

The Relationship Between Social Media Use and Negative Emotions Among Chinese Medical College Students: The Mediating Role of Fear of Missing Out and the Moderating Role of Resilience

Sijian Chen^{1,2}, Honghe Li¹, Lihong Pang³, Deliang Wen¹

¹Institute for International Health Professions Education and Research, China Medical University, Shenyang, People's Republic of China; ²School of Nursing, China Medical University, Shenyang, People's Republic of China; ³School of Nursing, Qiqihar Medical University, Qiqihar, People's Republic of China

Correspondence: Deliang Wen, Institute for International Health Professions Education and Research, China Medical University, No. 77 Puhe Road, Shenyang, Liaoning, 110122, People's Republic of China, Email dlwen@cmu.edu.cn

Objective: This study aimed to examine the mediating role of fear of missing out (FoMO) and the moderating role of resilience in the association between social media use and negative emotions among medical college students in China during the COVID-19 pandemic.

Participants and Methods: A cross-sectional study design was conducted, medical college students from Qiqihar Medical University, China participated in the study. A total of 470 medical college students were recruited voluntarily to complete questionnaires on social media use, FoMO, resilience, and negative emotions.

Results: Social media use was positively associated with FoMO and negative emotions among medical students ($p < 0.01$). The total effect of social media use on negative emotions was significant ($\beta = 1.101$, $SE = 0.079$, $p < 0.001$). Social media use had no significant direct effect on negative emotions ($\beta = 0.168$, $SE = 0.096$, $p > 0.05$), but it had an indirect effect on negative emotions via mediation of FoMO ($\beta = 0.933$, $SE = 0.106$, 95% CI: 0.731 to 1.149). Moreover, resilience had a significant moderating effect on the relationship between FoMO and negative emotions ($\beta = -0.021$, $SE = 0.005$, 95% CI: -0.032 to -0.012). FoMO had a significant positive predictive effect on negative emotions at both levels of resilience (low resilience individuals: $\beta = 1.079$, $SE = 0.076$, $p < 0.001$; high resilience individuals: $\beta = 0.212$, $SE = 0.094$, $p < 0.05$).

Conclusion: Social media use and FoMO may be risk factors for increased negative emotions, and resilience should be considered in prevention and intervention strategies designed to mitigate negative emotions among medical college students.

Keywords: social media use, negative emotions, fear of missing out, resilience, COVID-19

Introduction

Negative emotions are a variety of painful and unpleasant experiences that individuals perceive, with the most common negative emotions being depression, anxiety, and stress.¹ Medical college students are usually still maturing physically and psychologically, and they are more likely to experience negative emotions such as anxiety, depression, and psychological distress due to the highly specialized and academically challenging medical profession and current intense employment competitiveness.^{2,3} The coronavirus disease 2019 (COVID-19) epidemic has spread to almost all countries and regions of the world. Countries around the world urged the public to take responsive care, including hand washing, wearing masks, maintaining physical distance, and avoiding large gatherings and assemblies.⁴ Reducing the mixing of susceptible and infectious individuals by early ascertainment of cases or reduction of contact is one of the most important strategies.⁵ Nonetheless, during the COVID-19 pandemic, these stringent measures (eg, lockdowns) not only caused economic consequences,⁶ but also affected individual lifestyles and mental health.⁷ During the COVID-19 pandemic, individuals utilized social media much more frequently to remain up to date with recent health-related information.^{8,9} The majority of Chinese colleges implemented policies requiring students to minimize

unnecessary mobility, which has prompted college students to turn to use social media to keep connected and informed.¹⁰ Meanwhile, some colleges have implemented online modes of education to sustain education.¹¹ Drastic changes in the lifestyles and learning styles of students during major public health emergencies may increase the incidence of negative emotions such as anxiety and depression^{12,13} and negatively affect physical and mental health, well-being, and academic performance.⁷ Additionally, the prolonged presence of negative emotions can easily trigger individual physical and mental disorders^{14,15} and lead to emotional outbursts that can have negative consequences (eg, suicidal behavior).¹⁶ The study of negative emotions in medical college students can be used to provide support and assistance to this population, and contribute to improving the medical education and training system to create a learning environment that is more conducive to the physical and mental health of medical college students. Therefore, it is crucial to investigate the mechanisms underlying negative emotions in medical college students during the COVID-19 pandemic.

Social Media Use and Negative Emotions

While numerous factors can contribute to negative emotions,¹⁷ there is increasing interest in the potential effects of social media use on mental health. Social media, which can be defined as “Internet-based applications that permit the creation and exchange of user-generated content”,¹⁸ have become an integral part of connecting with friends and family, sharing personal content, and gaining access to news and entertainment.^{19,20} According to studies, the frequency with which individuals use social media can have a negative impact on their self-esteem and well-being.^{21,22} Individuals are motivated to maintain a positive self-presentation on social media; however, continuous exposure to positive content posted by others may result in the distortion of perception, lack of control, and frustration in social comparisons.^{22–24} Furthermore, for those with high narcissistic personality scores and low self-esteem,²⁵ this can result in negative emotions such as envy and depression. In addition, in response to the COVID-19 pandemic, China implemented strict policies restricting public gatherings and events. Due to this disease control approach (eg, spatial distance, social distance), individuals relied heavily on media, and social media in particular (eg, Weibo and WeChat), to keep up with the latest news and stay in touch.^{8–10} Compared to traditional media, social media has played many positive roles in information exchange during the COVID-19 pandemic, including spreading health-related advice, improving interpersonal connectivity, providing psychological first aid,²⁶ and showcasing public attitudes, perception of the disease, and sentiments toward governments and regulatory bodies;²⁷ however, they also contributed to the rapid spread of misinformation and rumors, causing confusion and panic among audiences.²⁸ Using social media, young adults are more likely to interact with disaster-related reports.^{29,30} According to the Differential Susceptibility to Media Effects Model (DSMM),³¹ media use influences the cognitive, emotional, physiological, and behavioral outcomes of the audience, which in turn influences the audience’s personality, development, and social variables, forming a recursive loop. Disaster coverage in media may induce adverse physical and mental reactions in audiences.³² The indispensability and complexity of social media may exacerbate the adverse mental effects of exposure to disasters.

Prior research has focused on the direct relationship between social media use and negative emotions among college students or students pursuing a single healthcare specialization.^{33,34} However, few studies have focused on a varied group of medical-related students in the medical education setting at medical colleges. As a result of disease control measures and the need to communicate and access health information, the frequency and patterns of social media use among healthcare students have changed significantly during the COVID-19 pandemic;^{35,36} therefore, further research is necessary to determine the relationship between social media use and negative emotions among medical college students.

