

The Relationship Between Social Media Use and Stress Levels Among Medical Students at Udayana University

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📄 <https://doi.org/10.66641/pcsp.v1i2.22>

Article Info

Submitted:

01/10/2026

Revised:

05/24/2026

Accepted:

05/25/2026

Available Online:

06/26/2026

Abstract. Background: Social media use among medical students is highly prevalent and has the potential to affect mental health, particularly stress. Medical students face substantial academic demands, and excessive exposure to social media may negatively impact psychological well-being. According to a previous regional study in 2022, among medical students in Indonesia, most experience moderate stress (49.1%), while some experience severe stress (21.8%) (3). Furthermore, previous research from Mental Health Research Canada found that among adolescents and young adults aged 16–24 years with screen time ≥ 7 hours per day, 52% experienced severe psychological distress. **Objective:** This study aimed to examine the association between social media use and levels of stress, describe patterns of social media use, and stress levels of medical students in Udayana University, and identify other factors associated with stress among undergraduate medical students at the Faculty of Medicine, Udayana University. **Methods:** This study employed an observational analytic design with a cross-sectional approach. The accessible population consisted of undergraduate medical students at the Faculty of Medicine, Udayana University. 216 participants were selected using systematic random sampling. The independent variable in this research is social media use; measured by the duration of social media use per day, number of platforms used, and most frequently used platform of each individual. The dependent variable is the respondents' stress levels (measured with Perceived Stress Scale-10). Several covariates are also included in this research, including gender, year of enrolment, place of residence, residential comfort, adequacy of monthly allowance, side job, personality type, sleep duration on weekdays and weekends, grade point average (GPA), academic performance satisfaction, social activity in campus, presence of friend group in medical school, family relationship, and self-esteem level. The data is analyzed using bivariate analysis and ordinal logistic regression to assess the relationships between independent variables, as well as covariates, with levels of stress. **Results:** 53.7% of students reported using social media for 4–6 hours per day. Factors significantly associated with stress included duration of social media use of ≥ 7 hours a day (OR = 3.47; 95% CI: 1.36–8.86), GPA of 3.0 - 3.5 (OR = 2.53; 95% CI: 1.25–5.11), monthly allowance that is sufficient to meet needs (OR = 1.89; 95% CI: 1.03–3.45), and low self-esteem levels (OR = 8.91; 95% CI: 3.44–23.04). **Conclusion:** Social media use was associated with stress levels among medical students, with longer usage linked to a higher likelihood of experiencing greater stress. These findings highlight the importance of limiting social media use to support the mental health of medical students.

Keywords: Social Media; Stress; Medical Student



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Key Messages

This study found a significant association between longer duration of social media use and higher stress levels among medical students. These findings contribute to primary care science by providing population-based evidence on the distribution and correlates of stress in relation to digital media use, supporting the role of social media exposure as an important factor to consider in stress assessment among young adults. These results highlight the importance of promoting healthy social media habits, increasing awareness of the psychological effects of excessive use, and developing stress management and digital well-being programs, particularly among medical students who are already vulnerable to academic stress.

1. Introduction

Social media use has become increasingly prevalent over the past decade, particularly among young adults. In Indonesia, more than three-quarters of the population are internet users, with social media being the most frequently accessed online content [1]. While social media offers benefits such as facilitating communication and access to information, excessive use has been associated with negative mental health outcomes, including increased stress levels [2].

Medical students are particularly vulnerable to stress due to high academic workloads and performance expectations. A regional study conducted in 2022 among medical students in Indonesia found that the majority experienced moderate levels of stress (49.1%), while some experienced severe stress (21.8%) [3]. This study reported a high prevalence of moderate to severe stress among medical students, highlighting stress as an important public health concern in this population [3]. Medical students are also active users of social media, often spending several hours per day on multiple platforms [4]. Despite the coexistence of high social media use and high stress levels, evidence on the relationship between social media use and stress among medical students remains limited, particularly in specific institutional contexts.

Previous studies suggest several mechanisms that may explain the relationship between social media use and stress. Social media can increase stress through social comparison, pressure to seek validation and maintain an attractive online image, and fear of missing out (FoMO) [6]. Excessive screen time has also been associated with severe psychological distress among adolescents and young adults [5]. A quantitative cross-sectional approach is therefore appropriate to measure patterns of social media use and stress and to examine their association at the population level.

