

ORIGINAL ARTICLE

Executive Dysfunction and Psychological Symptoms in Problematic Social Media Use

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Main Points

- Problematic social media use was correlated with impairments in executive functions, particularly in organizational abilities, underscoring the cognitive control deficits commonly observed in behavioral addictions.
- Higher levels of depression, anxiety, and stress were observed among individuals with greater PSMU, supporting the link between emotional distress and maladaptive technology engagement.
- Psychological variables—particularly stress levels and sleep quality—were found to be closely associated with executive functions. Individuals with higher levels of empathy exhibited greater stress and poorer sleep quality, while those experiencing more pronounced psychological distress also showed difficulties in organization and impulse control.

Abstract

This study aimed to investigate the relationship between problematic social media use (PSMU), executive functions, depression, anxiety, stress, and sleep quality in a healthy adult population. A total of 174 adults (62.6% female, mean age = 37.19 ± 9.17 years) were recruited online. Participants completed a sociodemographic data form, the Bergen Social Media Addiction Scale (BSMAS), the Executive Function Index (EFI), the Depression Anxiety Stress Scale-21 (DASS-21), and the subjective sleep quality subscale of the Pittsburgh Sleep Quality Index (PSQI). Pearson correlations were conducted. Problematic social media use showed negative associations with executive functioning, particularly with organization ($r = -.423, p < .001$). In addition, BSMAS scores were positively correlated with depression ($r = .354, p < .001$), anxiety ($r = .217, p < .001$), and stress ($r = .233, p < .001$). The findings indicate that PSMU is strongly linked to executive function and psychological distress. These results highlight the need for interventions targeting cognitive regulation, emotional well-being, and healthy technology use.

Keywords: Executive functions, mental health, problematic social media use

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Introduction

Problematic social media use (PSMU) is a public health concern characterized by excessive social media engagement, preoccupation, and loss of control despite its negative consequences (Andreassen et al., 2017). Excessive interactions on social media platforms are associated with emotional dysregulation, poorer academic and occupational performance, and reduced well-being (Marino et al., 2018; Sha et al., 2019).

An increasing body of evidence has emphasized the relationship between PSMU and mental health concerns. Meta-analyses have demonstrated that problematic use of Facebook is associated with depressive symptoms (Yoon et al., 2019). With the increasing use of social media, psychiatric symptoms, such as anxiety and stress, are also frequently observed (Dhir et al., 2018; Huang, 2017). Such findings indicate a bidirectional process: emotional distress can increase social media use, while excessive use further exacerbates distress (Brand et al., 2019).

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Mediated by the prefrontal cortex, executive functions include planning, time management, impulse control, working memory, and cognitive flexibility (Spinella, 2005). Impaired planning and impulse control have been reported in individuals with problematic internet use (Ioannidis et al., 2019; Wegmann & Brand, 2020). Such impairments may weaken one's ability to evaluate the consequences of behaviors, thus fostering compulsive online behaviors.

Another important research domain in the area of social media use is sleep and sleep quality. Problematic social media use is associated with shorter sleep duration, delayed bedtimes, and poorer sleep quality (Xanidis & Brignell, 2016; Wolniczak et al., 2013). Late-night interactions with devices disrupt circadian rhythms, contributing to cognitive fatigue and emotional problems (Sha et al., 2019). In turn, sleep disturbances can exacerbate executive dysfunction and psychological distress, creating a negative cycle.

Despite the growing body of evidence, relatively few studies have simultaneously explored the interactions among social media use, executive functions, psychological distress, and sleep quality. This study addresses this gap by investigating such domains within a community-based adult sample. The authors hypothesize that greater PSMU would be associated with executive functions, increased depression, anxiety, and stress, and reduced subjective sleep quality.

