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Psychological distress, social media use, and academic performance of medical students: the mediating role of coping style

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Abstract

Background Given that social media use (SMU) is an increasingly widespread activity among university students, more information is needed to evaluate its relationship with students' mental health, particularly medical students.

Objective The present study assessed the relationships between SMU and coping style with psychological distress and academic performance of medical students.

Methods An offline cross-sectional survey conducted with 398 undergraduate medical students. The survey collected data on demographics, psychological distress (DASS-21), coping strategies (Brief COPE Scale), academic performance (grade point average) and estimated average time spent on social media per day. Structural equation modeling was used to clarify relationships between the main study variables. The study also examined the mediating effect of maladaptive coping between SMU and psychological distress.

Results Students with higher levels of psychological distress were more likely to be engaged in frequent social media use. Spending more than two hours a day on social media use had a positive association with maladaptive coping ($p < 0.001$), particularly with substance use and behavioral disengagement both of which could negatively affect academic performance. Maladaptive coping mediated the relationship between students' SMU and psychological distress.

Conclusion The findings suggest that medical students commonly use social media as a maladaptive coping tool to deal with psychological distress. Empowering students to adopt and foster appropriate coping strategies could help them to enhance resilience against life stresses and ameliorate potential long-term mental health consequences associated with maladaptive behaviors.

Keywords Psychological distress, Social media use, Academic performance, Coping strategies, Depression, Anxiety, Stress, Medical students

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Introduction

University students are considered as a high risk group for developing depressive and anxiety disorders [1]. There is substantial evidence from studies conducted across different developed and developing countries showing that the rate of psychological distress among university students is higher than general population [2]. Transitioning to university can be a stressful life experience because students commonly face a wide range of stresses such as living away from the family, augmented responsibilities, extensive course loads, altered sleep/wake patterns, and inadequate time for self-care [3–5]. Education in medicine is particularly accompanied by numerous stresses. It is well known that the prevalence of psychological distress including depression, anxiety and other related mental health problems among medical students is consistently higher than their non-medical peers [6]. Globally, it is estimated that on average, 27% of medical students are affected by depression and 34% suffer from anxiety [7, 8]. Uncontrolled psychological distress among university students can negatively impact their quality of life and academic performance and increase the risk of interpersonal relationship instability, lack of self-confidence, alcohol and substance use, and suicidal ideations and behaviors [2].

An understanding of factors associated with psychological distress and academic performance among medical students is needed to tailor appropriate strategies and to support those individuals who are predisposed to experience greater mental distress. Given that social media use (SMU) is an increasingly widespread activity among university students, there has been a growing interest in investigating the potential links between students' social media activity and mental well-being. Problematic social media use has been associated with mental health problems such as depression, anxiety, and stress [9]. A majority of the related literature has investigated adolescents and young adults and has reported negative SMU-related mental health consequences. For example, a large cohort study reported that US adolescents who spent more than three hours per day on social media were particularly at risk of developing internalizing problems [10].

There is also some evidence that an increase in prevalence of depression among young adolescents may be related to a rapid increase in social media use among this age group [11]. Moreover, a systematic review of 13 studies found a general correlation between social media use and adolescents' mental health problems. However, the authors emphasized the relationships were complex, and few studies were designed to explore the effect of mediating factors [12]. It has been postulated that spending a lot of time on social media promotes a sedentary lifestyle and less face-to-face social interactions, both of which are risk factors for mental health disorders [9]. However, current evidence is inconsistent because some studies have reported uncertainty regarding the potential risks and benefits of SMU on mental well-being [13, 14].

Similarly, research on the effect of social media use on students' academic performance has shown contradictory results [15, 16]. Several studies have reported negative impacts of social media use on students' academic performance [17, 18]. However, many of these studies assessed time spent on smartphones and included data on SMSs, calls, games and non-social networking apps that may not actually represent social media use [19]. On the other hand, some authors believe that social media use has the potential for improving students' academic performance through collaborative and interactive learning [20].

Individuals with stress-related unpleasant emotions may use specific behavioral approaches to reduce, moderate or manage life stress that collectively comprise coping strategies. Previous research has emphasized the importance of coping strategies in psychological adjustment against mental distress [21]. Coping strategies might focus on regulation of emotions to better tolerate stressful conditions (i.e., emotion-focused coping) or seek ways to resolve the problem that have caused psychological distress (i.e., problem-focused coping) [22]. Accordingly, coping styles can be categorized into adaptive and maladaptive approaches.

Adaptive coping is described as actively trying to confront the problems, by seeking stressor-related information and social support, and planning strategies to resolve the problems [23]. In contrast, maladaptive (avoidant) coping is described as a strategy in which an individual tries to disengage from a stressor through arousal-reduction strategies such as distraction, relaxation or escape from the stressor by moving away from it [24, 25]. Both adaptive and maladaptive coping strategies are likely to reduce mental distress in the short-term. However, unhealthy coping strategies could lead to adverse mental health outcomes in the long-term [26].

Currently, the available empirical evidence is insufficient to draw firm conclusions on the relationships between student social media use, distress, and academic performance. One key question is whether social media use has a direct role in inducing or relieving mental distress or whether it is mediated by other related factors such as coping strategies. Given that medical students often have greater mental health problems that other students [6], this cohort was the focus in the present study. It was hypothesized that: (i) the estimated average time spent on social media would significantly predict medical students' levels of psychological distress (H_1), (ii) the estimated average time

spent on social media and psychological distress would significantly predict medical students' academic performance (H_2) and (iii) the association between social media use and psychological distress among medical students would be mediated by other factors such as students' coping style (H_3). To the best of the present authors' knowledge, this is the first study to evaluate the interaction between social media use and coping styles on mental health among medical students.

Methods

Participants and procedure

A cross-sectional survey study was conducted between July and August 2022 at Shiraz Medical University. Eligible students included those who had spent at least six months of clinical training in hospital settings during the 5th to 7th years of their medical curriculum. The sample size was determined using PASS 15.0.5 software (NCSS, LLC. Kaysville, Utah, USA). It was based on total population of students ($N = 3200$), the prevalence of psychological distress among Iranian university students in a previously conducted study [27]: 0.41, 5% significance level, effect design = 0.177 and 4% margin of error. A convenience sample of 400 students was recruited from four main teaching hospitals of the university. The surveys were conducted face-to-face by 'paper-and-pencil' administration and the enrollment process was continued until the required sample size was attained.