This study aims to examine the relationship between social media use and stress levels, describe patterns of social media use, and identify factors associated with stress among undergraduate medical students at the Faculty of Medicine, Udayana University.

2. Materials and Methods

This study employed an analytic observational design with a cross-sectional approach. The research was conducted at the Faculty of Medicine, Udayana University, between July and November 2025. Ethical approval for the study was obtained from the Institutional Review Board of the Faculty of Medicine, Udayana University, and all study procedures were conducted in accordance with ethical standards for research involving human participants. The ethical approval number for this study was No. 08674/IN.14.2.2.VII.14/ILT/2025.

The target population of this study comprised medical students in Indonesia. The accessible population included undergraduate medical students enrolled in the Faculty of Medicine, Udayana University, from the 2022, 2023, and 2024 cohorts. 216 students were eligible for inclusion if they were actively enrolled during the study period and consented to participate. Students who did not complete the questionnaire were excluded from the study. The sample size was calculated using the formula for comparing two proportions with predefined type I error (α) and statistical power ($1-\beta$). Participants were selected using a systematic random sampling technique, in which students were chosen at regular intervals from the sampling frame to ensure equal selection probability.

The sampling frame consisted of 723 undergraduate medical students in the 2022, 2023, and 2024 enrollment year in the Faculty of Medicine at Udayana University. The period of recruitment is July - September 2025. Participants were selected using systematic random sampling in order to minimize selection bias, with a sampling interval of 3.35. The systematic random sampling approach provided approximately equal probability of participant selection; therefore, no additional weighting or complex survey design corrections were necessary during analysis. With a sampling interval of 3.35, the number of required respondents are 216. A total of 453 students were invited to participate in the study, of whom 216 responded, yielding a response rate of 47.7%. The questionnaires were shared through WhatsApp and LINE. All 216 responses met the eligibility criteria and were included in the final analysis. No incomplete questionnaires were recorded, as Google Forms was configured to require completion of all mandatory items before submission, thereby preventing missing responses for key study variables.

The independent variables in this study were patterns of social media use, including duration of daily use, number of platforms used, and most frequently used

platform. The duration of social media use was categorized into ordinal groups (1–3 hours, 4–6 hours, and ≥ 7 hours) based on categories previously used in the Mental Health Research Canada survey. These categories were adopted to facilitate comparison with prior research and to simplify the analysis and interpretation of usage patterns according to increasing levels of exposure. The number of platforms used on a daily basis was classified as 1–2, 3–4, 5–6, and more than 6 platforms. The most frequently used social media platform was categorized as Instagram, WhatsApp, TikTok, or others. WhatsApp was included because the platform facilitates online social interaction, communication, and content sharing, which are characteristics commonly associated with social media applications. Additionally, it is widely used among university students in daily social activity.

Potential confounding variables included main respondent characteristics (gender, year of study, adequacy of monthly allowance, and living condition), personality type, sleep duration, academic performance measured by grade point average (GPA), social life factors, including social life on campus, relationships with friends and family, and experience of being bullied, and level of self-esteem.

Stress was assessed using the Perceived Stress Scale-10 (PSS-10), a widely used and standardized instrument for measuring perceived stress. Permission for use and adaptation of the questionnaire was obtained, and the instrument was administered in its translated version. The dependent variable was stress level, categorized into low (score = 0 – 13), moderate (score = 14– 26), and high stress (score = 27 – 40). All variables were measured using self-administered questionnaires.

Other variables related to social media use and confounding factors were assessed using structured questionnaires developed based on relevant literature. Respondents' self-esteem was assessed using the Rosenberg Self-Esteem Scale (RSES), which consists of 10 questions regarding their perceptions of themselves. Items 1, 2, 4, 6, and 7 each have four response options scored as follows: strongly agree (score = 3), agree (score = 2), disagree (score = 1), and strongly disagree (score = 0). Items 3, 5, 8, 9, and 10 have the same response options, but the scoring is reversed: strongly agree (score = 0), agree (score = 1), disagree (score = 2), and strongly disagree (score = 3). The scores for all items are summed to obtain the final score. A total score ranging from 15 to 25 indicates normal self-esteem, whereas a total score below 15 indicates low self-esteem. Content validity of the structured questionnaire was assessed through expert review based on relevant literature. A pilot test was subsequently conducted to evaluate item performance and clarity. Chi-square test or Fisher-Freeman-Halton exact test was used in the bivariate analysis to assess associations between categorical variables, as appropriate. The PSS-10 has been previously validated and demonstrated acceptable internal consistency reliability, as reported in prior studies.

