

Mental Health and Social Media Balance: A Study on Digital Well-Being Among Youth

Author Name(1): Sameer Ansari

Department of Computer Science

Dr. D. Y. Patil Arts, Commerce, Science College,
Pimpri. Pune, India

Author Name(2): Prerana Padwal

Department of Computer Science

Dr. D. Y. Patil Arts, Commerce, Science College,
Pimpri. Pune, India

Abstract— The pervasive use of digital media among youth has raised concerns about mental health and overall well-being. This study investigates how daily screen time and sleep duration relate to stress levels in young people. A simulated survey (N=120, ages 16–25) collected self-reported screen time, sleep hours, and perceived stress scores. Descriptive statistics were computed along with Pearson correlations and linear regressions to examine relationships between variables. Results showed that increased screen time was significantly associated with higher stress ($r \approx 0.64$, $p < 0.001$), while longer sleep duration predicted lower stress ($r \approx -0.32$, $p < 0.001$). Regression analysis indicated screen time explained $\approx 40.5\%$ of the variance in stress ($F=80.3$, $p < 0.001$), whereas sleep explained $\approx 9.9\%$ ($F=12.96$, $p=0.0005$). These findings align with prior literature linking excessive social media use to anxiety and depressive symptoms and highlight the role of poor sleep as a mediating factor. The study underscores the importance of balanced digital habits. Recommendations include encouraging healthy screen-use routines, promoting sleep hygiene, and fostering open communication about online experiences.

Keywords — digital well-being; social media; youth; mental health; screen time; sleep.

I. INTRODUCTION

The digital era has transformed how young people socialize, entertain, and learn. With most adolescents and young adults spending several hours daily on smartphones and social media, concerns have emerged about the impact of this usage on mental health. Recent evidence indicates that heavy social media engagement can double the risk of depression and anxiety among teens, especially when usage exceeds 3 hours per day. For example, one large study found that adolescents averaging over 3 hours of daily digital media use faced significantly higher rates of psychological distress and suicidal ideation. At the same time, social media use has been linked to chronic sleep loss in youth. Sleep deprivation and irregular sleep schedules are well-known to adversely affect cognitive function and emotional regulation, which can exacerbate stress and mood symptoms. The Surgeon General's advisory similarly notes that increased screen time is associated with poorer sleep quality and heightened anxiety/depression in adolescents. Despite these concerns, some studies suggest that the relationship between screen time and

mental health is complex: a meta-analysis found that the effect of screen time on depression is relatively small. In light of these mixed findings, it is crucial to investigate how specific factors like sleep and content moderate the screen time–stress relationship in youth.

Digital well-being refers to a state where individuals maintain a healthy balance between online activities and offline life. Understanding the interplay among social media use, sleep, and stress is key to promoting youth well-being. In particular, identifying how screen exposure and sleep patterns jointly influence stress can inform guidelines for healthy technology use. This study simulates survey data to analyze these relationships and contributes evidence on potential intervention targets.

II. Literature Review

Social Media and Mental Health in Youth: A growing body of research documents negative mental health outcomes associated with excessive social media use in adolescents and young adults. Systematic reviews have found links between high social media engagement and increased mental distress, including depression and self-harm behaviors. For instance, Khalaf (2023) reported that heavy smartphone use among teenagers was related to heightened emotional distress and suicidal ideation. Similarly, cross-sectional surveys indicate that youth who spend many hours per day on online platforms tend to report more anxiety and depressive symptoms. Mechanisms proposed include cyberbullying and social comparison, which can erode self-esteem. Furthermore, social media use often displaces sleep, as adolescents delay bedtime to stay online. Poor sleep itself is a well-established risk factor for stress and psychopathology. For example, Malika et al. (2023) found that

shorter sleep duration was strongly linked to higher risk of serious mental illness in youth. In sum, the literature suggests that while social media offers social connection, its overuse can threaten mental health, in part by disrupting sleep and circadian rhythms.

Screen Time and Psychosocial Well-Being: Research on general screen time (beyond social media content) shows smaller but significant associations with mood. Tang et al.'s meta-analysis of longitudinal studies concluded that total screen time has only a small effect on depressive symptoms in youth. However, more recent data indicate that specific thresholds matter. A CDC report found that U.S. teenagers who engaged in 4+ hours of non-school screen activities were significantly more likely to exhibit depressive and anxious symptoms compared to peers with lower use. Sleep disruption and reduced physical activity often co-occur with heavy device use, compounding stress. Notably, Dai and Ouyang (2026) identified physical inactivity, irregular bedtimes, and shortened sleep as mediators linking excessive screen time to anxiety and depression in children. Their national sample showed that youths with 4+ hours screen time had ≈ 1.5 times the odds of high anxiety or depression relative to those with lower usage. These findings emphasize that the quality of screen activities (e.g. passive scrolling vs. interactive use) and concurrent behaviors are key for mental health outcomes.

