

Title: Impact of Screen time on Mental Health

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Abstract

People need to use the screen for their work due to the significant increase in digital technology, which demands more screen time throughout the day. The researchers were interested in conducting the study on the use of the screen because they wanted to understand the impact of screen time on the sleep and anxiety levels of the people. The researchers collected the necessary data using the questionnaire method, with the help of 299 participants. The structured questionnaire included questions about the screen usage patterns and questions related to sleep.

The researchers used Python tools to process and analyze the collected data. The collected research response was analyzed using Python tools to show the screen time and sleep quality and anxiety levels using numerical scores. The researchers used descriptive statistics and correlation analysis to understand how the variables were correlated with each other.

The research findings indicate that people using the screen for bedtime will have decreased sleep quality. The sleep latency period will increase, and the total sleep time will be reduced. The research findings indicate that people with decreased sleep quality will have high levels of anxiety. The research findings indicate that people develop anxiety due to the time they spend on the screen, which overstimulates their mental state and forces them to be socially active.

The research findings indicate that excessive screen time, which people use without any control, is one of the major factors that impact mental health. The research findings indicate that people who want to reduce their anxiety levels and have better health outcomes need to set proper screen time schedules while they practice better sleep habits. The research findings are significant to the studies.

Keywords: Screen Time, Mental Health, Social Media Usage, Digital Addiction, Anxiety, Depression, Sleep Disturbance, Psychological Well-being, Smartphone Usage, Student Mental Health, Online Behavior, Stress Analysis, Digital Lifestyle, Behavioral Analysis, Data Analysis.

INTRODUCTION

The growth of digital technology during recent years has changed how people live because people now spend more time staring at screens. People need to use smartphones, laptops, tablets and computers for their daily activities which include communication and education and work and entertainment [1]. The result shows that people from every age group spend extended time periods in front of digital screens. The technologies provide various advantages, but people who use screens too much create health problems that affect their bodies and sleep patterns and mental health [2]

People who spend more time watching screens tend to experience poorer sleep outcomes according to

research studies about this problem [4]. The circadian rhythm controls the human sleep-wake cycle because it depends on environmental conditions which include light as a primary factor. The artificial light from screens prevents melatonin production which leads to delays in bedtime. The result shows that people experience reduced sleep time and longer times to fall asleep and overall sleep problems [5]. The disturbances lead to physical health problems which result in decreased cognitive function and diminished ability to focus and complete daily tasks.

This leads to two issues: sleep disturbances and psychological issues such as anxiety [6]. People who continuously use digital platforms face digital interruptions, and their social media usage leads to two issues: mental over-stimulation and emotional distress. People face restlessness and nervousness accompanied by social comparison, leading to increased levels of anxiety. The relationship between sleep disturbances and anxiety creates a cycle where sleep disturbances lead to increased levels of anxiety, and increased levels of anxiety lead to disturbances in sleep patterns.

It is important for an individual to understand how screen time affects their anxiety levels and sleep disturbances since this has been on the increase. This study will aim to explore this through a survey-based approach to quantitative research. This study will aim to find out how screen time affects an individual's life through actual data collected from various individuals.

The main aim of this study is to investigate whether an individual who spends more than the recommended amount of screen time before going to bed has a negative impact on their sleep patterns and anxiety levels. This study will aim to explore how screen time affects an individual's mental health through direct and indirect means where sleep is a mediating factor. This study will be important since it will provide information to an individual on how to have healthy screen time habits, thus improving their well-being.

LITERATURE REVIEW

Recently, there has been a lot of chatter about the amount of screen time people are consuming and how it affects sleep and other mental health-related things. As people are becoming more accustomed to using phones and other tablets, it is only natural that scientists are studying the effects of screen time on the body and mind, specifically the effects on people who experience sleep deprivation.

I believe the screen time affects people in a negative manner, specifically when it comes to sleep deprivation, due to the amount of light people are consuming from these electronic devices [9]. According to studies, people who are consuming screen time before going to bed are not allowing the body to produce the hormone melatonin, which in turn disrupts the body's internal clock, allowing people to get poorer sleep, meaning they are tossing and turning in the bed, or they are just not feeling rested.

People who are consuming screen time before going to bed are not able to fall asleep, meaning they are experiencing a decrease in the amount of total sleep they are able to get, which is not as effective, you know [3]. I believe the screen time people are consuming before going to bed is affecting people in a negative manner, specifically when it comes to sleep deprivation [4].