Data collection

Data collection was carried out by two experienced researchers after receiving ethical approval. Before administering the surveys, participants were given a verbal explanation about the objectives of the study and they provided written informed consent. The surveys were anonymous. However, students were asked to write their student number, so that their grade point averages (GPAs) could be retrieved from the Department of Education in the School of Medicine. To avoid any potential bias in completion of forms (such as unreal answers or completing forms twice by one individual), the research team assured participants about anonymity and confidentiality of the collected information. The students completed the questionnaires in hospital wards and the surveys were collected immediately after completion. All the psychometric scales included in the survey were the validated Persian versions (see next section for details). The present study was reviewed and approved by Research Ethics Committee of Shiraz University of Medical Sciences (ref: IR.SUMS.MED.REC.1401.228).

Measures

Basic demographic information: This included age, gender, marital status (single/married), and clinical educational level (pre-internship/internship). In most Iranian medical universities, the clinical curriculum of undergraduate students includes 24 months pre-internship and 18 months internship.

Self-reported history of anxiety or depression: This was simply assessed by asking participants if they had been diagnosed with anxiety and/or depression by a physician in the past 12 months.

Social media use: This was assessed by asking participants how much time they spent on social networking sites for personal purposes on a typical day. Four response categories included: (i) 0 to 30 min, (ii) 31 to 60 min, (iii) 61 to 120 min, and (iv) > 120 min. To estimate the frequency of use of the most popular social media platforms among Iranian young adults, participants were asked to indicate how frequently they visited the most popular social media used by Iranian young adults (i.e., *WhatsApp, Instagram, Facebook, Twitter, YouTube* and *LinkedIn*). The responses were classified as (i) never, (ii) less than once per week, (iii) 1–2 times per week, (iv) 3–6 times per week, (v) almost daily, (vi) 2–4 times per day, and (vii) ≥ 5 times per day. Additionally, students were asked to indicate their main motivation for using social media from three possible options: (i) general information seeking, (ii) entertainment, and (iii) academic and educational purposes.

Psychological distress: This was assessed using the 21-item Depression, Anxiety and Stress Scale (DASS-21). The DASS-21 is used to assess the extent to which individuals experience negative emotional states over the previous week. The scale comprises three subscales: depression (Items 3, 5, 10, 13, 16, 17, 21), anxiety (Items 2, 4, 7, 9, 15, 19, 20), and stress (Items 1, 6, 8, 11, 12, 14, 18). Participants use a four-point Likert scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). In addition to a total score for the whole scale, subscales scores were calculated to estimate the level of depression, anxiety, and stress among participants [28]. Moreover, the severity of psychological distress was categorized into normal (0–4 for depression, 0–3 for anxiety, and 0–7 for stress), mild (5–6 for depression, 4–5 for anxiety, and 8–9 for stress), moderate (7–10 for depression, 6–7 for anxiety, and 10–12 for stress), severe (11–13 for depression, 8–9 for anxiety, and 13–16 for stress), and extremely severe (≥ 14 for depression, ≥ 10 for anxiety, ≥ 17 for stress). As a previous study showed that DASS-21 can be used as a general score of distress [29], in the present study's analyses, the total scale score was used as an overall measure of psychological distress. The validity and reliability of the

Persian version of the DASS-21 have been confirmed in both clinical and non-clinical populations [30, 31]. Cronbach's alpha in the present study was 0.926.

Coping styles: These were evaluated using the 28-item Persian version of the Brief COPE Inventory [32]. The scale assesses an individual's response to stressful situations and events during the past month. Each item is rated on a four-point Likert scale ranging from 1 (*I haven't been doing this at all*) to 4 (*I've been doing this a lot*). Stress responses include emotions, cognitions and behaviors provoked by stressful stimuli. This scale is assumed to assess different methods individuals might use to deal with environmental stresses. The Brief COPE includes 14 subscales: active coping (Items 2 and 7), planning (Items 14 and 25), positive reframing (Items 12 and 17), acceptance (Items 20 and 24), humor (Items 18 and 28), turning to religion (Items 22 and 27), using emotional support (Items 5 and 15), using instrumental support (Items 10 and 23), self-distraction (Items 1 and 19), denial (Items 3 and 8), venting (Items 9 and 21), substance use (Items 4 and 11), behavioral disengagement (Items 6 and 16), and self-blame (Items 13 and 26). It has been indicated that different coping responses reflect two principal coping styles: adaptive (approach) coping (including active coping, acceptance, use of emotional and instrumental support, positive reframing, planning, humor and religion) and maladaptive (avoidant) coping (including self-distraction, denial, substance use, behavioral disengagement, venting, and self-blaming) [25, 33]. Total scores for adaptive and maladaptive coping were calculated separately by summing up their related components scores representing each coping style. The validity and reliability of the Persian version of the scale has been reported to be satisfactory [32]. Cronbach's alpha for total, adaptive and maladaptive items scores in the present study were 0.793, 0.813 and 0.690, respectively.

Academic performance: This was assessed using the students' overall grade point average (GPA). GPAs were classified into three categories: good (GPA $\geq$ 17), moderate (GPA = 14–16.99) and poor (GPA < 14). Students' GPAs were obtained from the medical school's Department of Education.

Statistical analysis

Data including demographic characteristics were analyzed as frequencies and percentages for categorical variables and means and standard deviations for numerical variables. Mann–Whitney U test and Kruskal–Wallis test were used to assess significant differences between DASS-21 scores based on the study variables. Spearman's rank correlation test was used to calculate the correlations between the main study variables.

A structural equation model with latent variables was tested. Since it was hypothesized that SMU may predict students' academic performance and psychological distress, and the latter could also be influenced by coping strategies, a model with three predictive variables (SMU, adaptive coping and maladaptive coping) and two outcome variables (psychological distress and GPA) were designed using AMOS (v.23).

