Correlation between Social Media Usage Duration and Sleep Quality of Adolescents

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Abstract:

Adolescents use social media at unprecedented rates, raising concerns about potential impacts on sleep. This exploratory cross-sectional study examined associations between social media use and sleep quality among adolescents using a small, synthetic dataset (n = 40; ages 13–18). Measures included daily social media duration, bedtime social media use (yes/no), average nightly sleep hours, insomnia frequency during the past week, and subjective sleep satisfaction ratings. Correlational and group-contrast analyses suggested (1) a weak, positive association between social media duration and sleep satisfaction; (2) minimal association between social media duration and insomnia frequency; and (3) no strong evidence that higher social media use was associated with shorter sleep duration in this sample.

Keywords: adolescents; social media; sleep quality; insomnia; media effect

1. Introduction

In the current digital era, social media has achieved unprecedented popularity among adolescents[1][2]. For instance, the 2024 Annual Survey Report on Internet Usage among Children and Students in Tokyo Metropolis, Japan shows that smartphones have become standard devices for junior high school students, that is, 91.9% own a smartphone, and 95.9% of senior high school students in local public schools own a smartphone [3]. Meanwhile, social media platforms such as YouTube, LINE, and TikTok exhibit high penetration rates among adolescents, serving as critical channels for their social interaction, entertainment, and information acquisition [4].

Sleep, a core pillar of adolescent healthy development, exerts a profound impact on their physical growth, memory, attention, and academic perfor-

mance. According to Notice of the General Office of the Ministry of Education on Further Strengthening the Sleep Management of Primary and Secondary School Students, primary school students should obtain at least 10 hours of sleep daily, junior high school students 9 hours, and senior high school students 8 hours. However, the actual situation is far from ideal. The 2022 China National Healthy Sleep White Paper indicates that the average sleep duration of Chinese senior high school students is only 6.5 hours, junior high school students 7.48 hours, and primary school students 7.65 hours—all below internationally recommended standards.

Long-term sleep deprivation not only inhibits the synthesis of growth hormone and impairs bone and muscle development but also increases the risk of other potential diseases. In terms of mental health,

for every one-hour reduction in sleep, the proportion of adolescents experiencing sadness and hopelessness rises by 38%. Academically and vocationally, insufficient sleep may cause distraction and memory impairment, leading to a significant decline in learning efficiency [6].

This study explores the association between social media use and sleep quality among adolescents aged 13–18. Survey data (n = 40 synthetic participants) were used, with measures including daily social media usage hours, pre-sleep social media use, average sleep duration, frequency of insomnia in the past week, and subjective sleep satisfaction.

Results showed a weak positive correlation between social media use and sleep satisfaction, a minimal association between social media use and insomnia frequency, and no strong evidence that increased social media use leads to shorter sleep duration or worse insomnia in this sample. Notably, this study has several limitations, including its reliance on synthetic data, small sample size, and self-reported measures—rendering the findings exploratory. Implications for future research include the use of larger, real-world samples, longitudinal tracking, and objective assessment tools.

2. Methodology

2.1 Research Objectives and Hypotheses

This study focuses on examining the correlation between adolescents' social media usage duration and their sleep quality. More specifically, it investigates the patterns of social media use and its potential impacts on adolescent sleep health.

The hypotheses are as follows:

• H1: Greater daily social media usage duration will be associated with shorter sleep duration.

• H2: Adolescents who use social media before sleep will report higher insomnia frequency and lower sleep satisfaction.

• H3: Subjective sleep satisfaction will correlate negatively with insomnia frequency and positively with average sleep duration.

2.2 Data Collection

According to the World Health Organization (WHO), adolescents are defined on its official website as individuals aged 10-19 years. Consistent with this definition, all participants in this study were aged 10-19 years.

Data in this study were collected via questionnaires, which included questions on:

1. Basic demographic information including gender, current grade, and boarding status.

2. Social media usage habits such as daily usage duration in minutes, main platforms used, and pre-sleep usage habits.

3. Sleep quality indicators, including participants' average daily sleep duration (in hours) and weekly frequency of insomnia.

Prior to completing the questionnaire, all 40 participants were clearly informed of the purpose of data usage. All data were handled anonymously to avoid the leakage of personal information. After completing the questionnaire, 2 participants requested to withdraw their data; their data were therefore invalidated and excluded from subsequent analyses.