Material and Methods

Participants and Procedure

This cross-sectional study was carried out between March and May 2025, involving individuals aged 18 and above who were reached through targeted recruitment on Instagram. Inclusion criteria comprised individuals aged between 18 and 65 years who voluntarily agreed to participate by providing informed consent. Exclusion criteria included the presence of any psychiatric or neurological disorders that could affect executive functioning, current use of psychotropic medications, illicit substance use, or alcohol dependence.

Ethical approval for this study was obtained from the Scientific Research and Publication Ethics Committee of Memorial Antalya Hospital on March 10, 2025, under approval number 2, and Helsinki Declaration rules were followed to conduct this study. All participants provided informed consent. This research adhered to institutional and/or national research committee ethical standards, as well as the 1964 Helsinki Declaration and its subsequent amendments or comparable ethical standards.

Prior to data collection, electronic informed consent was obtained from all participants; clicking the "I agree to participate in the study" button on the online form was deemed equivalent to signing the informed consent form. Following this, participants completed a sociodemographic questionnaire collecting information on age, gender, education level, marital status, occupational status, physical health conditions, harmful habits, and psychiatric history. Subsequently, the following standardized instruments were administered: the Bergen Social Media Addiction Scale (BSMAS), the Executive Function Index (EFI), the Depression Anxiety Stress Scale-21 (DASS-21), and the Pittsburgh Sleep Quality Index (PSQI)—subjective sleep quality subscale. To

prevent duplication, each participant was allowed to complete the survey only once using the same email address.

Initially, 236 participants were enrolled in the study; however, 14 were excluded for not completing the study, and 48 were excluded due to a history of psychiatric disorder or current use of psychotropic medications. Among the participants included in this study, 62.6% were female and 37.4% were male, with a mean age of 37.19 ± 9.17 years. Regarding marital status, 21.3% were single, 65.5% were married, 6.9% were in a relationship, and 6.3% were divorced.

Measures

Sociodemographic Data Form gathered comprehensive demographic and personal information, including participants' age, gender, marital status, educational attainment, employment status, physical and psychiatric history, and current smoking, alcohol, and illicit substance use.

Bergen Social Media Addiction Scale, developed by Andreassen et al. (2016), is a six-item self-report instrument designed to assess PSMU over the past 12 months. Each item corresponds to one of the six core addiction components: salience, mood modification, tolerance, withdrawal, conflict, and relapse. Items are rated on a 5-point Likert scale ranging from 1 (very rarely) to 5 (very often), with total scores ranging from 6 to 30; higher scores reflect greater levels of PSMU. An example item is, "How often during the last year have you used social media to forget about personal problems?" The original scale demonstrated high internal consistency (Cronbach's $\alpha = .88$). The Turkish adaptation of the scale was validated by Demirci (2019), who reported a test – retest reliability coefficient of 0.83 based on a 3-week interval with 51 participants. **In the present study, the Cronbach's alpha coefficient for the BSMAS was 0.86, indicating good internal consistency.**

Executive Function Index is a 27-item self-report instrument developed by Spinella (2005) to assess executive functioning in non-clinical populations. It comprises five subscales: motivational drive (4 items), organization (5 items), impulse control (5 items), empathy (6 items), and strategic planning (7 items). Items are rated on a 5-point Likert scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"), with higher scores indicating more effective executive functioning. The subscales reflect distinct domains of executive function associated with prefrontal-subcortical activity. The original scale demonstrated acceptable internal consistency, with Cronbach's alpha values ranging from 0.69 to 0.76, and 0.82 for the total score. The Turkish adaptation of the EFI was conducted by Kafadar and Arıcan (2022), who reported Cronbach's alpha coefficients ranging from .54 to .76, indicating an acceptable level of reliability for the Turkish version. **In the present study, the Cronbach's alpha coefficient for the EFI was 0.77, indicating acceptable internal consistency.**

