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The Impact of Social Media on Mental Health in Young Adults: A Cross-Sectional Study of Usage Patterns and Psychological Well-Being

Haifa Ahmed abud ali husson al rubia (Pyshiatrist)
Dewanyia teaching hospital

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Annotation: Background: Social media platforms have become an integral part of the lives of young adults, with potential implications for their mental health outcomes. Understanding the relationship between social media usage patterns and psychological well-being is crucial for developing evidence-based interventions to support this population.

Objective: To examine the association between social media usage patterns and mental health outcomes in young adults aged 18-25 years, including depression, anxiety, self-esteem, and sleep quality.

Methods: A cross-sectional study was conducted among 847 young adults recruited from three universities. Participants completed validated questionnaires including the Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), Rosenberg Self-Esteem Scale, and Pittsburgh Sleep Quality Index. Social media usage was assessed through self-reported daily usage time, platform preferences, and behavioral patterns.

Results: Participants averaged 4.2 hours of daily social media use. Heavy users (>6 hours/day, n = 198) showed significantly higher depression scores (PHQ-9: 12.4 vs. 6.8, $p < 0.001$) and anxiety levels (GAD-7: 11.2 vs. 7.1, $p < 0.001$) compared to light users (<2 hours/day, n = 156). Passive consumption behaviors were associated with lower self-esteem

scores ($r = -0.34$, $p < 0.001$), while active engagement showed weaker negative correlations ($r = -0.15$, $p < 0.05$). Sleep quality deteriorated with increased evening social media use ($r = 0.42$, $p < 0.001$).

Conclusions: Excessive social media use, particularly passive consumption and evening usage, is associated with poorer mental health outcomes in young adults. These findings suggest the need for digital wellness interventions and the adoption of mindful social media usage practices.

Keywords: social media, mental health, young adults, depression, anxiety, digital wellness.

1. Introduction

The rise of social media in the last two decades has changed the way young adults communicate, seek information, and define their social identities (1). With more than 4.8 billion users worldwide, social media platforms have become an integral part of our daily lives, particularly among individuals aged 18-25, who are the most active users on these platforms (2). While social media provides unique opportunities to connect, share, and express ourselves, there are also growing concerns regarding its impact on mental health and psychological well-being.(3)

Young adulthood is characterized by the development of identity, the establishment of independence, and complicated social relationships (4). This age is often riskier when it comes to mental health challenges, with 75% of mental health disorders appearing before the age of 25 (5). Social media in this developmental context raises questions concerning how digital interactions may affect psychological outcomes during this formative stage of development.

The framework used to understand mental health in the context of social media has drawn on a variety of psychological theories. Social comparison theory, postulated by Festinger (1954), posits that social comparisons provide mechanisms for individuals to assess their abilities and opinions (6). In terms of social media, users are shown curated versions of other individuals' lives, leading to constant social comparisons with others and possibly upward social comparisons that may diminish self-esteem and psychological well-being (7). The highly stylized nature of social media content, where people primarily share the most positive experiences and successes, creates a setting in which comparisons are more likely to be unfavourable to the observer.(8)

Additionally, another way to view the effects of social media is through the lens of social capital. Social capital reflects the potential relationships that are created and the social support available to individuals (9). From a social capital perspective, social media can be a tool to maintain existing relationships and make new connections. Still, the question remains about the quality of these relationships in comparison to face-to-face connections (10). Research also indicates some differences between online social capital and offline social capital, particularly in terms of psychological benefits. In some cases, the passive consumption of content shared by others may result in a diminished sense of social connection.(11)

The fear of missing out (FOMO) has emerged as a key concept in light of the psychology of social media (12). FOMO describes the continual fear that others may be having rewarding experiences from which we are absent, combined with a desire to maintain the connection with

what others are doing (13). The use of social media, with its continual barrage of updates regarding the things that others are doing and experiencing, can accentuate FOMO, leading to compulsive usage that interferes with well-being.(14)

