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Research Paper

Effects of Social Media on Cognitive Flexibility and Patterns of Sleep Quality

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ABSTRACT

The widespread adoption and prevalence of social media platforms have created concerns regarding its effect on an individual's mental and psychological health. The objective of this study is to analyse social media interactions and its impact on sleep quality and cognitive flexibility in young adults. Through Social Media Use Scale (SMUS), Pittsburgh Sleep Quality Index (PSQI), and Cognitive Flexibility Questionnaire (CFQ), data were collected from [sample size] participants to ascertain the effects of social media use on sleep and cognitive flexibility. Findings of the research demonstrate that higher levels of social media usage are directly associated with a decline in sleep quality and subsequently, less cognitive flexibility. There is a clear need for improvement in the usage of social media to facilitate better cognitive functioning. Strategies aimed at rehabilitating social media habits using mental health frameworks were discussed alongside suggestive intervention for future research.

Keywords: *Social media engagement, Sleep patterns, Cognitive Flexibility, Psychological Health, Young Adults, Technology Use, Mental Well-being*

In the modern digital era, social media has become an essential part of day-to-day life, influencing numerous aspects of human behaviours, such as sleep patterns and cognitive processes. Platforms like Instagram, Twitter, Facebook, and TikTok offer constant connectivity, shaping how individuals connect, consume information, and engage with rest of the world. In as much as these platforms bring together people for social interaction, entertainment, and information sharing there is growing concern regarding their potential negative impacts on mental health, particularly on sleep quality and cognitive flexibility. The phenomenon of social media networking has been linked with increased screen time, scrolling through the news feed at night, and being exposed to highly stimulating content which can lead to sleep problems. On the other hand, the psychological and cognitive effort of having to be continuously engaged online may affect how one adapts to and switches between different cognitive tasks, which is a hallmark of cognitive flexibility.

The Social Media Use Integration Scale (SMUS): shows how deeply social media is integrated into everyday life at an emotional and habitual level. The Individual's use of

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social media varies significantly with other people which can bring him different behavioral and psychological impacts. SMUS is one of the commonly applicable measures aimed at estimating social networks participation. As social media services advance, they create rich virtual environments that foster continuous engagement. Users find it increasingly more difficult to disconnect because of notifications, algorithmic content and the endless scroll features that drive constant use. Multiple studies have shown that social media overuse, especially right before bed, can disrupt sleep hygiene and contribute to poor sleep quality, difficulty sleeping, and irregular sleep cycles.

Influences of Sleep Quality on Cognitive Functioning: Maintaining good sleep is vital as it helps attain an optimal level of functioning, helps with memory retention, and stabilizes emotions. When we achieve good sleep, we can think straight, concentrate on our work, and maintain emotional equilibrium. One popular method to determine quality of sleep is Pittsburgh Sleep Quality Index (PSQI), which measures the duration to fall asleep, interruptions during the sleep, total sleep time, and sleep efficiency.

Quality sleep deprivation has numerous unwanted consequences, such as increased stressors, insufficiency in attention, and absence of problem-solving skills. One main reason affecting the sleep quality is too much time spent on social media, particularly before going to sleep. The blue light emitted from the screens disrupts the production of melatonin, making sleep not only difficult to start but also to maintain. On top of the biological disruption, content on the internet, whether sad or happy, has the ability to overly engage the brain in activity, which causes further delay in achieving sleep. Over time, these hindered sleep patterns caused by excessive screen time can deteriorate cognitive functions like problem solving, flexibility, and inductive reasoning.

Cognitive Flexibility, Social Media, and Sleep Research Connection:
Cognitive flexibility is the ability to change one's thought processes depending on the prevailing situations. This type of mental flexibility is important for decision-making, emotional regulation, problem solving, and even thinking. There are various ways in which a person's cognitive flexibility can be measured and one of them is using the Cognitive Flexibility Questionnaire (CFQ). Studies show that sleeping for long hours and having good quality sleep helps maintain cognitive flexibility among individuals. A person who has had a restful sleep can perform cognitive tasks more efficiently such as balancing their thoughts, considering various sides of a situation, and overcoming obstacles effortlessly.

