals 0 – Expected	1 – Actuals 0.01695 – Expected	0 – Actuals 0 – Expected	1

Yes	25 – Actuals 24.5763 – Expected	27 – Actuals 26.5424 – Expected	6 – Actuals 5.89831 – Expected	58
Total	25	27	6	59

Table 7: Contingency table for arriving at Chi-square result.

Do you feel whether the pandemic has led to an increase in screen time?	In past month, On a scale of 1-3, does you have more energy or less energy ?			
	1 (Less energy)	2 (No difference)	3 (More energy)	Total
No	Difference – 0 Square Difference – 0 Expected – 0	Difference – 0.98305 Square Difference – 0.96639 Expected – 57.0169	Difference – 0 Square Difference – 0 Expected – 0	1
Yes	Difference – 0.42373 Square Difference – 0.17955 Expected – 0.00731	Difference – 0.45763 Square Difference – 0.20942 Expected – 0.00852	Difference – 0.10169 Square Difference – 0.01034 Expected – 0.00042	58
Total	25	27	6	59

H_0 - Null Hypothesis is that the above variables are independent

Ha- Alternative Hypothesis is that the above variables are not independent

- Taking the risk of 5% of the above variables is not independent when they are independent. Therefore we set a = 0.05 as significant values
- Test statistic = 57.0332 (arrived by adding all expected values from table 7)
- Degree of freedom[5] = 1 (row – 1) x (col – 2)
- The chi-square value with a = 0.05 and two degrees of freedom is 5.991
- Since the Chi-square value (57.0332) > one degree of freedom (5.991), we reject the idea that variables are independent.

The chi-square test result concluded that there *is* some relationship between the question answered about pandemic has led to an increase in screen time vs. their energy levels.

11. Identify the relationship between the increase in screen time due to the pandemic and screen time impacting their mental health.

[5] http://uregina.ca/~gingrich/appchi.pdf

The Chi-square testing method was used to ascertain the relationship between two categorical variables. A Chi-square test is a hypothesis testing method, which involves checking if observed frequencies in one or more categories match expected frequencies.

Data were summarized in a contingency table.

Table 8: Contingency table for actuals and expected values

Do you feel whether the pandemic has led to an increase in screen time?	Do you feel due to increase in screen time is impacting your mental health?		
	Yes	No	Total
Yes	45 – Actual 44.23729 – Expected	13 – Actual 12.779 – Expected	58
No	1 – Actual 0.01695 – Expected	0 – Actual 0 – Expected	1
Total	46	13	59

Table 8: Contingency table for arriving at Chi-square result.

Do you feel whether the pandemic has led to an increase in screen time?	Do you feel due to increase in screen time is impacting your mental health?		
	Yes	No	Total
Yes	Difference – 0.76271 Square Difference – 0.581729 Expected – 0.01315	Difference – 0.22034 Square Difference – 0.048549 Expected – 2.864407	58
No	Difference – 0.98305 Square Difference – 0.966389 Expected – 57.01695	Difference – 0 Square Difference – 0 Expected – 0	1
Total	46	13	59

H_0 - Null Hypothesis is that the above variables are independent

Ha- Alternative Hypothesis is that the above variables are not independent

- Taking the risk of 5% of the above variables is not independent when they are independent. Therefore we set a = 0.05 as significant values
- Test statistic = 59.8945 (arrived by adding all expected values from table 8)
- Degree of freedom = 1 (row – 1) x (col – 1)
- The chi-square value with a = 0.05 and one degree of freedom is 3.841
- Since the Chi-square value (59.8945) > one degree of freedom (3.841), we reject the idea that variables are independent.

The chi-square test result concluded that there *is* some relationship between the question answered about pandemic has led to an increase in screen time vs. it is impacting your mental health.

Major Finding

- The survey result shows that the majority, 58 (98.31), felt increased screen time.
- It is clear from the study that respondents utilize smartphones more than any other digital gadgets during weekends and weekdays.
- It indicates that no users utilized Tablets as a digital gadget and Television screens are being used very low during weekends and weekdays.
- According to the Canadian Mental Health Association, mental illness can decrease energy levels. 28(47.46) responded to this survey, informing less energy which might be an effect of mental illness.
- Users 12 who were students responded that they feel less connected with friends; on the other hand, 9 full-time users do not feel any difference.
- Users 19 who were students responded that they felt less happy; on the other hand, 8 full-time users did not feel any difference.
- Survey results show that` screen time utilization across different digital gadgets is 13.48 hours per day.
- Significant health is impacting students as they feel not connected with friends and felt less happy. It has been documented in 'open learn' that why friendships are vital to well-being. Loneliness can cause depression and harm health and lifespans, equal to smoke.
- Users 22 students and 9 full-time responded that increased screen time had a negative impact on their attitude.
- Analysis shows that almost many feel that due to increase in screen time is impacting their mental health.
- Conducted the chi-square test, which results in stating that there *is* some relationship between the question answered about pandemic has led to an increase in screen time vs. it is impacting their mental health and energy levels.

