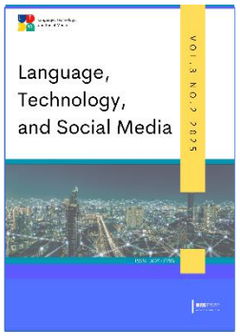

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Social Media Addiction and Adolescent Mental Health: The Mediating Role of Cognitive Interference in Digital Communication

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Research Article

Social Media Addiction and Adolescent Mental Health: The Mediating Role of Cognitive Interference in Digital Communication

Kavita Sharma* and Manju Gera

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Abstract

This study investigates the relationships among social media addiction, cognitive interference, and mental health outcomes within the context of digital communication among adolescents aged 13–19 in Chandigarh, India. Utilizing a cross-sectional design, data were collected from 541 participants who completed the Bergen Social Media Addiction Scale (BSMAS), a computerized Stroop Test to assess cognitive interference, and the Depression, Anxiety, and Stress Scale (DASS-21). Results indicated moderately high levels of social media addiction (M = 4.2, SD = 1.1), substantial cognitive interference (incongruent trials: M = 850 ms), and moderate psychological distress across all mental health indicators. Correlation analyses revealed that social media addiction was positively associated with cognitive interference (r = 0.45, p < 0.01) and negatively associated with mental health outcomes (r = -0.38, p < 0.01). Cognitive interference was also significantly and negatively correlated with mental health (r = -0.42, p < 0.01), indicating that increased cognitive disruption due to digital engagement exacerbates emotional distress. Mediation analysis confirmed that cognitive interference partially mediated the relationship between social media addiction and mental health, accounting for approximately 35% of the total effect. These findings underscore cognitive interference as a critical psychological mechanism linking problematic social media use to adverse mental health outcomes among adolescents. The study contributes region-specific empirical evidence to the global discourse on digital media effects and highlights the urgency of implementing targeted interventions such as cognitive training and digital literacy programs to mitigate the cognitive and emotional risks associated with excessive digital communication in adolescent populations.

Keywords: Social Media Addiction, Cognitive Interference, Digital Behavior, Mental Health, Adolescents, Stroop Test, Anxiety, Stress.

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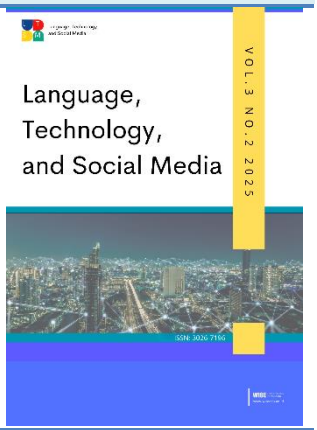

INTRODUCTION

Social media has become deeply integrated into modern life, surpassing 4.9 billion global users as of 2023 [1]. In India, digital communication through social media has rapidly expanded, with approximately 467 million users actively engaging on platforms such as Instagram, Facebook, and WhatsApp [2]. Each platform facilitates distinct communication patterns ranging from rapid messaging and multimodal interactions (e.g., text, emoji, images) to asynchronous and synchronous exchanges that reshape contemporary social norms and digital literacy practices [3], [4]. Urban Indian regions, notably Chandigarh a prominent educational and technological hub characterized by youthful demographics have witnessed significant penetration and integration of social media, influencing adolescent socialization, identity formation, and linguistic behaviors [5], [6], [7]. Adolescence (ages 13 – 19) is marked by profound developmental shifts in physical, cognitive, emotional, and social domains [8], [9]. During this sensitive period, adolescents demonstrate increased susceptibility to the pervasive influence of social media, driven largely by intensified peer influence, heightened social comparison, and constant pursuit of external validation [10], [11], [12]. These social-psychological phenomena are deeply intertwined with specific linguistic and communicative demands inherent to digital platforms, including filtered self-representation [11], [12], constant linguistic code-switching, multimodal literacy [12], [13], and real-time interactive expectations [14]. According to Social Identity Theory, adolescents' identities and behaviors are significantly shaped by group memberships fostered online, where linguistic patterns and digital literacy practices become central markers of social affiliation [12], [15],[16].

