ORIGINAL ARTICLE

Connected Yet Alone: Exploring the Association between Social Media Use, Loneliness, and Mental Health among Medical Students

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Abstract

Background: Social media is integral to students' lives, yet its excessive use may negatively associate with psychological well-being, leading to loneliness and poor mental health. This study explored these associations among medical students.

Objective: To determine the association between increased social media usage, loneliness, and psychological distress in medical students.

Methods:: A cross-sectional study was conducted among 208 students at Aziz Fatimah Medical & Dental College, Faisalabad, from May to October 2025. Participants were selected *via* non-probability convenience sampling. A pre-tested, self-structured questionnaire and the Depression, Anxiety, and Stress Scale-21 (DASS-21) were used. Data were analyzed using SPSS version 25, with chi-square and ANOVA tests applied; p-values <0.05 were considered significant.

Results: The average age of participants was 21.43 ± 1.63 years, and the majority were female (57.2%). A significant association was found between gender and the perception of social media's relationship with connectedness (p=0.030), with more females (58.0%) feeling "more connected" than males (38.2%). Excessive use (>4 hours/day) correlated significantly with higher loneliness (p=0.036). In the multivariable regression model, increasing MBBS years were associated with lower DASS-21 scores (β = -1.33, 95% CI: -2.65 – -0.01, p = 0.049). Use of Facebook (β=9.01, 95% CI: 2.77 – 15.25, p=0.005) and YouTube (β=6.19, 95% CI: 1.16 – 11.22, p=0.016) were associated with higher DASS-21 scores. There was no significant association between feelings of isolation and DASS-21 scores.

Conclusion: Platform selection had a greater impact on psychological distress among medical students, with Facebook and YouTube users posing higher risks. Duration of use was associated with loneliness but not with overall distress. It is advised to implement platform-specific measures that are meaningful.

Keywords: *Health, loneliness, medical, mental, social media, students.*

INTRODUCTION

The digital age has ushered in a new era of human interaction, fundamentally altering its nature, with social media at its center, especially among teenagers and young adults [1]. The modern world sees digital connectivity as a necessity rather than a luxury, thereby creating a worldwide community with the highest degree of interconnection ever [2]. On the one hand, these platforms open up a range of communication opportunities, information sharing, and networking that have never been seen before; on the other hand, staying "connected" has become a cause of loneliness and psychological distress reported among students in particular and a large number of people in general [3]. This situation of "being connected yet alone" is a public health challenge that needs to be explored deeply to discover how virtual socializing and mental health are interrelated.

Social media platforms have become the primary means of communication and have greatly changed the techniques students use [4]. It has been argued that, rather than face-to-face interactions being enhanced, their quality and quantity might be reduced as people spend more time in the digital sphere, leading to isolation [5]. This isolation is theorized to be one of the main causes of loneliness among students. For young adults, the temptation to have many online connections and followers can sometimes deter them from seeking deep, meaningful, and real-life relationships, leading to a sense of social shallowness.

Loneliness is an unpleasant emotional state that arises when an individual's social relationships do not meet their desired level of connection, and it may persist even in online contexts [6]. Social media, alongside this, has become one of the main causes of this emotional state, as the constant comparison with others on these platforms breeds loneliness and aesthetic negation. The viewing of nicely controlled snapshots of others' lives can awaken these feelings of unworthiness, envy and insecurity, which detach the person even more from the world of true connection and is getting more and more associated with mental disorders such as depression and anxiety [7]. This problem is particularly relevant for medical students, who are typically young and operate in a highly demanding, competitive environment [8]. Intensive medical training may use the Internet and

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social media as distractions and refuges for those who feel overwhelmed or need social support.

Nevertheless, voyaging into the virtual realm might unintentionally create an unhealthy pattern that harms students' general well-being, sleep, and interpersonal relationships [9]. Heavily engaged users are often also inactive, have sleep issues, and experience increased envy and loneliness; thus, all these factors may hinder both academic and personal growth [10]. The discussion is still ongoing about the "displacement hypothesis" and the "stimulation hypothesis" and their respective views regarding social media and loneliness. In contrast, the former claims that online interactions replace and thus increase loneliness offline, the latter asserts that social media can facilitate more connections [3].