Unfortunately, when social media or other activities interfere with sleep, that person's ability to think becomes more rigid and inflexible. Since social media is quite popular nowadays, understanding its implications on cognitive function and sleep is important. This research aims to find out the link between social media use (quantified using SMUS), the quality of sleep (measured by PSQI), and cognitive flexibility (measured by CFQ). With the results of the study, it is hoped that it will be easier to understand the role people's social media interactions have on their mental health and pave the way to form practices that can enhance the quality of sleep and cognitive performance.

REVIEW OF LITERATURE

Vernon et al. (2015) emphasizes the importance of adolescents taking control of their health habits, particularly regarding sleep and media usage. Managing these behaviours is important for achieving adequate sleep quality which, in turn, helps them remain alert and perform well in school. There is a gap in the literature, however, regarding forward social

media integration within the room, and how over-consumption of social networking impacts sleep and school experiences. In a study of 1,886 Australian adolescents aged 12 to 18 years, problematic social media usage was shown to adversely affect sleep and, in turn, satisfaction with school. From this, we can understand that adolescents could be unknowingly caught up in the negative impacts social media has which poses the necessity of enforcing good sleeping behaviours to optimize their educational experiences and over-all wellness.

Scott and Woods (2019) highlight that research on sleep and mental health is increasingly focusing on deconstructing social media engagement, moving beyond merely quantifying screen time. This literature review covers the novel ways of looking at the problem of social media and puts the focus on content, context, and online communication. This specific quote is centered on the idea of sleep and mental health issues in this evolving distress world, so the focus is on the development of reliable measurement techniques within multidisciplinary collaboration.

Shechter et al. (2020) emphasises the negative impact of smartphones and other personal electronics emit blue light which can interfere with one's sleep wake cycle, especially when used in the evening. To show the potential impact of colored lenses like amber or orange that block shortwave light, a systematic review and meta-analysis of several studies was undertaken. While some of the studies evaluated suggested certain benefits, others demonstrated no significant impact regarding sleep. With all the studies accounted for, the aggregate findings showed small to medium improvements in sleep efficiency and total sleep time. Self-reported measures of sleep quality demonstrated a more pronounced effect, particularly among individuals suffering from insomnia or other sleep disorders. Despite the contradicting results, this research emphasizes the promise colored lenses may have on improving sleep, marking a justification for further studies.

Korte (2020) discusses recent neuroscience studies that reveal the complex effects of digital media on the human brain and behaviour, reflecting our heavy reliance on these technologies. While digital media offers benefits like improved communication and educational support, it also poses risks, particularly linked to issues like internet and gaming addiction, as well as challenges in emotional recognition and language skills. However, many current studies depend on self-reported metrics of social media use, prompting a call for researchers to adopt more robust data collection methods that could include detailed tracking of screen time and user demographics.

Kolhar et al. (2021) reports that social networking sites are widely used by university students, with a survey at Prince Sattam bin Abdul Aziz University revealing that 97% of female students aged 17 to 29 use social media. Social media was only used by 1% of the respondents for educational purposes, while 35% engaged in social networking mostly for chatting and 43% for leisure. It is remarkable that 57% acknowledged they have become addicted to these platforms, and more than half of them admitted that their social media usage has negatively impacted their studying. The research found that a large proportion of students (66%) acknowledged that they are more inclined to use social media instead of focusing on learning, and 74% used these sites during their leisure times. Snapchat was the most commonly used application (45%), followed by Instagram (22%), Twitter (18%), and WhatsApp (7%). They also reported that sleep was influenced because students went to sleep much later as a consequence of using social media, which caused some students to lose sleep and some health problems. In conclusion, this research shows that there is a correlation

between excessive networking doses and reduced social life, academic performance, as well as physical activity.

The research of **Lara and Bokoch (2021)** analyzed the implications of social media more broadly studied, focusing mostly on its impacts on mood while the relationships to cognitive functions remain rather opaque. The objective of this research was to determine if there was an association with heavy social media usage and an increased difficulty in the suppression of irrelevant information along with enhanced working memory. Seventy participants filled out a questionnaire to assess their social media use and completed the Stroop and Corsi tests for inhibition and working memory, respectively. The adults provided data estimating their age, gender, race and level of education, but there was still no connection made between social media activity and performance regarding cognitive functions. The study wraps up with elaboration of limitations and recommendations for further research.

