



Journal of Frontiers in Multidisciplinary Research

Social Media Addiction and Cognitive Distortion among University Students in the Context of Screen-Induced Brain Fog: A Descriptive Correlational Study

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Article Info

E-ISSN: 3050-9726

P-ISSN: 3050-9718

Volume: 07

Issue: 02

Received: 16-08-2026

Accepted: 14-09-2026

Published: 12-10-2026

Page No: 333-339

Abstract

Background: Social media has become deeply integrated into students' academic and social lives, raising concerns regarding its potential impacts on cognitive functioning. Excessive social media use may contribute to attentional difficulties, and distorted thinking patterns.

Aim: This study aimed to explore the association between social media addiction and cognitive distortion among university students.

Methods: A descriptive correlational design was used among a convenience sample of 146 nursing students at Riyadh Elm University, Saudi Arabia. Data were collected electronically using the Social Media Addiction Scale–Student Form (SMAS-SF) and the Cognitive Assessment Questionnaire (CAQ). Both instruments demonstrated excellent internal consistency in the current study, with Cronbach's alpha coefficients of 0.926 and 0.928, respectively.

Results: The mean social media dependence score was 3.085 ± 0.790 , while the mean cognitive distortion score was 2.886 ± 0.807 . A statistically significant moderate positive correlation was found between social media dependence and cognitive distortion ($r = 0.561$, 95% CI: 0.439–0.663, $p < 0.001$). Cognitive distortion also differed significantly according to daily social media use ($p = 0.048$). Simple linear regression showed that social media dependence significantly predicted cognitive distortion ($\beta = 0.561$, $B = 0.573$, $p < 0.001$), explaining 31.5% of the variance in cognitive distortion scores ($R^2 = 0.315$).

Conclusion: Higher levels of social media dependence were significantly associated with greater cognitive distortion among nursing students. These findings highlight the importance of promoting healthy digital-use behaviors and increasing awareness of the potential cognitive effects of excessive social media engagement.

DOI: <https://doi.org/10.54660/JFMR.2026.7.2.333-339>

Keywords: Social media addiction, Cognitive distortion, Cognitive failures, Screen-induced brain fog, University students

1. Introduction

Social media has become a central aspect of modern communication, offering users instant access to information, entertainment, and social interactions (Beyari, 2023) ^[4]. However, concerns about its potential cognitive effects are rising, particularly among university students relying on digital platforms for academic and social purposes. One such concern is screen-induced brain fog, a phenomenon characterized by mental fatigue, difficulty concentrating, memory impairment, and distorted thinking patterns

(Kolhar *et al.*, 2021) ^[10]. Cognitive distortions can negatively impact the mental clarity and decision-making of university students (Benhalilem, 2024) ^[3]. Research suggests that excessive social media engagement may contribute to these distortions by promoting constant information overload and reduced attention spans (Naik *et al.*, 2025) ^[13]. Despite the increasing prevalence of social media usage, limited studies have explored its direct impact on university students' cognitive distortions and mental clarity (Shanmugasundaram & Tamilarasu, 2023) ^[15].

University students may be particularly vulnerable to the cognitive consequences of excessive social media use because of the high academic demands, frequent multitasking, and continuous exposure to digital information that characterize their daily routines (Gong *et al.*, 2025) ^[9]. Persistent engagement with social media may interrupt attention, increase mental overload, and reduce opportunities for cognitive recovery. Over time, these patterns may contribute to difficulties in memory and concentration, decision-making, and emotional regulation (Duan *et al.*, 2025) ^[8]. For nursing students, these effects may be especially important because their education requires sustained attention, accurate information processing, clinical judgment, and effective decision-making (Candan Dönmez *et al.*, 2025) ^[6]. Therefore, examining the relationship between social media addiction and cognitive distortions among nursing students may provide valuable insight into factors that could influence both academic performance and psychological well-being.

Despite the prevalent use of social media among university students, limited research has explored its direct impact on cognitive distortions and mental clarity, particularly with screen-induced brain fog. Therefore, this study addresses this gap by investigating how social media Addiction influences cognitive distortions and mental fatigue among university students. The potential benefits of this study include providing insights into mental health interventions, digital wellness strategies, and educational policies, which could significantly improve the well-being of university students.