Social media addiction, typified by compulsive behavior, persistent preoccupation, impaired control, and withdrawal symptoms [2], [17], emerges within these linguistically and cognitively demanding digital ecosystems [18]. Previous research aligns social media addiction closely with traditional substance-use disorders [19], revealing overlapping neurological pathways associated with reward and reinforcement cycles mediated by dopamine-driven feedback mechanisms [17], [20]. Within Chandigarh's urban context, adolescents often experience a compulsion to maintain continuous online visibility and responsiveness, driven by linguistic phenomena such as immediacy, hyper-connectivity, and the fear of missing out (FOMO) [18], [21]. Empirical evidence indicates that around 65% of adolescents spend more than four hours daily interacting with linguistically dense digital content, exhibiting significant addiction-related behaviors [17], [18], [21]. A crucial cognitive mechanism adversely affected by prolonged and intensive digital communication exposure is cognitive interference defined as difficulty suppressing irrelevant stimuli during cognitive tasks [22], [23]. Multitasking within linguistically and visually complex digital environments significantly amplifies cognitive interference, weakening executive functions like attention regulation, cognitive control, and inhibitory processing [22], [24], [25]. Tools such as the Stroop Test objectively measure these attentional conflicts, simulating linguistic incongruities and attentional overload akin to those experienced during digital multitasking [25], [26]. Excessive use of digital platforms driven primarily by complex digital communication demands directly correlates with cognitive depletion, increased attentional lapses, and reduced executive control [18], [19], [20]. For instance, Wegmann et al. demonstrated that adolescents with higher social media addiction scores showed pronounced impairments in inhibitory control during the Stroop Test, underscoring the cognitive cost associated with digital communication overload [27]. The implications extend beyond cognitive impairment; constant digital communication and

cognitive interference intensify adolescents' vulnerability to psychological distress, including anxiety, stress, and depressive symptoms [28], [29]. Cognitive Load Theory (CLT) [27] further elucidates these dynamics by highlighting how continuous engagement in rapid-fire digital communication, notification-driven multitasking, and multimodal information processing cumulatively generate cognitive overload, contributing directly to emotional exhaustion and mental fatigue [30], [31]. Additionally, the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP) posits that the brain has finite resources for processing mediated messages, and excessive demands from digital communication exceed these cognitive resources, thereby impairing cognitive functions and increasing psychological distress [23], [32].

Although global research extensively documents relationships between social media addiction, cognition, and mental health, much of the existing scholarship predominantly originates from Western contexts, underscoring a notable gap in the Indian urban adolescent literature. Specifically, there remains a lack of rigorous empirical research utilizing objective cognitive measures such as the Stroop Test within the Indian adolescent population, particularly in digitally rich urban contexts like Chandigarh. Addressing this gap, the current study investigates the interplay between social media addiction, cognitive interference (objectively assessed via the Stroop Test), and mental health outcomes (depression, anxiety, stress) among adolescents aged 13–19 in Chandigarh. Central to this investigation is the conceptualization of digital communication as a mediating force, analyzed through frameworks of digital literacy, linguistic complexity, cognitive resource theory, Social Identity Theory, and LC4MP. This interdisciplinary approach integrating cognitive psychology, digital linguistics, social psychology, and communication theory aims to provide nuanced insights into how adolescents are cognitively and psychologically shaped by contemporary digital communication practices. The outcomes of this study are anticipated to inform targeted educational and social interventions designed to bolster cognitive resilience, manage digital addiction risks, and enhance holistic adolescent mental well-being within the complexities of digitally mediated communication environments.

METHODS

Research Objectives

The present study pursued the following objectives:

1. To evaluate the levels of social media addiction, cognitive interference associated with digital communication, and mental health outcomes including depression, anxiety, and stress among adolescents residing in Chandigarh.
2. To analyze the relationships among social media addiction, cognitive interference, and mental health outcomes within this adolescent population.
3. To investigate the mediating role of cognitive interference induced by digital platform usage in the association between social media addiction and mental health outcomes.