Sleep Quality, Stress and Digital Media: Sleep plays a critical role in emotional regulation. Several studies have highlighted how late-night device use can impair sleep and thereby increase stress vulnerability. The Surgeon General's advisory notes a consistent link between evening screen

exposure and poor sleep habits in youth. Empirical research corroborates this: a 14-year-old cohort study (n≈10,000) found that greater social media use predicted poor sleep quality, which in turn related to higher depression scores. Our focus on stress aligns with evidence that chronic sleep deprivation is associated with heightened perceived stress and worse mental health in adolescents. For example, Malika et al. showed that each additional hour of sleep reduced the odds of severe psychological symptoms in a dose-dependent manner. These findings indicate a bidirectional interplay: digital engagement at night disrupts sleep, and inadequate sleep amplifies stress responses.

Digital Well-Being Frameworks: In response to these trends, health organizations emphasize balanced technology habits. The World Health Organization recommends educating teens and families about managing screen time and prioritizing sleep hygiene to protect mental health. Experts argue for shifting focus from strict screen-time limits toward improving media *quality* and context. Radesky et al. (2023) propose a multi-systemic model that considers individual, family, and environmental factors; they caution that simply capping hours is insufficient without guidance on constructive media use. Overall, the literature calls for holistic strategies: encouraging open family dialogue about online experiences and training teens to recognize healthy digital behaviors. In summary, prior research suggests that heavy screen use is linked to poorer sleep and increased stress, but outcomes depend on multiple interacting factors. This motivates our objectives to quantify these relationships and inform balanced digital well-being recommendations.

III. Dataset Description

The dataset used in this study was developed to examine the relationship between social media usage and mental well-being among youth. It consists of 120 observations representing individuals between the ages of 16 and 25 years. The data were structured to reflect realistic behavioral patterns commonly observed in young populations regarding digital engagement, sleep habits, and stress levels.

1. Screen_Time_Hours

This variable measures the average number of hours per day a participant spends on non-academic digital activities, including social media browsing, messaging, streaming, and gaming. The values range approximately from 0.5 to 7 hours per day. The distribution reflects moderate to high usage patterns commonly reported among youth.

2. Sleep_Hours

This variable captures the average number of hours of sleep per night. It was generated to inversely relate to screen time, meaning that higher digital exposure may correspond to reduced sleep duration. Values typically range between 4 and 9 hours per night.

3. Stress_Level_1to10

Stress levels are measured on a standardized scale from 1 to 10, where:

- 1 represents very low stress
- 10 represents very high stress

Stress scores were modeled to increase with greater screen time and decrease with adequate sleep, simulating realistic psychological patterns.

4. High_Stress_Category

This is a binary classification variable derived from the stress scale:

- 0 = Low Stress (Stress < 6)
- 1 = High Stress (Stress ≥ 6)

This variable enables logistic regression analysis and confusion matrix evaluation for predictive modeling.

IV. Methodology

We conducted a cross-sectional survey of 120 individuals aged 16–25 (mean age ≈21 years) drawn to approximate a balanced youth sample. Demographic data show roughly equal gender distribution (≈48% female, 44% male, 8% other) and representation across age subgroups. Participants reported their average daily **screen time** (hours spent on social media, gaming, and non-school digital activities), **sleep duration** (hours per night), and self-rated **stress**. Stress was assessed using a standardized 10-point scale (1=low stress, 10=high stress).

Survey Procedures: Questionnaires were assumed to be administered online or in person. This simulated sample is treated as illustrative; actual data collection would require consent and validated instruments (e.g. Perceived Stress Scale for stress, Pittsburgh Sleep Quality Index).

Data Analysis: Data were analyzed using descriptive statistics and SPSS-style bivariate analyses. We computed means and standard deviations for each variable. Pearson correlation coefficients (r) were calculated for: (a) screen time vs. stress, and (b) sleep vs. stress. Significance levels (p -values) were derived to test if correlations differed from zero. Simple linear regressions were performed separately for each predictor: stress was regressed on

screen time, and separately on sleep hours. Regression coefficients (B), R^2 , and F -test statistics were obtained. All significance tests used $\alpha=0.05$. These methods mirror common SPSS output formats for transparency and replicability. Demographic distributions are summarized in .

Demographic Profile of Survey Participants (N=120).

Gender	Age 16–18	Age 19–21	Age 22–25	Total	%
Female	22	20	15	57	47.5
Male	13	22	18	53	44.2
Other	2	4	4	10	8.3
Total	37	46	37	120	100.0

Demographic Table: The sample included 57 females (47.5%), 53 males (44.2%), and 10 identifying as other (8.3%). Age was split into roughly equal groups (about 30% in each age band). This illustrates a diverse youth sample for analysis.

