



# IMPACT OF SCREEN-TIME ON STUDENTS DURING COVID-19 - AN EMPIRICAL STUDY AIMS TO EVALUATE THE PHYSICAL AND MENTAL HEALTH OF STUDENTS

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## **ABSTRACT**

This paper addresses the impact of screen-time students spent on their electronic devices learning during the Covid-19 and how it affects their physical and mental health. The research considered the following constraints categorized into two, namely physical and mental issues faced by students. The primary data for this research deals with six physical health and two mental health variables. They are Eye problems, Heart problems, Body pain, Back pain due to bad posture on the body, Weight gain, and Diabetes risk are the physical part and increase in aggressiveness and addition in anxiety are the mental part respectively. The above-listed factors and variables were evaluated across four levels of students during the Covid-19 lockdown period in India. They are Primary, Secondary, at school level, and Undergraduate, Postgraduate students in higher education. Data are analyzed using Multiple Correlation and Regression as the analytical Technique for finding the relation between the Screen-Time as the independent variable and the above factors as the dependent variable. We want to conclude that having online classes for students during Covid-19 resulted in sitting in front of electronic devices, namely laptops, desktops, and mobile phones, has adversely affected their health. It has resulted mainly in eye problems, body pain, back pain due to bad posture, weight gain on the physical side, and increased anxiety on the mental side. Therefore, educational institutions should consider students' physical and mental problems while deciding the mode of education and find ways to reduce students' screen time

**Keywords:** Higher Education, Online Learning, Mental and Physical Health, Covid-19, and Data Analysis.

## I. INTRODUCTION

Students were amongst the most affected sections of the population during the lockdown due to the Covid-19 pandemic in India. Due to various reasons: no schools were operating for around, which started initially for complete lockdown three to four months and got extended more than a year. The timing was too coincidental during the academic year-end, so many students could not complete their end exam for that particular year. It also had a significant impact on starting of the next academic year. When education authorities' decisions taken to teach online were begrudging, this decision made the situation even worse in two ways: initiating inequality among the students who can afford online courses and the students who cannot afford them. It created health problems among the students who would have to use electronic devices only for online classes. So, in this paper, we will deal with the aspect of mental and physical health issues faced by the students. To gauge this impact, we will compare the students' screen time with various parameters where the health issues are divided into two: physical and mental.

## II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### 1. Factors Representing Physical Health:

#### 1.1 Eye Problem

Eye pain, exhaustion, blurred vision, headaches, dry eyes, and other signs of eyestrain related to students mainly spends a lot of time looking at their laptops and computer screens [1]. In addition, there has been an increase in the number of cases of myopia in students, especially in young children [2].

#### 1.2 Heart Problem

Even if the correlation between screen time and Cardiac Rhythm Management (CRM) isn't evident in early childhood, long-term studies may reveal a definitive link in the future. There was a connection between regular screen time and non-HDL cholesterol levels, affecting health [3]. Increased screen time also results in a minor detrimental effect on cardiorespiratory fitness [4]. Excessive screen time will result in inadequate sleep and cardiovascular disease risk factors, including high blood pressure, obesity, and poor stress management [5].

#### 1.3 Body Pain

Increased screen time causes many physical complaints, especially among young people [6]. Screen time has also affected the bone, and also it results in decreasing bone density [7].

#### 1.4 Back Pain (Bad Posture)

The use of smartphones increased musculoskeletal problems. Long-term use of a smartphone can lead to poor posture, including forwarding neck posture, slouched posture, and rounded shoulders [8]. Maintaining a wrong sitting posture for an extended period, such as while using an electronic device, results in advanced spinal asymmetries, scoliosis, and other issues [9].

#### 1.5 Weight Gain

Increased screen media consumption causes obesity in children and teenagers by encouraging them to consume as they watch; exposure to high-calorie, low-nutrient food, and beverage advertisements affects children's tastes [10].

#### 1.6 Diabetes Risk

Obesity at a young age contributes to a sedentary lifestyle, which, if not addressed, is a statistically significant factor in the development of diabetes later in life [11]. Reducing teenage screen time may be a promising strategy for primary obesity prevention, lowering the risk of diabetes, and promoting a healthy physical self-concept [12].