Conclusion

The present study revealed that a more significant part of respondents was that increasing screen time impacted their mental health. Students feel unhappier, less connected, and affected their attitude, whereas full-time respondents do not feel any difference. However, per day, screentime was significantly reported. During this research paper, multiple studies talked about mental health impact due to less connected friends, feeling lesser happier, feeling low energy. Therefore, everyone needs to understand and utilize their screen time wisely, impacting their mental health. Findings from this study also need to be interpreted in light of its limitation as participants were asked to self-report their screen time. Thus, there might be potentially introducing self-reporting bias into the finding.

Acknowledgment

Researchers would like to thank the respondents for participating in this research study.

References

Twenge, J. M., & Campbell, W. K. (2018). Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. Preventive medicine reports, 12, 271–283. https://doi.org/10.1016/j.pmedr.2018.10.003

Guo C, Zhou Q, Zhang D, et al.: Association of total sedentary behaviour and television viewing with risk of overweight/obesity, type 2 diabetes and hypertension: A dose-response meta-analysis. Diabetes Obes Metab. 2020; 22(1): 79–90. PubMed Abstract | Publisher Full Text

Guo, Yf., Liao, Mq., Cai, Wl. et al. Physical activity, screen exposure and sleep among students during the pandemic of COVID-19. Sci Rep **11,** 8529 (2021). https://doi.org/10.1038/s41598-021-88071-4

Sultana A, Tasnim S, Hossain MM et al. Digital screen time during the COVID-19 pandemic: a public health concern [version 1; peer review: awaiting peer review]. F1000Research 2021, 10:81 (https://doi.org/10.12688/f1000research.50880.1)

Viktoria A. Kovacs, Gregor Starc, Mirko Brandes, Monika Kaj, Rok Blagus, Bojan Leskošek, Thomas Suesse, Elek Dinya, Benjamin C. Guinhouya, Viviana Zito, Paulo M. Rocha, Benito Perez Gonzalez, Anna Kontsevaya, Michal Brzezinski, Radu Bidiugan, Anita Kiraly, Tamás Csányi & Anthony D. Okely (2021) Physical activity, screen time and the COVID-19 school closures in Europe – An observational study in 10 countries, European Journal of Sport Science, DOI: 10.1080/17461391.2021.1897166

Digital Screen Time During the COVID-19 Pandemic: Risk for a Further Myopia Boom?
Wong, Chee Wai et al.
American Journal of Ophthalmology, Volume 223, 333 - 337
doi: https://doi.org/10.1016/j.ajo.2020.07.034

Danijela Maras, Martine F. Flament, Marisa Murray, Annick Buchholz, Katherine A. Henderson, Nicole Obeid, Gary S. Goldfield,
Screen time is associated with depression and anxiety in Canadian youth,

INCREASE IN SCREEN TIME DUE TO SARS-COV-2 PANDEMIC AND ITS EFFECT ON MENTAL HEALTH

https://doi.org/10.1016/j.ypmed.2015.01.029.
(https://www.sciencedirect.com/science/article/pii/S0091743515000316)

Smith, L., Jacob, L., Trott, M., Yakkundi, A., Butler, L., Barnett, Y., Armstrong, N. C., McDermott, D., Schuch, F., Meyer, J., López-Bueno, R., Sánchez, G. F. L., Bradley, D., & Tully, M. A. (2020). The association between screen time and mental health during COVID-19: A cross sectional study. Psychiatry research, 292, 1-2. [113333]. https://doi.org/10.1016/j.psychres.2020.113333

Dwajani S et al.2020 Effect of Increased Screen Time In Undergraduate Students During Covid-19 Pandemic-A Survey-Based Study. Int J Recent Sci Res. 11(12), pp.40252-40258. DOI: http://dx.doi.org/10.24327/ijrsr.2020.1112.5659