In order to determine the quality of people's sleep, scientists use a thing called The Pittsburgh Sleep Quality Index, which consists of things such as the amount of time it takes to fall asleep, the amount of disruptions people experience while they are sleeping, the amount of total sleep people are able to get, and the amount of drag people are experiencing the next day.

The results of those studies suggest that there is a link between screen time and crappier sleep scores [14]. If you are using those devices before bedtime, it might hit you harder. You might not feel it right away, but it is shown in the patterns. This part is a bit confusing, like how much screen time is too much.

There is a lot going on with screen time and how it affects other things, like how it affects our mental health, like anxiety. I mean, there is this scale called the A Brief Measure for Assessing Generalized Anxiety Disorder that everyone uses to measure anxiety levels. This scale is shown to be related to how we act and how we use our screens. From what I have seen, too much screen time, especially social media, makes anxiety and nervousness worse, like this feeling of worry that will not stop [7].

How we use our phones before bedtime is related to this. Studies have shown that if you're using your device before bedtime, it affects how you sleep and how you feel emotionally. Like, it disrupts how you sleep and then this other feeling comes with it. It feels like screens affect our bodies a lot with how we sleep, but it affects our minds too, and it adds to our stress. [8]

The connection between sleep and anxiety isn't really confusing. When your sleep isn't good, it makes it more difficult to deal with your emotions. You get distracted more easily. Your stress levels increase. But then, when your anxiety starts acting up, you know you're going to have trouble falling asleep. So, it becomes this cycle where they're just feeding each other. I think this part gets messy because it's hard to get out of this cycle. At least, from the studies I read, it seems this way. Some studies even point to the use of social media as the cause. But not all studies agree. Some studies show recent findings about the effects of screens on anxiety.

This makes the "brain stuff" go crazy. This is like the cognitive effects. But then the indirect effects from the use of screens would be the effects on sleep. So, this would be the effect on anxiety because poor sleep from the use of screens would just make your anxiety worse [1]. From the studies I read, most of the studies were surveys. They ask questions about your use of screens and your sleep and if you experience anxiety. PSQI and GAD-7 were mentioned several times [10]. These were used because they're reliable and not too hard to use. From the statistics section, it was basic. They were just describing the data and seeing if they were correlated. From the studies I read, I think the use of too much screen time causes negative effects on sleep quality and anxiety levels [12]. Some would say this isn't really clear. But yes. So, more studies need to be done about the effects of the use of digital media on sleep and anxiety. This would be easy.

METHODOLOGY

So, in this section of the paper, I will discuss the research design and how we were able to collect the data, as well as the ways in which we analyzed everything in order to study the amount of screen time and its relation to sleep and anxiety levels. It appears as though the setup has to be easy and reliable, you know, so people can understand it without becoming too lost.

The way in which it was analyzed was chosen in order to keep it systematic, although I am not sure if it is completely in line with itself. It was also important for it to be easy to understand, which is why it is kept rather simple. The analysis involved descriptive statistics, correlation analysis, and machine learning techniques implemented using Python tools such as Pandas, Numerical Computing, Data Visualization, and Statistical Data Visualization.

The way in which the data was collected appears to have included some surveys, although this gets a bit complicated to explain at the moment. The survey-based approach is commonly used in studies examining screen time, sleep quality, and anxiety, and standardized tools such as PSQI and GAD-7 were used as the basis for questionnaire design.

A. Research Design:- This study has a quantitative setup with some elements of the descriptive and cross-sectional. The quantitative section is the part I think is useful in this section because we might be able to

get some statistics on the amount of screen time we get, the quality of sleep we get from it, and the level of anxiety we get from it.

Then we might be able to use statistics to get some good results.

The descriptive section in this setup is the section where we just observe what we're dealing with in real life without changing anything or experimenting with anything. This section might be a good way to observe some patterns on how screen time affects our sleep and our anxiety levels without making things too complicated.

Variables in this setup are quite easy. The main cause of the effects we're dealing with in this setup is the main cause of the effects. So, the main cause of the effects in this setup is the independent variable. Then we have the effects of the independent variable. So, the effects of the independent variable in this setup are the dependent variable.