Depression Anxiety Stress Scale-21 is a short-form self-report instrument developed by Lovibond and Lovibond (1995) to assess symptoms of depression, anxiety, and stress over the past week. The scale consists of 21 items, with seven items allocated to each subscale. Respondents rate each item on a 4-point Likert scale ranging from 0 ("Never") to 3 ("Always"), with higher scores indicating greater symptom severity. The Turkish adaptation of the scale was carried out by Sarıçam (2018), who examined both

construct and criterion validity. Exploratory and confirmatory factor analyses supported the three-factor structure, with item loadings ranging from 0.42 to 0.72 and good model fit indices. Internal consistency coefficients for the Turkish clinical sample were 0.87 for the depression subscale, 0.85 for the anxiety subscale, and 0.81 for the stress subscale, indicating satisfactory reliability. In the present study, the Cronbach's alpha coefficients for the DASS-21 subscales were 0.87, 0.86, and 0.83 for depression, anxiety, and stress, respectively, with the total scale demonstrating excellent internal consistency at 0.93.

Pittsburgh Sleep Quality Index assesses sleep quality and disturbances over the past month and is widely used. Developed by Buysse et al. (1989), it has demonstrated good reliability (Cronbach's alpha = 0.80). The Turkish version, validated by Ağargün et al. (1996), showed similar reliability. The scale contains 24 items, 19 self-reported and 5 answered by a roommate or spouse (not scored). Eighteen items are grouped into seven components scored 0–3, with a total score ranging from 0 to 21; higher scores indicate poorer sleep quality. The seven components include subjective sleep quality, sleep latency, duration, efficiency, disturbances, medication use, and daytime dysfunction. This study included only the subjective sleep quality subscale.

Statistical Analysis

Statistical analyses were conducted using the Jamovi v2.5 software package (The Jamovi Project 2024). Continuous variables were reported as means and standard deviations, while categorical variables were summarized with counts and percentages. Normality was assessed using skewness and kurtosis values, and visual inspection of histogram plots. According to the literature, a skewness value between –2 and +2 and kurtosis values between –7 and +7 are interpreted as indicative of normal distribution (Hair et al., 2010). The correlations of the total and subscale scores of the participants group's BSMAS, EFI, DASS-21, and Pittsburgh Sleep Quality Index—subjective sleep quality subscale were assessed using Pearson correlation analysis. The results of the analyses are presented in tabular form. The significance level for all tests was set at $p < .05$.

Table 1.
Sociodemographic Characteristics of the Participants

Variables	Patients (n = 174)
Age (mean ± SD)	37.19 ± 9.17
Gender (n(%))	
Female	109 (62.6)
Male	65 (37.4)
Marital status (n(%))	
Single	37 (21.3)
Married	114 (65.5)
In a relationship	12 (6.9)
Divorced	11 (6.3)
Education duration (mean ± SD)	14.4 ± 3.0
High school or below (n(%))	16 (9.2)
University degree or above (n(%))	158 (90.8)
Number of employees (n(%))	158 (90.8)
Presence of physical disease (n(%))	27 (15.5)
Cigarette use (n(%))	
Yes	38 (21.8)

n = number, SD = standard deviation, % = frequency.

Results

The sociodemographic characteristics of the participants are presented in Table 1.

The mean score for PSMU, as measured by the BSMAS, was 15.38 (SD = 5.57). The total Executive Function Index score had a mean of 99.88 (SD = 11.31), with subscale means of 14.66 (SD = 2.92) for Motivational Drive, 17.71 (SD = 4.16) for Organization, 18.37 (SD = 3.25) for Impulse Control, 24.23 (SD = 4.53) for Empathy, and 24.88 (SD = 4.39) for Strategic Planning. For psychological symptoms, the DASS-21 total score had a mean of 15.56 (SD =