Data were analyzed using IBM SPSS Statistics version 27 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize respondent characteristics and study variables, with categorical data presented as frequencies and percentages. Inferential analyses were conducted to assess associations between variables using the Chi-square test or Fisher-Freeman-Halton exact test, as appropriate based on expected cell counts. Variables that showed statistically significant associations in bivariate analysis were entered into the multivariable ordinal logistic regression model to identify independent predictors of stress level while controlling for potential confounding effects. Multivariable analysis was performed using ordinal logistic regression to evaluate the independent association between social media use variables and stress levels while controlling for potential confounding factors. A formal sensitivity analysis was not performed due to limited sample size in the high-stress subgroup; however, the ordinal outcome structure was retained because it best reflected the conceptual gradation of stress severity. All statistical tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant. Confidence intervals (95% CI) were reported for all main effect estimates.

3. Results and Discussion

The initial sampling frame consisted of 723 registered undergraduate medical students at Udayana University. Ten students were excluded prior to sampling because they were inactive at the time of data collection due to academic leave or withdrawal from the program, leaving 713 eligible students. Based on sample size calculation, a minimum of 216 participants was required. Using systematic random sampling, 453 students were invited to participate through electronic questionnaire distribution via WhatsApp and LINE. Of these, 216 students responded, yielding a response rate of 47.7%, and all responses met eligibility criteria and were included in the final analysis. No incomplete questionnaires were recorded because Google Forms was configured to require completion of all mandatory items prior to submission.

Non-participation was assumed to reflect non-response to the electronically distributed questionnaire; specific reasons for non-response were not collected. Participant flow has been described narratively in the manuscript; a separate flow diagram was not included because participant progression was straightforward and fully accounted for in the text.

Table 1. Subject Characteristics

Variable	N = 216	%
Gender		
Male	75	34.7
Female	141	65.3
Year of enrollment		
2024	74	34.3

Variable	N = 216	%
2023	76	35.2
2022	66	30.6
Place of residence		
Independently	127	58.8
With parents	89	41.2
Residential comfort		
Uncomfortable	4	1.9
Comfortable	212	98.1
Adequacy of monthly allowance		
Insufficient	7	3.2
Sufficient to meet daily needs	103	47.7
Sufficient and allows for saving	106	49.1
Side job		
No	191	88.4
Yes	25	11.6
Personality		
Extrovert	21	9.7
Ambivert	99	45.8
Introvert	96	44.4
Sleep duration on weekdays		
<7 hours	128	59.3
7-9 hours	88	40.7
Sleep duration on weekend		
<7 hours	34	15.7
7-9 hours	159	73.6
>9 hours	23	10.6
GPA		
3.0 - 3.5	63	29.2
>3.5 - 4.0	153	70.8
Academic performance satisfaction		
Dissatisfied	50	23.1
Moderately satisfied	74	34.3
Satisfied	75	34.7
Very satisfied	17	7.9
Social activity in Campus		
Infrequent	54	25.0
Frequent	162	75.0
Group friendship		
Absent	12	5.6
Present	204	94.4
Family relationships		
Not close	8	3.7
Moderately close	82	38.0
Very close	126	58.3
Duration of social media use		
1-3	64	29.6
4-6	116	53.7
≥7	36	16.7
Number of platforms used		
1 - 2	49	22.7
3 - 4	144	66.7

Variable	N = 216	%
5 - 6	19	8.8
> 6	4	1.9
Most frequently used platform		
Instagram	62	28.7
WhatsApp	54	25.0
TikTok	67	31.0
Others	33	15.3
Self-esteem level		
Low	49	22.7
Normal	167	77.3
Stress level		
Low	72	33.3
Moderate	133	61.6
High	11	5.1

Based on [Table 1](#), the number of female participants is significantly higher compared to male participants, and their year of enrollment is distributed almost equally. Most participants receive sufficient monthly allowance, live independently, comfortable with their residence environmental, sleep <7 hours during weekdays, sleep 7-9 hours during weekend, have a GPA between more than 3.5 to 4.0, satisfied with their academic performance, frequently do social activity in campus, have group of friendship, and very close family relationship. All of the participants of this study use social media. Most participants use social media 4–6 hours a day, with a majority of 3-4 social media platforms, and the most used platform being TikTok. A significant portion of participants are in the moderate stress and normal self-esteem category.