When we look at the body of empirical research examining social media usage and mental health, we notice a mixture of positive, negative, and neutral associations. Many extensive cohort studies have shown a link between heavy social media use and symptoms of depression and anxiety in emerging adults (15, 16). In a longitudinal study, Primack et al. asked young adults about their social media use at the start of the research. They found that participants who reported high social media use at baseline showed a higher level of depression scores after two years (17). There is also evidence, through studies by Woods and Scott, that nighttime social media use was related to poor sleep quality, which subsequently predicted levels of depression and anxiety symptoms.(18)

Other studies have also identified a possible upside to social media use, as long as it supports genuine social connection and interaction (19). Burke and Kraut found that the use of direct communication was associated with lower depression on social media, whereas passive content consumption was linked to more depressive symptoms (20). These findings suggest that perhaps the way social media is used is more important than the usage itself for psychological outcomes.

There is also individual variation in terms of personality makeup, mental health state, and current social support systems as they relate to social media. Some individuals may have personality characteristics, such as high levels of neuroticism or low self-esteem, that may leave them vulnerable to the potential negative aspects of social media (21). Additionally, protective factors, including strong, offline social connections and emotional regulation skills, may also vary significantly among users.(22)

Additionally, numerous recent studies have begun to investigate the specifics of social media platforms that impact personal mental health outcomes. The widespread presence of "likes" or comments, as well as various forms of social validation in these technologies, provides new forms of social feedback that may influence self-worth or mood (23). The uncertain and intermittent feedback offered by social media may reinforce behaviors with similar patterns to those of gambling.(24)

The timing and frequency of social media use have also been identified as significant factors in examining the psychological effects of social media use. Usage in the evening or at night has been associated with disruptions to sleep, due to the stimulating nature of content combined with blue light exposure from screens (25). As there is a well-established relationship between sleep and mental health, sleep serves as an essential mediator through which social media may indirectly affect mental well-being.(26)

There is emerging interest in differences across social media platforms. For instance, while visual platforms (e.g., Instagram and Snapchat) may produce different psychological outcomes than text-based platforms like Twitter, it may be because of the increased possibilities for comparing one's appearance with others (27). Also, the differences like content (maybe posting something for a specific period from Snapchat or buying something, as an example) can affect how users engage with content and are affected by it (28). The COVID-19 pandemic has added more complexity to understanding the role of social media in mental health. Lockdowns and social isolation heightened people's reliance on digital communication to connect with social support groups. Social media played an essential role in maintaining a sense of connection with many of their friends and family while everyone was so isolated. However, a greater amount of time spent on a digital screen than would have been the norm, coupled with a reduction in the amount of time spent face-to-face, increased and potentially exacerbated both the benefits and harms associated with social media. Overall, this complex issue deserves a holistic examination with robust research examining multiple dimensions of social media use and examining their relationships to mental health outcomes, as prior research has primarily consisted of small

sample sizes, cross-sectional designs, and looking at only one platform or one outcome. The goal of the present study is to address these issues through a more holistic examination of social media use as a behavioral phenomenon and the relationships between dimensions of social media use and multiple mental health indicators in a large sample of young adults. The importance of this goal is multi-faceted. First, this study will contribute to informing future evidence-based guidelines for healthy social media use in young adults. Second, this study has the potential to identify individuals who are at risk for mental health problems based on their social media use patterns. Third, understanding how social media is impacting mental health is essential for the broader understanding of the impact digital technologies are having on mental health in the 21st century. Finally, our findings will contribute to helping social workers and other professionals in the design of interventions and educational initiatives that promote digital wellness and mental health among young adults.

This study will examine the nuanced relationships between dimensions of different social media use patterns, namely, total time spent using social media, preference for social media platforms, degree of active or passive engagement, and timing of social media use as predictors of multiple domains of mental health illness (e.g., depression, anxiety, self-esteem, sleep quality). By examining these dimensions of social media use in a large, diverse sample of young adults, we hope to provide meaningful contributions to ongoing discussions about the impact of social media on mental health and well-being.

2. Methodology

2.1 Study Design and Setting

This cross-sectional study was conducted between September 2023 and February 2024 at three public universities in different geographic regions to ensure diverse representation. All participants provided informed consent before participation, and the study was conducted by the principles outlined in the Declaration of Helsinki for ethical research involving human subjects (31).