Even though global awareness of this matter is high, context-specific studies on the stressful atmosphere of medical education in Pakistan remain very important, as its young, rapidly digitizing population navigates a unique tension between increasing social media use and family-based cultural traditions that require face-to-face interactions. Medical students face increased pressure to compete with peers in a system that demands high academic performance. This specific combination of cultural, technological, and academic stressors demonstrates that social media use affects mental health differently in this region. Thus, the present research was conducted to unravel these complicated connections among medical students at Aziz Fatimah Medical & Dental College, Faisalabad. The main goal was to examine the relationship between social media use and loneliness among medical students. In addition, the research aimed to determine how different social media usage patterns correlate with mental health, as indicated by DASS-21 scores, and to examine the links among social media usage, the intensity and platform-specific use of social media, and levels of psychological distress. Moreover, the research was bound to the student perspective and thus sought to examine students' perceptions of whether reducing their social media usage, even consciously, could improve their mental health; thereby, the research could offer insights for targeted institutional interventions.

METHODOLOGY

A cross-sectional study design was used for this research, conducted from May to October 2025 at Aziz Fatimah Medical & Dental College in Faisalabad, Pakistan. The college's Ethical Review Board approved the study under reference IEC/362-25. Consent was secured before the questionnaires were distributed. The target population consisted of all five-year MBBS undergraduate students.

The sample size was determined to be 208 individuals using the OpenEpi tool, based on the formula for a finite population: $n = [NZ^2P(1-P)]/ [d^2(N-1) + Z^2P(1-P)]$, where the total population (N) was 710 students, with a confidence level of 95% (Z=1.96), an assumed prevalence (P) of 50% for increased social media use, and a 5% margin of error (d) [11]. All undergraduate students who were currently enrolled in the MBBS program were eligible to take part in the study. The study excluded students who were either on leave of absence or who did not provide informed consent. A non-probability convenience sampling method was used to select participants.

A composite questionnaire having three sections was employed for data collection. Before the actual study, the questionnaire was pre-tested on 35 students to check if it was clear and valid. The pre-tested observations were not included in the main study. The first section gathered socio-demographic information. In the second section, a pre-tested, self-structured questionnaire was used to collect data on social media usage patterns and perceptions. Three experts reviewed the self-structured questionnaire to ensure its validity. They evaluated each question's relevance, understanding, and whether it accurately measured respondents' perceptions of social media use, loneliness, and connectivity. To increase the tool's accuracy, confusing questions were modified, and those that weren't needed were eliminated based on their recommendations. The third part included the DASS-21, a standardized scale for measuring depression, anxiety, and stress, which has been licensed from the Psychology Foundation of Australia for the mental health status assessment [12]. The participants' ratings for each of the 21 items were done on a 4-point Likert scale, where 0 was for "Did not apply to me at all", 1 was "Applied to me to some degree, or some of the time", 2 was "Applied to me to a considerable degree or a good part of time" and 3 was for "Applied to me very much or most of the time." The total DASS-21 score was derived by summing all items, while the scores for the depression, anxiety, and stress subscales were obtained by counting the relevant items. The study questionnaire is attached as a Supplementary File.

Data from the SPSS version 25 analysis were used. Frequencies/percentages were used for categorical data, and for continuous data, the mean ± standard deviation was reported as descriptive statistics. The normality assumption for continuous variables was verified using the Shapiro-Wilk test along with visual inspection of histograms and Q-Q plots; the data were suitable for parametric tests [13]. Inferential analyses included Chi-square tests to verify the relationships between categorical variables. DASS-21 scores were compared across different social media platforms using a one-way Analysis of Variance (ANOVA) and Dunnett's test, followed by the ANOVA. The continuous variables were checked for bivariate correlations with Pearson's correlation coefficient. Then, a multiple linear regression was performed with the total DASS-21 score as the dependent variable to identify independent predictors of psychological distress. Gender, MBBS year, daily social

media hours (as a continuous variable), a binary variable for feeling isolated (derived from the perceived impact question), and primary social media platform (entered as dummy variables with Instagram as the reference category) were the predictors. A p-value of <0.05 was considered statistically significant.

RESULTS

The study included 208 undergraduate medical students. The mean age of the sample was 21.43 ± 1.63 years, with a predominance of females (57.2%) over males, and was equally represented across all five years of the MBBS program. The most used social media platform was Instagram (71.2%), and a huge majority of students (68.8%) reported spending over 3 hours daily on social media. When asked about the perceived impact, almost half of the participants (49.5%) stated they felt "more connected" due to social media, while 27.4% admitted they felt "more isolated." Also, 39.9% reported feeling lonely "very often" after the extensive scrolling (**Table 1**).