To examine the mediating effect of coping strategies in the relationship between SMU and psychological distress, Hayes Macro Process was used, which is a well-documented bootstrapping statistical technique to test the mediation effects between variables [34]. The mediating effect of both adaptive and maladaptive coping scores were assessed through simple mediation relationships. In first step, psychological distress was considered as the dependent variable (Y), SMU as independent variable (X) and adaptive coping as the mediating variable (M). In the next step, psychological distress was considered as the dependent variable (Y), SMU as independent variable (X), and maladaptive coping as the mediating variable (M). Following Hayes Macro Process procedure, Model 4 multivariable regression analysis was conducted using 5000 boot-strapped samples. According to Preacher and Hayes [35], a mediating effect is present when (i) there is a total effect that can be mediated ($c \neq 0$), and (ii) the indirect effect (a*b) is statistically significant in the direction predicted by the mediation hypothesis. SPSS version 26 (IBM, United States) was used for all statistical analysis and the significance level was set at 5%.

Results

The response rate of those approached to participate was 100%. However, two participants were excluded from final analysis because their GPA scores could not be verified. Participants included 398 medical students who were in the clinical stage of medical training (5th to 7th years of education) where their degree course was spent in teaching hospitals. Overall, 217 students were in pre-internship stage (54.5%) and 181 were in the internship stage (45.5%). Most participants were aged 22–26 years (92.5%), with a mean age of 24 years (SD ± 1.6). There were 218 male students (55%) and 180 female students (45%) including 346 who were single (87%) and 52 who were married (13%). Approximately 23% of the participants had a self-reported history of depression/anxiety within the past year. Over half of the participants reported using social media more than two hours per day (52%). The most common social media platforms used by Iranian medical students at least once per day were *WhatsApp* (96.7%), *Instagram* (84.7%), *YouTube* (24.6%), *Twitter* (19.1%), *LinkedIn* (2.7%) and *Facebook* (0.8%). The motivations of students to visit social media networks

were mostly for information and entertainment purposes, and just over 12% of the students reported using social media platforms for academic and educational purposes.

Table 1 shows distribution of DASS-21 scores according to the study variables. The resultant DASS-21 scores ranged from 0–51 (mean = 14.5 SD ± 10.7). There was no statistically significant difference between participants' DASS-21 scores and the three levels of academic performance ($p = 0.232$). However, DASS-scores were statistically different based on the history of depression/anxiety ($p < 0.001$), frequency of social media use per day ($p = 0.021$), and frequency of using adaptive and maladaptive coping strategies ($p < 0.001$). More specifically, students with higher DASS-21 scores were more likely to be engaged in frequent use of social media and maladaptive coping and less likely to use adaptive coping strategies.

Table 1 Distribution of DASS-21 scores representing levels of psychological distress among medical students based on the study variables

Characteristic	N (%)	DASS -21 Mean (± SD)	DASS-21 Median	*p*-value
Gender				
Male	218 (55)	13.7 (10.8)	12	0.097
Female	180 (45)	15.3 (10.5)	13	
Marital status				
Married	90 (22.6)	11.9 (9.1)	11	0.073
Single	308 (77.4)	15.1 (10.7)	13	
History of anxiety/depression				
No	304 (76.4)	12.3 (9.4)	11	< 0.001*
Yes	94 (22.6)	21.7 (11.5)	21	
Daily use of social media				
< 30 min	10 (2.3)	8.9 (7.8)	8	0.021*
31—60 min	56 (14.2)	11.2 (9.6)	9.5	
61 – 120 min	126 (31.7)	14.1 (10.4)	13	
> 120 min	206 (51.8)	15.6 (10.9)	14	
Frequent use of adaptive coping strategies				
Yes	197 (49.5)	10.7 (9.1)	9	< 0.001*
No	201 (50.5)	17.7 (10.8)	17	
Frequent use of maladaptive coping strategies				
Yes	162 (40.7)	19.3 (11.0)	18.5	< 0.001*
No	236 (59.3)	11.3 (9.3)	10.0	
Grade point average (GPA)				
< 14	44 (11)	8.9 (7.8)	8	0.232
14 – 16.99	243 (61)	11.2 (9.6)	9.5	
≥ 17	111 (28)	15.6 (10.9)	14	

* statistically significant

Table 2 shows the prevalence of depression, anxiety, and stress symptoms and their severity categories in the sample. Using the DASS-21 subscales, depression was the most prevalent emotional state (44.4%), followed by anxiety (37.7%), and stress (37.4%). The prevalence of medium to high use of different coping strategies and more than two hours per day use of social media use is shown in Table 3. Overall, irrespective of the students' emotional state, using adaptive strategies was more common than using maladaptive strategies. The most common adaptive strategies used were planning (79%), active coping (77%) and acceptance (75%), and the most common maladaptive coping strategies were self-distraction (59%), venting (56%), and self-blaming (44%). With respect to emotional states, students with greater anxiety, stress or depression were more likely to use maladaptive than adaptive coping strategies. This difference was especially prominent for self-blaming, substance use, and behavioral disengagement. Also, students who used social media more than two hours per day were more likely to have a depressed mood than those who used social media less often ($p = 0.007$). Additionally, there was no statistically significant difference between students' academic performance and time spent using social media ($p = 0.330$).

Results of Rho Spearman correlations between the main study variables showed that SMU was positively and significantly correlated with psychological distress ($p = 0.005$) and maladaptive coping ($p < 0.001$). However, there was no significant correlation between SMU and adaptive coping ($p = 0.876$) (Table 4). Moreover, GPA, as a measure of academic performance, had no significant correlations with SMU, adaptive coping, maladaptive coping or psychological distress.

Structural equation modeling showed good to excellent fit indices = CMIN/DF = 2.67 (acceptable range = 1–3), GFI = 0.990 (acceptable > 0.90), CFI = 0.972 (acceptable > 0.95), SRMR = 0.058 (acceptable < 0.08), RMSEA = 0.054 (acceptable < 0.06) and PCLOSE = 0.203 (acceptable > 0.05).