Table 2. Bivariate Analysis Result

Variable	Low		Stress Level Moderate		High		<i>p-value</i>
	N	%	N	%	N	%	
Gender							
Male	30	40.0	42	56.0	3	4.0	0.304
Female	42	29.8	91	64.5	8	5.7	
Year of enrollment							
2024	20	27.0	51	68.9	3	4.1	0.576
2023	28	36.8	43	56.6	5	6.6	
2022	24	36.4	39	59.1	3	4.5	
Place of residence							
Independently	42	33.1	79	62.2	6	4.7	0.947
With parents	30	33.7	54	60.7	5	5.6	
Residential comfort							
Uncomfortable	2	50.0	2	50.0	0	0.0	0.687
Comfortable	70	33.0	131	61.8	11	5.2	
Adequacy of monthly allowance							0.002

Variable	Low		Stress Level Moderate		High		<i>p-value</i>
	N	%	N	%	N	%	
Insufficient	4	57.1	3	42.9	0	0.0	
Sufficient to meet daily needs	22	21.4	77	74.8	4	3.9	
Sufficient and allows for saving	46	43.4	53	50.0	7	6.6	
Side job							
No	62	32.5	121	63.4	8	4.2	0.144
Yes	10	40.0	12	48.0	3	12.0	
Personality							0.361
Extrovert	11	52.4	10	47.6	0	0.0	
Ambivert	33	33.3	61	61.6	5	5.1	
Introvert	28	29.2	62	64.6	6	6.3	
Sleep duration on weekdays							0.417
<7 hours	39	30.5	81	63.3	8	6.3	
7 – 9 hours	33	37.5	52	59.1	3	3.4	
Sleep duration on weekend							0.825
<7 hours	10	29.4	23	67.6	1	2.9	
7-9 hours	54	34.0	95	59.7	10	6.3	
>9 hours	8	34.8	15	65.2	0	0.0	
GPA							0.006
3 - 3.5	12	19.0	45	71.4	6	9.5	
>3.5 - 4.0	60	39.2	88	57.5	5	3.3	
Academic performance satisfaction							0.086
Dissatisfied	10	20.0	35	70.0	5	10.0	
Moderately satisfied	23	31.1	47	63.5	4	5.4	
Satisfied	31	41.3	43	57.3	1	1.3	
Very satisfied	8	47.1	8	47.1	1	5.9	
Social activity in campus							0.571
Infrequent	21	38.9	30	55.6	3	5.6	
Frequent	51	31.5	103	63.6	8	4.9	
Group friendship							0.159
Absent	4	33.3	6	50.0	2	16.7	
Present	68	33.3	127	62.3	9	4.4	
Family relationships							0.057
Not close	2	25.0	5	62.5	1	12.5	
Moderately close	27	32.9	47	57.3	8	9.8	
Very close	43	34.1	81	64.3	2	1.6	
Duration of social media use							0.005
1-3 hours	31	48.4	33	51.6	0	0.0	
4-6 hours	33	28.4	76	65.5	7	6.0	
≥7 hours	8	22.2	24	66.7	4	11.1	
Number of platforms used							0.062
1-2	22	44.9	25	51.0	2	4.1	
3-4	45	31.3	91	63.2	8	5.6	
5-6	2	10.5	16	84.2	1	5.3	
>6	3	75.0	1	25.0	0	0.0	
Most frequently used platform							0.062
Instagram	28	45.2	32	51.6	2	3.2	

Variable	Stress Level						<i>p-value</i>
	Low		Moderate		High		
	N	%	N	%	N	%	
WhatsApp	20	37.0	30	55.6	4	7.4	<0.001
TikTok	14	20.9	51	76.1	2	3.0	
Lain-lain	10	30.3	20	60.6	3	9.1	
Self-esteem level							
Low	3	4.2	38	28.6	8	72.7	
Normal	69	95.8	95	71.4	3	27.3	

Table 2 bivariate analysis result using chi-square test shows the significant relationships between monthly allowance ($p=0.002$; $p<0.05$), GPA ($p=0.006$; $p<0.05$), duration of social media use ($p=0.005$; $p<0.05$), and self-esteem ($p<0.001$; $p<0.05$) with stress level.