A chi-square test indicated a substantial association between gender and students' perceptions of social media's influence on real-life connectedness (p=0.030). The female participants were more likely to report feeling "more connected" (58.0%) than the male participants (38.2%). On the other hand, a higher share of male participants reported feeling "more isolated" (34.8%) than female participants (21.8%). Moreover, a significant association was observed between the time spent on social media per day and reported loneliness (p=0.036), suggesting that users with the highest daily limits were most likely to experience moderate or even severe loneliness (**Table 2**).

Table 1: Socio-demographic characteristics and social media usage patterns (n=208).

Characteristic	Category	Frequency	Percentage
Gender	Male	89	42.8
	Female	119	57.2
MBBS Year	1st Year	35	16.8
	2nd Year	46	22.1
	3rd Year	49	23.6
	4th Year	42	20.2
	Final Year	36	17.3
Primary Social Media Platform	Instagram	148	71.2
	Facebook	19	9.1
	YouTube	29	13.9
	Twitter	12	5.8
Daily Social Media Use	>5 hours	72	34.6
	3–4 hours	69	33.2
	1–3 hours	53	25.5
	30 min–1 hour	14	6.7
Perceived Impact on Connectedness	More connected	103	49.5
	More isolated	57	27.4
	Neither	29	13.9
	Not sure	19	9.1
Loneliness after Prolonged Use	Yes, a lot	55	26.4
	Yes, a little	83	39.9
	Not at all	55	26.4
	Not sure	15	7.3

Table 2: Association of social media use and loneliness by gender (n=208).

Variables	Male n (%)	Female n (%)	p-value
Time spent on SM (per day)			
30 min–1 hour	10 (11.2)	4 (3.4)	0.158
1–3 hours	22 (24.7)	31 (26.1)	
3–4 hours	29 (32.6)	40 (33.6)	
>5 hours	28 (31.5)	44 (37.0)	
Perception of SM impact			
More connected	34 (38.2)	69 (58.0)	0.030
More isolated	31 (34.8)	26 (21.8)	
Neither	16 (18.0)	13 (10.9)	
Not sure	8 (9.0)	11 (9.2)	

The average total DASS-21 score was 24.63 ± 12.82. A one-way ANOVA showed that psychological distress across the major social media platforms differed significantly (p=0.008). Facebook has the highest average distress level (31.11 ± 9.70), followed by YouTube (28.48 ± 10.29). On the contrary, Instagram (23.45 ± 13.17) and Twitter (19.58 ± 13.95) users were the least distressed. The post-hoc analysis using Dunnett's test showed that Facebook users had significantly higher distress scores (mean difference: 11.89, 95% CI: 1.20 to 22.58, p = 0.026) than Twitter users, who served as the control group with the lowest distress scores. YouTube users also displayed significantly higher distress scores than Twitter users (mean difference: 9.97, 95% CI: 0.02 to 19.92, p = 0.049). The analysis showed no significant difference between Instagram and Twitter users (mean difference: 4.33, 95% CI: -4.37 to 13.03, p=0.448), as shown in Table **3**.

Table 3: DASS-21 total scores by primary social media platform (One-Way ANOVA with Dunnett Post-Hoc test) (n=208).

Social Media App	n	Mean ± SD	Mean Difference *vs.* Twitter (Control)	95% Confidence interval	*p-value
Twitter (Control)	12	19.58 ± 13.95	-	-	-
Instagram	148	23.91 ± 13.18	4.33	(-4.37 to 13.03)	0.448
YouTube	29	29.55 ± 10.71	9.97	(0.02 to 19.92)	0.049
Facebook	19	31.47 ± 9.67	11.89	(1.20 to 22.58)	0.026

*P-value is computed for Dunnett Post-Hoc Test

To investigate the associations between the primary variables of the study, a correlation matrix was created (**Table 4**). The high correlation was seen between DASS anxiety and total DASS score (r=0.86, p <0.01) and DASS anxiety and depression (r=0.74 to 0.82, p<0.01), thus confirming the excellent reliability. A very weak but significant negative correlation between age and anxiety was found (r =-0.15, p<0.05). In this analysis, however, the daily time spent on social media did not show any significant correlation with the total DASS-21 score or with any of its subscales.

Table 4: Correlation matrix of key study variables (n=208).

Variables	Age	Daily Social Media Hours	Total DASS-21 Score	DASS Depression	DASS Anxiety	DASS Stress
Age	-	-0.01	-0.11	-0.05	-0.15*	-0.07
Daily Social Media Hours	-0.01	-	-0.04	-0.01	-0.06	-0.01
Total DASS-21 Score	-0.11	-0.04	-	0.89**	0.86**	0.90**
DASS Depression	-0.05	-0.01	0.89**	-	0.74**	0.82**
DASS Anxiety	-0.15*	-0.06	0.86**	0.74**	-	0.82**
DASS Stress	-0.07	-0.01	0.90**	0.82**	0.75**	-

Values are Pearson correlation coefficients (r), * p <0.05, ** p <0.01

Table 5: Univariate and multivariable linear regression for associated factors of Total DASS-21 score (n=208).