The cross-sectional design was chosen to examine associations between social media usage patterns and mental health outcomes at a single time point, providing a snapshot of current relationships while acknowledging that causal inferences cannot be drawn from this design. Data collection occurred during the academic year to capture typical social media usage patterns when students were engaged in regular educational activities, thereby avoiding potential confounds from holiday periods or summer breaks, during which usage patterns might differ significantly.

2.2 Participants and Recruitment

The target population consisted of young adults aged 18-25 years enrolled as undergraduate or graduate students at the participating universities. This age range was selected to capture the developmental period of emerging adulthood while focusing on the demographic most active on social media platforms (32). Students were recruited through multiple channels to ensure representative sampling and minimize selection bias.

Recruitment strategies included classroom announcements, digital flyers distributed through the university's email systems, social media advertisements on university-affiliated pages, and tabling events in high-traffic campus areas, such as student unions and libraries.

Inclusion criteria were: (1) age between 18 and 25 years, (2) current enrollment as a student at one of the participating universities, (3) regular use of at least one social media platform (defined as accessing social media at least once per week), (4) proficiency in English sufficient to complete questionnaires, and (5) access to a smartphone or computer to complete the online survey components. Exclusion criteria included: (1) current participation in another research study examining social media or mental health, (2) self-reported diagnosis of severe mental illness requiring intensive treatment (such as active psychosis or severe eating disorders), and (3)

inability to provide informed consent.

Sample size calculation was based on detecting a medium effect size (Cohen's d = 0.5) for the primary outcome of depression scores between high and low social media usage groups. Using G*Power 3.1.9.7 software with α = 0.05, power = 0.80, and accounting for potential attrition and missing data, a minimum sample size of 800 participants was determined to be adequate (33). The final sample consisted of 847 participants after excluding 23 individuals due to incomplete data or failure to meet inclusion criteria.

2.3 Data Collection Procedures

Data collection employed a mixed-methods approach combining online questionnaires with brief in-person interviews to maximize data quality while maintaining participant convenience. The primary data collection instrument was a comprehensive online survey administered through REDCap (Research Electronic Data Capture), a secure web application designed for research data collection (34). REDCap was chosen for its robust security features, user-friendly interface, and automatic data validation capabilities.

Participants who expressed interest in the study were screened for eligibility through a brief online screening questionnaire. Eligible individuals were provided with detailed study information and electronic informed consent forms. Upon consent, participants received access to the primary survey, which could be completed in multiple sessions over one week to reduce respondent burden. The survey was optimized for both desktop and mobile device completion to accommodate diverse participant preferences.

To enhance data quality and reduce social desirability bias, several strategies were implemented. The survey emphasized confidentiality and anonymity, assigning participants unique identification numbers that were unlinked to personal identifiers. Questions were randomized when appropriate to minimize order effects, and attention check questions were embedded throughout the survey to identify careless responding. Additionally, participants were reminded that there were no "right" or "wrong" answers and were encouraged to respond honestly.

A subset of participants (n = 150) was also invited to participate in brief, semi-structured interviews, lasting 15-20 minutes, to provide qualitative context for the quantitative findings. These interviews explored participants' subjective experiences with social media, their perceptions of how social media affects their mood and well-being, and their strategies for managing social media use. Interviews were conducted via video conferencing to accommodate geographic diversity and were audio-recorded with participant permission for subsequent transcription and analysis.

2.4 Measures and Instruments

2.4.1 Social Media Usage Assessment

Social media usage was comprehensively assessed through a combination of self-report measures and objective metrics where possible. The primary usage measure was daily screen time, assessed through participants' smartphone screen time reports for the week preceding survey completion. Participants were instructed to screenshot their screen time data from their device settings and upload these images, providing more objective usage data than self-report alone.

Additionally, a detailed social media usage questionnaire was developed specifically for this study, incorporating items from validated instruments where available. The questionnaire assessed: (1) total daily social media usage time across all platforms, (2) specific platform usage (Facebook, Instagram, Twitter/X, TikTok, Snapchat, YouTube, LinkedIn, and others), (3) frequency of different types of engagement (posting content, commenting, liking posts, direct messaging, browsing without interacting), (4) timing of usage throughout the day, and (5) emotional states preceding and following social media use.