Fear of Missing Out as a Potential Mediator

In addition to providing information, social media also facilitate communication and social-emotional support. According to the theory of uses and gratifications,³⁷ individuals actively consume, engage with, and participate in media to fulfill their needs and desires. The research of social media usage and gratifications has brought to light a broad range of previously unidentified gratification, including socializing, virtual community, interpersonal utility, reciprocity, expressive information sharing, professional advancement, career opportunities, and psychological support.³⁸ According to the compensatory motivation perspective of self-determination theory,³⁹ individuals with inadequate social connectivity or social-emotional support, in reality, may turn to use social media to compensate for these needs. Although social media

may initially alleviate social-emotional deficits, concomitantly to “real world” issues that remain unaddressed, theoretically it may also lead to more fear of missing out (FoMO)-related thoughts,⁴⁰ as other people might be perceived to be enjoying a more rewarding experience than oneself.^{40,41} A systematic review of short-term abstinence effects across potential behavioral addictions has found that Internet use can increase FoMO levels.⁴²

Even though it is not yet clear whether FoMO causes negative emotions,⁴³ a study using repeated measures designs has found some preliminary support that FoMO drives negative emotions over short (1-week) periods of time.⁴⁴ Furthermore, research indicates that more than half of pharmacy students reported using their smartphones more frequently because of concerns about missing messages and/or alarms and that this problematic smartphone use was associated with insomnia and anxiety.⁴⁵ Although researchers have also demonstrated a positive correlation between social media use and FoMO and mental health problems among Chinese nursing students during the COVID-19 pandemic,³⁶ it is still unclear whether the results can be generalized to the medical college student population following the pandemic as the primary setting for these studies was before the COVID-19 pandemic. Therefore, this study hypothesizes that FoMO may mediate the relationship between social media use and negative emotions during the COVID-19 pandemic.

Resilience as a Potential Moderator

Resilience is an individual characteristic that is both variable and stable, which reflects an individual’s ability to adapt positively to adversity and recover quickly.^{46,47} General resilience processes act as a buffer between stressors and negative emotions.⁴⁸ Compared to others experiencing the same level of stress or adversity, resilience is manifested in superior problem-solving, where the required problem-solving skills include narrative creativity, emotion regulation, and interpersonal collaboration.⁴⁹ Enhancing hope resilience by the narrative Method of Ordering Memory is effective in reducing depression and anxiety, and burnout in participants.⁵⁰ Prior research has also demonstrated that individuals with high levels of resilience are more effective than those with low levels of resilience at regulating and reducing the incidence of their negative emotions.⁴⁸ High levels of resilience are adversely associated with negative emotions,⁵¹ but low levels of resilience may be a primary pathway to negative emotions.⁵² Moreover, empirical research has demonstrated a negative correlation between resilience and negative emotions.⁵³ A study among college students in China during the COVID-19 pandemic has found that resilience and social support co-moderated the relationship between FoMO and depression, anxiety, and stress.⁴⁷ In other words, resilience can mitigate the negative effect of risk factors (eg, FoMO) on negative emotions.

According to the emotion regulation strategies,^{54,55} individuals with insufficient self-regulation and resilience may not be able to mitigate interpersonally based fears and worries, which may conducive to FoMO and negative emotions. Previous research has demonstrated that resilience is vital for alleviating mental problems in individuals.⁵⁶ During the COVID-19 pandemic, college students who require access to outbreak-related information, communication, and social-emotional support may choose to engage with others online via social media.⁵⁷ During this time, college students who have greater resilience might be able to cope effectively with stressors and adversity, whereas those with less resilience may become absorbed in the virtual world of the Internet, leading to a propensity to experience negative emotions.⁵⁸ These findings suggest that resilience may play a different role in the connection between FoMO and negative emotions.

The Present Study

Based on a review of the literature, we aimed to test a model that examines the relationship between social media use and negative emotions among medical college students, as well as its internal mechanisms (ie, FoMO and resilience), during the COVID-19 pandemic, which may contribute to develop intervention and prevention strategies for negative emotions among medical college students. As an integrated model, this study was designed to test the following hypotheses (Figure 1).

H1: Social media use is positively associated with negative emotions among medical college students during the COVID-19 pandemic.

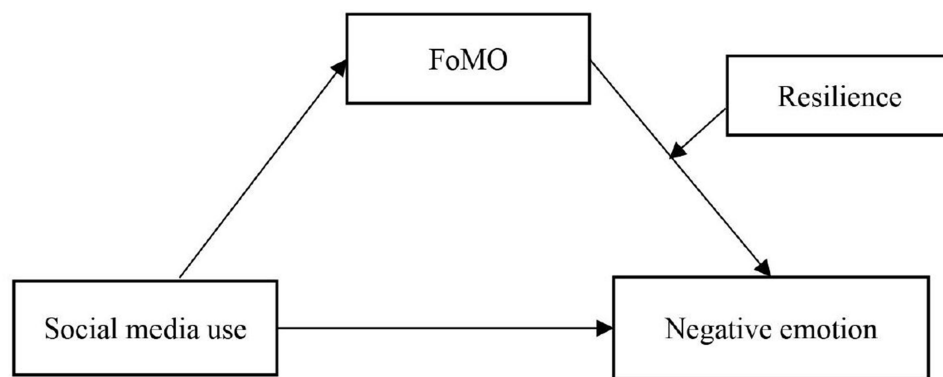


Figure 1 Conceptual model.

Abbreviation: FoMO, fear of missing out.

H2: FoMO partially mediates the relationship between social media use and negative emotions among medical college students.

H3: Resilience moderates the effect of FoMO on negative emotions among medical college students.

Materials and Methods

Participants and Procedures

In this study, we determined the estimated sample size to be 383 through the following formula: $X = Z_{\alpha/2}^2 * p * (1 - p) / MOE^2$, using a power of 80%, a confidence level of 95%, and a margin of error of 5%.^{59,60} Accounting for potential invalid data (ie, up to 15% invalid), the minimum number of participants were determined to be 450. We administered a series of self-reported questionnaires to 470 students of medical college recruited from Qiqihar Medical University, China, between June 2, 2022, and June 15, 2022. A total of 453 students completed the questionnaires, 46 invalid responses were excluded, and 407 (86.60%) were effectively recovered. The sample consisted of 131 male and 276 female students aged 18–26 years (mean: 21.562 ± 2.167 years), including 383 undergraduate and 24 postgraduate students. There were 104 nursing students, 107 clinical medicine students, 62 medical technology students, 97 pharmacy students, and 37 students from other medical-related disciplines. No participants had been suspected, confirmed, or cured of SARS-CoV-2 infections.