Research Design

This study investigates the relationship between social media addiction, cognitive interference, and mental health outcomes among adolescents aged 13 – 19, employing a quantitative research design with a cross-sectional approach conducted in Chandigarh, India.

Population

The study focuses on adolescents aged 13 – 19 residing in Chandigarh, India. This age group was selected due to their intensive use of social media platforms such as Instagram, Snapchat, and WhatsApp, coupled with a developmental stage characterized by heightened emotional sensitivity and increased susceptibility to digital stressors. The target population comprises both school and college students who engage in extracurricular activities and live within the Chandigarh area, thereby representing the city's socially and academically diverse adolescent community.

Participants

A total of 556 adolescents, comprising school and college students from Chandigarh, were recruited using a convenience sampling method. The required sample size was determined using *G*Power* version 3.1 [33], with parameters set for a medium effect size ($f^2 = 0.15$), a significance level of $\alpha = 0.05$, and a statistical power of 0.95, ensuring adequate generalizability of findings. Inclusion criteria specified participants to be aged between 13 and 19 years, with a minimum daily social media usage of two hours. Additionally, parental consent was required for minors, while assent was obtained from participants under the age of 18. Exclusion criteria included any formal diagnosis of cognitive or mental health conditions (e.g., ADHD, clinical depression) or the use of medication known to affect cognitive function. The final sample consisted of 55% females and 45% males, with a mean age of 16.2 years (SD = 2.0); approximately 75% were school students and 25% were college students.

Research Instruments

Social Media Addiction

Measured using the Bergen Social Media Addiction Scale (BSMAS) [34], a 6-item scale assessing addiction symptoms such as salience, mood modification, tolerance, withdrawal, relapse, and conflict. Items are rated on a 5-point Likert scale (1 = rarely, 5 = very often), with higher scores indicating greater addiction. The scale demonstrated high reliability in this study (Cronbach's alpha = 0.89) [34].

Cognitive Interference

Assessed using a computerized version of the Stroop Test [35], which measures the ability to inhibit automatic responses and focus on relevant tasks. Participants are asked to name the color of words while ignoring their meanings, with slower reaction times and higher error rates on incongruent trials indicating greater cognitive interference [35].

Mental Health

Measured using the Depression, Anxiety, and Stress Scale (DASS-21) [36], a 21-item scale rated on a 4-point Likert scale (0 = did not apply to me at all, 3 = applied to me very much). Higher scores reflect greater severity of symptoms (Cronbach's alpha = 0.92 for depression, 0.88 for anxiety, and 0.90 for stress) [36].

Data Collection Procedure

Data collection was carried out over a three-month period (October to December 2024) in collaboration with various schools and colleges across Chandigarh. Sessions took place in quiet,

institution-based computer laboratories during non-instructional hours to provide a familiar and low-stress environment for adolescent participants. For individuals under 18, written parental consent was obtained, while those aged 18 to 19 provided informed consent independently. At the outset, participants received a brief, age-appropriate explanation outlining the study's purpose, procedures, and confidentiality protocols. They then completed the BSMAS [34] and the DASS-21 [36], with trained researchers present to provide clarification and ensure proper understanding. This was followed by administration of a computerized Stroop Test [35]. Participants first engaged in five practice trials to become familiar with the task, followed by forty timed test trials designed to assess cognitive interference. Reaction times and error rates were automatically recorded. The entire procedure lasted approximately 30 to 40 minutes, with flexible scheduling implemented to minimize disruption to academic routines. Upon completion, participants received a youth-friendly debriefing handout summarizing the study's objectives and promoting mental health awareness. All data were anonymized and stored securely, in full compliance with ethical standards governing research involving minors.

Data Analysis

All statistical analyses were performed using *IBM SPSS Statistics* Version 23 and the *PROCESS Macro* for SPSS [37]. Descriptive statistics including means, standard deviations, and frequency distributions were computed to summarize the data and to illustrate patterns of central tendency and variability. Outliers were identified through boxplots and standardized Z-scores, with a threshold of ±3.29 employed to determine extreme values [38]. Consequently, 15 outliers were excluded, resulting in a final analytical sample of 541 participants. To ensure the assumptions underlying regression analyses were satisfied, the dataset was screened for normality, linearity, homoscedasticity, and multicollinearity. Normality was assessed via Q-Q plots and by examining skewness and kurtosis values, while linearity and homoscedasticity were evaluated using scatterplots of standardized residuals [39]. Multicollinearity was examined using the Variance Inflation Factor (VIF), with all predictor variables meeting the acceptable criterion of VIF < 5 [40].