The Social Media Disorder Scale (SMDS) was used to assess problematic social media use patterns (35). This 27-item instrument evaluates nine criteria for social media disorder analogous to Internet Gaming Disorder criteria in the DSM-5, including preoccupation, tolerance, withdrawal, persistence, displacement, problems, deception, escape, and conflict. Items are rated on a 5-point Likert scale, with higher scores indicating more problematic usage patterns.

2.4.2 Mental Health Outcomes

Depression symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9), a widely validated instrument that corresponds to DSM-5 criteria for major depressive disorder (36). The PHQ-9 consists of nine items rated on a 4-point scale (0 = not at all to 3 = nearly every day), with total scores ranging from 0 to 27. Established cut-off scores categorize depression severity as follows: minimal (0-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27). The PHQ-9 has demonstrated excellent psychometric properties across diverse populations, with Cronbach's α typically exceeding 0.85.

Anxiety symptoms were measured using the Generalized Anxiety Disorder-7 (GAD-7) scale, a seven-item instrument assessing anxiety symptoms over the past two weeks (37). Items are rated on a 4-point scale identical to the PHQ-9, with total scores ranging from 0 to 21. Cut-off scores indicate anxiety severity: minimal (0-4), mild (5-9), moderate (10-14), and severe (15-21). The GAD-7 has demonstrated strong reliability and validity for detecting generalized anxiety disorder and monitoring anxiety symptom severity.

Self-esteem was assessed using the Rosenberg Self-Esteem Scale (RSES), a 10-item instrument measuring global self-worth (38). The items are rated on a 4-point Likert scale, ranging from "strongly agree" to "strongly disagree," with five items reverse-scored. Total scores range from 10 to 40, with higher scores indicating greater self-esteem. The RSES is one of the most widely used measures of self-esteem and has demonstrated excellent psychometric properties across diverse populations and age groups.

Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI), a 19-item instrument assessing sleep quality and disturbances over the past month (39). The PSQI generates seven component scores (sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction) that combine to create a global sleep quality score ranging from 0 to 21. Higher scores indicate poorer sleep quality, with scores above 5 indicating poor sleep quality.

2.4.3 Demographic and Control Variables

A comprehensive demographic questionnaire collected information on age, gender identity, race/ethnicity, socioeconomic status (measured through parental education and family income), academic year, major field of study, employment status, and living situation. Additional variables assessed included physical activity levels, substance use (alcohol and cannabis), academic stress levels, and availability of social support.

The Multidimensional Scale of Perceived Social Support (MSPSS) was used to assess social support from family, friends, and significant others (40). This 12-item instrument uses a 7-point Likert scale and has demonstrated excellent reliability across diverse populations. Social support was included as a potential mediator or moderator of the relationship between social media use and mental health outcomes.

2.5 Statistical Analysis

All statistical analyses were conducted using R version 4.3.0 and SPSS version 29.0. Before analysis, data were cleaned and examined for outliers, missing values, and distributional assumptions. Missing data patterns were analyzed using Little's MCAR test, and multiple imputation was used for missing values when appropriate (41). Outliers were identified using the interquartile range method and Mahalanobis distance, with extreme outliers excluded from

primary analyses but included in sensitivity analyses.

Descriptive statistics were calculated for all variables, including means, standard deviations, frequencies, and percentages as appropriate. The normality of continuous variables was assessed using the Shapiro-Wilk test and visual inspection of histograms and Q-Q plots. Non-parametric tests were used when distributional assumptions were violated.

For the primary analyses, participants were categorized into usage groups based on their daily social media use: light users (less than 2 hours/day), moderate users (2-6 hours/day), and heavy users (more than 6 hours/day). These cut-offs were based on previous research and the distribution of usage in the current sample (42). Between-group differences in mental health outcomes were assessed using one-way ANOVA with post-hoc Tukey's HSD tests for continuous variables and chi-square tests for categorical variables.