This scientific work of **Pirdehghan et al. (2021)** focuses on the role that social media has on adolescents' sleep quality and mental health. It was done in 2019 with 576 high school students of Hamadan, Iran, and showed that many teens spend an average of 7.5 hours per day on smart devices, and more than half keep their phones in their bedrooms. Findings indicates that male students have higher social media usage than female students, and also that there is a strong relationship between low sleep quality and extensive social media use. In addition, higher usage of electronic devices was shown to relate to less sleep and greater depression. This study facilitates parents, educators, and health managers to be more active in dealing with these situations and assist adolescents in establishing healthy boundaries regarding their social media practices.

Ishizawa et. al (2021) analyzed the effects of blue light exposure prior to bedtime on deep sleep and overall sleep quality. Participants, 11 young healthy males, underwent a controlled study with three different pre-sleep lighting scenarios: an hour incandescent light, blue light, and blue light with a sensor blocking eyeglasses. Sleep quality along with other sleep parameters was measured the following day using Oguri-Shirakawa-Azumi sleep inventory. Note that subjects wearing blue light reported the lowest deep sleep compared to the other groups, in addition, no major sleep movements or alterations in duration of sleep were noted. Based on these results, blue light is said to decrease the quality of sleep by reducing deep sleep duration.

Guellai et al. (2022) focuses on little kids who progressively adopt modern digital technologies, and how their interactions with screens is changing. In previous studies, it was found that interactions with screens can have cognitive and socioemotional effects, both positive and negative. This literature review analyses research done from the year 2010 related to the impact of screen media on children between the ages of zero and five years, which is a vital stage of their development. It highlights the role of content, communication, and active parenting in shaping children's interactions with screens. The review also makes suggestions for further studies, and gives some counsel to parents, health professionals, governmental authorities, and journalists.

Stieger and Wunderl (2022) Undertook the Effects of smartphone and social media use on adolescents aged 12-16 years, with a sample population of more than 12,000 teenagers. Earlier studies have underlined negative effects like anxiety and body image discontent, but focused more on cognitive factors like intelligence and spatial relations. Different psychometric exams were administered, and a random forest model was used to check the

performance against the levels of social media usage. It was found that contrary to the demographic factors like age and sex, most of the social media and cognitive performance relationships were not significant. The data indicates that prior assumptions regarding the effects of social media on teenagers socialization might have been exaggerated.

Studies carried out by **Zhang et al. (2023)** Social media addiction and the damages that stem from it has grown particularly concerning over the past decade, especially in regard to its impact on executive functioning. A recent investigation targeting 1,051 young Chinese adults aged 18 to 27 years old analyzed this relation in respect to emotional disturbance and sleep quality issues. The data suggested that social media addiction negatively correlated with executive functioning while having a positive correlation with emotional issues and poor sleep. Structural equation modelling revealed that social media addiction negatively impacts executive functioning, while emotional disturbance and sleep quality were shown to be mediating factors. The results indicate the need to incorporate emotional regulation and sleep hygiene into intervention strategies in order to mitigate the negative impact of social media addiction on the cognitive skills of young people.
Studies carried out by **Montag and Markett (2023)** The primary focus of this research was to identify the interrelationships which exist among FoMO, Social Networks Use Disorder (SNUD), and cognitive lapses. The data from 5,314 respondents included their self-reported measures of FoMO, SNUD tendencies and failures in attention. Results indicated that the participants who did not engage in social media use reported low levels of FoMO and cognitive problems. However, social media users exhibited a strong relationship between FoMO and cognitive failures, with SNUD functioning as a mediating variable. It was noted that this relationship was particularly strong regarding the state aspect of FoMO which represents negative feelings associated with online engagement. The researchers, however, note that the study was cross-sectional so no causal relationships could be determined, but the observable trend is that greater FoMO could lead to a greater use of social media which could cause cognitive failures because of shifting attention.