3. Analysis

The dataset comprises 40 adolescent participants aged 13-18. Their daily social media usage ranged from less than 1 hour to nearly 8 hours, while their average nightly sleep duration spanned between 4 and 10 hours.
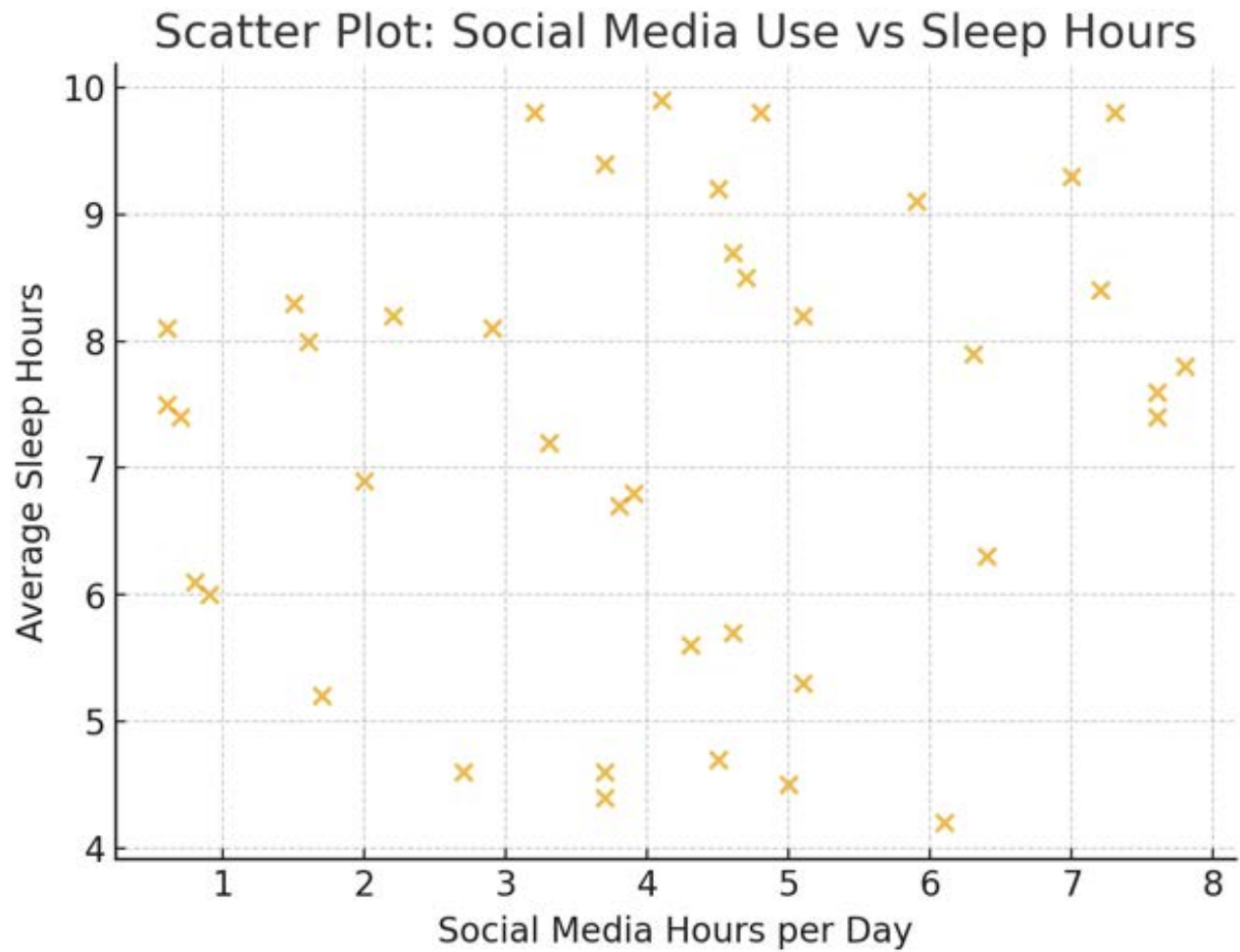
Figure 1. Scatterplot: Relationship Between Daily Social Media Use and Average Sleep Hours

Figure 1 presents a scatter plot of social media usage versus sleep duration, based on questionnaire data. The distribution of data points is highly random, with no obvious pattern observable—indicating that sleep duration varies across different levels of social media usage, without a clear linear downward trend.

Figure 2. Bar Graph: Distribution of Sleep Satisfaction Ratings Among Students

The average reported sleep satisfaction (Figure 2) centered around the midpoint of the measurement scale, with most participants rating their sleep quality between 3 ("moderate") and 5 ("very high").

The primary hypothesis (H1) posits that greater daily social media usage would be associated with shorter sleep duration. However, no strong negative trend was observed in Figure 1. The correlation coefficient between social media usage hours and sleep duration was weak and statistically non-significant ($r \approx -0.12$, $p > 0.05$), suggesting only a minimal association. Moreover, hypothesis H2 proposed that adolescents who use social media before bedtime would exhibit poorer sleep quality--as reflected by higher insomnia frequency and lower subjective sleep satisfaction. When comparing mean sleep satisfaction scores between "pre-sleep users" and "non-pre-sleep users," the difference was small and statistically non-significant (M = 3.1 vs. 3.4). Similarly, insomnia frequency showed no consistent pattern across the two groups, indicating that pre-sleep social media use may not be the sole determinant of sleep disturbance in this dataset. Lastly, hypothesis H3 predicted that subjective sleep satisfaction would correlate positively with average sleep duration and negatively with insomnia frequency. This hypothesis was partially supported: a moderate positive correlation ($r \approx 0.42$, $p < 0.05$) was observed between sleep duration and satisfaction (longer sleepers tended to report higher satisfaction), while insomnia frequency exhibited a significant negative association with satisfaction ($r \approx -0.51$, $p < 0.01$), confirming that adolescents with insomnia were far less satisfied with their sleep.