The Human Research Ethics Committee of China Medical University approved this study (ref no: 2019079). Before the investigation, all participants were informed that the study would be conducted anonymously and that their information would be kept confidential. All participants entered the study voluntarily with any incentive and could withdraw at any time.

Measures

Social Media Use

Ellison created the Facebook Use Intensity Scale to measure the intensity of individuals' social media use.⁶¹ The scale has good reliability and validity.⁶² It has been utilized in a large body of literature on social media in China and has shown its reliability and validity among young citizens. In view of the different actual use of mainstream social media networks in the Chinese media environment, some similar widely used social media networks, such as “Weibo” and “Qzone”, were used instead of “Facebook” in the studies among the Chinese population. The original questionnaire was modified from “Facebook” to “Weibo” with a Cronbach's α of 0.9.⁶³ Similarly, Cronbach's α for the “Qzone” usage intensity questionnaire was 0.87.⁶⁴ In the questionnaire for this study, “Facebook” was replaced with “social media” based on the processing of previous researchers.⁶⁵ The revised scale contained eight items (eg, “How many days per month do you use social media on average?”) to measure the intensity of social media use. All items were scored on a 5-point Likert scale (1 = completely disagree, 5 = completely agree), with higher scores indicating a higher intensity of social media use. The one-factor CFA model also generated a very good fit for the Social Media Use Intensity Scale: $\chi^2/df = 2.163$, $p < 0.01$, RMSEA = 0.054,

SRMR = 0.028, GFI = 0.978, AGFI = 0.953, NFI = 0.978, RFI = 0.964, IFI = 0.988, TLI = 0.980, CFI = 0.988. Therefore, this scale had good construct validity. Cronbach's α was 0.880 in this study.

FoMO

FoMO was assessed by the FoMO Scale developed by Przybylski et al.⁴¹ Participants from China utilized the scale and demonstrated good reliability and validity.⁶⁶ It consists of ten items (eg, "It bothers me when I miss an opportunity to meet up with friends") that are rated on a 5-point Likert scale (1 = not at all true, 5 = extremely true), with higher scores indicating higher levels of FoMO. In the present study, Cronbach's α was 0.912.

Resilience

Resilience was measured using the Chinese version of the Connor–Davidson Resilience Scale (CD-RISC) by Connor and Davidson.^{67,68} The scale contains 25 items (eg, "able to adapt to change") that evaluate the three dimensions of resilience (tenacity, strength, and optimism). All participants were instructed to respond on a 5-point Likert scale (1 = not true at all, 5 = true nearly all the time). Higher scores indicate higher levels of resilience. Cronbach's α was 0.954 in this study.

Negative Emotions

The 21-item Depression–Anxiety–Stress Scale, which was developed by Lovibond and Lovibond⁶⁹ and subsequently revised in Chinese, was used to examine the negative emotions of medical college students.⁷⁰ It has demonstrated high reliability and validity in studies among Chinese college students.⁷¹ A total of 21 items (eg, "I found it hard to wind down") are categorized into three dimensions (depression, anxiety, and stress). Each item is scored on a 4-point Likert scale (0 = did not apply to me at all, 3 = applied to me very much or most of the time). The participants are required to respond according to the negative emotional symptoms of the past week. Higher total scores reflect higher levels of negative emotional symptoms. Cronbach's α was 0.975 in this study.

Data Analysis

This study used Statistical Package for Social Sciences (SPSS 28.0 SPSS Inc, Armonk, NY, USA) and PROCESS macros (<http://www.afhayes.com>),⁷² specially developed for assessing complex models including mediators and moderators, for data entry and analysis. First, data screening revealed no outliers or missing values. Second, descriptive statistics, correlational analysis, and independent-sample *t*-tests were calculated among the primary variables. Third, we used Model 4 of the PROCESS macro for SPSS to examine the mediating effects of FoMO in the relationship between social media use and negative emotions.⁷³ Fourth, Model 14 of the PROCESS macro for SPSS was applied to test the moderating effects of resilience in the relationship between FoMO and negative emotions. Moreover, sex and age were controlled because prior evidence has shown that they are important confounders in negative emotions.⁷⁴ Based on 5000 bootstrap samples, the bootstrap confidence intervals (CIs) determined whether the effects in Model 4 and 14 were statistically significant. The 95% bias-corrected CIs did not contain zero, indicating that the effect was significant. All study variables were standardized in Model 4 and 14 before data analyses. *P*-values < 0.05 were considered statistically significant.

Results

Descriptive Statistics and Correlational Analysis

The means, SDs, and Pearson correlations for the study variables are shown in Table 1. Social media use was positively associated with FoMO, and negative emotions and negatively associated with resilience. FoMO was correlated positively with negative emotions and negatively with resilience. Resilience was negatively associated with negative emotions. An independent-samples *t*-test revealed no significant differences between men and women for the variables of social media use ($t = -1.886$, $p > 0.05$), FoMO ($t = -1.170$, $p > 0.05$), resilience ($t = 0.231$, $p > 0.05$), and negative emotions ($t = 0.056$, $p > 0.05$). There was a significant negative correlation between age and social media use ($r = -0.477$, $p < 0.001$), FoMO ($r = -0.459$, $p < 0.001$), and negative emotions ($r = -0.433$, $p < 0.001$); however, there was a significant positive correlation between age and resilience ($r = 0.415$, $p < 0.001$).

Table 1 Correlations and Means of Study Variables (N = 407)

Variables	M±SD	1	2	3	4
1. Social media use	22.821±7.478	–			
2. FoMO	20.880±8.188	0.788**	–		
3. Resilience	83.843±20.952	–0.651**	–0.683**	–	
4. Negative emotions	36.936±14.006	0.656**	0.780**	–0.791**	–

Note: ** $p < 0.01$.

Abbreviation: FoMO, fear of missing out.

The Mediating Role of FoMO

We examined the mediating effects of FoMO on the relationship between social media use and negative emotions, with sex and age as covariates, using Model 4 of the PROCESS macro. All data were standardized. The total effect of social media use on negative emotions was significant ($\beta = 1.101$, $SE = 0.079$, $p < 0.001$). Social media use had no significant direct effect on negative emotions ($\beta = 0.168$, $SE = 0.096$, $p > 0.05$), but it had an indirect effect on negative emotions via mediation of FoMO ($\beta = 0.933$, $SE = 0.106$, 95% CI: 0.731 to 1.149). Social media use affected negative emotions only through the mediating effect of FoMO, accounting for 84.782% of the total effect. Thus, FoMO entirely, rather than partially, mediated the relationship between social media use and negative emotions (Figure 2).