Pearson's correlation coefficients were computed to assess the direction and strength of associations among the primary constructs: social media addiction, cognitive interference (operationalized via Stroop Test reaction times and error rates), and mental health outcomes (depression, anxiety, and stress) [41]. Hierarchical multiple regression analyses were conducted to examine the predictive influence of social media addiction on cognitive interference and mental health outcomes, while controlling for demographic covariates such as age, gender, and average daily screen time. Gender was dummy-coded (0 = male, 1 = female), and screen time was log-transformed to correct for non-normal distribution patterns [42]. To investigate the mediating role of cognitive interference in the relationship between social media addiction and mental health, a bootstrapped mediation analysis was conducted using *PROCESS Macro* Model 4 [37], with 5,000 bootstrap samples and 95% confidence intervals. This non-parametric approach enhances the reliability of indirect effect estimates and mitigates concerns regarding distributional assumptions [43]. Effect sizes were reported for interpretation, with Cohen's f^2 used to assess the magnitude of regression effects (small = 0.02, medium = 0.15, large = 0.35), and Pearson's r used for bivariate correlations [44]. Both unstandardized (B) and standardized (β) regression coefficients were reported, and the proportion of the total effect mediated by cognitive interference was calculated to quantify the indirect pathway.

RESULTS AND DISCUSSION

Prior to the primary analyses, comprehensive assumption checks were conducted to validate the integrity of statistical inferences. The assumption of normality was supported for all key variables, as indicated by non-significant results from the Kolmogorov–Smirnov tests (D = 0.06–0.08, $p > 0.05$), alongside acceptable skewness and kurtosis values: social media addiction (skew = -0.32, kurtosis = -0.51), cognitive interference (skew = 0.41, kurtosis = 0.76), and mental health outcomes (skew = -0.21, kurtosis = -0.37). Homoscedasticity was confirmed through Levene's Test for equality of variances, yielding non-significant results for both social media addiction, $F(1, 539) = 1.24$, $p = 0.27$, and cognitive interference, $F(1, 539) = 0.89$, $p = 0.35$. Furthermore, visual inspection of residual plots revealed no discernible patterns, suggesting constant variance across predicted values. To identify multivariate outliers, standardized Z-scores exceeding ±3.29 were employed, in line with established statistical guidelines. A total of 15 cases were removed based on this criterion, reducing the analytical sample from 556 to 541 participants. Sensitivity analyses were subsequently conducted to examine the impact of outlier exclusion. The results demonstrated only marginal differences in regression coefficients (original $\beta = -0.38$, $p < 0.01$; including outliers: $\beta = -0.36$, $p < 0.01$), thereby reinforcing the stability and reliability of the findings. Lastly, multicollinearity was assessed using Variance Inflation Factor (VIF) values, with all predictors falling well below the critical threshold of 5, confirming independence among variables: social media addiction (VIF = 1.12) and cognitive interference (VIF = 1.08).

Objective 1: To assess the level of social media addiction, cognitive interference due to digital communications, and mental health outcomes (depression, anxiety, and stress)

Table 1 presents the descriptive statistics for the primary variables measured in the study. The results indicate that adolescents reported moderately high levels of social media addiction (M = 4.2, SD = 1.1), significantly exceeding the established threshold for problematic use (≥3.16). This finding aligns with contemporary research that positions social media as a growing behavioral addiction, particularly among adolescents who frequently engage with digital platforms for identity formation and social validation [18]. In terms of cognitive functioning, results from the Stroop Test revealed pronounced cognitive interference. Participants demonstrated significantly longer reaction times during incongruent trials (M = 850 ms, SD = 120 ms) compared to congruent trials (M = 600 ms, SD = 90 ms), with a mean difference of approximately 250 milliseconds. This pattern is consistent with prior findings indicating that persistent digital multitasking and attentional fragmentation impair cognitive control and executive functioning in youth [22]. Such interference reflects diminished attentional regulation, which can negatively impact both academic performance and everyday decision-making. Mental health assessments revealed scores within the moderate clinical range across all dimensions: depression (M = 14.5), anxiety (M = 12.3), and stress (M = 15.7). These levels are indicative of meaningful psychological distress and correspond with previous research showing that prolonged exposure to high-demand digital communication environments exacerbates emotional strain, thereby increasing susceptibility to mood disorders and other mental health challenges among adolescents [21].