### 2. Factors Representing Mental Health:

#### 2.1 Increase in aggressiveness

Increased screen time is directly related to decreased sleep time, resulting in increased rule-breaking behavior and aggressiveness [13]. According to a study, children and teenagers who watched television for long periods were more likely to engage in violent behavior [14].

#### 2.2 Increase in Anxiety

High screen users were more than twice as likely to have been diagnosed with depression, diagnosed with more anxiety, treated by a mental health professional, or taken medication for a psychological or behavioral problem in the previous 12 months among 14- to 17-year-olds. Moderate screen use was also linked to lower psychological well-being [15].

## III. METHODOLOGY

The Primary data collection for this study is from the online learners during Covid-19 was conducted through the field survey. The information collected is aimed with specific set objectives, mainly two issues mental and health issues. The data relating to cross-section picture of anything studied. To evaluate the two points, we have to conduct this research study on the effect or impact of any policy. A questionnaire shows the research study by a research instrument consisting of questions and other prompts to gather the necessary information from respondents. Although, they are often designed for statistical analysis of the responses. A structured questionnaire consisting of two appendices of the above issues is collected, and related questions are developed. The questionnaires

were mainly administered among 300 respondents across primary, secondary, and higher education. The source from which data was collected was – Google survey form.

#### IV. RESULTS AND ANALYSIS

As our research deals with the factors representing the health issues as the dependent variable and screen-time as the independent variable, the significance and correlation between the dependent and independent variable is analyzed, and the results are as follows. The various parameters related to health and mental issues are statistically analysed and updated in the following table which deals with correlation analysis. The two outcomes of the significance test are either significant or not significant. If the significance index value is greater than 0.95, then it's said to be significant. If the significance index value is less than 0.95, then it's said to be not significant.

| Parameter      | Significance    | Correlation     |
|----------------|-----------------|-----------------|
| Eye Problem    | Significant     | Strong Positive |
| Heart Problem  | Not Significant | NIL             |
| Body Pain      | Significant     | Strong Positive |
| Back Pain      | Significant     | Strong Positive |
| Weight Gain    | Significant     | Strong Positive |
| Diabetes risk  | Not Significant | NIL             |
| Aggressiveness | Significant     | Weak Positive   |
| Anxiety        | Significant     | Strong Positive |

Table 4.1 Significance and Correlation

| Education Level | Average Screentime |
|-----------------|--------------------|
| Middle school   | 6.5                |
| High School     | 9.4                |
| Under Grads     | 8.6                |
| Post Grads      | 7.6                |

Table 4.2 Average Screen Time for different Education Levels

| Parameter      | Significance (X) | Significance Index (1-X) |
|----------------|------------------|--------------------------|
| Eye Problem    | 1.74968E-38      | 1                        |
| Heart Problem  | 0.771102815      | 0.228897185              |
| Body Pain      | 5.77548E-28      | 1                        |
| Back Pain      | 0.003693185      | 0.996306815              |
| Weight Gain    | 1.7095E-33       | 1                        |
| Diabetes risk  | 0.212566841      | 0.787433159              |
| Aggressiveness | 0.007534611      | 0.992465389              |
| Anxiety        | 4.33313E-29      | 1                        |

Table 4.3 Significance Index

The two outcomes of the correlation are strongly positive and weakly positive in the correlation test. This outcome depends on the value of the correlation index. If the value is greater than or equal to 0.5, then it is a strong positive. If the value is less than 0.5, it is weakly positive. This research has no negatively correlated parameters, so the correlation index is always greater than 0.

| Parameter      | Correlation Index |
|----------------|-------------------|
| Eye Problem    | 0.86              |
| Heart Problem  | 0.03              |
| Body Pain      | 0.79              |
| Back Pain      | 0.79              |
| Weight Gain    | 0.83              |
| Diabetes risk  | 0.11              |
| Aggressiveness | 0.24              |
| Anxiety        | 0.80              |

Table 4.4 Correlation Index

The above output suggests that having more screen time severely affects students in physical and mental issues. The top three problems students face are Eye problems, Weight Gain, and an Increase in Anxiety, as these three have more than 80% correlation with screen time. The first affected part of the body if there is an increase in screen time is our eyes. The results also mention that having a higher screen time implies sitting in the same place for a long time, reducing physical activities and general body metabolism. It has resulted in weight gain. Most people generally feel anxious and feel nothingness when they sit in a small space for longer with close to no non-electronic interaction.