The Moderating Effect of Resilience

To investigate the moderating effects of resilience, we employed Model 14 of the PROCESS macro with sex and age as covariates. Resilience had a significant moderating effect on the relationship between FoMO and negative emotions ($\beta = -0.021$, $SE = 0.005$, 95% CI: -0.032 to -0.012). We divided resilience into high ($M + 1SD$) and low ($M - 1SD$) groups in order to better explain its moderating effects on FoMO and negative emotion. Simple slope tests suggested that FoMO had a significant positive predictive effect on negative emotions at both levels of resilience (Figure 3; low resilience individuals: $\beta = 1.079$, $SE = 0.076$, $t = 14.243$, $p < 0.001$; high resilience individuals: $\beta = 0.212$, $SE = 0.094$, $t = 2.256$, $p < 0.05$), indicating that resilience reduced the effects of FoMO on negative emotions.

Discussion

We constructed a mediated moderating model to investigate the potential mechanisms between social media use and negative emotions among medical college students during the COVID-19 pandemic. FoMO was a potential mediator, and resilience was a potential moderator in explaining the relationship.

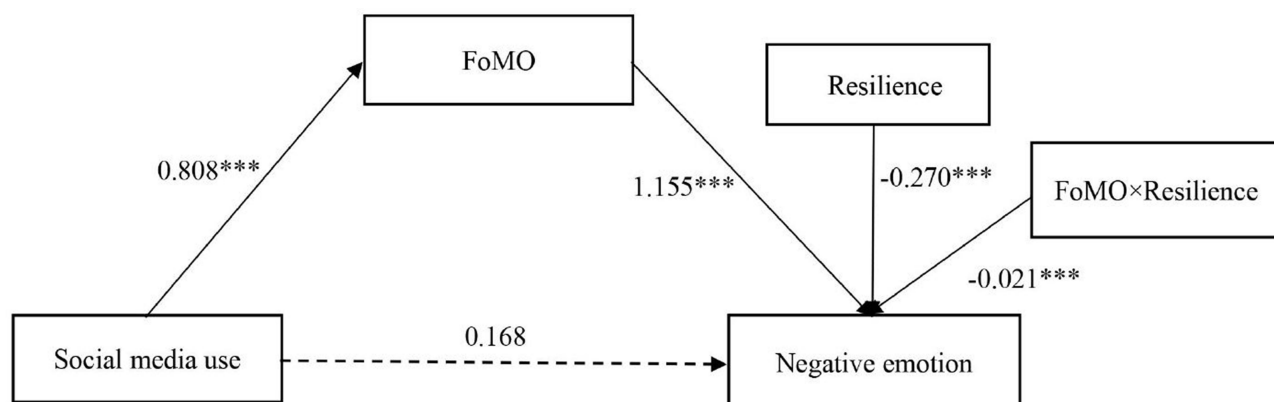


Figure 2 The relationship between social media use and negative emotion.

Note: *** $p < 0.001$.

Abbreviation: FoMO, fear of missing out.

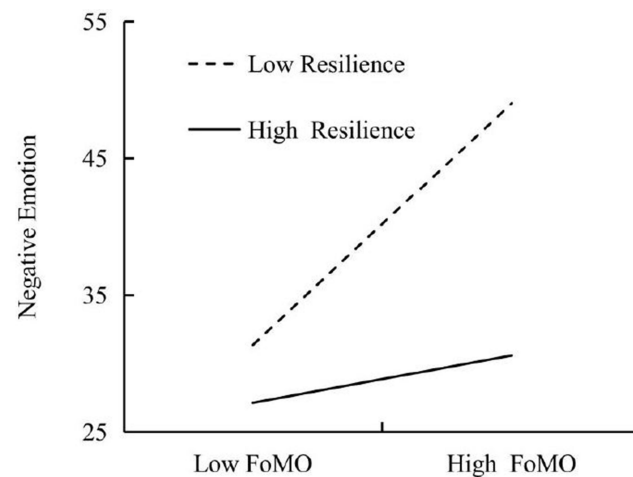


Figure 3 The moderating effect of resilience.
Abbreviation: FoMO, fear of missing out.

Relationship Between Social Media Use and Negative Emotions

Social media use was significantly and positively associated with negative emotions among medical college students during the COVID-19 pandemic, thereby supporting H1. This is in accordance with previous research findings. For instance, some college students' frequent use of social media may lead to depression, anxiety, and post-traumatic stress.⁷⁵ Moreover, increased self-exposure on social media may increase the likelihood of cyberbullying, resulting in negative emotions.⁷⁶ College students have fewer outdoor activities and face-to-face communication opportunities because of the need to prevent the spread of the COVID-19 pandemic. Consequently, utilizing social media may be one of their primary means of temporarily alleviating inner emptiness and loneliness. When social networking sites are used as a primary or secondary method of relieving stress, loneliness, or depression, the use of social networking sites may also become problematic behavior.⁷⁷ Furthermore, our study revealed a complex relationship between social media use and negative emotions.

The Mediating Role of FoMO

The effects of social media use on negative emotions were mediated by FoMO entirely rather than partially. In other words, medical college students who frequently used social media were more likely to experience FoMO, conducive to negative emotions. Even though the results did not support H2, we discovered that FoMO played a more significant role than anticipated in the relationship between social media use and negative emotions, which is consistent with previous findings that FoMO may mediate the relationship between social media use and depression.⁴⁴

FoMO is one predictor of negative emotions, and its adequate mediating role revealed it to be a significant risk factor for negative emotions among medical college students, confirming the findings of previous research on college students in China.^{44,78} On the one hand, FoMO is related to unmet needs for individual social connection,⁴¹ which can conducive to negative emotions (eg, loneliness and depression). Using social media, individuals can receive emotional support and alleviate negative emotions, such as loneliness caused by the COVID-19 pandemic. When college students do not receive adequate emotional support, they seek it via social media. On the other hand, as these students continue to receive emotional support via social media, they will come to expect and anticipate it. Hence, these students are more likely to fear that they will miss out on this immediate emotional support from their friends if they temporarily stop using social media,⁷⁹ which may promote increased levels of FoMO. FoMO could be a source of negative emotions because social media use is associated with FoMO, which is related to negative emotions.⁸⁰ Subsequently, when these students seek more emotional support from social media during the COVID-19 pandemic, they may be afraid of missing out on future social engagement, which may increase the likelihood of negative emotions.

The Moderating Role of Resilience

Consistent with H3, resilience significantly moderated the relationship between FoMO and negative emotions. As previously mentioned, a lack of resilience may be positively associated with stress and depression,⁸¹ thereby making it more likely to result in negative experiences.