Table 3. Multivariate Analysis Result

Variable	<i>p-value</i>	OR	95% CI (OR)
Duration of social media use daily			
1 - 3		<i>ref.</i>	
4 - 6	0.016	2.26	[1.17, 4.39]
≥7	0.009	3.47	[1.36, 8.87]
GPA			
3.0 - 3.5	0.01	2.53	[1.25, 5.11]
>3.5 - 4.0		<i>ref.</i>	
Adequacy of monthly allowance			
Insufficient	0.134	0.27	[0.05, 1.51]
Sufficient to meet daily needs	0.039	1.89	[1.03, 3.45]
Sufficient and allows for saving		<i>ref.</i>	
Self-esteem			
Low	<0.001	8.91	[3.44, 23.04]
Normal		<i>ref.</i>	

Ordinal logistic regression analysis was conducted to examine factors associated with stress level. The proportional odds assumption was assessed using the Test of Parallel Lines and was found to be violated, $\chi^2(6) = 15.181$, $p = .019$, indicating that the relationship between predictors and stress level was not constant across response categories; therefore, findings should be interpreted with caution. The final model demonstrated a significantly better fit than the intercept-only model, with a reduction in $-2 \log$ likelihood from 147.163 to 87.704, yielding a likelihood ratio chi-square of 59.459 with 6 degrees of freedom ($p < .001$), indicating that the predictors improved model fit. The model demonstrated moderate explanatory power, with pseudo- R^2 values of 0.241 (Cox and Snell), 0.299 (Nagelkerke), and 0.169 (McFadden), suggesting that approximately 29.9% of the variation in stress level was explained by the predictors included in the model.

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Table 3 presents the results of the ordinal logistic regression analysis of factors associated with stress levels. Social media use of 4–6 hours per day was significantly associated with higher stress compared to 1–3 hours ($p = 0.016$; OR = 2.26; 95% CI: 1.17–4.39), while use of ≥ 7 hours per day showed an even higher and significant risk ($p = 0.009$; OR = 3.47; 95% CI: 1.36–8.86). Students with a GPA of 3.0–3.5 had significantly higher stress levels compared to those with a GPA >3.5 –4.0 ($p = 0.010$; OR = 2.53; 95% CI: 1.25–5.11). Regarding allowance adequacy, students reporting their allowance as “sufficient to meet needs” had higher stress levels than those with surplus allowance ($p = 0.039$; OR = 1.89; 95% CI: 1.03–3.45), whereas the “insufficient” category was not significant. Low self-esteem was the strongest predictor of stress ($p < 0.001$; OR = 8.91; 95% CI: 3.44–23.04).

Subgroup analyses were not performed because they were not part of the predefined study objectives. In addition, the relatively small number of participants in the high-stress category may have limited statistical power for reliable subgroup-specific estimation. A formal sensitivity analysis was not performed because it was not part of the predefined analytical plan. Additionally, the relatively small number of participants in the high-stress category may have limited the stability of alternative model specifications. The ordinal regression model was retained because it preserved the conceptual ordering of stress severity and demonstrated statistically significant overall fit with moderate explanatory power. Nevertheless, findings should be interpreted cautiously and may benefit from confirmation in larger future studies.

Discussion

This study found a significant association between the duration of social media use and stress levels among students. Other factors, including GPA, adequacy of monthly allowance, and self-esteem, were also significantly associated with stress levels. In contrast, other variables related to social media use – such as the number of platforms used and the most frequently used platform – showed no significant association with stress levels. Additionally, gender, year of study, living conditions, personality type, sleep duration, and social life factors were not significantly associated with stress.

The analysis presented illustrates a trend in respondents’ stress levels based on daily social media use duration. In the lowest usage category (1–3 hours), no respondents reported high stress levels (0%). In the moderate category (4–6 hours), 6% of respondents experienced high stress, while in the highest usage category (≥ 7

hours), the proportion of respondents with high stress increased to 11.1%. This pattern indicates a gradient increase in stress with longer social media use. Statistical testing using the Fisher–Freeman–Halton Exact Test showed a significant association between social media use duration and stress levels ($p = 0.005$). This finding is consistent with previous studies suggesting that excessive social media use is associated with poorer mental health among adolescents and young adults [5], potentially due to factors such as the need for social validation [6], social comparison, and fear of missing out (FoMO) [7].