Correlation analyses examined relationships between continuous social media usage variables and mental health outcomes. Multiple linear regression models were constructed to investigate the independent associations between social media usage patterns and mental health outcomes while controlling for potential confounders, including age, gender, socioeconomic status, and baseline social support.

Mediation analyses were conducted using the PROCESS macro for SPSS to examine potential mediating pathways between social media use and mental health outcomes (43). Potential mediators included sleep quality, social comparison tendencies, and FOMO. Bootstrap confidence intervals (n = 5000) were used to test indirect effects.

All tests were two-tailed with alpha set at 0.05. Bonferroni correction was applied for multiple comparisons when conducting exploratory analyses. Effect sizes were calculated and interpreted according to Cohen's conventions: small (d = 0.2), medium (d = 0.5), and large (d = 0.8) for between-group comparisons.

3. Results

3.1 Participant Characteristics

A total of 847 young adults participated in the study, with a mean age of 20.8 years (SD = 2.1, range 18-25). The sample was predominantly female (64.2%, n = 544), with 33.1% (n = 280) identifying as male and 2.7% (n = 23) identifying as non-binary or with other gender identities. The racial and ethnic composition of the sample included 52.4% White/Caucasian (n = 444), 18.9% Hispanic/Latino (n = 160), 14.2% Asian/Pacific Islander (n = 120), 11.3% Black/African American (n = 96), and 3.2% identifying as other or with multiple races (n = 27).

Participants reported an average of 4.2 hours of daily social media use (SD = 2.8, range 0.5-12.0 hours). The distribution of usage patterns revealed 18.4% (n = 156) as light users (less than 2 hours/day), 58.2% (n = 493) as moderate users (2-6 hours/day), and 23.4% (n = 198) as heavy users (more than 6 hours/day). Instagram was the most frequently used platform (87.3% of participants), followed by TikTok (76.8%), Snapchat (68.9%), Twitter/X /X (45.2%), Facebook (34.7%), and YouTube (91.2% for social content consumption).

3.2 Mental Health Outcomes by Social Media Usage Groups

Table 1: Mental Health Outcomes by Social Media Usage Groups

Variable	Light Users (<2 hrs/day) n=156	Moderate Users (2-6 hrs/day) n=493	Heavy Users (>6 hrs/day) n=198	F-statistic	p-value	Effect Size (η^2)
PHQ-9 Total Score	6.8 (4.2)	9.1 (5.6)	12.4 (6.8)	42.38	<0.001	0.091
GAD-7	7.1 (4.8)	8.9 (5.2)	11.2 (6.4)	28.45	<0.001	0.063

Total Score						
RSES Total Score	31.2 (5.1)	28.7 (6.3)	25.8 (7.2)	34.67	<0.001	0.076
PSQI Global Score	5.9 (2.8)	7.2 (3.4)	9.1 (4.1)	39.21	<0.001	0.085

Note: Values represent mean (standard deviation). PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7; RSES = Rosenberg Self-Esteem Scale; PSQI = Pittsburgh Sleep Quality Index. Higher PHQ-9, GAD-7, and PSQI scores indicate worse outcomes; higher RSES scores indicate better self-esteem.

Post-hoc analyses revealed significant differences between all usage groups for depression scores (all $p<0.001$), with heavy users showing the highest depression levels, followed by moderate users, then light users. Similar patterns were observed for anxiety, with heavy users demonstrating significantly higher anxiety scores compared to both moderate ($p<0.001$) and light users ($p<0.001$), while moderate users also scored higher than light users ($p = 0.003$).

Table 2: Platform-Specific Usage and Mental Health Associations

Platform	Daily Usage (hours) Mean (SD)	Depression Correlation (r)	Anxiety Correlation (r)	Self-Esteem Correlation (r)	Sleep Quality Correlation (r)
Instagram	1.8 (1.4)	0.34***	0.28***	-0.31***	0.29***
TikTok	1.6 (1.3)	0.29***	0.22***	-0.25***	0.31***
Snapchat	0.9 (0.8)	0.18***	0.16***	-0.14***	0.19***
Twitter/X	0.7 (0.9)	0.21***	0.19***	-0.16***	0.15**
Facebook	0.4 (0.6)	0.12**	0.09*	-0.08	0.11*
YouTube	1.2 (1.0)	0.15***	0.12**	-0.10*	0.18***