Compared to medical college students with high levels of resilience, FoMO predicted negative emotions in those with lower resilience with greater accuracy, indicating that FoMO may exert an increased influence on the emotions of medical college students with lower resilience. In other words, during the COVID-19 pandemic, people with lower resilience are more likely to experience negative emotions due to their FoMO. This also supports the emotion regulation strategies proposed by Min et al,⁵⁴ namely that self-regulation and resilience may alleviate negative emotions. For instance, young individuals with high levels of resilience may be able to overcome the FoMO induced by social media use, in part by talking about the experience with others and having supportive peers;⁸² this alleviates negative emotions. Individuals with high levels of resilience are less likely to experience depression and stress due to their ability to inhibit rumination and FoMO through inhibitory control.^{83,84} These findings are similar to those of previous studies, which demonstrated that individuals with high levels of resilience were less likely to suffer from depression and stress.^{85,86} Medical college students with low levels of resilience may be unable to adopt appropriate coping strategies and eventually demonstrate a propensity for negative emotions.⁸¹ Therefore, whether during the COVID-19 pandemic or in pre-pandemic daily life, the effects of FoMO on negative emotions can be mitigated by resilience.

Limitations and Future Directions

Several limitations should be taken into account when interpreting the findings. First, by the time we collected the data, COVID-19 had been largely contained in China, and some college students had returned to school. These data may differ from other regional data collected during the COVID-19 pandemic. Second, a cross-sectional study cannot determine a causal relationship between social media use and negative emotions. However, when the mediation and moderation models are grounded in theory and are partially supported by prior research, cross-section mediation and moderation can provide valuable information regarding the relationship of variables. Future research should utilize longitudinal designs to test this mediated moderating model. Third, response bias may exist because of self-reporting, though we took measures to alleviate medical college students' concerns about participating, including providing clear instructions, informing them that there were no right or wrong answers, and emphasizing the confidentiality of the results. Future research should incorporate experimental methods for measuring variables or include teacher and peer evaluations. Fourth, the current study attempted to examine the intensity of social media use and negative emotional states, but separate pathways for each domain of negative emotional states, and associations between motivations for social media use and negative emotions were not assessed. Future research should investigate the role of motivations for social media use and the relationships between changes in these motivations and the intensity of social media use and negative emotions, as well as provide a more comprehensive and explicit insight into health issues related to negative emotions. Finally, medical college students are the population measured in the current study. Even though the current study showed similar results to previous studies of medical students, nursing students, and pharmacy students, there is some heterogeneity in the population of students of different specialties. Future research should expand the sample size of different specializations in colleges to examine differences in social media use and negative emotions among students of different specialties.

Despite these limitations, the current study had both theoretical and practical implications. Theoretically, the results of this study supported a relationship between social media use and negative emotions among medical college students, enriching the literature on negative emotions. In addition, an empirical framework is provided by testing a model of mediated moderating effects of FoMO and resilience. These findings may shed light on the underlying mechanisms of the relationship between social media use and negative emotions among medical college students during the COVID-19 pandemic. From a practical standpoint, our findings can aid in designing effective measures to reduce negative emotions among college students. For instance, enhancing students' resilience (eg, seeking support from family members, teachers, and peers) may help improve their adaptability, stimulate positive emotions, and reduce the risk of depression and anxiety. Furthermore, medical educators and practitioners should pay more attention to students with high levels of

FoMO. On the one hand, it's critical to properly understand FoMO by developing a basic perspective understanding of the importance of the concept, its causes, symptoms, negative effects, and how to tackle it dealing with the problem.⁸⁷ On the other hand, checklists, self-talk, expectation management, and protective narratives can be used to develop methods to enhance hopeful resilience,^{50,82} which may help students prevent and cope with high levels of FoMO.

Conclusions

The present study contributes to the literature by conducting a mediated moderating model that provides insight into how social media use can contribute to negative emotions among medical college students during the COVID-19 pandemic. The results demonstrated a positive correlation between social media use and negative emotions among medical college students. FoMO could mediate the relationship between social media use and negative emotions, and resilience could moderate the association between FoMO and negative emotions.

Data Sharing Statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics Statement

The study was approved by the Human Research Ethics Committee of China Medical University. All procedures performed in studies involving human participants were in accordance with the ethical standards and with the Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Acknowledgments

The authors wish to thank all the participants for their efforts in the study.

Funding

This research was supported by the Liaoning Social Science Planning Fund Project [grant number L20AED006] and Research Projects of the School of Nursing of China Medical University [grant number 2022HL-16].

Disclosure

The authors report no conflicts of interest in this work.

References

1. Guo K, Zhang X, Bai S, et al. Assessing social support impact on depression, anxiety, and stress among undergraduate students in Shaanxi province during the COVID-19 pandemic of China. *PLoS One*. 2021;16(7):e0253891. doi:10.1371/journal.pone.0253891
2. Goodwin GM. The overlap between anxiety, depression, and obsessive-compulsive disorder. *Dialogues Clin Neurosci*. 2015;17(3):249–260. doi:10.31887/DCNS.2015.17.3/ggoodwin
3. Hill MR, Goicochea S, Merlo LJ. In their own words: stressors facing medical students in the millennial generation. *Med Educ Online*. 2018;23(1):1530558. doi:10.1080/10872981.2018.1530558
4. Pokhrel S, Chhetri R. A literature review on impact of COVID-19 pandemic on teaching and learning. *Higher Educ Future*. 2021;8(1):133–141. doi:10.1177/2347631120983481
5. López-Valenciano A, Suárez-Iglesias D, Sanchez-Lastra MA, Ayán C. Impact of COVID-19 pandemic on university students' physical activity levels: an early systematic review. *Front Psychol*. 2021;11:624567. doi:10.3389/fpsyg.2020.624567
6. Bonaccorsi G, Pierri F, Cinelli M, et al. Economic and social consequences of human mobility restrictions under COVID-19. *Proc Natl Acad Sci USA*. 2020;117(27):15530–15535. doi:10.1073/pnas.2007658117
7. Aqeel M, Rehna T, Shuja KH, Abbas J. Comparison of students' mental wellbeing, anxiety, depression, and quality of life during COVID-19's full and partial (smart) lockdowns: a follow-up study at a 5-month interval. *Front Psychiatry*. 2022;13:835585. doi:10.3389/fpsyg.2022.835585
8. Limaye RJ, Sauer M, Ali J, et al. Building trust while influencing online COVID-19 content in the social media world. *Lancet Digital Health*. 2020;2(6):e277–e278. doi:10.1016/S2589-7500(20)30084-4
9. Tull MT, Edmonds KA, Scamaldo KM, Richmond JR, Rose JP, Gratz KL. Psychological outcomes associated with stay-at-home orders and the perceived impact of COVID-19 on daily life. *Psychiatry Res*. 2020;289:113098. doi:10.1016/j.psychres.2020.113098
10. Li LZ, Wang S. Prevalence and predictors of general psychiatric disorders and loneliness during COVID-19 in the United Kingdom. *Psychiatry Res*. 2020;291:113267. doi:10.1016/j.psychres.2020.113267