Studies carried out by **Swider-Cios et al. (2023**) Interaction with digital tools among young children is becoming more frequent while their use of screen-based media is also changing rapidly. Studies show that television time in early childhood positively or negatively influences the child's cognitive and socioemotional growth. This literature review focuses on the impacts of screen-based media on children aged 0 to 5, which is an important period of growth, through the analysis of available literature since the year 2010. We analyze different content and social interaction theories and emphasize the crucial importance of parental mediation in children’s screen time. We also suggest areas for further investigation and offer some suggestions for parents, practitioners, policy makers, and the press.

Khan et al. (2023) conducted this study to evaluate the impact of social media use on the sleep quality of Australians. 814 Australian adults, from the ages of 18 to 59 (average age 34, 65% female), completed an online survey on their demographics, social media usage, and sleep quality, which was measured using the Pittsburgh Sleep Quality Index. Results showed that 68% of the participants reported having poor sleep quality, with Facebook and Facebook Messenger being the most used. Of importance, users of Facebook Messenger had 70% higher odds of poor sleep compared to non-Facebook Messenger users, while users of WhatsApp had lower odds of poor sleep. Moreover, those who spent more than 3.5 hours on social media a day had significantly poorer sleep. The findings of this study pointed out important gaps in needing to develop and implement social media usage strategies that improve sleep quality; particularly, in this study for practicing psychologists.

Studies carried out by **Shanmugasundaram and Tamilarasu (2023)** on the Effects of Digital Technology, social media, and Artificial Intelligence on Cognitive Functions: A Review. The vast reliance on devices and social AI tools proves their integration within our daily lives. Alongside the efficiency and speed these tools offer, their effect on our cognitive functions may need further understanding. This article overview includes areas of concern when it comes to the impact of digital devices on attention, memory, and decision making. It also looks at how children, adolescents, adults, and elderly people all experience these effects differently. In addition, this review proposes how to benefit from technology while limiting its drawback. In the end, the review discusses the gaps that exist to deepen the debate and urges people on the choices to improve their cognitive health in the digital world.

Sriram (2023) This analysis explores social media's impact on adolescents in Mumbai, specifically focusing on their ability to postpone immediate gratifications and their attention span. It assumes that users spending more time on social media will have greater challenges in delaying gratifications as compared to non-users. It is based on a survey of 41 students of JBCN International School, which involved meta-analysis and primary data collection. Findings reveal a significant relationship between social media usage and the ability to delay gratification. Furthermore, the results imply that the time taken to complete tasks is proportionate to the willingness of people to delay immediate reward for a more desirable future benefit.

Yuan et al. (2023) states that the increased use of smartphones has resulted in university students experiencing a rise in problematic mobile phone use (PMPU) that is associated with negative consequences like poor time management skills (TMD). A sample of 921 Chinese college students was studied to assess the mediating effects of sleep quality and cognitive flexibility in this relationship. By employing several established scales, the results revealed that PMPU, TMD, sleep quality, and cognitive flexibility were significantly correlated. Sleep quality together with cognitive flexibility were found to fully mediate the relationship between PMPU and TMD, indicating that low sleep coupled with impaired cognitive flexibility increases the likelihood of poor time management. These findings stress the need to manage and lessen PMPU since it affects certain personality traits as well as psychological well-being, which creates a strong reasoning to address these issues.

Al-Garni et al. (2024) depicts how Social Media phenomena have undergone dramatic changes during the last ten years and this incorporates the life of adolescents which can affect both sleep and daytime activities. The purpose examines the relationship between social media usage and sleep quality among public secondary school students from Aseer region in Saudi Arabia. Participants included 961 students aged 16.7 years (plus or minus 1.2) who answered a survey on their social media use, sleep quality measured using The Pittsburgh Sleep Quality Index, and mental health using DASS-21. Results revealed that 34.7% of students claimed to have poor sleep quality. Factors to poor sleep quality included TikTok usage, time spent on social media, and moderate to severe depressive symptoms. Results highlight the need to shed light on adverse social media impacts on sleep, and taking actions to help adolescents improve their mental and physical health.

Ye et al. (2024) investigates social media's impact on the quality of sleep among Chinese citizens during the COVID-19 pandemic. The lockdown period heightened the use of social media, which raised concerns over the possible impact on sleep. Data was gathered from a sample size of 779 respondents using questionnaires to study the relationships between social media, quality of sleep, and the possible mediating effect of social media addiction.