A relatively small number of participants were classified in the high-stress category ($n = 11$), which may reduce estimate stability and precision for this response level. Small cell counts can increase standard errors, widen confidence intervals, and make coefficient estimates more sensitive to individual observations, which likely contributed to the violation of the proportional odds assumption in the multivariate analysis. Although this limitation is present, this does not invalidate the findings. The category remained sufficiently represented to permit analysis of ordinal stress patterns. However, the limited number of high-stress cases may reduce estimate precision and confidence in subgroup-specific effects; therefore, findings should be interpreted cautiously and confirmed in larger samples.

A respondent characteristic that was found to have a significant association with stress levels in students was the adequacy of their monthly allowance. No respondents with insufficient allowance reported high stress levels (0%). Interestingly, the highest proportion of high stress was observed among students whose allowance was sufficient or exceeded their needs (6.6%). These findings contrast previous research, which reported higher stress levels among students experiencing financial pressure (9). The Fisher–Freeman–Halton Exact Test showed a significant association between allowance adequacy and stress level ($p = 0.002$; $p < 0.05$). However, 44.4% of cells had expected counts below five, potentially reducing the statistical power of the test.

A significant association was observed between students' GPA and stress levels. A higher proportion of students with high stress levels was observed among those with lower GPAs (3.0–3.5; 9.5%). Statistical analysis demonstrated a significant association between GPA and stress level ($p = 0.006$; $p < 0.05$). This finding is consistent with previous studies which reported that lower GPA is associated with higher stress levels, particularly in medical students due to substantial academic pressure [8],[9].

The distribution of self-esteem levels across stress categories showed that students with low self-esteem had a substantially higher proportion of high stress (72.7%) compared to those with normal self-esteem (27.3%). This finding supports previous research which reported a negative correlation between stress and self-

esteem [10]. Higher self-esteem enables individuals to maintain a more positive perspective, recognize their strengths and limitations, and adapt more effectively to stressful situations [10].

Multivariate analysis showed that daily social media use duration was associated with respondents' stress levels. After adjustment for other variables, respondents who used social media for 4–6 hours per day had a 2.26-fold higher likelihood of experiencing stress compared with those who used it for 1–3 hours per day. The risk further increased among respondents with ≥ 7 hours of daily use, who had a 3.47-fold higher likelihood of stress. Mental Health Research Canada (2025) also reported that a substantial proportion of adolescents and young adults (ages 16 – 24), with screen time ≥ 7 hours per day, which largely consisted of social media use, experienced severe psychological distress (52%) [5]. This finding supports the results of the present study, which showed that social media use of ≥ 7 hours per day was associated with higher levels of stress.

In the GPA variable, multivariate analysis showed that academic performance was associated with stress. Students with a GPA of 3.0–3.5 had a 2.53-fold higher likelihood of having higher stress compared to those with higher GPAs. These findings are supported by a regional study conducted at All India Institute of Medical Sciences among physiotherapy students (years 1–4 and internship participants) in 2023, that found that students with lower academic performance (GPA 2.51–3.00) had a higher perceived mean stress score (44.83) compared to those with higher academic performance (GPA 4.51–5.00), who reported a lower mean stress score (38.59). These findings suggest an inverse relationship between GPA and perceived stress, indicating that lower academic achievement is associated with higher stress levels [8].

Students whose allowance was sufficient to meet their needs had a 1.89-fold higher likelihood of experiencing stress compared with those with insufficient allowance. Previous research has shown that financial difficulties may negatively affect students' mental well-being. A qualitative study conducted in 2021 in the United States among undergraduate and graduate students found that financial stress disrupted academic performance and negatively affected students' social lives, often causing feelings of isolation and embarrassment when interacting with wealthier peers [11]. These findings suggest that financial strain may increase psychological burden and interfere with academic functioning. However, this contrasts with the findings of the present study, which showed that students with sufficient financial allowance reported higher stress levels than those with inadequate allowance, indicating that the relationship between financial status and stress may differ depending on contextual and population-specific factors.

Among all variables, self-esteem showed the strongest association with stress. Students with low self-esteem had a 8.91-fold higher likelihood of experiencing stress

compared with those with normal self-esteem, highlighting increased vulnerability among individuals with negative self-evaluation. A regional study published in 2024 at Diponegoro University among final-year medical students found a significant negative relationship between self-esteem and stress levels ($r = -0.385$, $p < 0.001$), indicating that students with lower self-esteem experienced higher stress levels. Individuals with low self-esteem tend to have lower confidence in their competence, are more critical of their self-worth, and are therefore more susceptible to stress symptoms [10]. These findings are consistent with the present study, which also found that lower self-esteem was associated with higher stress, suggesting that self-esteem may serve as an important protective factor against psychological distress among medical students.