Table 2.
Descriptive Statistics for Study Measures

Variables	Mean	SD	Skewness	Kurtosis	Minimum	Maximum
Bergen Social Media Addiction Scale	15.38	5.57	0.395	–0.391	6	30
Executive Function Index						
Motivational Drive	14.66	2.92	–0.135	–0.257	6	20
Organization	17.71	4.16	–0.357	–0.166	6	25
Impulse Control	18.37	3.25	–0.549	1.038	5	25
Empathy	24.23	4.53	–0.955	0.686	9	30
Strategic Planning	24.88	4.39	–0.630	1.062	11	35
DASS-21						
Depression	5.31	4.29	1.099	1.465	0	21
Anxiety	4.02	3.91	1.203	1.688	0	20
Stress	6.22	4.11	0.635	0.046	0	21
Sleep quality	1.32	0.57	0.188	–0.170	0	3

DASS-21 = Depression Anxiety Stress Scale-21, SD = standard deviation.

Table 3.
Correlation between Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1	–											
2	–0.043	–										
3	–0.423***	0.081	–									
4	–0.095	–0.181*	0.281***	–								
5	0.102	0.377***	–0.135	0.022	–							
6	–0.040	0.494**	0.034	–0.008	0.662**	–						
7	–0.168*	0.579***	0.428***	0.350***	0.712***	0.791***	–					
8	0.354***	–0.187*	–0.275***	–0.064	0.026	–0.078	–0.188*	–				
9	0.217***	–0.112	–0.254**	–0.059	0.048	–0.019	–0.128	0.674***	–			
10	0.233***	–0.001	–0.270***	–0.168*	0.155*	0.080	–0.055	0.741***	0.702***	–		
11	0.301***	–0.113	–0.298***	–0.108	0.085	–0.007	–0.139	0.903***	0.878***	0.909***	–	
12	0.087	–0.097	–0.236**	–0.111	0.216**	0.060	–0.034	0.285***	0.241**	0.276***	0.298***	–

1: Bergen Social Media Addiction Scale, 2: Motivational drive, 3: Organization, 4: Impulse control, 5: Empathy, 6: Strategic planning, 7: Total score of Executive Function Index, 8: Depression, 9: Anxiety, 10: Stress, 11: Total score of Depression Anxiety Stress Scale – 21, 12: Sleep quality, * $p < .05$, ** $p < .01$, *** $p < .001$.

11.04), with subscale means of 5.31 (SD = 4.29) for Depression, 4.02 (SD = 3.91) for Anxiety, and 6.22 (SD = 4.11) for Stress. Finally, participants' subjective sleep quality scores on the PSQI had a mean of 1.32 (SD = 0.57). These descriptive statistics are summarized in Table 2.

The BSMAS showed significant positive correlations with depression ($r = 0.35, p < .001$), anxiety ($r = 0.21, p < .001$), and stress ($r = 0.23, p < .001$). Conversely, it was negatively associated with organization ($r = -0.42, p < .001$), indicating that higher levels of PSMU were related to lower organizational abilities. Sleep quality showed negative associations with organization ($r = -0.23, p < .01$) and positive correlations with empathy ($r = 0.21, p < .01$), depression ($r = 0.28, p < .001$), anxiety ($r = 0.24, p < .01$), and stress ($r = 0.27, p < .001$). Overall, the pattern suggests that greater social media addiction and higher levels of psychological distress are associated with lower executive functioning capacities, particularly in organization and impulse control. A comprehensive overview of the remaining associations among study variables is provided in Table 3.

Discussion

The present study demonstrated that PSMU was correlated with deficits in executive functioning, particularly in organizational abilities, and higher levels of depression, anxiety, and stress. Although the association with sleep quality did not reach statistical significance, the direction of the relationship was consistent with theoretical expectations, suggesting that sleep may still play a relevant role in cognitive-emotional regulation among social media users. These findings extend prior research by providing additional evidence that complements earlier studies linking addictive social media behaviors to deficits in impulse control and planning, thereby contributing novel insights to the existing literature (Wegmann & Brand, 2020; Ioannidis et al., 2019). The particularly strong correlation between PSMU and organization underscores the involvement of neurocognitive processes in behavioral addictions.