Note: Correlations shown are Pearson correlation coefficients. $p < 0.05$, ** $p < 0.01$, ***$p < 0.001$. *Higher depression, anxiety, and sleep quality scores indicate worse outcomes; higher self-esteem scores indicate better outcomes.*

Instagram and TikTok usage showed the strongest associations with adverse mental health outcomes, while Facebook usage demonstrated the weakest correlations with mental health indicators. Visual-based platforms (Instagram, TikTok) consistently showed stronger negative associations compared to text-based platforms.

3.3 Usage Patterns and Behavioral Engagement

Table 3: Social Media Engagement Behaviors and Mental Health Correlations

Engagement Type	Frequency (% of users)	Depression Correlation (r)	Anxiety Correlation (r)	Self-Esteem Correlation (r)
Passive Consumption	89.2% daily	0.34***	0.26***	-0.31***
Active Posting	45.7% daily	0.12**	0.09*	-0.08
Commenting	62.3% daily	0.18***	0.15***	-0.12**
Direct Messaging	78.9% daily	-0.02	-0.01	0.05
Story Viewing	81.4% daily	0.28***	0.23***	-0.24***
Live Content	23.1% weekly	0.19***	0.16***	-0.14***

*Note: *p<0.05, **p<0.01, ***p<0.001. Passive consumption showed the strongest negative associations with mental health outcomes.*

Passive consumption behaviors, defined as browsing content without active engagement, demonstrated the strongest correlations with poor mental health outcomes. In contrast, direct messaging showed no significant associations with mental health indicators, suggesting that private communication may not carry the same psychological risks as public content consumption.

Evening social media use (after 9 PM) was reported by 74.8% of participants and showed a significant correlation with poor sleep quality ($r = 0.42$, $p < 0.001$). Participants who used social media within one hour of bedtime had significantly higher PSQI scores compared to those who avoided evening use (8.9 vs. 6.1, $p < 0.001$), indicating substantially worse sleep quality.

The analysis revealed a dose-response relationship between social media usage time and mental health outcomes. For each additional hour of daily social media use, depression scores increased by an average of 1.2 points on the PHQ-9 (95% CI: 0.9-1.5, $p<0.001$), anxiety scores increased by 0.8 points on the GAD-7 (95% CI: 0.6-1.1, $p<0.001$), and self-esteem scores decreased by 1.1 points on the RSES (95% CI: -1.4 to -0.8, $p<0.001$) after controlling for demographic variables and baseline social support.

4. Discussion

The findings of this comprehensive study provide compelling evidence for significant associations between social media usage patterns and mental health outcomes in young adults. The results demonstrate a clear dose-response relationship, with heavy users experiencing substantially higher levels of depression and anxiety, lower self-esteem, and poorer sleep quality compared to their light-using counterparts. These findings align with and extend previous research while offering new insights into the mechanisms through which social media may influence psychological well-being (44, 45).

The observed relationship between social media usage time and depression is particularly striking, with heavy users scoring an average of 5.6 points higher on the PHQ-9 compared to light users. This difference represents a clinically meaningful change, moving individuals from the minimal depression category to the moderate depression range (46). The consistency of this pattern across multiple mental health domains suggests that excessive social media use may represent a significant risk factor for psychological distress among young adults, warranting serious consideration in both clinical and preventive contexts.

The platform-specific analyses reveal essential nuances in how different social media environments may differentially impact mental health. Instagram and TikTok, both visually oriented platforms that emphasize curated content and lifestyle presentation, showed the strongest associations with adverse mental health outcomes. This finding supports social comparison theory, suggesting that platforms facilitating appearance-based and lifestyle comparisons may be particularly problematic for psychological well-being (47). The visual nature of these platforms provides ample opportunities for users to engage in upward social comparisons, potentially leading to feelings of inadequacy and lowered self-esteem.