Variables	Crude β (95% CI)	p-value	Adjusted β (95% CI)	p-value
Gender				
Male	Reference	-	Reference	-
Female	1.48 (-2.09 to 5.05)	0.414	2.73 (-0.98 to 6.44)	0.148
MBBS Year	-1.15 (-2.46 to 0.17)	0.086	-1.33 (-2.65 to -0.01)	0.049*
Daily Social Media Hours	0.01 (-0.03 to 0.05)	0.626	0.02 (-0.02 to 0.06)	0.386
Feels Isolated (Yes *vs.* No)	-2.80 (-6.75 to 1.14)	0.163	-3.34 (-7.24 to 0.56)	0.093
Primary Platform				
Instagram	Reference	-	Reference	-
Facebook	6.97 (0.91 to 13.03)	0.024*	9.01 (2.77 to 15.25)	0.005**
YouTube	5.13 (0.07 to 10.18)	0.047*	6.19 (1.16 to 11.22)	0.016*
Twitter	-5.90 (-13.44 to 1.65)	0.125	-3.11 (-10.74 to 4.52)	0.423

*Note: $R^2 = 0.096$, $F(7, 200) = 3.04$, $p = 0.005$
Reference group for Platform: Instagram*
**p < 0.05, *p < 0.01

The psychological distress was significantly predicted by the multiple regression model ($F(7,200)=3.04$, $p=0.005$, $R^2=9.6\%$). The primary social media platform was the strongest predictor after controlling for other factors. Facebook users scored 9.01 points higher, and YouTube users scored 6.19 points higher on the DASS-21. Twitter users, however, showed a non-significant trend toward lower distress scores than Twitter users, but this should be taken with a grain of salt due to the small sample size (n=12). Furthermore, each incremental MBBS year was linked to a notable reduction in distress scores (β=-1.33, 955 CI: (-2.65 to -0.01, p=0.049). The variables of gender, daily social media hours, and feeling isolated were not independent predictors in the final model, as shown in Table **5**.

DISCUSSION

The research provides deep insights into the nexus among social media, loneliness, and psychological distress among medical students in Pakistan. Our research reveals an intricate digital environment in which gender-specific opinions about social media's impact differ significantly, and platform selection is more important than time spent. One of the most important findings of this research is the identification of risks associated with social media platforms. Even after adjusting for demographic characteristics and time of use, using Facebook or YouTube as one's main social media platform was a stronger independent predictor of greater psychological distress than using Instagram. These findings suggest that social media platforms should not be conceptualized as a single homogeneous exposure [14]. A previous study also demonstrated that consuming curated information on social media can trigger comparison processes, which may further lead to stress [15]. The significant relationship with YouTube was more surprising. Although the platform serves as a passive entertainment service, as users watch content according to its algorithm, it also creates extended periods of solitary viewing because it shows distressing content, which leads to negative mental health outcomes [16].

On the other hand, Instagram caters to student users with its visually appealing, peer-influenced content, which is likely to foster a sense of belonging and social support, helping them resist distress, making the platform relatively less harmful than others. Platform differences exist because their users interact with content in different ways. Facebook users share news and personal updates in extended written form, creating more opportunities for social comparison and information overload. At the same time, YouTube's algorithm-driven video recommendations can lead to prolonged passive consumption of distressing content. Instagram provides a visual platform that enables users to connect with friends through social interactions, helping them feel more connected to others while reducing their psychological distress.

The 9-point difference in DASS-21 scores between Facebook and Instagram users is of a magnitude that may be clinically relevant. It could lead students from mild to moderate distress. The assessment of risk based on the platform might serve as a basis for placing students who primarily use Facebook or YouTube in the group receiving priority mental health support. Our