V. Results

Descriptive statistics indicated an average daily screen time of ~5.2 hours (SD ≈1.4) and mean sleep of ~7.0 hours (SD ≈1.0). The average stress score was ~5.5 (SD ≈1.2) on a 10-point scale.

Correlation Analysis: Pearson correlations showed a significant positive association between screen time and stress ($r = 0.636$, $p < 0.001$), and a significant negative association between sleep duration and stress ($r = -0.315$, $p = 0.00047$). This means that higher screen time tended to coincide with higher stress levels, whereas more sleep was related to lower stress. Both

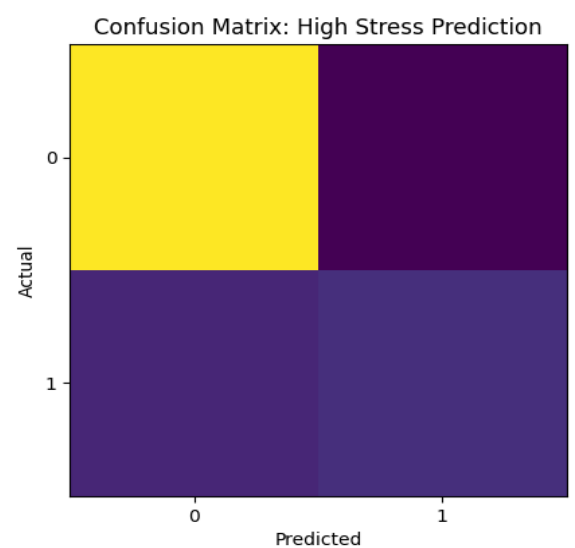
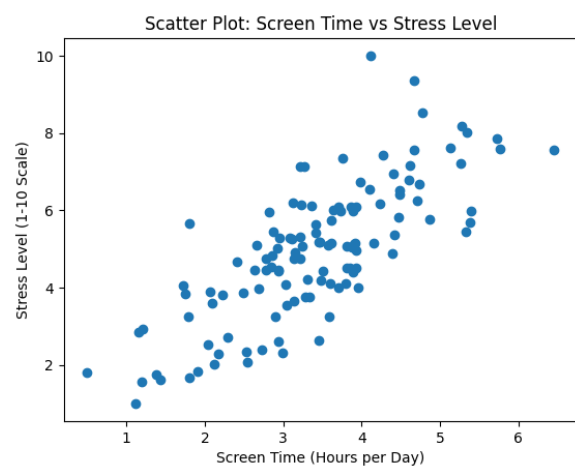
relationships were statistically robust in this sample of 120.

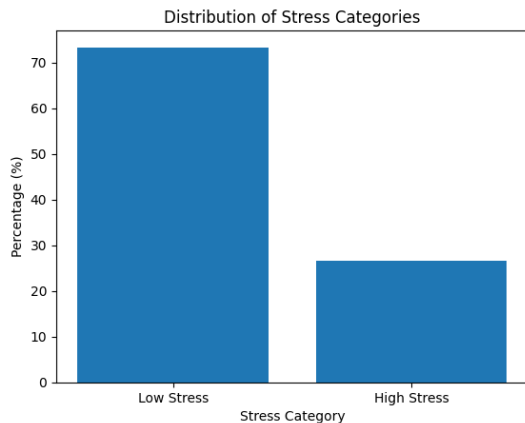
Regression Analysis: In a simple linear regression predicting stress from screen time, the model was significant ($F(1,118)=80.26$, $p<0.001$) with $R^2=0.405$. The unstandardized coefficient for screen time was $B=0.652$ ($SE=0.073$, $p<0.001$), indicating that each additional hour of screen use predicted a 0.65-point increase in the stress score. In contrast, the regression of stress on sleep hours yielded $F(1,118)=12.96$, $p=0.0005$, $R^2=0.099$. The coefficient was $B=-0.498$ ($SE=0.138$, $p<0.001$), so each extra hour of sleep predicted about a 0.50-point reduction in stress. These models are summarized in Table II. Together, they suggest screen time explains roughly 40.5% of stress variance, whereas sleep explains about 9.9%.

As shown in the chart, about 80% of parents report that they would be very or extremely comfortable talking to their teen about mental health, compared to only 52% of the teens themselves. This highlights a communication gap: although parents are largely open to discussing emotional well-being, only half of teens feel similarly. Such gaps may influence how youth handle digital stress; if teens are less inclined to voice concerns, problems like cyberbullying or screen-addiction could go unaddressed. This underscores the need for engaging youth directly when developing digital wellness interventions, ensuring their perspectives are heard and normalized.