1.1. Study Aim

Our study aimed to explore the association between social media addiction and cognitive distortions among university students.

1.2. Research Questions

1. What is the level of social media addiction among university students?
2. What is the level of cognitive distortion among university students?
3. Is there a statistically significant relationship between social media addiction and cognitive

1.3. Research Hypotheses

H1: There is a statistically significant positive relationship between social media addiction and cognitive distortion among university students.

Null Hypothesis (H0): There is no statistically significant relationship between social media addiction and cognitive distortion among university students.

2. Materials and Method

2.1. Study Design

A descriptive correlational study design was employed in the current study.

2.2. Setting

The study was conducted at Nursing Department of College of Pharmacy, Nursing, and Medical Sciences at Riyadh Elm University located in Saudi Arabia. The Nursing Department provides an academic environment for the education and professional preparation of nursing students through theoretical instruction, practical training, and clinical learning experiences. The department supports students' academic and professional development through teaching, training, and related educational activities. This setting was selected because it provided access to the target population of nursing students relevant to the objectives of the study.

2.3. Study Subjects

A convenience sample of 146 students was included in the study. Eligible participants were undergraduate and bridging nursing students enrolled in the Nursing Program who were active social media users for at least one hour per day. Students who had been diagnosed with neurological disorders or who were using medications that could significantly affect cognitive function were excluded from the study.

The sample size was calculated using Epi Info 7 software based on a population of 1,200 students enrolled during the 2024–2025 academic year, an expected frequency of 50%, an acceptable margin of error of 10%, and a 99% confidence level. Based on these parameters, the minimum required sample size was approximately 146 students. To compensate for possible participant withdrawal or incomplete responses, 150 students were initially recruited. During data collection, four students withdrew from the study, resulting in a final sample of 146 students, with an attrition rate of approximately 2.7%.

2.4. Data Collection Instruments

Data were collected using a self-reported electronic questionnaire hosted on Google Forms. The survey included two standardized instruments:

Tool I: The Social Media Addiction Scale - Student Form (SMAS-SF)

The scale was designed by Cengiz Şahinis (2018) to measure social media addiction among university students. The scale consists of 29 items organized into four sub-dimensions, including virtual tolerance, virtual communication, virtual problem, and virtual information. It is a 5-point Likert-type scale, where participants rated their agreement with each statement from "Strongly Disagree" (1) to "Strongly Agree" (5). The total score ranges between 29 and 145, with higher scores indicating that the students perceive themselves as a "social media addict". Cronbach's Alpha reliability coefficient for the total scale was 0.93, with subscale reliability ranging between 0.81 and 0.86, demonstrating high internal consistency. Test-retest reliability also showed a high correlation (0.94), indicating strong stability over time (Şahin, 2018) ^[14]. In the current study, the reliability of the tool was reassessed using Cronbach's alpha coefficient.

It demonstrated excellent internal consistency, with a Cronbach's alpha of 0.926. This result indicates that the items of the scale were highly consistent in measuring social media dependence among the study participants and confirms that the instrument was reliable for use in the present study. Students' characteristics such as gender, age and GPA as well as data related to social media usage duration and platforms were attached to this tool.

Tool II: Cognitive Assessment Questionnaire (CAQ)

This tool was first created by Broadbent *et al.* (1982) [5] to assess the occurrence of cognitive failures in everyday life. It evaluates instances of absent-mindedness, lapses in attention, forgetfulness, and errors in perception. It consists of 25 items, each assessing different types of cognitive lapses. Respondents rated how frequently they experience these lapses over the past six months employing a 5-point scale using Likert-type responses, with values spanning from "4 – Very often" to "0 – Never". The overall score ranged from 0 to 100, with higher scores reflecting a greater frequency of cognitive distortion (Broadbent *et al.*, 1982) [5]. The scale included three subdomains as follows; forgetfulness (e.g., forgetting names, appointments, or intentions), distractibility (e.g., absent-mindedness, lack of focus in social settings, being easily disturbed), and false Triggering (e.g., errors in motor actions, misperceptions, processing interruptions). In the current study, the 25-item Cognitive Distortion Scale demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of 0.928.