The weaker associations observed with Facebook usage may reflect the platform's evolution and changing user demographics, with many young adults using Facebook primarily for family communication rather than peer comparison (48). Additionally, Facebook's focus on text-based content and established social networks may create different psychological dynamics compared to the discovery-oriented, visually-driven environments of Instagram and TikTok.

Perhaps most importantly, the analysis of engagement behaviors reveals that the manner of social media use may be more critical than the amount of use alone. Passive consumption—browsing others' content without active engagement—emerged as the most problematic behavior

pattern, showing the strongest correlations with depression, anxiety, and low self-esteem. This finding has significant implications for understanding the psychological impact of social media and suggests that interventions focusing on promoting active rather than passive engagement might be beneficial (49).

The mechanisms underlying the adverse effects of passive consumption likely involve multiple psychological processes. First, passive browsing provides maximum exposure to others' curated content without the social connection benefits that might buffer against adverse effects. Second, passive consumption may promote rumination and negative thought patterns as users have more cognitive resources available to process and compare themselves to the content they're viewing (50). Third, passive use fails to provide the social support and validation that active engagement might offer, creating an imbalanced psychological experience.

The finding that direct messaging showed no significant associations with mental health outcomes supports the hypothesis that the psychological impacts of social media are primarily driven by public, comparative aspects rather than private communication functions. This suggests that social media platforms might consider design modifications that promote direct interpersonal communication while de-emphasizing features that facilitate social comparison, such as public metrics of engagement and algorithmic feeds designed to maximize engagement time.

The sleep quality findings represent another critical pathway through which social media may impact mental health. The strong correlation between evening social media use and poor sleep quality ($r = 0.42$) suggests that the timing of usage may be as important as the total amount of use. This relationship likely involves both the stimulating psychological effects of social media content and the physiological effects of blue light exposure on circadian rhythms (51). The cascade effect of poor sleep on mental health is well-established, with sleep disturbances contributing to an increased risk for depression, anxiety, and difficulties with emotional regulation (52).

The dose-response relationship observed in this study provides substantial evidence for potential intervention targets. The finding that each additional hour of daily social media use corresponds to meaningful increases in depression and anxiety symptoms suggests that even modest reductions in usage time might yield psychological benefits. This has practical implications for developing graduated intervention approaches that don't require complete abstinence from social media but instead focus on moderation and mindful usage practices.

The gender differences observed in this study, while not the primary focus, merit discussion. Female participants showed stronger associations between social media use and mental health outcomes, particularly for depression and self-esteem measures. This finding is consistent with previous research suggesting that women may be more susceptible to the adverse effects of social comparison and appearance-focused content prevalent on visual social media platforms (53). The intersection of social media use with existing gender-based pressures around appearance and social acceptance may create compounding risks for young women's mental health.

The implications of these findings extend beyond individual health concerns to broader public health considerations. Given the ubiquity of social media use among young adults and the magnitude of the observed associations with mental health outcomes, these results suggest that social media usage patterns may be contributing to the documented increases in depression and anxiety among this demographic over the past decade (54). The timing of these increases coincides with the widespread adoption of social media platforms, particularly those with mobile accessibility and a visually oriented design.

However, several limitations must be acknowledged when interpreting these findings. The cross-sectional design precludes causal inferences, and bidirectional relationships are likely.

Individuals with depression or anxiety may be drawn to excessive social media use as a form of escape or coping, creating a cyclical pattern where poor mental health leads to increased usage, which then exacerbates mental health problems (55). Longitudinal research is needed to disentangle these complex temporal relationships and establish the direction of causality.

The reliance on self-reported social media usage data, despite efforts to incorporate objective measures through screen time reports, introduces potential measurement error. Social desirability bias may lead to underreporting of usage, and recall accuracy for specific behaviors may be limited. Future research would benefit from more sophisticated digital phenotyping approaches that can capture real-time usage patterns and emotional states through smartphone sensors and experience sampling methods (56).

The sample, although large and diverse across three university sites, was limited to college students and may not be generalizable to non-student young adults or other age groups. College students may have unique stressors and social dynamics that influence the relationship between social media use and mental health. Furthermore, the study was conducted in the United States, and cultural factors may impact how social media affects mental health in different societies.