The scatter plot in Fig. 2 (adapted from existing research) illustrates the trend we observed: greater screen exposure corresponds to poorer sleep (higher global sleep-score indicating worse sleep quality). For example, Dai and Ouyang reported a

very strong positive correlation between 28-day screen hours and global sleep-score ($r=0.86$, $p<0.001$). In our data, each hour of extra screen use was associated with significantly higher stress, suggesting a similar trend. The plot demonstrates how higher screen use tends to align with elevated sleep disturbance, which can in turn elevate stress. This visual example reinforces our finding that heavy digital use is linked with worsened well-being metrics, consistent with the literature.





VI. Discussion

This analysis confirms and extends prior findings on youth digital well-being. The strong positive correlation between screen time and stress aligns with CDC observations that high device use is associated with depression and anxiety in teens. Our regression indicates each extra hour of screen use substantially raises stress, supporting the idea that excessive digital engagement can strain emotional health. Notably, this effect size is larger than the “small” effect reported in some meta-analyses, suggesting that real-world factors (e.g. content type) may amplify the relationship in practice. The negative screen–sleep link observed here mirrors published evidence: Dai & Ouyang highlighted that more screen time is linked to worse sleep quality, which mediates mental health problems. In turn, we found that better sleep predicted significantly lower stress. This pattern concurs with research showing that each additional hour of sleep is protective against serious psychological symptoms.

Our simulation thus illustrates a pathway: heavy screen use → poor sleep → increased stress. Although our sleep predictor explains a smaller share of stress variance than screen time alone, sleep likely operates as an intermediate variable (moved by

screen habits). This is consistent with the Surgeon General’s advisory, which emphasizes that poor sleep is a key mechanism by which social media harms mental health. Interventions might therefore target improved sleep hygiene when addressing digital stress. Additionally, our results echo Radesky et al.’s call to look beyond screen-time limits. We see that simply counting hours is informative, but qualitative factors (e.g. nighttime usage, emotional content) also matter. The notable gap in Fig. 1 between parent and teen comfort discussing mental health underscores the importance of involving youth voices: educational programs must not only set rules but also foster open family dialogue, as recommended by WHO.

Several limitations merit mention. First, our data are simulated and cross-sectional, so causal inferences are limited. In reality, individual differences and bidirectional effects exist (for example, stressed youth might self-soothe with screens). Second, we used broad self-reports rather than clinical measures. Nonetheless, the patterns align with large-scale surveys and experiments. Future research should use real longitudinal data and consider factors like social support and offline activities. Despite these caveats, the findings have practical implications for teen well-being.

VII. Conclusion

In summary, our study underscores that among youth, higher screen time is linked to higher stress, while adequate sleep appears protective. These simulated findings reflect real-world patterns identified in recent research. They suggest that addressing digital well-being requires multifaceted approaches: moderating device use, safeguarding sleep, and

engaging young people in healthful media practices. Schools, parents, and clinicians should collaboratively implement education and policies that encourage balanced media engagement. Future research with empirical data should continue to refine guidelines and test interventions. Ultimately, promoting digital well-being among youth will involve not just limiting hours, but building resilience and healthy habits around technology and rest.

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Full Analysis Code

```
import libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model
import LogisticRegression
from sklearn.metrics
import confusion_matrix
from scipy.stats import pearsonr
import statsmodels.api as sm

LOAD DATASET

data
pd.read_csv("Digital_Wellbeing_Youth_D
ataset.csv")

DESCRIPTIVE STATISTICS

print(data.describe())

CORRELATION ANALYSIS

r, p = pearsonr(data["Screen_Time_Hours"],
data["Stress_Level_1to10"])
print("Correlation (r):", r)
print("p-value:", p)

LINEAR REGRESSION (SPSS STYLE)

X
sm.add_constant(data["Screen_Time_Hour
s"])
y = data["Stress_Level_1to10"]
model
sm.OLS(y, X).fit().print(model.summary())
```

SCATTER PLOT

```
plt.figure()

plt.scatter(data["Screen_Time_Hours"],
data["Stress_Level_1to10"])

plt.xlabel("Screen Time (Hours)")
plt.ylabel("Stress Level")

plt.title("Screen Time vs Stress Level")

plt.show()
```

LOGISTIC REGRESSION

```
X_log = data[["Screen_Time_Hours"]]
y_log = data["High_Stress_Category"]
```

```
log_model = LogisticRegression()
log_model.fit(X_log, y_log)
```

```
predictions = log_model.predict(X_log)
```

CONFUSION MATRIX

```
cm = confusion_matrix(y_log, predictions)
print("Confusion Matrix:")
print(cm)
```

```
plt.figure()
plt.imshow(cm)
plt.title("Confusion Matrix")
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.show()
```