11. Cen X, Sun D, Rong M, et al. The online education mode and reopening plans for Chinese schools during the COVID-19 pandemic: a mini review. *Front Public Health*. 2020;8:566316. doi:10.3389/fpubh.2020.566316
12. Cao W, Fang Z, Hou G, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res*. 2020;287:112934. doi:10.1016/j.psychres.2020.112934
13. Xiang MQ, Tan XM, Sun J, et al. Relationship of physical activity with anxiety and depression symptoms in Chinese college students during the COVID-19 outbreak. *Front Psychol*. 2020;11:582436. doi:10.3389/fpsyg.2020.582436
14. Al Mamun F, Hosen I, Misti JM, Kaggwa MM, Mamun MA. Mental disorders of bangladeshi students during the COVID-19 pandemic: a systematic review. *Psychol Res Behav Manag*. 2021;14:645–654. doi:10.2147/PRBM.S315961
15. Vaccarino V, Shah AJ, Mehta PK, et al. Brain-heart connections in stress and cardiovascular disease: implications for the cardiac patient. *Atherosclerosis*. 2021;328:74–82. doi:10.1016/j.atherosclerosis.2021.05.020
16. Xu Y, Su S, Jiang Z, et al. Prevalence and risk factors of mental health symptoms and suicidal behavior among university students in Wuhan, China during the COVID-19 pandemic. *Front Psychiatry*. 2021;12:695017. doi:10.3389/fpsyg.2021.695017
17. Tan G, Jensen MP, Thornby J, Sloan PA. Negative emotions, pain, and functioning. *Psychol Serv*. 2008;5:26–35. doi:10.1037/1541-1559.5.1.26
18. Kaplan AM, Haenlein M. Users of the world, unite! The challenges and opportunities of social media. *Bus Horiz*. 2010;53(1):59–68. doi:10.1016/j.bushor.2009.09.003
19. Subrahmanyam K, Reich SM, Waechter N, Espinoza G. Online and offline social networks: use of social networking sites by emerging adults. *J Appl Dev Psychol*. 2008;29(6):420–433. doi:10.1016/j.appdev.2008.07.003
20. Cunningham S, Craig D. Creator governance in social media entertainment. *Soc Media Soc*. 2019;5(4):2056305119883428. doi:10.1177/2056305119883428
21. Ilyas Z, Shahed S, Hussain S. An impact of perceived social support on old age well-being mediated by spirituality, self-esteem and ego integrity. *J Relig Health*. 2020;59(6):2715–2732. doi:10.1007/s10943-019-00969-6
22. Lee JK. The effects of social comparison orientation on psychological well-being in social networking sites: serial mediation of perceived social support and self-esteem. *Curr Psychol*. 2022;41(9):6247–6259. doi:10.1007/s12144-020-01114-3
23. Turel O, Brevers D, Bechara A. Time distortion when users at-risk for social media addiction engage in non-social media tasks. *J Psychiatr Res*. 2018;97:84–88. doi:10.1016/j.jpsychires.2017.11.014
24. Xie L, Lee EWJ, Fong VWI, Hui KH, Xin M, Mo PKH. Perceived information distortion about COVID-19 vaccination and addictive social media use among social media users in Hong Kong: the moderating roles of functional literacy and critical literacy. *Int J Environ Res Public Health*. 2022;19(14):8550. doi:10.3390/ijerph19148550
25. Mehdizadeh S. Self-presentation 2.0: narcissism and self-esteem on Facebook. *Cyberpsychol Behav Soc Netw*. 2010;13(4):357–364. doi:10.1089/cyber.2009.0257
26. Merchant RM, Lurie N. Social media and emergency preparedness in response to novel coronavirus. *JAMA*. 2020;323(20):2011–2012. doi:10.1001/jama.2020.4469
27. Zhu Y, Fu KW, Grépin KA, Liang H, Fung ICH. Limited early warnings and public attention to coronavirus disease 2019 in China, January–February, 2020: a longitudinal cohort of randomly sampled weibo users. *Disaster Med Public Health Prep*. 2020;14(5):e24–e27. doi:10.1017/dmp.2020.68
28. Garfin DR, Silver RC, Holman EA. The novel coronavirus (COVID-2019) outbreak: amplification of public health consequences by media exposure. *Health Psychol*. 2020;39(5):355. doi:10.1037/hea0000875
29. Jones NM, Garfin DR, Holman EA, Silver RC. Media use and exposure to graphic content in the week following the Boston marathon bombings. *Am J Community Psychol*. 2016;58(1–2):47–59. doi:10.1002/ajcp.12073
30. Yeung NCY, Lau JTF, Yu NX, et al. Media exposure related to the 2008 Sichuan earthquake predicted probable PTSD among Chinese adolescents in Kunming, China: a longitudinal study. *Psychol Trauma*. 2018;10(2):253–262. doi:10.1037/tra0000121
31. Valkenburg P, Beyens I, Pouwels JL, van Driel II, Keijsers L. Social media use and adolescents' self-esteem: heading for a person-specific media effects paradigm. *J Commun*. 2021;71(1):56–78. doi:10.1093/joc/jqaa039
32. Holman EA, Garfin DR, Lubens P, Silver RC. Media exposure to collective trauma, mental health, and functioning: does it matter what you see? *Clin Psychol Sci*. 2020;8(1):111–124. doi:10.1177/2167702619858300
33. Al-Rabiaah A, Temsah MH, Al-Eyadhy AA, et al. Middle East Respiratory Syndrome-Corona Virus (MERS-CoV) associated stress among medical students at a university teaching hospital in Saudi Arabia. *J Infect Public Health*. 2020;13(5):687–691. doi:10.1016/j.jiph.2020.01.005
34. Punyanunt-Carter NM, Cruz JJDL, Wrench JS. Analyzing college students' social media communication apprehension. *Cyberpsychol Behav Soc Netw*. 2018;21(8):511–515. doi:10.1089/cyber.2018.0098
35. Luo S, Xin M, Wang S, et al. Behavioural intention of receiving COVID-19 vaccination, social media exposures and peer discussions in China. *Epidemiol Infect*. 2021;149:e158. doi:10.1017/S0950268821000947
36. Zhu X, Yang C, Ding L, et al. Social media usage of Chinese nursing students: attitudes, motivations, mental health problems, and self-disclosure. Schoultz M, ed. *PLoS One*. 2022;17(12):e0277674. doi:10.1371/journal.pone.0277674
37. Katz E. Mass communications research and the study of popular culture: an editorial note on a possible future for this journal; 1959:6.
38. Tanrikulu I, Erdur-Baker Ö. Motives behind cyberbullying perpetration: a test of uses and gratifications theory. *J Interpers Violence*. 2021;36(13–14):NP6699–NP6724. doi:10.1177/0886260518819882
39. Deci EL, Ryan RM. The “what” and “why” of goal pursuits: human needs and the self-determination of behavior. *Psychol Inq*. 2000;11(4):227–268. doi:10.1207/S15327965PLI1104_01
40. Akbari M, Seydavi M, Palmieri S, Mansueto G, Caselli G, Spada MM. Fear of missing out (FoMO) and internet use: a comprehensive systematic review and meta-analysis. *J Behav Addict*. 2021;10(4):879–900. doi:10.1556/2006.2021.00083
41. Przybylski AK, Murayama K, DeHaan CR, Gladwell V. Motivational, emotional, and behavioral correlates of fear of missing out. *Comput Human Behav*. 2013;29(4):1841–1848. doi:10.1016/j.chb.2013.02.014
42. Fernandez DP, Kuss DJ, Griffiths MD. Short-term abstinence effects across potential behavioral addictions: a systematic review. *Clin Psychol Rev*. 2020;76:101828. doi:10.1016/j.cpr.2020.101828
43. Elhai JD, Yang H, Montag C. Fear of missing out (FOMO): overview, theoretical underpinnings, and literature review on relations with severity of negative affectivity and problematic technology use. *Braz J Psychiatry*. 2021;43(2):203–209. doi:10.1590/1516-4446-2020-0870