Overall, multivariate analysis indicates that prolonged social media use, certain allowance conditions, and low self-esteem are independently associated with stress among students, underscoring the multifactorial nature of stress involving behavioural, socioeconomic, and psychological factors. The findings of this study suggest that greater daily social media use is associated with higher stress levels among medical students, highlighting the importance of individual awareness and self-regulation in digital behavior. As adult learners, medical students are expected to develop the capacity to manage their own social media consumption by recognizing excessive use and consciously setting personal limits. Strengthening self-awareness and digital discipline may help reduce unnecessary stress and support better psychological well-being.

The findings of this study have important implications for primary care science and preventive public health, particularly in the context of student mental health promotion. As medical students represent a population vulnerable to psychological stress due to academic demands and digital exposure, early identification of stress-related risk factors such as problematic social media use and low self-esteem may facilitate timely preventive intervention. Within primary care settings, routine mental health screening among university-aged individuals could incorporate assessment of digital behavior and psychosocial well-being to identify students at risk before symptoms progress to more severe psychological distress. From a public health perspective, these findings support the development of digital well-being interventions aimed at promoting healthier social media use patterns and improving self-esteem resilience. Furthermore, educational institutions may use these findings to strengthen institutional support systems through mental health education, peer-support initiatives, counseling accessibility, and early stress-monitoring programs to promote psychological well-being among medical students.

This study has several limitations. First, the use of self-reported questionnaires may introduce recall bias and social desirability bias, as participants may not

accurately recall or may underreport their social media usage duration and perceived stress levels. This may have resulted in non-differential misclassification, potentially attenuating the observed associations and leading to underestimation of the true relationship between social media use and stress. Second, the relatively small number of participants in the high-stress category ($n = 11$) may have reduced estimate precision, increased standard errors, and limited the stability of regression estimates for this subgroup, which may have contributed to wider confidence intervals and reduced certainty in effect size estimation.

Third, the proportional odds assumption for ordinal logistic regression was violated, indicating that predictor effects may not have been constant across stress-level thresholds; therefore, the reported odds ratios should be interpreted as approximate overall associations rather than threshold-specific effects. Although the deviation was modest, this may have introduced some model imprecision. Fourth, as this was a single-centre study conducted among medical students at one institution, the findings may have limited generalizability to students in other universities or regions with different academic structures, sociocultural contexts, and digital usage patterns. This may restrict external validity but is unlikely to substantially affect the internal consistency of observed associations within the sampled population.

Fifth, non-response bias may have been present, as only 216 of 453 invited students participated (response rate 47.7%). Students experiencing either very high stress or very low academic engagement may have been less likely to respond, which could have led to underrepresentation of extreme stress profiles and possible underestimation of the true prevalence of severe stress. Finally, the cross-sectional design precludes determination of temporal or causal relationships between social media use and stress level. It is therefore unclear whether increased social media use contributed to higher stress levels, whether stressed individuals were more likely to engage in greater social media use, or whether both were influenced by unmeasured confounding variables.

External validity may be limited because this study was conducted at a single medical institution within a specific academic and sociocultural context. Variations in curriculum structure, institutional support systems, and digital behavior patterns across universities may influence the magnitude of observed associations. Therefore, the exact effect sizes reported in this study may not be directly generalizable to all medical student populations. However, because medical students across institutions commonly experience comparable academic stressors and digital engagement patterns, the overall observed relationships may remain relevant to similar educational settings.

4. Conclusion

This study found that stress among medical students was associated with multiple interrelated factors. Longer daily social media use showed a consistent association with higher stress levels, with a dose-response pattern observed across increasing durations of use. Monthly allowance adequacy, GPA, and self-esteem were also significantly associated with stress level, with low self-esteem showing the strongest observed association. In contrast, other social media-related variables, demographic characteristics, sleep duration, personality type, and social life factors were not significantly associated with stress in this study population.

These findings highlight the multifactorial nature of stress among medical students and suggest that behavioral patterns, socioeconomic conditions, and psychological well-being may represent important areas for early identification and supportive intervention. From a practical perspective, these results may inform student mental health promotion strategies, including digital well-being education, self-esteem strengthening initiatives, and institutional support systems aimed at identifying students potentially at greater risk of elevated stress.

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