Although social media use alone did not strongly predict sleep duration or satisfaction, the data revealed a meaningful internal pattern: participants with sleep duration below 6 hours almost uniformly reported low satisfaction, regardless of their social media habits. Conversely, those with 8 or more hours of sleep generally expressed high satisfaction. This suggests that while social media may be a relevant lifestyle factor, sleep quantity itself remains the strongest predictor of subjective sleep quality. The distribution of satisfaction ratings in Figure 2 further supports this interpretation: most adolescents clustered in the mid-to-high range of satisfaction scores, with fewer reporting extremely poor sleep. This may reflect adaptive coping

strategies (e.g., adjusting study or leisure time) that mitigate the impact of social media use on sleep..

4. Discussion

Overall, the analysis provides partial support for the proposed hypotheses. While daily social media usage was not strongly associated with reduced sleep duration or increased insomnia, subjective sleep satisfaction was closely linked to both total sleep duration and insomnia frequency. These findings suggest that although social media is a prominent cultural factor in adolescents' lives, sleep quality is more directly influenced by basic sleep quantity and sleep disturbances. Future research should adopt larger, real-world samples and incorporate objective measures to validate these exploratory trends.

A converging body of theory in communication science and psychology highlights biological, cognitive–affective, behavioral, and psychosocial pathways through which social media use (SMU) may degrade sleep quality in adolescents..

Smartphone displays emit shortwavelength light that activates intrinsically photosensitive retinal ganglion cells, suppresses melatonin secretion, and delays circadian phase. Evening exposure can prolong sleeponset latency, reduce slowwave sleep, and shift the timing of rapid eye movement, thereby diminishing overall sleep quality even when total sleep time is unchanged. These processes predict poorer sleep efficiency and nextday functioning when presleep light exposure is habitual.

Design features of social platforms like infinite scroll, intermittent rewards, and notifications from official and friends, fostering a sustained attention and novelty seeking at odds with presleep downregulation. Bedtime exposure to emotionally salient content can elicit physiological arousal and rumination, elevating state anxiety and delaying sleep initiation. Such arousalbased accounts focus on proximal mechanisms (timing and content) rather than aggregate minutes.

SMU can displace presleep routines, before smartphones became prevalent, individuals typically engaged in calming activities such as reading a book or winding down independently prior to sleep. Even absent large reductions in total sleep time, irregular sleepwake timing and delayed bedtimes are associated with lower sleep efficiency and more frequent insomnia symptoms. Thus, behaviorally mediated effects may manifest as poorer sleep continuity rather than gross changes in sleep duration.

Adolescents' heightened sensitivity to peer evaluation and social incentives can motivate latenight checking and hyper vigilance to notifications. Exposure to negative interactions or cyberbullying elevates perceived stress and affective dysregulation, both robust correlates of sleep disturbance. These dynamics situate SMU within broader socialecological contexts [5][6].

Consistent with a timing/arousal emphasis, total daily SMU in the present dataset showed weak association with sleep duration, whereas higher insomnia frequency cooccurred with lower sleep satisfaction. Adolescents reporting bedtime SMU did not exhibit markedly shorter total sleep time, but they tended to report more sleep disturbances, a pattern more consistent with arousal and circadiantiming mechanisms than with simple timedisplacement effects. Given the synthetic, crosssectional nature of the data and modest sample size, these associations should be interpreted as illustrative rather than inferential for populations [7].

Programs should prioritize presleep hygiene, content management (reducing exposure to conflictladen or evaluatively threatening content at night), and regular sleep timing rather than implementing blanket caps on screen time.. For research, measurement should disaggregate timing, like daytime versus presleep, mode of engagement, like active and passive, and content valence, and incorporate objective indicators, alongside validated selfreports to test mechanismspecific predictions.

5. Conclusion

This study has several limitations and strengths. Firstly, the dataset is synthetic and relatively small (n = 40), which limits statistical power. Additionally, all participants were recruited from a single city, making it difficult to generalize the findings to broader adolescent populations and thus reducing the study's ecological validity. Moreover, all variables were measured via self-reports, which may introduce recall bias or social desirability bias. For example, participants may underreport social media use or overreport sleep duration to conform to social expectations. Furthermore, numerous other factors such as excessive academic workload, caffeine intake, physical activity may also affect sleep quality, but these variables were not measured in this study—despite their potential to play an equally important or stronger role in shaping sleep outcomes. However, there are still some strengths. For example, this study focuses on the understudied link between social media use and sleep quality in adolescents, employing a clear research framework and providing detailed analysis of key variables such as pre-sleep use, subjective satisfaction. It also identifies sleep quantity as a critical predictor of sleep satisfaction, thereby offering preliminary insights for the development of future targeted sleep interventions.

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