The main problem is body pain and back pain due to the wrong posture and sitting for a more extended period. While the online classes sit in front of the Screen more time, it indirectly affects their body, especially their spinal card, as their position and poster also matter when you are sitting at a place for a long time. The next set of problems are less significant problems at a shorter duration but have a very high impact in the long term. Generally, children do not have the maturity to comprehend that these problems will affect their life for a long time. The first one is a Heart problem, as being raised in a sedentary lifestyle does not bode well for cardiac health. Next is being at diabetes risk. Yes, this is a very indirect problem that students don't think about until they are affected directly during the online classes. Sitting and listening resulted in an increased sugar intake and fewer metabolic activities, which implies fewer calories burnt in the system. The final problem is an increase in aggressiveness. Generally, students find it hard to realize that they are aggressive. Still, according to much research done before, parents of students who attend online classes feel that their wards had turned more aggressive in general.

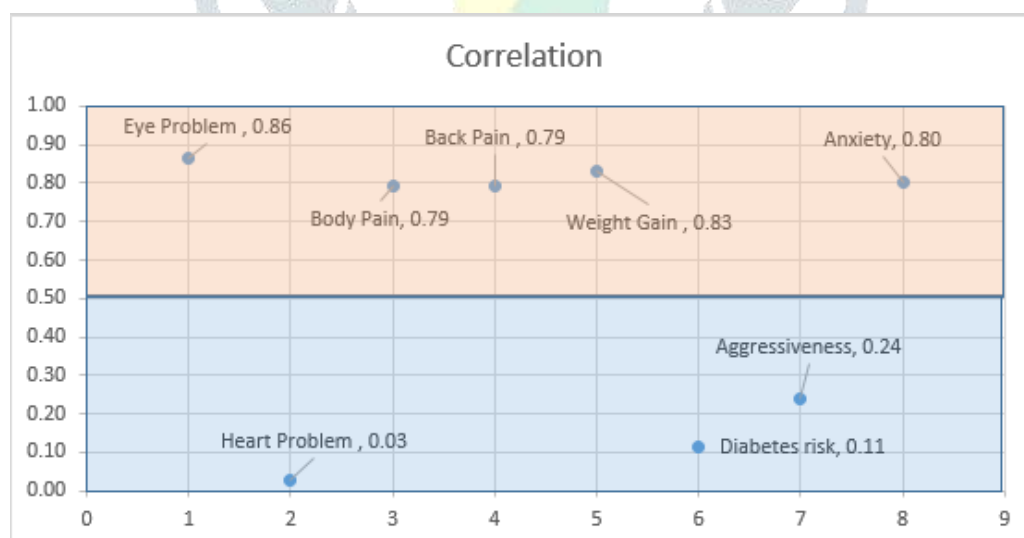


Figure 5.1 Correlation

The next important thing we have to interpret on this research output is the significance of screen time on all the above-stated problems.