2.5. Validation of the Tools

The study instruments were reviewed to ensure their relevance, clarity and appropriateness for the target population. The tools were translated into Arabic and then back-translated into English to ensure linguistic accuracy and consistency of meaning with the original versions. The translated instruments were reviewed by a panel of five experts in nursing to assess content validity in terms of item relevance, clarity, comprehensiveness, and appropriateness to the study objectives. The experts' comments and recommendations were considered, and the necessary modifications were made before data collection to ensure the suitability of the instruments for usage.

2.6. Data Collection/ Survey Administration

The questionnaire was administered electronically using Google Forms. An invitation link and QR code were shared with nursing students, so they can access and complete the questionnaire. A pilot study was conducted with 15 nursing students to assess the feasibility, clarity, and estimated time required to complete the questionnaire. The students who participated in the pilot study were excluded from the final study sample. Feedback obtained from the pilot study was used to refine the wording and organization of the questionnaire. The survey was completed electronically by the participants and took approximately 10–15 minutes to complete.

2.7. Ethical Considerations

The study was submitted to the Institutional Review Board (IRB) and was conducted in accordance with Riyadh Elm University (REU) IRB policies and procedures (FUGRP/2025/435/1273/1149). The aim of the study was explained to participants at the beginning of the questionnaire, and informed consent was obtained before participation. Participants were informed that participation was voluntary and that they had the right to decline participation or withdraw from the study at any stage without penalty. To maintain participants' anonymity, the electronic survey did not collect any personally identifiable information. All collected data were kept confidential and were accessible only to members of the research team. To ensure data security, all study data were stored securely in the principal investigator's Google Drive.

2.8. Statistical Analysis

The collected data were coded, organized, and analyzed using appropriate statistical procedures. The final dataset consisted of 146 participants. Descriptive statistics were used to summarize demographic characteristics and study variables. Categorical variables were presented as frequencies (N) and percentages (%), whereas continuous variables were summarized using Mean $\pm$ SD. The internal consistency of the study instruments was assessed using Cronbach's alpha (α). The relationship between the main study variables was examined using Pearson's correlation coefficient (r). This analysis was used to determine the strength and direction of the association between social media use/dependence and cognitive-failure scores.

To examine differences in the main study variables according to demographic characteristics, an independent-samples t-test was used when the demographic variable contained two groups, while one-way analysis of variance (ANOVA) was used for variables containing more than two groups. Finally, simple linear regression analysis was performed to determine whether social media use/dependence significantly predicted cognitive failure. The regression model was evaluated using the unstandardized coefficient (B), standardized beta coefficient (β), R^2 , adjusted R^2 , F-statistic, t-value, p-value, and 95% confidence interval. A p-value < 0.05 was considered statistically significant for all inferential analyses.

3. Results

Table 1 describes the demographic characteristics of the 146 nursing students. The sample was predominantly female (86.99%), while males accounted for 13.1%. More than half of the participants were aged 20–24 years (54.1%), followed by those aged 25–29 years (21.92%). Regarding academic performance, 30.82% of participants had a GPA of 4.00–4.49. In terms of daily social media use, 34.25% reported spending 3–5 hours per day on social media, while 26.03% reported 6–8 hours. TikTok was the most frequently reported platform (43.83%), followed by Snapchat (32.88%), Instagram (8.9%), and WhatsApp (8.22%).

