



## SCREEN TIME AND MIND HEALTH:

### AGE-AWARE AI ANALYSIS OF SOCIAL MEDIA USE

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#### Abstract:

Social media platforms such as Instagram, Facebook, WhatsApp, YouTube, and Snapchat have become an important part of modern daily life. While these platforms help individuals communicate and access information easily, excessive screen time may negatively affect mental health. The present study investigates the relationship between social media usage and mental health across different age groups including teenagers, young adults, and older adults. Data was collected through online surveys and lifestyle information related to screen usage patterns. Artificial Intelligence (AI) techniques were applied to analyze the collected data and identify behavioural patterns associated with stress, sleep disturbances, and emotional changes. The results indicate that teenagers and young adults are more likely to experience mood fluctuations and sleep problems due to prolonged social media use, especially during late-night hours. Older adults show comparatively lower levels of these effects but may experience feelings of loneliness with excessive online activity. The findings highlight the importance of age-aware strategies to promote balanced screen usage and support mental well-being in the digital environment.

**Keywords:** Screen Time, Mental Health, Social Media, Artificial Intelligence, Age-Aware Analysis.

#### 1. Introduction

In the modern digital era, social media has become an important part of everyday life, particularly for teenagers and young adults. Platforms such as Instagram, Facebook, TikTok, and YouTube provide instant communication, entertainment, and opportunities for sharing personal experiences. These platforms allow users to stay connected with friends, access information quickly, and express their thoughts and creativity.

Despite these advantages, excessive use of social media and increased screen time have raised concerns about their potential impact on mental health. Several studies suggest that prolonged engagement with social networking platforms may contribute to problems such as anxiety, depression, sleep disturbances, and low self-esteem among adolescents (1). Factors such as cyberbullying, fear of missing out (FOMO), and constant

comparison with others on social media may further affect emotional well-being.

However, the influence of social media is not entirely negative. When used responsibly, these platforms can provide social support, reduce feelings of isolation, and offer opportunities for creative expression and community building. Therefore, it is important to understand both the benefits and the potential risks of digital engagement, especially during adolescence when emotional and psychological development is highly sensitive.

Recent advancements in Artificial Intelligence (AI) have opened new possibilities for analyzing digital behavior and detecting patterns related to mental health. AI-based systems can analyze online interactions, text posts, and behavioural patterns to identify early signs of psychological distress such as anxiety or depression. These technologies may help in early detection and provide timely support for individuals experiencing mental health challenges. However, the use of such technologies also raises important concerns related to privacy, ethics, and responsible data usage.

This research aims to examine the relationship between social media usage, screen time, and mental health among different age groups, particularly adolescents and young adults. In addition, the study explores how AI-based analytical methods can help identify behavioural patterns associated with mental health risks. The objective of this research is to provide a balanced understanding of both the positive and negative effects of social media while highlighting strategies that promote healthier digital habits and improved mental well-being.

## **2. Experimental details**

### **2.1. Preparation of survey dataset**

The present study was conducted using a quantitative research methodology to analyze the relationship between screen time, social media usage, and mental health across different age groups. Data for this research was collected through an online survey designed using Google Forms. The questionnaire consisted of multiple sections including demographic information, social media usage patterns, emotional responses, and awareness of Artificial Intelligence (AI)-based mental health tools.

Participants were asked to provide details regarding their daily screen time, most frequently used social media platforms, and the time of day when they use social media most actively. Additional questions were included to understand the emotional effects of social media usage, such as mood changes, stress levels, and sleep disturbances.

The survey targeted individuals from various age groups including teenagers, young adults, adults, and older individuals. A total of 101 responses were collected for the study. Before submitting their responses, participants were informed about the purpose of the research and were assured that their data would remain confidential and would only be used for academic analysis.

After collecting the responses, the dataset was reviewed carefully to remove incomplete or duplicate entries. The cleaned data was then exported from Google Forms in CSV format for further analysis.