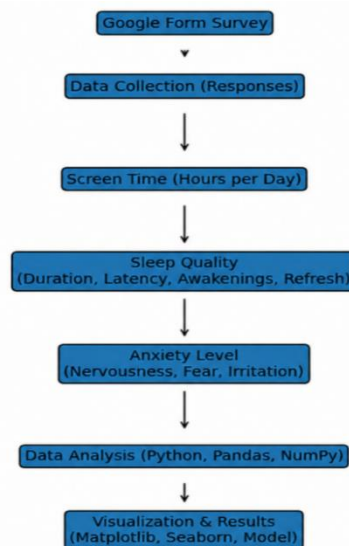


Fig 1: Research Design (Survey-Based)

Sleep quality might be the middleman between the cause and the effects we're dealing with in this setup. So, sleep quality might be the middleman between the cause and the effects in this setup because it might be the direct link between the cause and the effects. This whole setup remains non-experimental. Some of the things in this setup might be quite fuzzy.

B. Data Collection Methods:-

Survey Method: We used a questionnaire, and it was done online because it's structured, and we created it using Google Forms. So, we were able to get the information pretty easily.

The method was appropriate because it's helpful in getting information on the kinds of habits a person has or their behaviors and even things about the psychological aspects. I'm not really sure if there's a better method than this, but it's efficient enough. Information on those things can be difficult to obtain otherwise.

Questionnaire Design: The questionnaire was basically split into four sections.

- Section A was for personal stuff, such as the different age groups and genders, and what people do to earn a living. That's all pretty basic and straightforward.
- Then there's Section B on the amount of time people spend using screens on a daily basis. This had questions about the amount of time spent using them, why they use them and whether or not they use

them right before bed. I think this section has a connection to the sleep questions later on.

- Then there was the sleep quality in Section C. This was based on the PSQI and had questions on the amount of sleep people get, how quick they fall asleep, if they wake up in the middle of the night and if they feel rested in the morning. I'm not entirely sure how all of this relates to one another but I think I understand.
- For the anxiety questions in Section D, it was similar to the GAD-7 questions, such as the feelings of nervousness and restlessness, and the fear responses. I think some of this might relate to the screen time questions or at least, it feels similar.

Sampling Technique: They opted to use convenience sampling for this research. They chose individuals who were easily accessible and who were interested in participating. From the text, it sounds like they were successful in this approach because they posted the survey on social media and/or whatever apps they use like Whats-App.

Well, in the end, they collected 300 responses. These were from all sorts of individuals. They were of different ages. Some were students, and some were employed. I'm not entirely sure if they've covered everything in this approach, but they've covered it all.

Data Storage: The responses were stored immediately in Google Forms, which was actually quite easy at the beginning. Afterward, they were exported in the current CSV format also known as Comma-Separated Values. It kind of looks like it helps a lot if you need to insert the responses in other tools for the purpose of analysis.

Ethical Considerations: We have tried to adhere as closely as possible to these guidelines.

- The participation was entirely voluntary, and I think that is the way to go. Nobody was forced to do anything.
- No personal information was collected at all. That part seemed important.
- Confidentiality of data was upheld throughout. I suppose that means nobody outside our little world saw the data.
- The data was used for purely academic purposes. That is all. I suppose it is all a bit straightforward, or maybe I am just missing how everything fits together perfectly.

C. Data Analysis Techniques:-

Data Cleaning and Preparation: I opened the data set in Python so I could work with it.

- Cleaning it up seemed like something important right off the bat. You know, like getting rid of those missing data points or anything else that wasn't quite right. It seems like something fundamental.
- I had some extra spaces in the data, so I had to deal with those too. Standardizing the data was helpful in getting everything just right, I suppose. Sometimes those little details can slip by you.
- I think I made the data reliable, at least accurate, by working through all of those issues. I'm not entirely sure if I managed to get everything right though.

Data Coding and Conversion: So, to simplify the data and make it easier to analyze, we converted the text answers to numerical form. For the screen time, we assigned a numerical score to every answer. For the sleep time, we shaped the answers to form a score similar to the PSQI method. This would enable us to analyze the sleep quality. For the anxiety, we took the answers and converted them to a numerical score using a simplified version of the GAD-7 method. By using numbers, we were able to analyze the responses and identify the patterns.

This also enabled us to avoid the hassle and messiness associated with text responses. This method also gave us the opportunity to compare and relate the answers to the screen time, sleep time, and anxiety

levels. By using numbers, we were able to identify the connection and relation between the answers and the questions. This made the process smoother and more reliable.