Table 2 Prevalence of depression, anxiety, and stress among study participants ($N = 398$)

DASS-21 subscales	Normal N (%)	Mild N (%)	Moderate N (%)	Severe N (%)	Extremely severe N (%)
Depression	217 (54.6)	45 (11.3)	84 (21)	34 (8.5)	18 (4.6)
Anxiety	246 (61.8)	66 (16.5)	43 (10.8)	24 (6.1)	19 (4.8)
Stress	244 (61.2)	62 (15.6)	61 (15.4)	21 (5.2)	10 (2.6)

Table 3 Frequency of medium to high use of different coping strategies and more than two hours per day of social media use among participants based on their emotional states

Variables	Depression		Anxiety		Stress		Total (*N* = 398)
Coping strategy (Medium to high use)	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**N (%)**
	177 (44%) N (%)	**221(56%) N (%)**	**151 (38%) N (%)**	**247 (62%) N (%)**	**155 (39%) N (%)**	**243 (61%) N (%)**	
Active coping	124 (70)	186(84)**	100 (66)	210 (85)***	113 (73)	197(81)	307 (77)
Planning	127 (72)	181 (82)*	109 (72)	200 (81)*	124 (80)	187 (77)	314 (79)
Positive reframing	85 (48)	144 (65)**	71 (47)	158 (64)**	81 (52)	151 (62)	231 (58)
Acceptance	117 (66)	183 (83)***	91 (60)	207 (84)***	105 (68)	194(80)**	298 (75)
Use of emotional support	81 (46)	144 (65)***	77 (51)	156 (63)*	87 (56)	143 (59)	227 (57)
Use of instrumental support	94 (53)	166 (75)***	83 (55)	178 (72)**	95 (61)	165 (68)	263 (66)
Humor	71 (40)	93 (42)	59 (39)	104 (42)	67 (43)	100 (41)	163 (41)
Religion	42 (24)	102 (46)***	48 (32)	96 (39)	51(33)	97 (40)	145 (36)
Self-distraction	112 (63)	119 (54)*	89 (59)	143 (58)	104 (67)	134 (55)*	233(59)
Denial	42 (24)	29 (13)**	39 (26)	32 (13)**	36 (23)	36 (15)*	72 (18)
Substance use	42 (24)	20 (9)***	42 (28)	20 (8)***	42 (27)	22 (9)***	64 (16)
Behavioral disengagement	51 (29)	24 (11)***	42 (28)	32 (13)***	43 (28)	34 (14)**	76 (19)
Venting	90 (51)	133 (60)*	76(50)	146 (59)	95 (61)	129 (53)	223(56)
Self-blaming	104 (57)	71 (32)***	88 (58)	84 (34)***	101 (65)	76 (31)***	175 (44)
Social media use (> 2 h per day)	106 (60)	102 (46%)**	77 (51)	128 (52)	88 (57)	117 (48)	207 (52)

* ($p < 0.05$)

** ($p < 0.01$)

*** ($p < 0.001$)

Table 4 Rho Spearman correlation coefficients between social media use (SMU), emotional state (DASS-21 scores), adaptive coping (A.C) scores and maladaptive coping (MAC) scores and global point average (GPA) among Iranian medical students (*N* = 398)

Variable	Analysis	SMU	DASS-21	A.C	M.A.C	GPA
SMU	Coefficient	1				
	*p-value**	-				
DASS-21	Coefficient	0.147	1			
	p-value	0.005*	-			
AC	Coefficient	0.008	-0.328	1		
	p-value	0.876	< 0.001*	-		
MAC	Coefficient	0.183	0.478	0.144	1	
	p-value	< 0.001*	< 0.001*	0.006*	-	
GPA	Coefficient	0.026	-0.099	0.039	- 0.049	1
	p-value	0.630	0.071	0.477	0.365	-

* *p*-values significant at the 0.05 level (2-tailed)

The model showed that the direct relationship between SMU and psychological distress was not significant (path coefficient = 0.068, $p = 0.114$). However, the indirect relationship between SMU and psychological distress via maladaptive coping score was significant (path coefficient = 0.546, $p = 0.001$). The indirect relationship between SMU and psychological distress via adaptive coping score was non-significant (path coefficient = 0.08, $p = 0.165$). Moreover, the direct relationship between SMU and GPA scores was not significant (path coefficient = 0.068, $p = 0.114$) and the relationship between psychological distress and GPA was borderline non-significant (path coefficient = —0.102, $p = 0.07$) (Fig. 1).

Figure 2 shows the results of simple mediation analysis using Hayes Macro Process in assessing the mediating

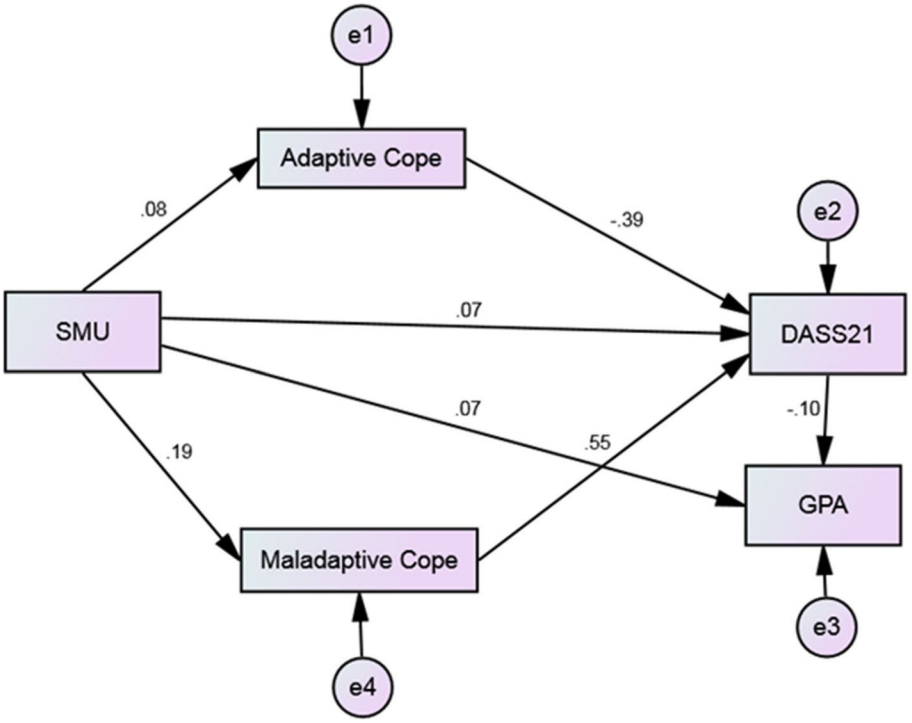

Fig. 1 Structural equation modeling of associations between average daily times spent on social media use (SMU), adaptive and maladaptive coping scores, psychological distress (measured by DASS-21 scores) and academic performance (measured by grade point average [GPA]). Numbers between boxes are standardized path coefficients