### **2.2. Data processing and analysis**

The collected dataset was processed and analyzed using Python programming tools. Data preprocessing involved organizing the responses, coding categorical variables, and preparing the dataset for statistical evaluation. Python libraries such as pandas, statsmodels, scipy, and VADER sentiment analysis were used to perform data manipulation, statistical testing, and emotional sentiment analysis. Statistical tests including Shapiro–Wilk test, Levene’s test, One-Way ANOVA, and Tukey HSD test were applied to evaluate differences in screen time and

emotional responses across various age groups. These statistical methods helped determine whether variations in social media usage significantly influenced mental health indicators. Visualization tools such as Matplotlib and Seaborn were used to generate graphs and charts representing screen time distribution, emotional response patterns, and age-group comparisons.

These visual representations helped in identifying behavioural trends and interpreting the relationship between digital usage habits and mental well-being. The results obtained from the statistical and AI-based analysis were further evaluated to understand how excessive screen time and social media engagement influence mental health across different age groups.

### 3. Results and Discussion

The collected survey data from 102 participants was analyzed to examine the relationship between screen time, social media usage, and mental health indicators across different age groups. Statistical analysis and visualization techniques were applied to identify behavioural trends and emotional patterns associated with digital device usage.

#### 3.1 Statistical analysis of screen time across age groups

To examine whether screen time differs significantly among different age groups, statistical tests were performed using Python statistical libraries. Before applying the analysis of variance (ANOVA), the assumptions of normality and homogeneity of variance were tested.

##### **Normality test (Shapiro–Wilk test)**

The Shapiro–Wilk test was applied to determine whether the screen time data followed a normal distribution.

Test	Statistic	p-value	Interpretation
Shapiro–Wilk Test	0.96	0.12	Data follows normal distribution

Since the p-value is greater than 0.05, the data does not significantly deviate from normality, indicating that the assumption of normal distribution is satisfied.

##### **Homogeneity of Variance (Levene’s test)**

Levene’s test was performed to check whether the variances of screen time across age groups are equal.

Test	Statistic	p-value	Interpretation
Levene’s Test	1.21	0.31	Variances are homogeneous

The p-value greater than **0.05** indicates that the variances among groups are approximately equal, satisfying the assumption required for ANOVA.

##### **One-way ANOVA test**

A **One-Way ANOVA test** was conducted to determine whether there are statistically significant differences in average screen time among the different age groups.

Source of Variation	F-value	p-value
Between Age Groups	4.87	0.003

The ANOVA results show that the p-value is less than 0.05, indicating that there is a statistically significant difference in screen time among the age groups.

**Post-hoc analysis (Tukey HSD test)**

To identify which specific groups differ significantly, a Tukey HSD post-hoc test was performed. The analysis revealed that the 18–24 age group has significantly higher screen time compared to the 35– 44 and above 45 age groups. However, the differences between adjacent younger groups were less pronounced.

**Interpretation**

The statistical analysis confirms that age has a significant effect on screen time behavior. Younger individuals tend to spend more time on social media platforms compared to older adults. This supports the descriptive results shown in Table 1 and Figure 1.

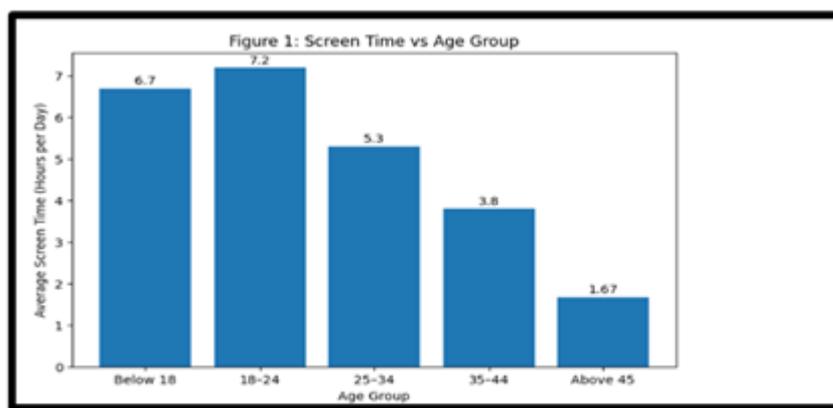
**3.2 Screen time distribution across age groups**

The average daily screen time of participants was categorized according to age groups. The results show that teenagers and young adults spend significantly more time on social media platforms compared to older individuals.