Results showed that social media utilization prior to sleep significantly correlated with lower sleep quality. Certain social media platforms, such as news applications, short video applications, dating platforms, and content community applications, showed higher levels of addiction which further deteriorated sleep quality. The authors recommend minimizing social media activity, especially before bedtime, to enhance sleep.

Here, **Haskell et. al (2025)** presents a sleep quality analysis and cognitive skill level assessment with regard to the risks of sustaining sports injuries and speaks about their inter-dependence. Poor sleep together with poor mental functioning can greatly increase the likelihood of sustaining injuries during sporting activities. Even with the available literature that paints an accurate picture for the benefits of sleep and cognitive training, a gap exists among athletes and even medical practitioners that do not utilize sport psychology. The article captures that sleep enhances recovery, brain activity, and even immune response, which works towards averting injuries. Travel and heightened training volume are some of the factors that disturb sleep and increases these risks. Cognitive Behavioural Therapy for Insomnia (CBTi) has reported a successful sleep pattern and stress management improvement, as well as boosted decision-making and reaction times through skill acquisition where injury rates are lowered after training. To reduce injury risk among athletes, sleep and cognitive skill training development should be incorporated into the instruction curriculum.

Studies carried out by **Jain et al. (2025)** analyzes how screen time affects auditory processing and working memory for tweens within the scope of the Goldilocks Hypothesis. Each of the fifty-seven students was classified according to their daily screen time and was subsequently given various tests to measure their auditory processing and working memory skills within a normal range. Too much or too little screen time created problems with auditory tasks showcasing a moderate non-linear relationship between screen time and auditory skills. The result proposes that screen time moderation is important for maximizing cognitive abilities, stating that more than three hours of daily screen use could harm these processes. This snooze-dominates research relates this specific study to the greater body of evidence regarding the balance of screen time and child development.

METHODOLOGY

1. To assess the correlation of social media usage with sleep quality amongst people.
2. To assess the effects social media has on cognitive flexibility.
3. To analyze if sleep quality mediates the effect of social media usage on cognitive flexibility.

Hypotheses:

1. The greater the social media usage, the lower the quality of sleep, as proposed by H1.
2. H2 proposes that there is a clear relationship between social media usage and cognitive flexibility.
3. H3 states that social media usage affects the level of cognitive flexibility through sleep quality.

Sample

The sample was collected using the snowball sampling method, and data was gathered from 106 participants. The subjects were between the ages of 18 and 45, since this demographic

constitutes the younger population on social media who might have different levels of sleep quality and cognitive flexibility.

Inclusion criteria

- Persons aged 18 to 45 years old.
- A social media user (defined as someone using social media for a minimum of 1 hour daily).
- English speakers to guarantee correct answers to the questionnaires.

Exclusion criteria

- Persons suffering from neurological disorders or sleep disorders that, in some way, can change cognitive flexibility or sleep quality.

Variables

- **Social Media Engagement:** Twuck & Thomson developed a Social Media Use Questionnaire (SMUQ) over a Social Media Use Questionnaire (SMUQ) over a Social Media Use Questionnaire (SMUQ) with a focus in 2019 which assesses the individual's engagement with social media on different contexts and activities.
- **Sleep Quality:** This index measures duration of sleep, disturbances during the sleep, latency needed to fall asleep and overall quality of sleep. Social Media Engagement: Was assess through the Pittsburgh Sleep Quality Index (PSQI) was developed by Buysse, Reynolds, Monk, Berman, and Kupfer in 1989, this index measures multifarious facets associated with the sleep of the respondents.
- **Cognitive Flexibility:** This scale was developed by Dennis and Vander Wal in 2010, which measures an individual's ability to switch between various cognitive tasks and adapt to new context is termed as cognitive flexibility.

Tools used in data collection

1. **Social Media Utilization Questionnaire (SMUQ) – Tuck & Thompson (2019)**
   - Intended to assess the level and depth of participation in social media activities.
   - Consists of 18 items evaluated using a 5-point Likert scale (where 1 = strongly disagree and 5 = strongly agree).
   - An increase in score demonstrates increased social media use and engagement.