The authors' findings highlight strong associations between PSMU and psychiatric symptoms. Greater levels of depression, anxiety, and stress among individuals with high levels of social media engagement align with previous meta-analyses identifying social media use as a risk factor for psychological distress (Marino et al., 2018; Yoon et al., 2019). Potential mediators include social comparison, cyberbullying, and a fear of missing out (FOMO) (Dhir et al., 2018; Huang, 2017). This supports a reciprocal reinforcement model, wherein individuals who are experiencing distress may turn to social media as a maladaptive coping mechanism, while, in turn, excessive use may aggravate distress (Brand et al., 2019).

Consistent with recent evidence, higher stress levels have been associated with poorer impulse control, as stress can impair prefrontal regulatory processes involved in executive functioning (Zhou et al., 2024). This finding suggests that individuals experiencing elevated psychological distress may be more vulnerable to impulsive behaviors, potentially contributing to PSMU.

By addressing executive functions, emotional symptoms, and sleep in combination, the findings of the present study contribute

to a more integrated understanding of PSMU. While many prior studies have examined these domains in isolation, the authors' findings demonstrate that they intersect to form a multidimensional risk profile. Cognitive dysfunction, emotional distress, and maladaptive behaviors likely interact to maintain problematic usage patterns (Brand et al., 2019). These findings underscore the importance of interventions to strengthen executive control, support emotional regulation, and promote healthier use of technology. Clinicians should be attentive to comorbid symptoms, such as depression, anxiety, and poor sleep, among individuals displaying problematic social media behaviors. At-risk populations may benefit from programs fostering digital literacy and self-regulation.

This study demonstrates that PSMU is related to impaired executive functions—particularly organization—and elevated levels of depression, anxiety, and stress. Overall, the authors' findings underscore the importance of clinical assessments and preventive interventions targeting cognitive regulation, emotional well-being, and healthy technology use. Longitudinal research is necessary to clarify causal mechanisms and guide evidence-based interventions.

Limitations and Suggestions for Future Research

Several limitations of the present study should be acknowledged. First, the cross-sectional design precludes any definitive conclusions regarding causal relationships among the variables. Additionally, the recruitment of participants through voluntary responses on social media platforms, particularly via Instagram, may limit the generalizability of the findings to the broader population and introduce self-selection bias due to the potential overrepresentation of highly active social media users. Because all data were collected through self-report instruments, potential biases—such as social desirability and response bias—cannot be ruled out. The exclusive reliance on self-report measures introduces potential biases, including social desirability and response bias. Furthermore, the assessment of sleep was restricted to the subjective sleep quality subscale of the PSQI, which may not comprehensively capture all dimensions of sleep. Finally, the exclusion of individuals reporting psychiatric or neurological conditions that could potentially affect cognitive functioning represents a limitation, as it restricts the generalizability of the findings to clinical populations.

Future research should consider employing longitudinal or experimental designs to elucidate the causal relationships between social media use, executive functions, psychological symptoms, and sleep quality. Investigations involving more diverse samples in terms of age, socioeconomic status, and clinical characteristics would enhance the generalizability of findings. The integration of objective measures, such as neuropsychological tests, neuroimaging techniques, or biological markers, could provide a more comprehensive evaluation of executive functioning and sleep. Cross-cultural comparative studies would further clarify how psychosocial effects of social media use vary across different cultural contexts. Finally, intervention-based studies aimed at regulating social media use, enhancing executive functioning, and improving sleep quality, as well as providing appropriate psychosocial support mechanisms for individuals experiencing psychological distress, could offer significant and multifaceted contributions to clinical and preventive mental health practices.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: Ethical approval for this study was obtained from the Scientific Research and Publication Ethics Committee of Memorial Antalya Hospital (Approval no: 2, Date: March 10, 2025)

Informed Consent: Informed consent was obtained from the participants who agreed to take part in the study.

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