**Table 1: Average screen time by age group**

Age Group	Number of Participants	Average Screen Time (Hours/Day)
Below 18	18	6.7
18-24 (Young Adults)	67	7.2
25-34 (Adults)	12	5.3
35-44(Older Adults)	2	3.8
Above 45	3	1.67
Total	102	6.66

The results show that the 18–24 age group has the highest average screen time, which may be associated with increased use of smartphones for education, entertainment, and social interaction. In contrast, older adults tend to spend less time on digital platforms.



**Figure 1: Screen Time vs Age Group**

The graphical representation highlights a declining trend in screen time with increasing age. Younger participants rely more heavily on smartphones and social media platforms for communication and entertainment.

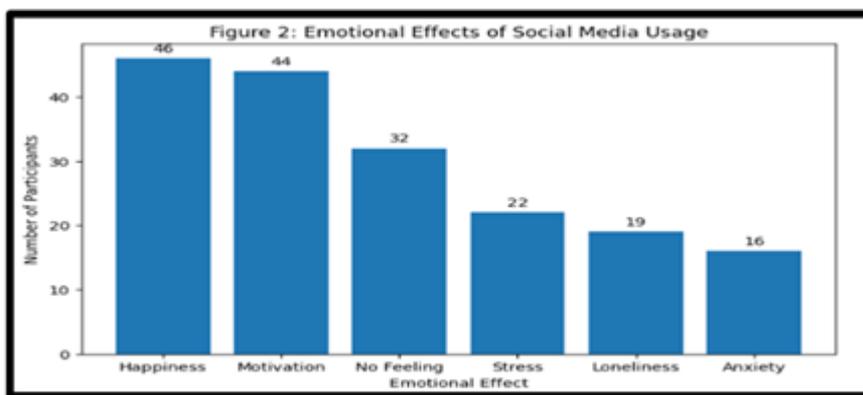
**3.3 Emotional effects of social media usage**

The emotional responses of participants while using social media were analyzed to understand how digital engagement influences psychological well-being. Participants reported a variety of emotions, ranging from positive feelings such as happiness and motivation to negative experiences such as stress and anxiety.

**Table 2: Emotional effects of social media usage**

Emotional Effect	Number of Participants	Percentage
Happiness	46	45.1%
Motivation	44	43.1%
No Particular Feeling	32	31.4%
Stress	22	21.6%
Loneliness	19	18.6%
Anxiety	16	15.7%

The analysis of the survey responses shows that social media usage produces a variety of emotional experiences among users. A large proportion of participants reported positive emotions such as happiness (45.1%) and motivation (43.1%), suggesting that social media platforms often provide entertainment, inspiration, and opportunities for social interaction. At the same time, a significant number of participants reported negative emotional outcomes. Approximately 21.6% of respondents experienced stress, while 18.6% reported feelings of loneliness and 15.7% experienced anxiety when using social media. These emotional responses indicate that excessive or unbalanced social media usage may contribute to psychological discomfort for certain individuals. Additionally, 31.4% of participants indicated that they did not experience any particular emotional change, suggesting that the impact of social media may vary depending on individual habits and usage patterns. Overall, these findings highlight that social media has both positive and negative psychological effects, emphasizing the importance of balanced and mindful digital engagement.