Table 1. Descriptive statistics

Variable	N	Mean (M)	Std. Deviation (SD)	Cutoff/Reference	Severity Classification
Social Media Addiction	541	4.2	1.1	≥3.16	Problematic Use
Stroop Test (Congruent)	541	600 ms	90 ms	—	—
Stroop Test (Incongruent)	541	850 ms	120 ms	d = 250 ms	Significant Interference
Depression (DASS-21)	541	14.5	3.8	14–20	Moderate
Anxiety (DASS-21)	541	12.3	3.2	10–14	Moderate
Stress (DASS-21)	541	15.7	4.1	15–18	Mild-to-Moderate

Figure 1 presents the frequency distributions of the primary variables: social media addiction, cognitive interference, and mental health outcomes as measured by DASS-21. The visual inspection of these distributions indicates that all variables closely approximate a normal distribution, thereby supporting the statistical assumptions necessary for both regression and mediation analyses. Although slight skewness was observed across the variables, the values remained within acceptable thresholds, confirming the suitability and robustness of the data for advanced statistical modeling.

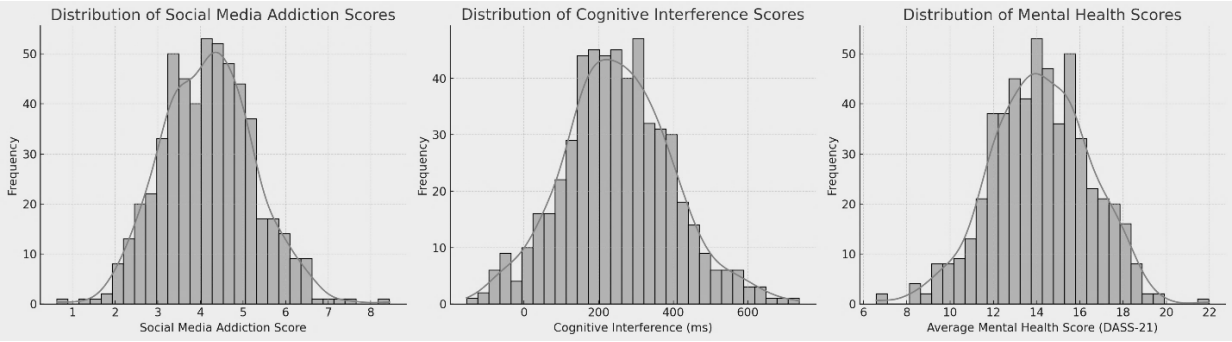

Figure 1. Trauma-Informed Bilingual Teacher Preparation Model

Objective 2: To examine the relationship between social media addiction, cognitive interference and mental health outcomes

Correlation analyses presented in Table 2 revealed statistically significant and theoretically consistent associations among the key variables. Social media addiction was positively correlated with cognitive interference (r = 0.45, p < 0.01), supporting previous research that suggests compulsive engagement with digital platforms increases cognitive burden and impairs inhibitory control [28]. Furthermore, a notable negative correlation was found between social media addiction and mental health outcomes (r = -0.38, p < 0.01), reinforcing a growing body of evidence indicating that excessive and addictive use of social media contributes to diminished emotional well-being [12]. Similarly, cognitive interference exhibited a strong negative correlation with mental health (r = -0.42, p < 0.01), consistent with existing literature emphasizing the detrimental impact of cognitive overload on psychological functioning [27]. This finding underscores the mediating role of impaired cognitive processing in linking digital overexposure to heightened levels of depression, anxiety, and stress among adolescents.