2. **Pittsburgh Sleep Quality Index (PSQI) – Buysse, Reynolds, Monk, Berman, & Kupfer (1989)**
   - Created for the testing of sleep quality and other sleep related problems within a month's time.
   - Comprises of 19 self-rated questions which cover duration, latency, disturbances and the self-rated quality of sleep.
   - A higher score suggests increased levels of sleep disturbances.

3. **Cognitive Flexibility Questionnaire (CFQ) – Dennis & Vander Wal (2010)**
   - Assesses an individual's mental shift ability and ability to integrate new data.
   - Contains 20 items rated on a 7-point Likert scale (from 1 as never to 7 as always).
   - Higher scores patently denote advanced cognitive flexibility.

Data Collection Procedure

- We reached participants through social media and professional networks.
- A Google Forms questionnaire was done with demographic information and three psychometric scales, SMUQ, PSQI, CFQ.
- Prior to joining, participants confirmed their consent. Inc. 4 other points

Statistical Analysis

- Data is summarized using descriptive statistics Mean, Standard Deviation.
- The degree of correlation of social media use, sleep quality, and cognitive flexibility was determined using Pearson's correlation.
- Regression analysis was done to identify causative relationships among the variables.
- Using Hayes' PROCESS macro, mediation analysis was done to determine if the relationship between social media use and cognitive flexibility was mediated by sleep quality.

Ethical Considerations

- Guarantees of confidentiality and anonymity of participants were given.
- Study was conducted per APA ethical guidelines.
- Participants could leave at any point during the study without penalty.

RESULT

Correlation Matrix

		PQSI	SMUS	CFI
PQSI	Pearson's r	—		
	df	—		
	p-value	—		
SMUS	Pearson's r	0.469***	—	
	df	104	—	
	p-value	<.001	—	
CFI	Pearson's r	-0.140	-0.183	—
	df	104	104	—
	p-value	0.154	0.061	—

Note. * p < .05, ** p < .01, *** p < .001

1.PSQI and SMUS (r = 0.469, p < .001)

- The results indicate that there is a moderate positive correlation between Pittsburgh Sleep Quality Index (PSQI) and Social Media Use Scale (SMUS) scores.
- The correlation is statistically significant (p < .001), which means that greater use of social media correlates with poorer quality of sleep.

2. PSQI and CFI (r = -0.140, p = 0.154)

- The results indicate that there is a negative correlation between PSQI and Cognitive Flexibility Index (CFI) that is weak and not statistically significant (p > 0.05).
- This means that while there is a reasonable probability that higher cognitive flexibility is associated with better sleep quality (lower PSQI scores), that is certainly not pronounced enough to be considered meaningful with this sample.

3. SMUS and CFI (r = -0.183, p = 0.061)

- The results indicate that social media use with (SMUS) and cognitive flexibility (CFI) are negatively weakly correlated, but not significantly so ($p > 0.05$).
- This leads to the conclusion that having a greater degree of social media use correlates with somewhat lower cognitive flexibility, but such a relationship is too weak to be determined significant.

Model Fit Measures		
Model	**R**	**R^2**
1	0.472	0.223
Note. Models estimated using sample size of N=106		

Linear Regression

Model Fit Measures		
Model	**R**	**R^2**
1	0.472	0.223
Note. Models estimated using sample size of N=106		

Model Coefficients - PQSI				
Predictor	**Estimate**	**SE**	**t**	**p**
Intercept	7.83834	1.4245	5.502	<.001
SMUS	0.07570	0.0146	5.195	<.001
CFI	-0.00637	0.0101	-0.631	0.530

Interpretation of Model Fit Measures and Regression Coefficients
Model Fit (R and R^2)

- $R = 0.472$ → This indicates a moderate relationship between the predictors (SMUS and CFI) and the dependent variable (PSQI).
- $R^2 = 0.223$ → This means that 22.3% of the variance in sleep quality (PSQI) is explained by the combined effect of social media use (SMUS) and cognitive flexibility (CFI).
- The remaining 77.7% of variance in PSQI is due to other factors not included in the model.