Table 1: Demographic Characteristics of Nursing Students (N = 146)

Variable	Category	N	Percentage (%)
Gender	Female	127	86.99
	Male	19	13.01
Age (years)	≤19	0	0.00
	20–24	79	54.11
	25–29	32	21.92
	30–34	13	8.90
	35–39	13	8.90
GPA	≥40	9	6.16
	<3.00	3	2.05
	3.00–3.49	19	13.01
	3.50–3.99	21	14.38
	4.00–4.49	45	30.82
	4.50–4.99	44	30.14
Duration of social media usage / day	5.00	14	9.59
	≤2 hours	20	13.70
	3–5 hours	50	34.25
	6–8 hours	38	26.03
	9–11 hours	17	11.64
	12–14 hours	10	6.85
Most-used social media platform	≥15 hours	11	7.53
	TikTok	64	43.83
	Snapchat	48	32.88
	Instagram	13	8.90
	WhatsApp	12	8.22
	X (Twitter)	4	2.74
	YouTube	2	1.37
	Facebook	1	0.68
	Safari	1	0.68
	Telegram	1	0.68

Table 2 summarizes the descriptive statistics of the main study variables among the 146 nursing students. The mean score of social media dependence was 3.085 ± 0.790 . Cognitive Failures demonstrated a comparatively lower mean

score (2.886 ± 0.807). Overall, the results indicate that the participants reported moderately higher scores for social-media-related behaviors compared with cognitive-failure experiences.

Table 2: Descriptive Statistics of the Main Study Variables (N = 146)

Main Variable	Mean $\pm$ SD	Mean Score (%)
Cognitive Failures	2.886 ± 0.807	57.73
Social Media Dependence	3.085 ± 0.790	61.71

Table 3 presents the correlation between cognitive distortion and social media dependence among nursing students. A moderate positive correlation was observed between the two main study variables ($r = 0.561$, 95% CI: 0.439–0.663, $p < 0.001$). This indicates that participants with higher social

media dependence scores tend to report higher levels of cognitive distortion. The association was statistically significant at the $p < 0.05$ level. However, because the study design is cross-sectional, the observed correlation is interpreted as an association rather than causation.

Table 3: Correlation Between Cognitive Distortion and Social Media Dependence among Nursing Students (N = 146)

Variables	Cognitive Distortion
Social Media Dependence	1.000
	$r = 0.561^*$

Pearson's correlation coefficient was used. $p < 0.001$; 95% CI for $r = 0.439$ –0.663.

Table 4 presents differences in cognitive distortion and social media dependence according to participants' characteristics. No statistically significant differences in cognitive distortion scores were observed according to gender, age group or GPA ($p > 0.05$). However, cognitive distortion scores differed

significantly according to daily social-media use ($p = 0.048$). Regarding social-media dependence, no statistically significant differences were observed according to gender, age group, GPA, or daily social-media use ($p > 0.05$).

Table 4: Differences in Cognitive Distortion and Social Media Dependence According to Participants' Characteristics (N = 146)

Variable	Category	Cognitive Distortion	p-value	Social Media Dependence	p-value
		Mean $\pm$ SD		Mean $\pm$ SD	
Gender	Male	2.64 $\pm$ 0.74	0.149	3.02 $\pm$ 0.91	0.694
	Female	2.92 $\pm$ 0.81		3.10 $\pm$ 0.77	
Age group (Years)	20–24	2.90 $\pm$ 0.82	0.323	3.11 $\pm$ 0.83	0.422
	25–29	3.07 $\pm$ 0.79		3.14 $\pm$ 0.76	
	30–34	2.53 $\pm$ 0.87		3.23 $\pm$ 0.71	
	35–39	2.82 $\pm$ 0.59		2.69 $\pm$ 0.57	
	≥ 40	2.71 $\pm$ 0.86		3.03 $\pm$ 0.91	
GPA	<3.00	2.95 $\pm$ 1.17	0.558	2.92 $\pm$ 0.68	0.751
	3.00–3.49	2.73 $\pm$ 0.74		3.33 $\pm$ 0.67	
	3.50–3.99	2.69 $\pm$ 0.63		2.96 $\pm$ 0.58	
	4.00–4.49	2.91 $\pm$ 0.76		3.03 $\pm$ 0.78	
	4.50–4.99	3.05 $\pm$ 0.84		3.12 $\pm$ 0.92	
	5.00	2.78 $\pm$ 1.09		3.05 $\pm$ 0.88	
Daily social-media use (hours)	≤ 2 hours	2.51 $\pm$ 0.92	0.048*	2.90 $\pm$ 0.77	0.094
	3–5 hours	2.78 $\pm$ 0.74		2.91 $\pm$ 0.81	
	6–8 hours	3.17 $\pm$ 0.74		3.12 $\pm$ 0.79	
	9–11 hours	3.07 $\pm$ 0.86		3.42 $\pm$ 0.57	
	12–14 hours	2.94 $\pm$ 0.86		3.38 $\pm$ 0.61	
	≥ 15 hours	2.75 $\pm$ 0.73		3.32 $\pm$ 0.99	