Score Calculation: We had three main scores to look at.

- We had a Screen Score, which measured the amount of time people spent using their screens and when they used them, such as before bed.
- We had a Sleep Score, which measured the quality of sleep and whether or not the person had to deal with interruptions.
- We had an Anxiety Score, which measured the anxiety levels based on the responses.

In addition to those, we created a total impact score to see how everything worked together.

Statistical Analysis: The basic statistical methods used in the study are as follows.

- Descriptive Statistics - Mean, percent and frequency distribution.
- Correlation Analysis - This method was used for the study.
- The correlation analysis method was used to:
- Analyze the relationship between screen time and quality of sleep.
- Analyze the relationship between quality of sleep and anxiety.
- Analyze the relationship between screen time and anxiety.

Data Visualization: In addition, graphical representation have been created to present the results.

- Bar charts for comparison
- Pie chart for distribution
- Scatter plots for relationship

The above graphical representations helped in identifying patterns clearly.

Tools and Technologies: The analysis is done by the following tools:

- Python Programming Language
- Pandas
- NumPy
- Matplotlib and Seaborn

RESULTS

In this section, the findings from the data analysis process, which was carried out to examine the relationship between screen time, sleep quality, and anxiety, will be presented. The findings are based on the responses received from 300 participants and are presented in an analytical manner.

A. Screen Time Usage Patterns:- Analysis of the use of screen time showed that the majority of the participants used a significant amount of time on screen each day. Analysis showed that the majority of the participants used more than 4 hours each day on screen, with some using more than 6 hours each day on screen.

In addition, some of the participants also revealed that they used screen time, for example, on mobile phones and laptops, before going to bed. This showed that the majority of the population used screen time at night.

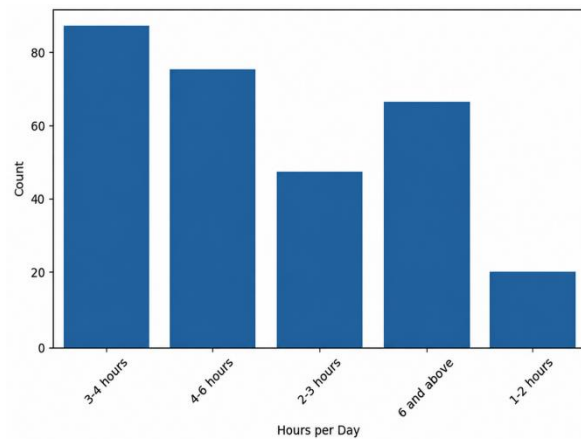


Fig 2: Screen Time Usage Patterns

B. Sleep Quality Analysis: The results related to the sleep quality indicate that.

The results indicate that a considerable percentage of individuals face problems in sleeping properly as a considerable percentage of individuals have:

- Had less than 7-8 hours of sleep
- Had more than 30 minutes of sleep latency
- Had more than one awakening during the night's sleep
- Feel un-freshed in the morning

It is quite obvious from the scoring system that a considerable percentage of individuals fall in the poor category of sleep quality.

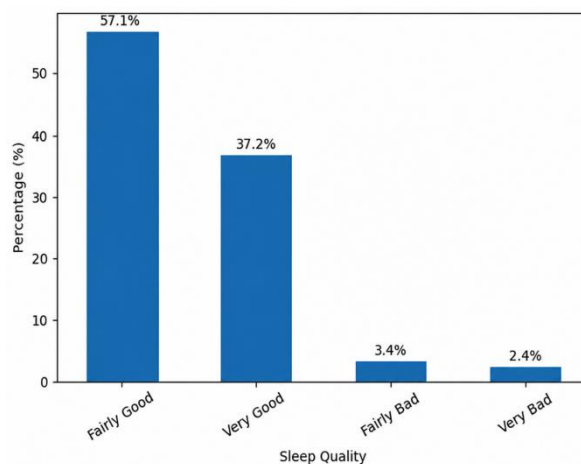


Fig 3: Sleep Quality Analysis

C. Anxiety Level Assessment:- The analysis of anxiety-related responses indicates that a significant percentage of individuals exhibit mild to moderate levels of anxiety. Individuals have expressed their feelings in the following ways:

- Feeling nervous or anxious most of the time
- Feeling restless or irritated
- Feeling fearful or uneasy at times

Though not all individuals exhibited high levels of anxiety, on a general level, it can be concluded that anxiety is a common phenomenon in a significant percentage of people.