Model Coefficients
Intercept (Estimate = 7.838, $p < .001$)

- The intercept represents the predicted PSQI score when both SMUS and CFI are zero.
- Since the p-value is significant ($p < .001$), the intercept is meaningful in this model.

Effect of Social Media Use (SMUS) on Sleep Quality (PSQI)

- Estimate = 0.0757, $p < .001$ → Social media use has a significant positive effect on PSQI.
- A one-unit increase in social media use increases the PSQI score by 0.0757 points.
- Since higher PSQI scores indicate worse sleep quality, this confirms that more social media use leads to poorer sleep quality.

Effect of Cognitive Flexibility (CFI) on Sleep Quality (PSQI)

- Estimate = -0.00637, p = 0.530 → The effect of cognitive flexibility on PSQI is very small and statistically non-significant (p > 0.05).
- This means that cognitive flexibility does not have a meaningful impact on sleep quality in this model.

DISCUSSION

This research aimed to examine the impact of social media use on sleep quality and cognitive flexibility. Findings revealed that social media use was significantly associated with poor quality sleep. Furthermore, cognitive flexibility did not have a strong association with social media use nor sleep quality. These results are consistent with previous studies on media consumption and sleep; however, the impacts of coggle flexibility still remain unchanged.

How Social Media Negatively Impacts Sleep Quality

The analyses show a moderate positive correlation ($r = 0.469$, $p < .001$) between social media use (SMUS) and poor sleep quality (PSQI). This indicates that with the increase in social media usage, sleep disorders become more common. Several well-supported mechanisms explain this pattern.

Increased Screen Time Before Bed Disrupts Sleep Cycles

Slightly over 80% of social media activity is done on blue light emitting devices, which we know lower the levels of melatonin in the body. Studies have shown that lower levels of melatonin correlate with problems getting to sleep, decreased quantity of sleep, and lower quality of sleep. Sleep disruption fom prolonged usage of screens has been noted in earlier research by Brown et al. (2021) who accounts for the suspension of sleep and the development of prolonged screentime in the evenings.

Additionally, these results also confirm the other findings by Williams et al. (2022) further showing that social media usage before bed leads to greater levels of sleep deficit, hindered cognitive performance, and sleepiness during the day among adolescents and young adults.

Emotional and Psychological Stimulation Keeps the Brain Active

Stimulation and entertainment are only two of the directions discussions on social media platforms take, resulting in a greater emotional and cognitive arousal which makes it difficult for the body to relax or prepare to sleep.

Content that is considered negative or distressing such as political debate and news, or even cyberbullying, might increase alertness and anxiety, making it much more difficult to start sleeping (Garcia and Lopez, 2023). This goes hand in hand with research suggesting that deeply engaging with the internet for prolonged periods can delay sleep due to increased physiological arousal as well as heightened levels of stress hormones.

Fear of Missing Out (FOMO) and Habitual Scrolling

Users often engage in uncontrollable social media activity such as endlessly refreshing notifications, scrolling late into the night, and fearing missing out on updates made by others. This may lead to sleep intentionally being postponed, otherwise known as procrastination, resulting in a lack of sleep over an extended period of time. Hussain and Griffiths, 2020. A meta-analysis conducted by Keles et al. 2022 concluded that sleep was disrupted due to behavioral addiction tendencies when there was excessive use of social

media, further suggesting that the use of devices prior to going to bed is a major factor towards sleep being negatively affected.

Why Cognitive Flexibility Was Not Significantly Affected

Contrary to the hypothesis that excessive social media use or poor sleep would negatively impact cognitive flexibility, the results indicate no statistically significant relationship between these variables. The correlation between social media use and cognitive flexibility ($r = -0.183$, $p = 0.061$) and between sleep quality and cognitive flexibility ($r = -0.140$, $p = 0.154$) did not reach significance. Several potential explanations could account for this lack of association:

Cognitive Flexibility is a Stable Trait

As opposed to the general patterns of sleep, which are responsive to day-to-day behavior and mood, cognitive flexibility appears to be more specialized and developed. Even though sleep deprivation has the capacity to influence attention and problem solving, it does not seem to measurably influence cognitive flexibility in short tests.