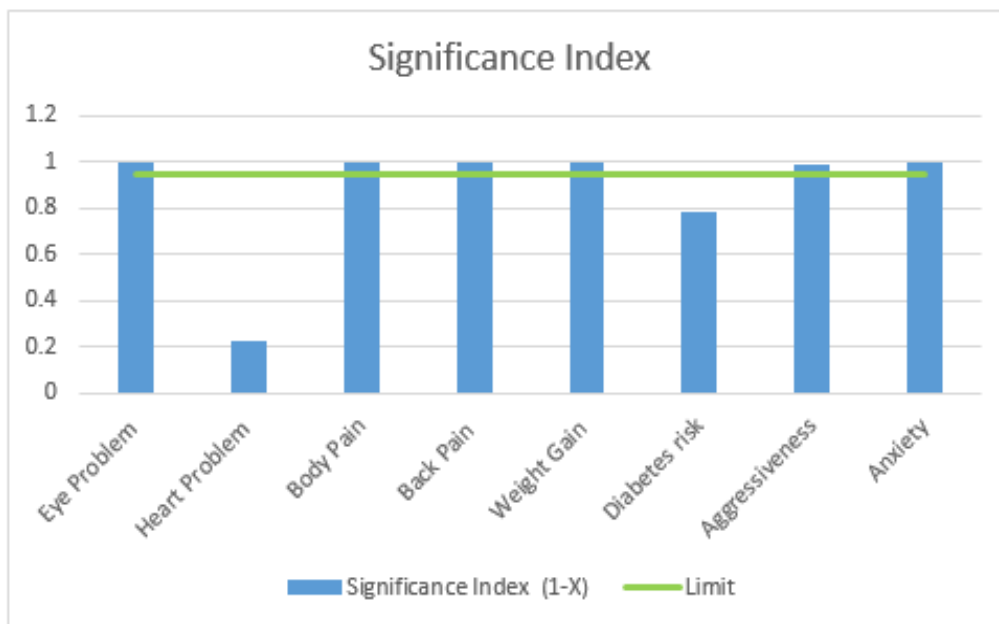


Figure 5.2 Significance Index

The Significance Index is a value that generally lies between 0 to 1. The index value gives whether the given problem screen time has some significance or not. According to our research, the limit taken was 0.95, which means the degree of freedom in error can only be five percent. With the above line in mind, the two problems that don't have enough significance are heart problem and Diabetes risk, where heart problem is way too lesser than diabetes risk. It shows there are two possible outcomes on the result, the students are not able to understand these problems and not able to represent them, or the second one, the screen time, doesn't directly affect the two problems. The Next thing we have measured is the importance of screen time being a factor for these problems.

| Parameter      | R <sup>2</sup> Value |
|----------------|----------------------|
| Eye Problem    | 0.74                 |
| Heart Problem  | 0.01                 |
| Body Pain      | 0.62                 |
| Back Pain      | 0.59                 |
| Weight Gain    | 0.69                 |
| Diabetes risk  | 0.01                 |
| Aggressiveness | 0.05                 |
| Anxiety        | 0.64                 |

Table 5.1 Importance of Screen time as a factor

The results show that the square of the R-value will give the importance of the independent variable as a factor for the dependent variable. For instance, here, the R square value for Eye problem vs screen time is 74%, which implies that Screen is a significant factor contributing to an eye problem, which means there are other 26% contributing factors. The research outcome has three problems for which screen time's importance is very low: heart problem, diabetes risk, and aggressiveness values 1%, 1%, and 5%, respectively. The results specify that screen time is not the major contributing factor for these particular problems and these problems have other significant factors.

## V. DISCUSSION, LIMITATIONS, AND CONCLUSIONS

We want to conclude that having online classes for students during Covid-19 resulted in sitting in front of electronic devices, namely laptops, desktops, and mobile phones, has adversely affected their health. It has resulted mainly in eye problems, body pain, back pain due to bad posture, weight gain on the physical side, and increased anxiety on the mental side. This research study was conducted among students because of the central dilemma between the safety of offline classes during the Covid-19 period and the mental and physical health issues of the online courses. It reveals their preference for online schooling, offline schooling, or a combination of both. The results were as expected that 55% of the students who responded prefer offline education. The study concludes that most of them want to have that sense of being in a familiar place to learn rather than isolated. Where they cannot see other students of their age, 35% prefer a combination of both. These students understand the new regular and act accordingly. They feel it is unavoidable to have online classes. Still, they want to have the school feel as well. There is that 10% of students who fell

into the comfort of being in the home and prefer online schooling, and it is expected there was no significant difference in students' screen time in terms of gender as both had 7-8 hours as their average. Therefore, educational institutions should consider students' physical and mental problems while deciding the mode of education and find ways to reduce students' screen time.

Also, the study results follow the previous studies quoted in the literature review and add to the existing literature. However, despite the modeling, this study has significant limitations as few students in the Schools and higher education sector participated. In the future, studies can collect larger samples, more representative samples in the various education sectors. The current research study seeks to address mainly mental and health issues only. Maybe other relevant areas can be explored in the future. In addition, future scholars might be able to use these findings to research similar topics using a nationally representative sample in the school and higher education sector.

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