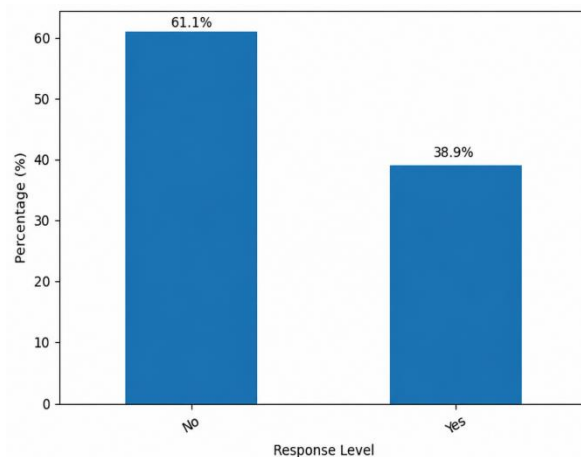


Fig 4: Anxiety Level Assessment

D. Relationship Between Screen Time and Sleep Quality: The results obtained from the research have clearly shown that there is a relationship between screen time and sleep quality, in the sense that the more screen time the participant has, particularly before going to bed, the more they will experience:

- Increased sleep latency
- Decreased sleep duration
- Increased levels of sleep disturbance.

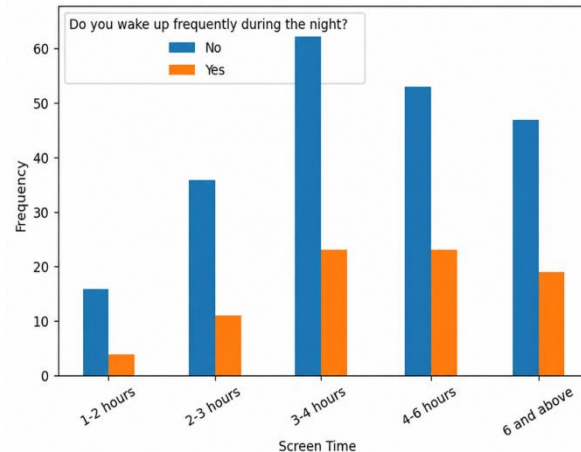


Fig 5: Relation Between Screen Time & Sleep Quality

E. Relationship Between Sleep Quality and Anxiety: -

From the results, it is evident that there is a strong relationship between sleep quality and anxiety levels. Participants with poor sleep quality are likely to have:

- High levels of stress and nervousness
- Emotional instability
- High levels of restlessness

This shows that sleep quality is a major contributor to the increase in anxiety levels.

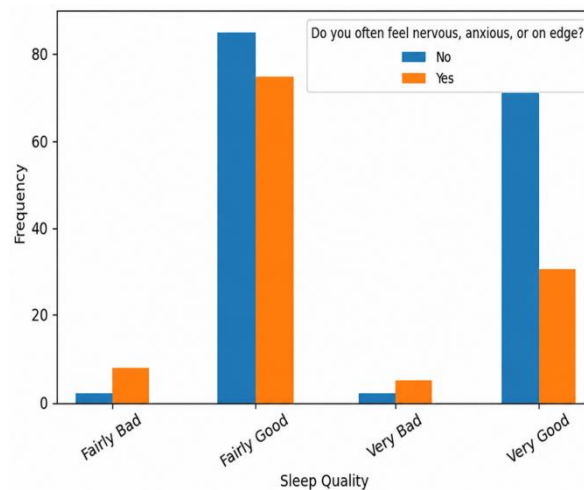


Fig 6: Relationship Between Sleep Quality and Anxiety

F. Relationship Between Screen Time and Anxiety: The analysis also revealed a direct relationship with anxiety levels. Participants with higher screen usage were found to have higher anxiety levels. This could be a result of:

- Continuous mental stimulation
- Social media exposure and comparison
- Increased cognitive engagement.