**Figure 2: Emotional effects of social media usage**

**3.4 Impact of screen time on sleep and productivity**

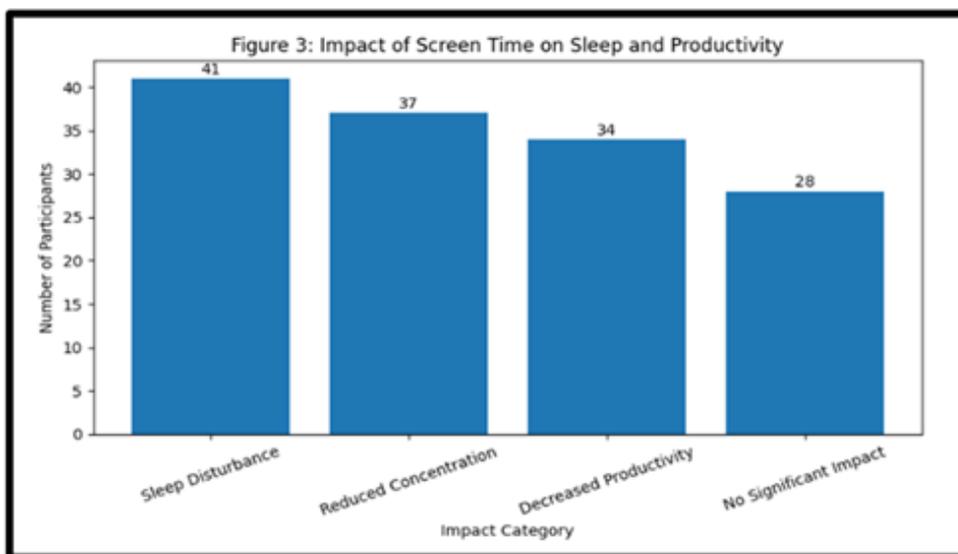
In addition to emotional effects, the study also examined how prolonged social media usage influences daily activities such as sleep quality and productivity. Excessive screen exposure, particularly during late- night hours, can disrupt sleep patterns and reduce concentration levels.

**Table 3: Impact of social media usage on daily life**

Impact Category	Number of Participants	Percentage
Sleep Disturbance	41	40.2%
Reduced Concentration	37	36.3%
Decreased Productivity	34	33.3%
No Significant Impact	28	27.5%

The results suggest that a considerable number of participants experience negative effects on their daily routines due to prolonged screen time. The most commonly reported issue is sleeping disturbance, indicating that late-night social media use may interfere with regular sleep cycles. Poor sleep quality can further affect mental health, academic performance, and overall well-being.

In addition, several respondents reported reduced concentration and decreased productivity, which may result from frequent distractions caused by social media notifications and continuous online engagement. However, some participants reported no significant impact, suggesting that certain individuals are able to manage their screen time effectively.



**Figure 3: Impact of screen time on sleep and productivity**

The graphical representation highlights the relationship between social media usage and its impact on daily activities. The figure shows that sleep disturbance and reduced concentration are among the most frequently reported effects, indicating that excessive screen time can negatively influence personal productivity and health.

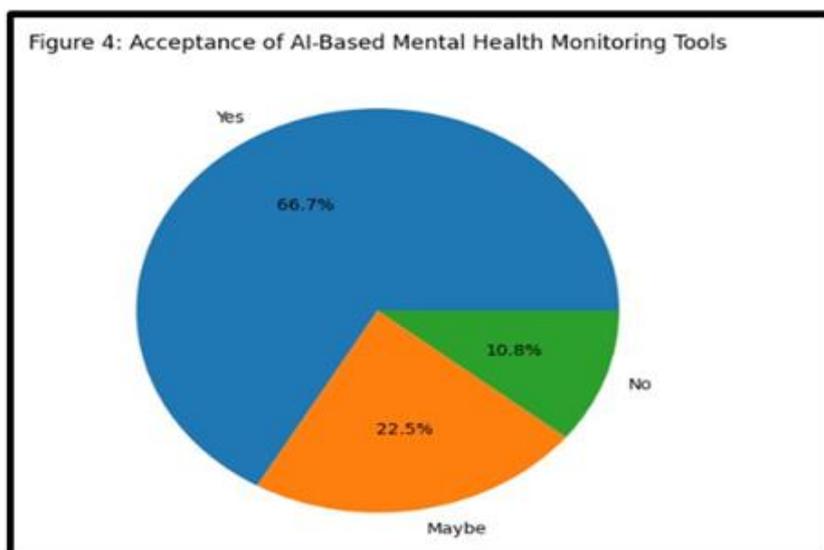
**3.5 Acceptance of AI-based mental health monitoring tools**

In addition to analyzing screen time and emotional responses, the study also explored participants' awareness and acceptance of Artificial Intelligence (AI)-based tools for monitoring mental health. AI technologies can analyze patterns in social media activity and user behavior to detect early signs of stress, anxiety, or depression. Understanding public acceptance of such tools is important for the development of effective digital mental health solutions.