Table 5 presents the results of the simple linear regression analysis examining whether social media dependence predicts cognitive distortion among nursing students. The regression model was statistically significant, $F(1,144) = 66.25$, $p < 0.001$, indicating that social media dependence was

a statistically significant predictor of cognitive distortion. The model explained 31.5% of the variance in cognitive distortion scores ($R^2 = 0.315$; adjusted $R^2 = 0.310$). Thus, higher social media dependence was associated with higher cognitive distortion in the study sample.

Table 5: Simple Linear Regression Analysis Predicting Cognitive Distortion among Nursing Students (N = 146)

Predictor	B	SE	β	t	p-value	95% CI for B
Social Media Dependence	0.573	0.070	0.561	8.139	<0.001	0.434–0.712
Constant	1.119	0.224	—	4.991	<0.001	0.676–1.562

Model statistics: $R^2 = 0.315$, Adjusted $R^2 = 0.310$, $F(1,144) = 66.25$, $p < 0.001$.

4. Discussion

The current study portrayed that social media dependence and cognitive distortion were present at moderate levels among nursing students, with social-media-related behaviors relatively more prominent. Concerning social media use, our study participants endorsed social-media-related dependence behaviors at a level between occasional and frequent occurrence. This finding may be explained by the extensive integration of social networking platforms into students' daily routines for entertainment, communication and information seeking and, in some cases, academic motives (Amirthalingam & Khera, 2024) [2]. Moreover, our findings revealed the excess use of social media platforms such as TikTok and Snapchat for several hours. Although social media usage duration does not constitute internet dependence, constant exposure to highly accessible, mobile-based, and algorithmically personalized platforms can facilitate repeated checking and habitual engagement (Chemnad *et al.*, 2023) [7]. Simultaneously, A Saudi nursing-student study at the University of Tabuk reported TikTok as the platform with the highest addiction prevalence and identified social media addiction as a relevant issue in the nursing-student population.

The moderate level of cognitive distortion observed among the participants of the current study suggests that the negatively biased patterns of thinking were present but were not severely disruptive. The present finding may reflect the psychological and academic demands experienced by university students. The moderate cognitive distortion may contribute to students' dependence on social media by

increasing their tendency to seek social approval and reassurance, distraction, as well as escape from negative thoughts (Marano *et al.*, 2025) [11]. The result is consistent with Alwawi & Alsaqqa (2023) [1] who cited that one-third of nursing students reported moderate levels of cognitive distortion. They also added that Single, first-year, and younger nursing students tend to have significantly higher levels of cognitive distortions. In the context of the present study, moderate cognitive distortion may contribute to students' dependence on social media by increasing their tendency to seek escape from negative thoughts. Nevertheless, this explanation remains tentative because the cross-sectional nature of the study.

The central finding of the present study is the significant association between social media dependence and cognitive distortion among nursing students. This finding is consistent with evidence that problematic social network use is related to everyday lapses in attention, memory, perception, and action control (Sisí *et al.*, 2026) [16]. However, the relationship between the two study variables may be reciprocal, as, Nagata *et al.* (2026) [12] found that problematic social media use may precede subsequent cognitive distortion. The present cross-sectional findings therefore demonstrate co-occurrence between constructs but cannot determine which construct precedes the other. Furthermore, the regression analysis of the present research strengthens the evidence that social media overuse is statistically relevant to variation in cognitive function among university students. This result agrees with explanations proposing that repeated checking, notifications, online preoccupation, and

information overload may compete with the students' attentional resources required for academic and everyday activities (Wang *et al.*, 2025) ^[17]. These current findings harmonize with the theoretical frameworks outlined by Shanmugasundaram & Tamilarasu (2023) ^[15], who argued that algorithmic, fast-paced media consumption continuously fragments attention spans, overloads working memory buffers, and induces persistent cognitive fatigue among young adults.