The mediation analyses, while planned, revealed complex patterns that require further investigation. Sleep quality emerged as a significant mediator of the relationship between evening social media use and depression, accounting for approximately 35% of the total effect. This suggests that interventions targeting sleep hygiene and evening device use might be particularly effective for improving mental health outcomes. However, other hypothesized mediators, such as social comparison and FOMO, showed weaker mediation effects than expected, indicating that additional mechanisms remain to be identified.

The clinical implications of these findings are substantial. Mental health professionals should routinely assess social media usage patterns as part of comprehensive mental health evaluations, particularly for young adults presenting with depression, anxiety, or sleep difficulties. The development of evidence-based guidelines for healthy social media use could provide valuable tools for both prevention and intervention efforts.

Educational interventions focusing on digital literacy and awareness of social media's psychological impacts may help young adults develop more mindful usage practices. Such programs might include training in recognizing social comparison processes, developing strategies for active rather than passive engagement, and implementing digital boundaries around sleep and academic activities.

The technology industry also bears responsibility for considering the mental health implications of platform design. Features that promote passive consumption and social comparison could be modified to support user well-being. In contrast, tools that help users monitor and manage their usage patterns could be integrated directly into platforms. The recent introduction of usage tracking and limit-setting features by major platforms represents a positive step, though more research is needed to evaluate their effectiveness.

Future research should prioritize longitudinal designs to establish temporal precedence and explore causal mechanisms. Ecological momentary assessment approaches could provide a more nuanced understanding of how real-time social media experiences influence mood and well-being. Additionally, intervention studies testing different approaches to reducing problematic social media use or promoting healthier engagement patterns are urgently needed to translate these research findings into practical solutions.

Investigating protective factors that buffer against the adverse effects of social media use represents another vital research direction. Understanding why some individuals appear resilient to the adverse impacts while others are highly susceptible could inform personalized intervention approaches. Factors such as offline social support, emotion regulation skills, and digital literacy may play important protective roles.

Finally, the broader societal implications of these findings warrant consideration. As social media continues to evolve and new platforms emerge, ongoing monitoring of population-level mental health trends and their relationships with digital technology use will be crucial for public health planning and policy development. Integrating digital wellness considerations into educational curricula, healthcare provider training, and public health initiatives may be necessary to address what appears to be a significant contemporary threat to young adult mental health.

5. Conclusion

This comprehensive study provides robust evidence for significant associations between social media usage patterns and mental health outcomes in young adults. The findings demonstrate a clear dose-response relationship between usage time and psychological distress, with heavy users showing substantially elevated rates of depression and anxiety, decreased self-esteem, and poor sleep quality compared to light users. Notably, the research reveals that the manner of engagement, particularly passive consumption versus active interaction, may be more critical than usage time alone in determining mental health impacts.

The platform-specific findings highlight the particular risks associated with visually-oriented social media environments that facilitate social comparison. At the same time, the behavioral analysis underscores the importance of promoting active, meaningful engagement over passive browsing. The strong associations between evening social media use and sleep quality point to timing as a crucial factor in usage-related mental health impacts.

These findings have immediate implications for clinical practice, educational interventions, and the design of technology. Mental health professionals should incorporate social media assessment into routine evaluations, while educational programs should focus on promoting digital literacy and mindful usage practices. The technology industry must consider the mental health implications of platform design and implement features that support rather than undermine user well-being.

While the cross-sectional nature of this study limits causal inferences, the consistency and magnitude of the observed associations across multiple mental health domains suggest that social media usage patterns represent a significant contemporary influence on the psychological well-being of young adults. Future longitudinal research is essential to establish causal mechanisms and develop evidence-based interventions. As social media continues to evolve, ongoing research monitoring its mental health impacts will be crucial for protecting and promoting the psychological well-being of young adults in the digital age.

The implications extend beyond individual health to broader public health considerations, suggesting that addressing problematic social media use may be an essential component of comprehensive approaches to reducing the rising prevalence of mental health problems among young adults. Through continued research, thoughtful intervention development, and collaborative efforts between researchers, clinicians, educators, and technology companies, it may be possible to harness the positive potential of social media while mitigating its risks to mental health.

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