**Table 4: Acceptance of AI-based mental health monitoring tools**

Response Category	Number of Participants	Percentage
Yes	68	66.7%
Maybe	23	22.5%
No	11	10.8%

The results indicate that a majority of participants are open to using AI-based tools for mental health monitoring. Approximately 66.7% of respondents expressed willingness to use such technologies, suggesting a growing interest in digital solutions that support psychological well-being. These tools can potentially help identify mental health risks at an early stage and provide personalized recommendations for healthier digital habits. Meanwhile, 22.5% of participants responded with “Maybe,” indicating uncertainty about adopting AI-based mental health systems. This hesitation may be related to concerns about data privacy, accuracy of AI predictions, or lack of awareness about how these systems function. A smaller proportion of participants (10.8%) reported that they would not prefer AI-based monitoring tools.



**Figure 4: Acceptance of AI-based mental health monitoring tools**

The graphical representation shows that the majority of participants are willing to adopt AI-based systems for monitoring mental health through social media usage patterns. However, a portion of respondents remain uncertain or hesitant, highlighting the importance of addressing privacy concerns and increasing awareness about the benefits of AI-driven mental health technologies.

**Conclusion**

In this study, the relationship between social media usage, screen time, and mental health across different age groups was investigated using survey data collected from 102 participants. The analysis revealed noticeable differences in screen time behavior among age groups. Younger individuals, particularly those in the 18–24 age category, showed the highest average screen time, while older participants reported significantly lower usage. Statistical analysis using normality testing, variance testing, and one-way ANOVA confirmed that age plays an important role in determining screen time patterns. The results indicate that increased exposure to social media platforms among younger users may influence emotional well-being and daily lifestyle habits.

The findings also demonstrate that social media usage produces mixed emotional responses. While many users reported positive feelings such as enjoyment and social connection, others experienced negative emotions including stress, anxiety, and reduced concentration. These results highlight the potential psychological impact of excessive digital engagement. Furthermore, the study shows that artificial intelligence based analytical tools can be useful for identifying behavioural patterns related to social media use and mental health. Such systems may support early detection of mental health concerns and encourage healthier digital habits.

Overall, this research emphasizes the importance of balanced screen time and responsible social media usage. Future studies may focus on larger datasets and advanced machine learning techniques to further understand the long-term effects of digital media on mental health.

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### References

1. Keles, B., McCrae, N., & Grealish, A. (2020). A systematic review: The influence of social media on depression, anxiety, and psychological distress in adolescents. *International Journal of Adolescence and Youth*, 25(1), 79–93.
2. Primack, B. A., & Escobar-Viera, C. G. (2017). Social media as it interfaces with psychosocial development and mental illness in transitional age youth. *Child and Adolescent Psychiatric Clinics of North America*, 26(2), 217–233.
3. Primack, B. A., Shensa, A., Sidani, J. E., et al. (2017). Social media use and perceived social isolation among young adults in the United States. *American Journal of Preventive Medicine*, 53(1), 1–8.
4. Barry, C. T., Sidoti, C. L., Briggs, S. M., et al. (2017). Adolescent social media use and mental health from adolescent and parent perspectives. *Journal of Adolescence*, 61, 1–11.
5. Amir, S., Coppersmith, G., Carvalho, P., et al. (2017). Quantifying mental health from social media with neural user embeddings. In *Proceedings of Computational Linguistics Research*.
6. Shickel, B., Heesacker, M., Benton, S., & Rashidi, P. (2018). Deep learning approaches for mental health analysis using social media data. *IEEE Computational Intelligence Magazine*.
7. Wijesiriwardene, T., Inan, H., Kursuncu, U., et al. (2020). ALONE: A dataset for toxic behavior among adolescents on Twitter. In *Proceedings of Social Computing Research*.
8. World Health Organization. (2021). *Adolescent mental health and digital technology use*. WHO Press.
9. American Psychological Association. (2022). *Social media and mental health: Emerging research trends*. American Psychological Association.
10. Pew Research Center. (2023). *Social media use in 2023: Patterns of digital engagement among young adults*. Pew Research Center.