44. Elhai JD, Rozgonjuk D, Liu T, Yang H. Fear of missing out predicts repeated measurements of greater negative affect using experience sampling methodology. *J Affect Disord*. 2020;262:298–303. doi:10.1016/j.jad.2019.11.026
45. Myers E, Drees ET, Cain J. An intervention utilizing the salience principle to reduce pharmacy students' psychological attraction to smartphones. *AJPE*. 2022;86(4):8717. doi:10.5688/ajpe8717
46. Masten AS, Lucke CM, Nelson KM, Stallworthy IC. Resilience in development and psychopathology: multisystem perspectives. *Annu Rev Clin Psychol*. 2021;17(1):521–549. doi:10.1146/annurev-clinpsy-081219-120307
47. Gong Z, Lv Y, Jiao X, Liu J, Sun Y, Qu Q. The relationship between COVID-19-related restrictions and fear of missing out, problematic smartphone use, and mental health in college students: the moderated moderation effect of resilience and social support. *Front Public Health*. 2022;10. doi:10.3389/fpubh.2022.986498
48. Havnen A, Anyan F, Hjemdal O, Solem S, Gurigard Riksfjord M, Hagen K. Resilience moderates negative outcome from stress during the COVID-19 pandemic: a moderated-mediation approach. *Int J Environ Res Public Health*. 2020;17(18):6461. doi:10.3390/ijerph17186461
49. Verger NB, Urbanowicz A, Shankland R, McAloney-Kocaman K. Coping in isolation: predictors of individual and household risks and resilience against the COVID-19 pandemic. *Soc Sci Humanit Open*. 2021;3(1):100123. doi:10.1016/j.ssaho.2021.100123
50. Nash C. Enhancing hopeful resilience regarding depression and anxiety with a narrative method of ordering memory effective in researchers experiencing burnout. *Challenges*. 2022;13(2):28. doi:10.3390/challe13020028
51. Kelifa MO, Yang Y, Carly H, Bo W, Wang P. How adverse childhood experiences relate to subjective wellbeing in college students: the role of resilience and depression. *J Happiness Stud*. 2021;22(5):2103–2123. doi:10.1007/s10902-020-00308-7
52. Israelashvili J. More positive emotions during the COVID-19 pandemic are associated with better resilience, especially for those experiencing more negative emotions. *Front Psychol*. 2021;12:648112. doi:10.3389/fpsyg.2021.648112
53. Mashaphu S, Talatala M, Seape S, Eriksson L, Chiliza B. Mental health, culture and resilience—approaching the COVID-19 pandemic from a South African perspective. *Front Psychiatry*. 2021;12:611108. doi:10.3389/fpsyg.2021.611108
54. Min JA, Yu JJ, Lee CU, Chae JH. Cognitive emotion regulation strategies contributing to resilience in patients with depression and/or anxiety disorders. *Compr Psychiatry*. 2013;54(8):1190–1197. doi:10.1016/j.comppsy.2013.05.008
55. Blanke ES, Bellingier JA, Riediger M, Brose A. When and how to regulate: everyday emotion-regulation strategy use and stressor intensity. *Affect Sci*. 2022;3(1):81–92. doi:10.1007/s42761-021-00087-1
56. Zhang X, Jiang X, Ni P, et al. Association between resilience and burnout of front-line nurses at the peak of the COVID-19 pandemic: positive and negative affect as mediators in Wuhan. *Int J Ment Health Nurs*. 2021;30(4):939–954. doi:10.1111/inm.12847
57. Lim LTS, Regencia ZJG, Dela Cruz JRC, et al. Assessing the effect of the COVID-19 pandemic, shift to online learning, and social media use on the mental health of college students in the Philippines: a mixed-method study protocol. Panada E, ed. *PLoS One*. 2022;17(5):e0267555. doi:10.1371/journal.pone.0267555
58. Ye Z, Yang X, Zeng C, et al. Resilience, social support, and coping as mediators between COVID-19-related stressful experiences and acute stress disorder among college students in China. *Appl Psychol Health Well*. 2020;12(4):1074–1094. doi:10.1111/aphw.12211
59. Population proportion - sample size - select statistical consultants. Available from: <https://select-statistics.co.uk/calculators/sample-size-calculator-population-proportion/>. Accessed April 14, 2023.
60. Soubra R, Hasan I, Ftouni L, Saab A, Shaarani I. Future healthcare providers and professionalism on social media: a cross-sectional study. *BMC Med Ethics*. 2022;23(1):4. doi:10.1186/s12910-022-00742-7
61. Ellison N, Steinfield C, Lampe C. The benefits of Facebook “friends”: exploring the relationship between college students; 2007. Available from: <https://xueshu.baidu.com/usercenter/paper/show?paperid=bb51b1109100acea2e46030f6ec73223>. Accessed September 19, 2022.
62. Gugushvili N, Täht K, Ruiter RAC, Verduyn P. Facebook use intensity and depressive symptoms: a moderated mediation model of problematic Facebook use, age, neuroticism, and extraversion. *BMC Psychol*. 2022;10(1):279. doi:10.1186/s40359-022-00990-7
63. Chan M, Wu X, Hao Y, Xi R, Jin T. Microblogging, online expression, and political efficacy among young Chinese Citizens: the moderating role of information and entertainment needs in the use of Weibo. *Cyberpsychol Behav Soc Netw*. 2012;15(7):345–349. doi:10.1089/cyber.2012.0109
64. Niu GF, Luo YJ, Sun XJ, et al. Qzone use and depression among Chinese adolescents: a moderated mediation model. *J Affect Disord*. 2018;231:58–62. doi:10.1016/j.jad.2018.01.013
65. Mieczkowski H, Lee AY, Hancock JT. Priming effects of social media use scales on well-being outcomes: the influence of intensity and addiction scales on self-reported depression. *Soc Media Soc*. 2020;6(4):2056305120961784. doi:10.1177/2056305120961784
66. Xie X, Wang Y, Wang P, Zhao F, Lei L. Basic psychological needs satisfaction and fear of missing out: friend support moderated the mediating effect of individual relative deprivation. *Psychiatry Res*. 2018;268:223–228. doi:10.1016/j.psychres.2018.07.025
67. Connor KM, Davidson JRT. Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). *Depress Anxiety*. 2003;18(2):76–82. doi:10.1002/da.10113
68. Yu X, Zhang J. Factor analysis and psychometric evaluation of the Connor-Davidson Resilience Scale (CD-RISC) with Chinese people. *Soc Behav Pers*. 2007;35(1):19–30. doi:10.2224/sbp.2007.35.1.19
69. Lovibond PF, Lovibond SH. The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the beck depression and anxiety inventories. *Behav Res Ther*. 1995;33(3):335–343. doi:10.1016/0005-7967(94)00075-U
70. Moussa MT, Lovibond P, Laube R, Megahead HA. Psychometric properties of an Arabic version of the Depression Anxiety Stress Scales (DASS). *Res Soc Work Pract*. 2017;27(3):375–386. doi:10.1177/1049731516662916
71. Gao J, Wang F, Guo S, Hu F. Mental health of nursing students amid coronavirus disease 2019 pandemic. *Front Psychol*. 2021;12:699558. doi:10.3389/fpsyg.2021.699558
72. Hayes AF. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York, NY: The Guilford Press; 2013.
73. Hayes AF, Montoya AK, Rockwood NJ. The analysis of mechanisms and their contingencies: PROCESS versus structural equation modeling. *Australas Mark J*. 2017;25(1):76–81. doi:10.1016/j.ausmj.2017.02.001
74. Yuan K, Zheng YB, Wang YJ, et al. A systematic review and meta-analysis on prevalence of and risk factors associated with depression, anxiety and insomnia in infectious diseases, including COVID-19: a call to action. *Mol Psychiatry*. 2022. doi:10.1038/s41380-022-01638-z
75. 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. doi:10.1016/j.childyouth.2014.03.001