Table 2. Pearson Correlation Matrix among variables

Variables	Social Media Addiction	Cognitive Interference	Mental Health
Social Media Addiction	1	0.45**	-0.38**
Cognitive Interference	0.45**	1	-0.42**
Mental Health	-0.38**	-0.42**	1

**p < 0.01 (2-tailed).

Figure 2 presents a correlation heatmap depicting the strength and direction of associations among social media addiction, cognitive interference, and mental health outcomes. The color gradient reflects correlation values, with positive relationships represented in shades of red and negative relationships in shades of blue. A strong positive correlation is evident between social media addiction and cognitive interference (r = 0.45), indicating that higher levels of addictive social media use are associated with greater cognitive disruption. Conversely, notable negative correlations are observed between social media addiction and mental health (r = -0.38), as well as between cognitive interference and mental health (r = -0.42), suggesting that both variables are significantly linked to diminished psychological well-being. These visual patterns reinforce the statistical findings and highlight the interdependent nature of digital behavior, cognitive functioning, and emotional health in adolescents.

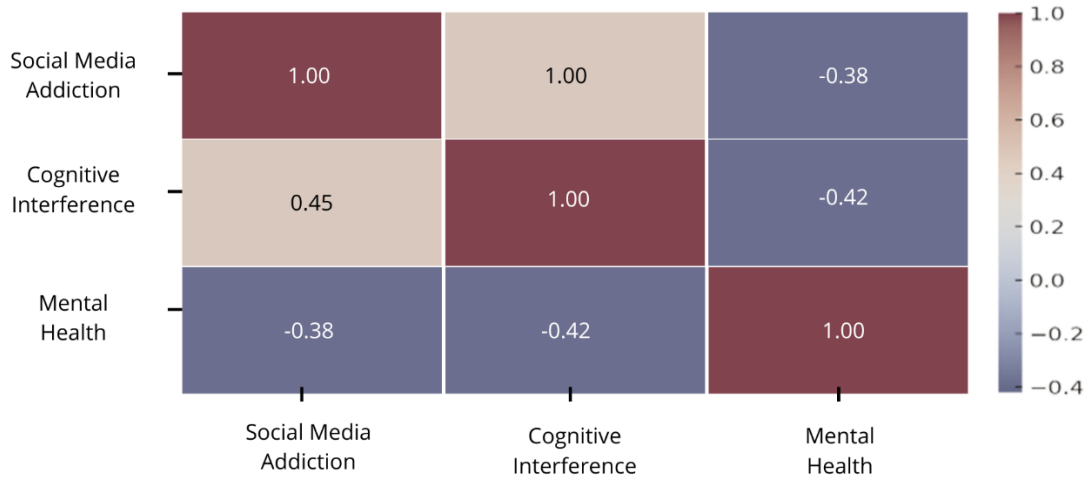

Figure 2. Correlational Heatmap

Objective 3: To investigate the mediating role of digital platform induced -cognitive interference in the relationship between social media addiction and mental health outcomes

The mediation analysis, summarized in Table 3, revealed compelling evidence that cognitive interference partially mediated the relationship between social media addiction and mental health outcomes. The overall model accounted for 34% of the variance in mental health scores (R^2 = 0.34, F = 45.21, p < 0.001), indicating substantial predictive power. The direct effect of social media addiction on cognitive interference was statistically significant (Path a: B = 0.45, p < 0.001), supporting existing research that links compulsive digital engagement to heightened cognitive load

and impaired executive functioning [14]. Subsequently, cognitive interference significantly predicted poorer mental health outcomes (Path *b*: $B = -0.42$, $p < 0.001$), in line with Cognitive Load Theory, which emphasizes the detrimental impact of cognitive burden on emotional well-being [27]. Importantly, the indirect effect of social media addiction on mental health through cognitive interference was significant ($B = -0.22$, 95% CI [-0.33, -0.11]), accounting for approximately 35% of the total effect. This partial mediation highlights cognitive interference as a critical psychological mechanism linking excessive social media use to declining mental health. The findings reinforce prior theoretical and empirical work positioning cognitive overload as a central mediator in the pathway from digital overuse to psychological distress [26], [27].