The demographic profile of the participants reveals important contextual dimensions regarding contemporary student populations in nursing field in Saudi Arabia. The sample was predominantly females, with a high concentration of young adults aged 20–24 years. This demographic distribution reflects prevailing enrollment patterns within health-science disciplines at the institutional setting. For social media use, daily engagement with digital platforms was notably high as three-quarters of students reported spending 3 or more hours daily on social networking sites, with substantial segments reporting 6 to 8 hours. Furthermore, TikTok and Snapchat emerged as the predominant platforms utilized by the student cohort. These usage patterns corroborate recent findings by Beyari (2023) ^[4], who emphasized the ubiquitous integration of algorithmic, short-form media into the daily routines of modern youth, underscoring an environment ripe for continuous digital stimulation and potential cognitive interference.

Inferential evaluations concerning demographic variables revealed nuanced dynamics. While gender, age groups, and cumulative GPA demonstrated no statistically significant differences in cognitive failures or social media dependence, notable variations emerged in specific sub-analyses. Specifically, cognitive failure differed significantly across categories of daily social media use, with peak cognitive disruption observed among students reporting 6 to 8 hours of daily screen time. This threshold suggests a critical tipping point wherein high digital immersion begins to significantly saturate cognitive processing capacities.

5. Conclusion

This empirical investigation set out to explore the complex relationship between social media addiction and cognitive distortions within the framework of screen-induced brain fog among university students at Riyadh Elm University. Utilizing a robust descriptive correlational design, the study established that social media dependence is prevalent among modern student cohorts, with TikTok and Snapchat serving as primary engagement channels. The findings conclusively demonstrate a significant moderate positive correlation and predictive relationship between excessive social media use and everyday cognitive distortion. Ultimately, while digital platforms offer substantial educational and social connectivity benefits, uncontrolled usage poses a latent threat to cognitive efficiency and academic well-being.

6. Practical Implications

The empirical insights generated by this research carry profound practical, pedagogical, and institutional implications for university administration, student counseling centers, and educators. University health centers should design targeted psychoeducational programs and digital hygiene workshops aimed at raising student awareness regarding screen-induced cognitive fatigue, attention fragmentation, and compulsive social media habits.

Academic advisors and faculty members can integrate structured digital break policies, promote active learning strategies, and guide students toward effective time-management frameworks to mitigate the adverse cognitive impacts of prolonged screen exposure during study hours.

7. Limitations of the Study

Despite its methodological rigor and significant contributions, several limitations must be acknowledged in the current research. First, the study employed a descriptive correlational cross-sectional design, which captures data at a single point in time. Consequently, while statistical prediction and strong associations were established, causality cannot be inferred. Longitudinal or experimental designs are necessary to establish directional causal pathways between social media addiction and cognitive deterioration. Second, all data were gathered via self-reported electronic questionnaires, which are inherently vulnerable to subjective response biases, social and desirability effects. Eventually, the sample was drawn conveniently from specific college within Riyadh Elm University, with a high proportion of female participants. Therefore, caution should be exercised when generalizing these findings to male student populations, non-health disciplines, or broader university contexts across Saudi Arabia.

Future Research

Utilize longitudinal and experimental designs to establish causal relationships between social media reliance and cognitive lapses.

Incorporate objective measures, such as device-logged screen time data and laboratory-based cognitive assessments, rather than relying solely on self-reports.

Expand sample diversity across balanced gender groups, non-health disciplines, and multiple regions to broaden generalizability.

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How to Cite This Article

Hamad NI, Almutairi HM, Majrash NJ, Alamer DA, Almutairi RE, Almutairi A. Social media addiction and cognitive distortion among university students in the context of screen-induced brain fog: a descriptive correlational study. *Journal of Frontiers in Multidisciplinary Research*. 2026;7(2):333-339. doi:10.54660/JFMR.2026.7.2.333-339.

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