effects of coping strategies in the relationship between SMU and psychological distress. In the case where psychological distress was the dependent variable (Y), SMU as the independent variable (X), and adaptive coping score as mediating variable (M), the total effect of X on Y was significant (unstandardized coefficient = 1.9078, SE = 0.7617, $p = 0.0128$). However, the indirect effect of X on Y was not statistically significant (unstandardized coefficient = -0.3388, SE = 0.2649, $p = 0.1774$) and the 95%CI for coefficient included zero (LLCI = -0.8675, ULCI = 0.0135), showing that adaptive coping strategies had no mediating effect on the relationship between SMU and psychological distress.

Conversely, when psychological distress was the dependent variable (Y), SMU was the independent variable (X) and maladaptive coping was the mediating variable (M), both the total effect of X on Y (unstandardized coefficient = 1.9078, SE = 0.7617, $p = 0.0128$), and the indirect effect of X on Y (unstandardized coefficient = 1.2346, SE = 0.4024, $p = 0.0019$) were statistically significant and the 95%CI for coefficient did not include zero (LLCI = 0.4707, ULCI = 2.0370), showing that maladaptive coping strategies had a substantial (65%) mediating effect on the relationship between SMU and psychological distress.

Discussion

The present study investigated the relationship between SMU and medical students' psychological distress (assessed using the DASS-21) and academic performance (assessed using GPA), and explored whether these were directly related to the magnitude of time spent on social media or were mediated by a third variable. It was hypothesized that greater social media use would predict greater psychological distress and a worse academic performance. The findings showed that there was a significant positive association between high SMU and higher psychological distress among medical students. However, structural equation modeling and mediation analysis showed that this relationship was indirectly mediated by students' maladaptive coping style.

These findings supported both H_1 and H_3 and suggest that social media use may act as a maladaptive coping strategy to deal with psychological distress among medical students. Previous studies have reported equivocal findings concerning the impact of social media on mental well-being of youth. The majority of studies in the literature suggest that problematic SMU may negatively impact young individuals' mental health [9, 36, 37]. Based on the present study's findings, the relationship between SMU and psychological distress depended on

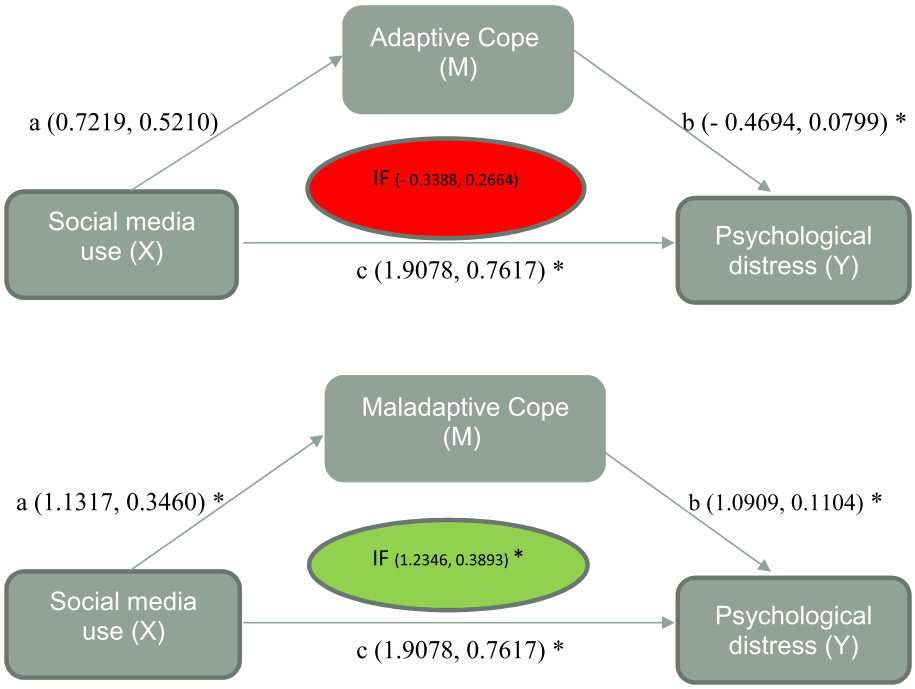

Fig. 2 Mediating effects of coping strategies (adaptive and maladaptive coping) on the relationship between social media use (SMU) and psychological distress among the participants ($N = 398$). *: statistically significant. a: (Unstandardized coefficient and standard error of the association between the independent variable [X] and the mediator variable[M]). b: Unstandardized coefficient and standard error of the association between the mediator variable [M] and the dependent variable [Y]. c: Unstandardized coefficient and standard error of total effect of the independent variable [X] on dependent variable [Y]. IF [Indirect effect]: Unstandardized coefficient and standard error of indirect effect [IF] of the independent variable [X] on dependent variable [Y]

the students' coping style and it appears that those students with high psychological distress use social media as a maladaptive tool to cope with their stresses.

It has been previously suggested that social networking sites are used for different reasons by university students. Although they may be used for maintaining social connectedness and increasing personal knowledge, they may also be used as a coping mechanism [38]. Based on the extant literature, social media use has been labeled as being a 'dual effect phenomenon because there is much debate and polarization regarding the potential benefits and harms of social media use by young individuals [39, 40].

There are still significant gaps in the existing evidence regarding the exact function of social media as a coping strategy. Current perspectives on using social media suggest that it can be used for various types of coping strategy. For example, a specific social media platform can be used for distraction from unpleasant thoughts or can be used to get social support. Social media use depends on the coping goal an individual sets to be achieved. Overall, it appears that the effect of SMU on an individual's psychological state varies based on the general tendency to handle stressors with a set of coping strategies, more specifically, the person's 'dominant coping style' [41].