76. Krogh SC. The beautiful and the fit reap the spoils: body image as a condition for the positive effects of electronic media communication on well-being among early adolescents. *Young*. 2022;30(1):97–115. doi:10.1177/11033088211009128
77. Stockdale LA, Coyne SM. Bored and online: reasons for using social media, problematic social networking site use, and behavioral outcomes across the transition from adolescence to emerging adulthood. *J Adolesc*. 2020;79:173–183. doi:10.1016/j.adolescence.2020.01.010
78. Li L, Griffiths MD, Mei S, Niu Z. Fear of missing out and smartphone addiction mediates the relationship between positive and negative affect and sleep quality among Chinese university students. *Front Psychiatry*. 2020;11:877. doi:10.3389/fpsy.2020.00877
79. Liu C, Ma J. Social support through online social networking sites and addiction among college students: the mediating roles of fear of missing out and problematic smartphone use. *Curr Psychol*. 2020;39(6):1892–1899. doi:10.1007/s12144-018-0075-5
80. Bui M, Krishen AS, Anlamlier E, Berezan O. Fear of missing out in the digital age: the role of social media satisfaction and advertising engagement. *Psychol Mark*. 2022;39(4):683–693. doi:10.1002/mar.21611
81. Lin P, Yen J, Lin H, Chou W, Liu T, Ko C. Coping, resilience, and perceived stress in individuals with internet gaming disorder in Taiwan. *Int J Environ Res Public Health*. 2021;18(4):1771. doi:10.3390/ijerph18041771
82. Alutaybi A, Al-Thani D, McAlaney J, Ali R. Combating Fear of Missing Out (FoMO) on social media: the FoMO-R method. *Int J Environ Res Public Health*. 2020;17(17):6128. doi:10.3390/ijerph17176128
83. Dempsey AE, O'Brien KD, Tiamiyu MF, Elhai JD. Fear of missing out (FoMO) and rumination mediate relations between social anxiety and problematic Facebook use. *Addict Behav Rep*. 2019;9:100150. doi:10.1016/j.abrep.2018.100150
84. Wyland CL, Forgas JP. On bad mood and white bears: the effects of mood state on ability to suppress unwanted thoughts. *Cogn Emot*. 2007;21(7):1513–1524. doi:10.1080/02699930601063506
85. Zhang J, Yang Z, Wang X, et al. The relationship between resilience, anxiety and depression among patients with mild symptoms of COVID-19 in China: a cross-sectional study. *J Creat Behav*. 2020;29(21–22):4020–4029. doi:10.1111/jocn.15425
86. To QG, Vandelandotte C, Cope K, et al. The association of resilience with depression, anxiety, stress and physical activity during the COVID-19 pandemic. *BMC Public Health*. 2022;22(1):491. doi:10.1186/s12889-022-12911-9
87. Tanhan F, Özkok HI, TayiZ V. Fear of Missing Out (FoMO): a current review. *Curr Approaches Psychiatry*. 2022;14(1):84–95. doi:10.18863/pgy.942431

Psychology Research and Behavior Management

Dovepress

Publish your work in this journal

Psychology Research and Behavior Management is an international, peer-reviewed, open access journal focusing on the science of psychology and its application in behavior management to develop improved outcomes in the clinical, educational, sports and business arenas. Specific topics covered in the journal include: Neuroscience, memory and decision making; Behavior modification and management; Clinical applications; Business and sports performance management; Social and developmental studies; Animal studies. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/psychology-research-and-behavior-management-journal>