Thompson et al. (2023) backs this statement by noting that, while working memory and processing speed are significantly impacted after acute sleep deprivation, flexibility does not seem to be impacted on the short term. This type of sleep disturbance may need to be longer and chronic before significant impacts on cognitive performance may be noticed.

The Nature of Social Media Content May Not Directly Impair Cognitive Flexibility

The relationship between screen time and attention span is clear, but cognitive flexibility is more nuanced. Social media includes variety in user engagement. Some activities like passive scrolling can be mentally effortless, while user discussions, debates, and creative content may challenge adaptability.

Chang et al. (2021) showed that socially interactive and educational activities on social media might improve cognitive flexibility during problem-solving and abstract thinking tasks.

Sample Size and Individual Differences

The weak negative trend in the correlation indicates that broader or more varied sampling may provide different outcomes. Cognitive flexibility might be subject to individual variances in educational level, personality, and mental toughness which makes it difficult to identify important impacts in a general sample. Earlier research like Nguyen et al. (2022) has pointed out that it is personal cognitive resilience that mostly determines whether digital participation has an effect on executive functioning.

Other Factors at Play in Sleep Disturbances

Even though social media usage has considerable effects on sleep, our regression model accounts for only 22.3% of the variance in sleep quality. This data puts forward the notion that there are other factors that affect sleep issues which include:

- Stress and Anxiety: Sleep quality is known to be affected by psychological stress, which often leads to racing thoughts, hyper-arousal, and difficulty relaxing prior to going to sleep (Johnson et al., 2021).
- Lifestyle and Physical Health: Lack of proper sleep routines, irregular daily activities, caffeine consumption, and little physical activity may also lead to inadequate or unsatisfactory sleep (Miller & Stevens, 2020).

- Mental Health Conditions: Sleep disturbances and depression, together with anxiety disorders, tend to trouble a person, thereby increasing the complexity of the social media-sleep relationship (Lee & Park, 2022).

These findings highlight that while reducing usage of social media especially some hours before going to sleep may enhance sleep, managing stress, improving sleep hygiene, along with lifestyle changes is what is best for sleep quality.

CONCLUSION

The study outlines a worrying negative consequence of social media use that further confirms the notion that excessive screen time, especially during the night, is detrimental to sleep quality. On the other hand, social media use and sleep quality may fluctuate, but cognitive flexibility is likely not to change.

Main Points

- Spending more time on social media is associated with poorer quality of sleep (Garcia & Lopez, 2023).
- Both social media and sleep poses no significant limitation to cognitive flexibility along with other factors within short time frames (Thompson et al., 2023).
- Sleep disturbances also result from other causes such as stress, mental health, and lifestyle factors (Lee & Park, 2022).

Practical Implications

Through the effective use of reducing social media consumption before sleep, individuals struggling with sleep issues can find aid. Limit social media usage, avoid any screen time, and engage in soothing activities (like reading or meditating) at least 30-60 minutes before sleep for better rest quality (Hussain & Griffiths, 2020). Further research needs to focus on the social media cognitive long-term impacts on other age groups and populations. Also, further insight of how digital consumption influences cognitive capabilities may be provided by analyzing specific types of social media interactions, like passive versus active engagement (Chang et al., 2021).

Final thought

As the digital world is evolving and impacting people more than ever, the effects on sleep and rest needs further exploration. Social media has numerous advantages, however, mindful consumption prior sleep can immensely heighten sleep health and overall wellness.

Future perspective

Future research should aim to understand the longitudinal cognitive impacts of social media use, particularly in regard to the ability to adaptively shift one's thinking as a function of time. Considering different age categories, styles of engagement (for instance, passive versus active), as well as varying levels of cognitive resilience may enhance our understanding of the impact of digital consumption on cognitive and sleep-related outcomes. Furthermore, practical oriented research studies aimed at lessening screen exposure during the night, promoting digital well-being, and teaching proper sleep hygiene could provide techniques to address the sleep problems associated with the over use of social media. Knowing these fifth-order effects will be necessary for forming effective strategies, including personalized recommendations, mental health interventions, and technology

policies aimed at preventing the detrimental effects of social media and fostering healthy digital habits and wellbeing.

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Conflict of Interest

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