discovery that the time spent on social media daily, in hours, was not a significant independent predictor in the regression model, yet had a bivariate association with loneliness, is very important. It implies that the quality of engagement dominates its quantity. This upholds the "how matters more than how much" paradigm, in which passive consumption (*e.g.*, scrolling) is found to be more strongly associated with negative outcomes than active, communicative use [17]. The absence of a significant correlation between DASS-21 scores and daily screen time suggests that psychological distress may not be solely related to the duration of social media use. Still, it may also be related to qualitative aspects of online engagement [18]. The impact of social media on perceptions of gender—with females more connected and males more isolated—presents an interesting twist to our understanding. This may indicate differences in usage: females are more likely to use social media to maintain and develop existing social bonds, thereby receiving that support, whereas feelings of isolation push males away from socializing [19]. The cultural environment of Pakistan shapes how students of both genders use social media platforms, as social norms in Pakistani society establish distinct gender-specific behavior patterns. Social media offers female students a vital platform that enables them to sustain their social relationships, as cultural norms restrict their ability to engage in face-to-face interactions. Male students use social media mainly for two purposes: entertainment and information-seeking, rather than developing emotional bonds with others, which results in increased feelings of isolation. Pakistani medical students need culturally specific digital well-being solutions that address their distinct gender-related needs.

The inverse relationship between academic year and psychological distress is reassuring. The evidence shows that medical students develop superior coping skills as they advance through their training [20]. But then again, the overall high mean DASS-21 score through all years emphasizes the ubiquity of psychological distress in this group, thus proving the necessity of mental health support throughout medical training [21]. One of the most interesting findings is that most students believed that reducing social media use would positively affect their mental health. This view aligns with findings from some intervention studies [22]. This understanding could be a good reason for the institution to take a proactive approach at the student level. Digital literacy could be incorporated into medical schools. Instead of closing students out of the digital world, medical institutions should focus on teaching them how to use digital media wisely and on the impact of different platforms and engagement styles on one's mental health [23]. Drawing "digital detox" periods and giving support through rich offline social and recreational activities could be some of the tactics to be employed to minimize the problems caused by excessive use [24].

This study had some limitations that should be taken into account when interpreting the results. First, the cross-sectional design does not allow for causal inferences. Second, the use of self-reported measures is prone to recall and social desirability biases. Third, the sample was taken from one private medical college using non-probability convenience sampling. It might result in selection bias, since readily accessible participants may have different social media usage patterns, mental health conditions, or other traits than the general medical student population. This may limit the extent to which the findings can be applied to public institutions, other geographical contexts, or the broader population of medical students in Pakistan. To improve generalizability, future studies should use random sampling across multiple institutions, including both public and private medical colleges from diverse areas. Fourth is the uneven sample sizes across platforms, with Instagram (n=148) outnumbering Facebook (n=19) and Twitter (n=12). The statistical power to detect meaningful pairwise differences between platforms was diminished by this imbalance, especially in comparisons involving smaller groups. The results for Facebook and Twitter should be interpreted cautiously, even if the overall ANOVA was significant. To enable more reliable comparisons and enhance the validity of platform-specific findings, future research should strive for bigger and more evenly distributed samples across all platforms.

CONCLUSION

The risk of psychological distress associated with social media differs among medical students. Still, it is mainly influenced by their platform choice, with Facebook and YouTube representing a higher independent risk than Instagram. Moreover, the effect is contingent on gender and academic rank. These results support the argument that mental health promotion strategies should be more advanced and not rely solely on simple screen-time recommendations. For example, digital literacy programs that emphasize managing social comparison and filtering news feeds to lessen information overload might be beneficial for students who use Facebook extensively. Interventions for YouTube users might focus on reducing extended, lonely watching and raising awareness of algorithm-driven content. In addition to encouraging offline leisure activities and recurring "digital detox" challenges, medical institutions should consider including platform-specific digital wellness modules in their curricula to help students develop healthier, more deliberate social media use.

ETHICS APPROVAL

The college's Ethical Review Board granted approval for the study under reference IEC/362-25. All procedures performed in studies involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and the Helsinki Declaration.

CONSENT FOR PUBLICATION

Informed consent was obtained from the participants of this study.

AVAILABILITY OF DATA

Data is available within the article. For any other information, contact the corresponding author.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORS' CONTRIBUTION

Mohi Ud Din: Study concept and design, data analysis, and critical review of the document.
Mahnoor Hussain: Study design, data interpretation, drafting the work.
Humayun Suqrat Hasan Imam: Data interpretation, critical review of the document.
Uzma Mubeen: Study design and drafting the work.
Haram Faheem: Data acquisition of the study, drafting the work.
Vaneeza Rashid: Data acquisition of the study, drafting the work.

All authors read and approved the manuscript.

GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the authors used ChatGPT (GPT-4, OpenAI) sparingly to generate language suggestions and perform minor proofreading in some parts of the manuscript. After using this tool/ service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

SUPPLEMENTARY MATERIAL

Supplementary material is available on the journal's website.

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