Table 3. Mediation Analysis Summary

Component	B	SE	t/Z	p	95% CI
Model Summary					
R	0.58	—	—	—	—
R^2	0.34	—	—	—	—
F	45.21	—	—	<0.001	—
Paths					
a: SMA → Cognitive Interference	0.45	0.07	6.43	<0.001	[0.31, 0.59]
b: Cognitive Interference → Mental Health	-0.42	0.08	-5.25	<0.001	[-0.58, -0.26]
c': SMA → Mental Health (Direct)	-0.4	0.09	-4.44	<0.001	[-0.58, -0.22]
Effects					
Total Effect (c)	-0.62	0.1	—	<0.001	[-0.82, -0.42]
Indirect Effect (a×b)	-0.22	0.05	—	<0.05	[-0.33, -0.11]

Discussion

This study set out to examine the complex interplay among social media addiction, cognitive interference, and mental health outcomes namely depression, anxiety, and stress among adolescents in Chandigarh, India, within the context of intensifying digital communication. Grounded in an integrative theoretical framework incorporating Cognitive Load Theory [27], the Limited Capacity Model of Mediated Message Processing [45], [46], [47] and dual-process theories of cognitive control [26], the study provides critical insights into how digital behaviors impact adolescent psychological well-being through cognitive disruptions.

The empirical findings provided strong support for the study's hypotheses, particularly by identifying cognitive interference as a key mediating mechanism linking problematic social media use to adverse mental health outcomes. Adolescents who reported frequent engagement with high-stimulation platforms such as Instagram, WhatsApp, and Facebook demonstrated notable difficulties in suppressing irrelevant stimuli, as evidenced by impaired Stroop Test performance. These cognitive impairments are consistent with previous research indicating that frequent digital multitasking impedes core executive functions including attention regulation, inhibitory control, and overall cognitive efficiency.

This aligns with Cognitive Load Theory, which suggests that sustained exposure to multimodal digital content encompassing notifications, visual imagery, and interactive elements can exceed the brain's processing threshold, particularly during adolescence, when executive control systems are still developing [27]. The resulting cognitive overload undermines attentional focus and task performance, contributing to heightened vulnerability to psychological stress.

The study further found that social media addiction was significantly associated with increased levels of depression, anxiety, and stress. This finding mirrors prior research indicating that compulsive social media use contributes to emotional distress [2], [17], [19]. Underlying mechanisms include intensified social comparison, heightened fear of missing out (FOMO), and persistent validation-seeking behaviors, all of which are accentuated by the curated and idealized nature of digital self-presentation. These patterns can be understood through Social Comparison Theory, which posits that adolescents are particularly prone to negative self-evaluation in digital environments. This is exacerbated by Reward Deficiency Syndrome frameworks, whereby the dopaminergic reinforcement cycles associated with social media engagement promote continual gratification-seeking that ultimately contributes to emotional exhaustion and distress.

The significant negative correlation observed between cognitive interference and mental health outcomes reinforces the hypothesis that greater cognitive dysfunction is linked to higher psychological distress. This suggests that adolescents who experience more severe attentional fragmentation and diminished inhibitory control in digital contexts are more likely to report elevated symptoms of depression, anxiety, and stress. These findings are in strong agreement with the Limited Capacity Model of Mediated Message Processing [48], which maintains that digital communication demands often surpass the brain's limited processing capabilities, leading to cumulative emotional strain.

Moreover, the mediation analysis confirmed that cognitive interference significantly mediated the relationship between social media addiction and mental health, accounting for approximately 35% of the total effect. This partial mediation underscores cognitive interference as a critical mechanism through which excessive digital engagement translates into psychological vulnerability, offering empirical validation for theoretical claims across cognitive and media psychology.

This research contributes novel empirical evidence from the Indian context specifically, the rapidly urbanizing city of Chandigarh where adolescent engagement with digital platforms is pervasive. The regional focus enhances the cultural relevance of the findings and expands the global applicability of existing theories surrounding digital addiction and cognitive-emotional health.