In the present study, participants reported using adaptive coping more frequently than maladaptive coping strategies. However, medical students with greater depression, anxiety and stress (represented by higher DASS-21 scores) were more likely to use maladaptive coping strategies (than adaptive ones) and spent more time using social media. This difference in using coping strategies and frequency of SMU suggests different applications of social media for normal and psychologically distressed medical students. The most common adaptive coping strategies used by participants were planning, active coping, and acceptance, while the most common maladaptive strategies used were self-distraction, venting, and self-blaming.

Consistent with the present study's findings, it has been reported that while using adaptive coping is more common than maladaptive coping strategies, maladaptive coping behaviors more strongly predict psychological distress among medical students [42–44]. Findings of the study by Neufeld and Malin [43] among a sample of Canadian medical students were similar with respect to the most common maladaptive strategies among medical

students. However, the most common adaptive strategies used by Canadian medical students were active coping, emotional support, and positive reframing, respecively [43].

The present study found no significant association between average daily time spent on social media and academic performance (assessed using GPA scores) and found a borderline non-significant association between psychological distress and academic performance. Nevertheless, the results showed high prevalence of maladaptive behaviors including self-distraction, substance use, behavioral disengagement among those students with higher SMU, all of which can negatively impact academic performance. Some studies have demonstrated decreased academic achievements and increased psychological distress with increasing use of social media by university students [15–18]. An Indian study also found a negative association between using social media and academic performance of medical students [45]. However, findings are not consistent across studies. For example, a study conducted in Saudi Arabia found no relationship between social media use and medical students' academic performance [46]. It has been suggested that problematic use of social media may act as a time-consuming activity that interferes with normal academic functioning [47]. According to some previous studies, SMU is not inherently deleterious to academic advancement. However, if it involves simultaneous participation in multiple activities (multitasking behavior), this can negatively affect students' academic performance [47, 48].

The present study found that just over 12% of medical students used social media for educational purposes. This percentage of academic use is less than that reported from Western countries. According to a meta-analysis, almost 20% of medical students use social media for academic purposes, but most of the included studies were from Western countries [49].

As expected, depression, anxiety and stress emotional states were common among Iranian medical students. More than 40% of the sample of clinical medical students reported depression and more than one-third reported stress and/or anxiety. Several previous studies have reported high levels of psychological distress during clinical rotations where students have to adapt to stringent demands of hospitals [6]. It has been shown that high rates of anxiety and depression can affect medical students' empathy, professional behaviors, and performance as a physician [50].

The potentially dual relationship between SMU and students' psychological state has a variety of implications. First, these findings suggest that proper and beneficial use of social media by medical students requires learning to adopt appropriate problem-focused coping strategies during emotional crises and distressing conditions. If not, social media could be used as a maladaptive coping tool that may reduce stress in the short-term but cause adverse mental health consequences in the long-term. Therefore, education of university students in practicing adaptive coping skills may help to prevent potential adverse mental health consequences associated with maladaptive coping strategies.

Another interesting observation in the present study data was that high SMU was particularly associated with increased substance use and behavioral disengagement, both of which are emotion-focused coping strategies. Use of such strategies could lead students to not engaging properly with their academic studies (e.g., poor class attendance) and decreased motivation to reach set goals which negatively impact academic performance [51]. Therefore, it is recommended that university educational systems monitor students with poor academic performance with regard to aforementioned maladaptive strategies through periodic mental health counselling.

One interesting field for future research is to examine which specific social media platforms are more commonly used by students who are facing stressful life conditions and are using social media as a maladaptive coping tool. Moreover, it is worth investigating whether highly visited social media platforms by students differ during normal conditions and during emotional disturbances.

There are some limitations to the present study. The research was carried out at a single university with a relatively small sample, and the target population may not be representative of all Iranian medical students. Also, the study design was cross-sectional, relying on the self-report data with a single assessment of perceived distress one week before the survey. Participants were not evaluated for problematic social media use and only data on the average daily time spent on social networking sites was collected. Moreover, the present study did not assess the passive or proactive nature of SMU among participants. It should also be noted that the study was conducted during 2022, which can be considered as a post COVID-19 pandemic period. It has been shown that assessment of academic performance of university students was affected by the pandemic during recent years [52], therefore, there is a possibility that the GPAs of the present study participants may have been affected by the pandemic. While mediation analysis provides supporting evidence on the effect of social media use on students' psychological distress, causality can only be confirmed by appropriate longitudinal study designs.

Conclusion

The present study provides more support on the potential coping role of SMU in its relationship with psychological distress among medical students. The findings suggest empowering students to adopt and foster appropriate active coping strategies which could help them to enhance resilience against life stressors and ameliorate potential long-term mental health consequences associated with maladaptive approaches. Further studies focusing on the patterns of social media use are needed to achieve greater clarity with regard to implications of social media use on medical students' mental health.

Abbreviations

GFI	Goodness of fit index
CFI	Comparative fit index
CMIN/DF	Minimum discrepancy function divided by degrees of freedom
SRMR	Standardized root mean square residual
RMSEA	Root mean square error of approximation