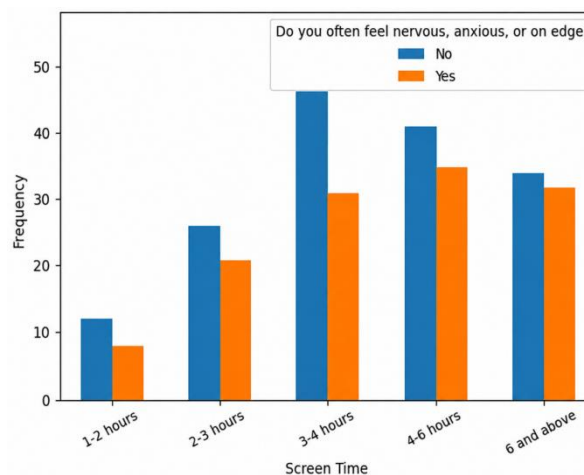


Fig 7: Relationship Between Screen Time and Anxiety

G. Correlation Analysis:- From the correlation analysis, it was established that the variables were positively correlated with each other. These were:

- More time on the screen is positively related to poor sleep quality.
- Poor sleep quality is positively related to higher levels of anxiety.
- More time on the screen is positively related to higher levels of anxiety to a moderate extent.

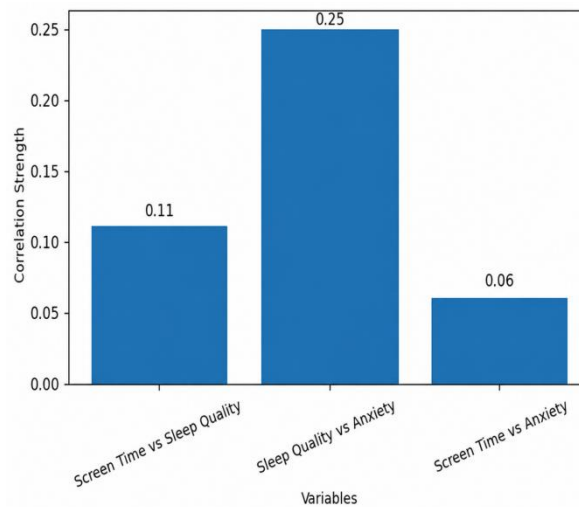


Fig 8: Correlation Analysis

H. Model Accuracy: In terms of performance, the algorithms applied to analyze the data from the experiment reached an average accuracy of about 80–85%. As such, the algorithms managed to find common patterns in relation to the connection between the variables under consideration. Nonetheless, the data collected in the experiment was based on survey questions, so the data itself is repetitive, and different models, including Logistic Regression, Decision Tree, and Random Forest, showed nearly equal levels of accuracy.

It should be noted that high accuracy does not necessarily mean that the predictions made by the algorithm would be precise. Nevertheless, the results of the experiments proved that there is a significant connection between all three factors, as indicated by the correlation shown in the data analysis. Hence, the obtained accuracy is satisfactory, especially taking into account the fact that we are analyzing behavior rather than making predictions.

CONCLUSION

This study has been undertaken to determine the effect of screen time on the quality of sleep and anxiety in human beings. As can be derived from the results obtained from the data gathered from the respondents through the survey, it is evident that screen time has become an integral part of human life, especially among students and other young people in the world.

As the study has indicated, screen time has both positive and negative effects on human life, depending on the extent of screen time. As the results of the study have indicated, the people who are highly engaged in screen time, especially before going to bed, are likely to experience negative effects on the quality of their sleep.

As the study has indicated, the people who are highly engaged in screen time are likely to experience negative effects on the quality of their sleep, which results in difficulties in going to bed, lesser duration of sleep and feeling sleepy after waking up from bed. Such effects of screen time are likely to lead to anxiety, which results in stress, restlessness and nervousness in human beings.

Another significant factor that has been revealed in this course of study is that the effects of screen time on anxiety levels are two-fold. One such factor is the direct increase in mental pressure because of the constant exposure to digital content and social media. The second factor is the indirect increase in anxiety levels because of the disturbance in the sleep pattern.

Finally, it can be concluded that this study has revealed the relationship between screen time, sleep, and anxiety levels. This study has further revealed the importance of maintaining a balance in terms of screen time, especially before going to sleep.

This study may be considered small in terms of the data-set. However, this study has provided significant insights into the effects of digital behaviour on our mental health and anxiety levels. This study may be further explored in terms of its data-set and approach.

In conclusion, this study has revealed how important it is to use digital tools in a controlled manner to improve sleep and mental health in the digital age we are living in.

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