The results emphasize the urgent need for integrating cognitive regulation and digital literacy into school-based interventions and mental health programs. Strategies such as Mindfulness-Based Cognitive Therapy (MBCT) [17], digital detox programs [18], and cognitive-behavioral interventions [19] hold potential for enhancing adolescents' resilience against the cognitive and emotional consequences of excessive digital communication. In conclusion, this study provides a nuanced understanding of the interrelationships among social media addiction, cognitive interference, and mental health, grounded in robust theoretical foundations. The findings advocate for the development of targeted, culturally sensitive educational and psychological strategies aimed at mitigating digital overuse, enhancing cognitive control, and promoting adolescent mental well-being in an increasingly digital world.

Limitations and Future Directions

This study employed a cross-sectional design, which restricts the ability to draw causal inferences among social media addiction, cognitive interference, and mental health outcomes. To establish causal pathways more definitively, future research should consider longitudinal or experimental methodologies. Another limitation involves the reliance on self-report instruments for assessing mental health and social media addiction, which may be susceptible to recall bias and social desirability effects. Future investigations would benefit from incorporating more objective assessment tools, such as structured clinical interviews and real-time digital behavior tracking applications. Additionally, the study did not explore potential moderating variables such as gender, socioeconomic status, or levels of digital literacy, which may influence the strength and direction of the observed relationships. Examining these moderators could offer a more nuanced understanding of the contexts in which digital engagement poses the greatest risk to adolescent well-being. Furthermore, intervention-based studies focusing on cognitive control training may yield valuable insights into protective strategies for reducing the cognitive and emotional consequences of excessive digital communication.

CONCLUSION

This study empirically demonstrates that cognitive interference serves as a significant psychological conduit linking social media addiction to deteriorating mental health among adolescents within digitally saturated environments. Drawing upon robust theoretical frameworks including Cognitive Load Theory and the Limited Capacity Model of Mediated Message Processing the findings reveal that excessive engagement in linguistically and multimodally rich digital platforms disrupts inhibitory control and executive functioning, leading to elevated levels of depression, anxiety, and stress. The partial mediation effect observed confirms that cognitive interference not only coexists with but also amplifies the adverse psychological outcomes associated with social media overuse. These insights underscore the urgent need to conceptualize adolescent digital behavior not merely as a technological trend but as a cognitive and emotional risk factor warranting proactive intervention. By integrating objective cognitive measures such as the Stroop Test within a culturally relevant Indian urban context, this research extends the global discourse on digital well-being and adolescent development. The implications are multifaceted: educators, mental health practitioners, and policymakers must collaboratively design preventive programs that incorporate digital literacy, cognitive resilience training, and emotional regulation strategies. In an era where digital communication increasingly defines adolescent socialization, such empirically grounded interventions are essential for safeguarding cognitive capacity and promoting sustainable mental health outcomes in youth.

LIMITATIONS

This study empirically demonstrates that cognitive interference acts as a critical psychological pathway linking social media addiction to declining mental health among adolescents in digitally immersive environments. Grounded in Cognitive Load Theory and the Limited Capacity Model of Mediated Message Processing, the findings suggest that excessive exposure to linguistically and multimodally rich digital content impairs adolescents' inhibitory control and executive functioning. However, the study is not without limitations. The absence of a longitudinal design restricts causal

inferences regarding the developmental trajectory of cognitive interference. Additionally, the reliance on self-reported measures may introduce social desirability bias, potentially affecting the accuracy of reported behaviors and psychological states. Future studies should incorporate neurocognitive assessments and longitudinal tracking to further elucidate the temporal and neural dynamics of these associations. Broader demographic sampling beyond the current adolescent cohort would also enhance generalizability across populations.

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AUTHOR CONTRIBUTION

K.S. contributed to the conceptualization, research design, data collection, data analysis, data interpretation, and writing of the original manuscript. M.G. provided academic supervision, methodological guidance, and contributed to the writing review and editing.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

The authors used ChatGPT during the preparation of this work to design graphics and images. After utilizing the tool, the authors thoroughly reviewed and edited the content as necessary and assumed full responsibility for the publication's content.

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