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Authors' contributions

RS conceived the presented idea, reviewed the literature and prepared the primary manuscript. AR contributed in the study design, data gathering and analysis. AA contributed in SEM analysis and visualization of the results. MDG contributed in reviewing and writing drafts and critically appraising the manuscript. All the authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated and/or analyzed during the present study are not publicly available due to due to institutional regulations and privacy restrictions but are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The protocol was approved by the Shiraz University's Ethics Committee (IR.SUMS.MED.REC.1401.228). All methods were carried out in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. Stallman HM. Psychological distress in university students: A comparison with general population data. Aust Psychol. 2010;45(4):249–57. https://doi.org/10.1080/00050067.2010.482109.
2. Mofatteh M. Risk factors associated with stress, anxiety, and depression among university undergraduate students. AIMS Public Health. 2020;8(1):36–65. https://doi.org/10.3934/publichealth.2021004.
3. Hershner SD, Chervin RD. Causes and consequences of sleepiness among college students. Nat Sci Sleep. 2014;6:73–84. https://doi.org/10.2147/NSS.S62907.
4. Bedewy D, Gabriel A. Examining perceptions of academic stress and its sources among university students: The Perception of Academic Stress Scale. Health Psychol Open. 2015;2(2):2055102915596714. https://doi.org/10.1177/2055102915596714.
5. Gusy B, Lesener T, Wolter C. Time pressure and health-related loss of productivity in university students: The mediating role of exhaustion. Front Public Health. 2021;9: 653440. https://doi.org/10.3389/fpubh.2021.653440.
6. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. Acad Med. 2006; 81(4):354–73. https://doi.org/10.1097/00001888-200604000-00009.
7. Rotenstein LS, Ramos MA, Torre M, Segal JB, Peluso MJ, Guille C, Sen S, Mata DA. Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: A systematic review and meta-analysis. JAMA. 2016;316(21):2214–36. https://doi.org/10.1001/jama.2016.17324.
8. Quek TT, Tam WW, Tran BX, Zhang M, Zhang Z, Ho CS, Ho RC. The global prevalence of anxiety among medical students: A meta-analysis. Int J Environ Res Public Health. 2019;16(15):2735. https://doi.org/10.3390/ijerph16152735.
9. Karim F, Oyewande AA, Abdalla LF, Chaudhry Ehsanullah R, Khan S. Social media use and its connection to mental health: A systematic review. Cureus. 2020;12(6): e8627. https://doi.org/10.7759/cureus.8627.
10. Riehm KE, Feder KA, Tormohlen KN, Crum RM, Young AS, Green KM, Pacek LR, La Flair LN, Mojtabai R. Associations between time spent using social media and internalizing and externalizing problems among US youth. JAMA Psychiat. 2019;76(12):1266–73. https://doi.org/10.1001/jamapsychiatry.2019.2325.
11. Twenge JM, Martin GN, Campbell WK. Decreases in psychological well-being among American adolescents after 2012 and links to screen time during the rise of smartphone technology. Emotion. 2018;18(6):765–80. https://doi.org/10.1037/emo0000403.
12. Keles B, McCrae N, Grealish A. A systematic review: the influence of social media on depression, anxiety and psychological distress in adolescents. Int J Adolesc Youth. 2020;25(1):79–93. https://doi.org/10.1080/02673843.2019.1590851.
13. Naslund JA, Bondre A, Torous J, Aschbrenner KA. Social media and mental health: benefits, risks, and opportunities for research and practice. J Technol Behav Sci. 2020;5(3):245–57. https://doi.org/10.1007/s41347-020-00134-x.
14. Orben A, Przybylski AK. The association between adolescent well-being and digital technology use. Nat Hum Behav. 2019;3(2):173–82. https://doi.org/10.1038/s41562-018-0506-1.
15. Junco R, Heiberger G, Loken E. The effect of Twitter on college student engagement and grades. J Comput Assist Learn. 2011;27(2):119–32. https://doi.org/10.1111/j.1365-2729.2010.00387.x.
16. Gabre H, Kumar G. The effects of perceived stress and Facebook on accounting students' academic performance. Account Finance Res. 2012;1(2):87. https://doi.org/10.5430/afr.v1n2p87.

17. Abi-Jaoude E, Naylor KT, Pignatiello A. Smartphones, social media use and youth mental health. CMAJ. 2020;192(6):E136–41. https://doi.org/10.1503/cmaj.190434.
18. van der Schuur WA, Baumgartner SE, Sumter SR, et al. The consequences of media multitasking for youth: A review. Comput Human Behav. 2015;53:204–15. https://doi.org/10.1016/j.chb.2015.06.03.
19. Giunchiglia F, Zeni M, Gobbi E, Bignotti E, Bison I. Mobile social media usage and academic performance. Comput Human Behav. 2018;82:177–85. https://doi.org/10.1016/j.chb.2017.12.041.
20. Al-Rahmi, W., Othman, M. The impact of social media use on academic performance among university students: A pilot study. J. Inf. Syst. Res. Innov. 2013, 4, 1–10. Retrieved from: http://seminar.utmspace.edu.my/jisri
21. Freire C, Ferradás MDM, Regueiro B, Rodríguez S, Valle A, Núñez JC. Coping strategies and self-efficacy in university students: a person-centered approach. Front Psychol. 2020;11:841. https://doi.org/10.3389/fpsyg.2020.00841.
22. Berjot S, Gillet N. Stress and coping with discrimination and stigmatization. Front Psychol. 2011;2:33. https://doi.org/10.3389/fpsyg.2011.00033.
23. Finset A, Steine S, Haugli L, Steen E, Lærum E. The Brief Approach/Avoidance Coping Questionnaire: Development and validation. Psychol Health Med. 2002;7(1):75–85. https://doi.org/10.1080/13548500120101577.
24. Folkman S, Lazarus RS. Coping as a mediator of emotion. J Pers Soc Psychol. 1988;54(3):466–75. https://doi.org/10.1037/0022-3514.54.3.466.
25. Allen MT. Explorations of avoidance and approach coping and perceived stress with a computer-based avatar task: Detrimental effects of resignation and withdrawal. Peer J. 2021;9: e11265. https://doi.org/10.7717/peerj.11265.
26. Stallman HM, Lipson SK, Zhou S, Eisenberg D. How do university students cope? An exploration of the health theory of coping in a US sample. J Am Coll Health. 2022;70(4):1179–85. https://doi.org/10.1080/07448481.2020.1789149.
27. Poorolajal J, Ghaleiha A, Darvishi N, Daryaei S, Panahi S. The prevalence of psychiatric distress and associated risk factors among college students using GHQ-28 Questionnaire. Iran J Public Health. 2017; 46(7):957–963. Available at: http://ijph.tums.ac.ir
28. Nieuwenhuijsen K, de Boer AG, Verbeek JH, Blonk RW, van Dijk FJ. The Depression Anxiety Stress Scales (DASS): Detecting anxiety disorder and depression in employees absent from work because of mental health problems. Occup Environ Med. 2003; 60 Suppl 1(Suppl 1):i77–82. https://doi.org/10.1136/oem.60.suppl_1.i77.
29. Zanon C, Brenner RE, Baptista MN, Vogel DL, Rubin M, Al-Darmaki FR, et al. Examining the dimensionality, reliability, and invariance of the Depression, Anxiety, and Stress Scale-21 (DASS-21) across eight countries. Assessment. 2021;28(6):1531–44. https://doi.org/10.1177/1073191119887449.
30. Kakemam E, Navvabi E, Albelbeisi AH, Saeedikia F, Rouhi A, Majidi S. Psychometric properties of the Persian version of Depression Anxiety Stress Scale-21 Items (DASS-21) in a sample of health professionals: A cross-sectional study. BMC Health Serv Res. 2022;22(1):111. https://doi.org/10.1186/s12913-022-07514-4.
31. Asghari A, Saed F, Dibajnia P. Psychometric properties of the Depression Anxiety Stress Scales-21 (DASS-21) in a non-clinical Iranian sample. Int J Psychol. 2008;2(2):82–102.
32. Ashktorab T, Baghcheghi N, Seyedfatemi N, Baghestani A. Psychometric parameters of the Persian version of the Brief COPE among wives of patients under hemodialysis. Med J Islam Repub Iran. 2017;31:20. https://doi.org/10.18869/mjiri.31.20.
33. Kasi PM, Naqvi HA, Afghan AK, Khawar T, Khan FH, Khan UZ, Khuwaja UB, Kiani J, Khan HM. Coping styles in patients with anxiety and depression. ISRN Psychiatry. 2012;2012: 128672. https://doi.org/10.5402/2012/128672.
34. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: a regression-based approach. New York: Guilford Press; 2017.
35. Preacher KJ, Hayes AF. SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behav Res Methods Instrum Comput. 2004;36(4):717–31. https://doi.org/10.3758/bf03206553.
36. Beyens I, Pouwels JL, van Driel II, Keijsers L, Valkenburg PM. Social media use and adolescents' well-being: developing a typology of person-specific effect patterns. Communic Res. 2024;51:691–716. https://doi.org/10.1177/00936502211038196.
37. Ulvi O, Karamehic-Muratovic A, Baghbanzadeh M, Bashir A, Smith J, Haque U. Social media use and mental health: a global analysis. Epidemiologia. 2022;3(1):11–25. https://doi.org/10.3390/epidemiologia3010002.
38. Vorderer P, Krömer N, Schneider FM. Permanently online–permanently connected: explorations into university students' use of social media and mobile smart devices. Comp Hum Behav. 2016;63:694–703. https://doi.org/10.1016/j.chb.2016.05.085.
39. Best P, Manktelow R, Taylor B. Online communication, social media and adolescent wellbeing: A systematic narrative review. Child Youth Serv Rev. 2014;41:27–36. https://doi.org/10.1016/j.childyouth.2014.03.001.
40. Wolfers LN, Schneider FM. Using media for coping: a scoping review. Communic Res. 2021;48(8):1210–34. https://doi.org/10.1177/0093650220939778.
41. Li D, Zhang W, Li X, Zhou Y, Zhao L, Wang Y. Stressful life events and adolescent Internet addiction: The mediating role of psychological needs satisfaction and the moderating role of coping style. Comput Human Behav. 2016;63:408–15. https://doi.org/10.1016/j.chb.2016.05.070.
42. Arif NMNA, Roslan NS, Ismail SB, Nayak RD, Jamian MR, Mohamad Ali Roshidi AS, Edward TC, Kamal MA, Mohd Amin MM, Shaari S, Shaharudin Basri MF. Prevalence and associated factors of psychological distress and burnout among medical students: findings from two campuses. Int J Environ Res Public Health. 2021; 18(16):8446. https://doi.org/10.3390/ijerph18168446.
43. Neufeld A, Malin G. How medical students cope with stress: a cross-sectional look at strategies and their sociodemographic antecedents. BMC Med Educ. 2021;21(1):299. https://doi.org/10.1186/s12909-021-02734-4.
44. Zhu Y, Zuo T, Lai Y, Zhao S, Qu B. The associations between coping strategies, psychological health, and career indecision among medical students: a cross-sectional study in China. BMC Med Educ. 2021;21(1):334. https://doi.org/10.1186/s12909-021-02781-x.
45. Bhandarkar AM, Pandey AK, Nayak R, Pujary K, Kumar A. Impact of social media on the academic performance of undergraduate medical students. Med J Armed Forces India. 2021;77(Suppl 1):S37–41. https://doi.org/10.1016/j.mjafi.2020.10.021.
46. AlFaris E, Irfan F, Ponnamperuma G, Jamal A, Van der Vleuten C, Al Maflehi N, Al-Qeas S, Alenezi A, Alrowaished M, Alsalman R, Ahmed AMA. The pattern of social media use and its association with academic performance among medical students. Med Teach. 2018;40(sup1):S77–82. https://doi.org/10.1080/0142159X.2018.1465536.
47. Karpinski AC, Kirschner PA, Ozer I, Mellott JA, Ochwo P. An exploration of social networking site use, multitasking, and academic performance among United States and European university students. Comput Hum Behav. 2012;29:1182–92. https://doi.org/10.1016/j.chb.2012.10.011.
48. Lau WW. Effects of social media usage and social media multitasking on the academic performance of university students. Comput Hum Behav. 2017;68:286–91. https://doi.org/10.1016/j.chb.2016.11.043.
49. Guraya SY. The usage of social networking sites by medical students for educational purposes: A meta-analysis and systematic review. N Am J Med Sci. 2016;8:268–78. https://doi.org/10.4103/1947-2714.187131.
50. Gold JA, Hu X, Huang G, Li WZ, Wu YF, Gao S, Liu ZN, Trockel M, Li WZ, Wu YF, Gao S, Liu ZN, Rohrbaugh RM, Wilkins KM. Medical student depression and its correlates across three international medical schools. World J Psychiatry. 2019;9(4):65–77. https://doi.org/10.5498/wjp.v9.i4.65.
51. Bosun A, Kalinovic R, Munteanu C, Pascariu AC, Vlad G, Enatescu VR. Stress sources and coping strategies in medicine students. Eur Psychiatry. 2023;66(Suppl 1):S894. https://doi.org/10.1192/j.eurpsy.2023.1892.
52. Vicario CM, Mucciardi M, Perconti P, Lucifora C, Nitsche MA, Avenanti A. The impact of the COVID-19 pandemic on academic performance: a comparative analysis of face-to face and online assessment. Front Psychol. 2024;14:1299136. https://doi.org/10.3389/fpsyg.2023.1299136.

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