Austin Journal of Multiple Sclerosis & Neuroimmunology

Open Access

Austin Publishing Group

Research Article

The Effect of Problematic Mobile Social Media Usage on Depressive Symptoms of Chinese College Students: Moderating Effect of COVID-19

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Received: January 29, 2022; **Accepted:** February 23, 2022; **Published:** March 02, 2022

Abstract

Background: The lifestyles and mental health of vast numbers of college students were affected by the outbreak of the novel coronavirus disease of 2019 (COVID-19). However, no study has examined the impact of subjective evaluations of exposure to the pandemic on mental health. The current study was conducted during the pandemic and examines the relations between problematic mobile social media usage and depressive symptoms, and the moderating effect of COVID-19.

Methods: A cross-sectional study of Chinese college students was conducted in March and April 2020. In total, 3123 participants were recruited from the Shanghai provinces to complete the online survey. Problematic mobile social media usage was assessed by a Problematic Mobile Social Media Usage Assessment Questionnaire and depressive symptoms were evaluated by the Patient Health Questionnaire-9 (PHQ-9). Results: The results showed that problematic mobile social media usage was positively connected with a high level of depressive symptoms and the influence of COVID-19 had a moderating effect. Specifically, compared with students who were unaffected by COVID-19, those affected showed more severe depressive symptoms. Conclusion: The findings suggested an independent effect of problematic mobile social media usage and the interactive relationship of problematic mobile social media usage. The influence of COVID-19 was significant among Chinese college students.

Keywords: Problematic mobile social media usage; Depressive symptoms; College students; COVID-19 influence

Introduction

The severe coronavirus disease of 2019 (COVID-19) pandemic, as announced by the World Health Organization (WHO), characterizes a unique period of stress [1] and is detrimental to mental health. As of July 2, 2021, there were 182,319,261 confirmed cases of COVID-19, including 3,954,324 deaths globally [2]. A rapid review and meta-analysis showed that the prevalence of psychological stress in the general population was 24.84% [3]. Furthermore, the concomitant depressive symptoms prevalence was 34% among college students during the COVID-19 pandemic around the world [4]. Many individuals, especially college students, faced multiple challenges related to the pandemic [5] which posed a serious threat to mental health, including the fear of being infected in the present or in the future [6,7], threats to physical health [8] and forced social isolation [9,10]. Moreover, an empirical study, that examined changes in major depressive symptoms in Ireland has found that the positive rate of major depressive symptoms in February 2019 (29.8%) was higher than in March and April 2020 (22.8%), during a prolonged stressful event [11].

Meanwhile, a study on influenza pandemics has found that the policy of school closures and mandatory home stays can largely decrease the infection rates [12]. Because of the policy of social isolation, students in China were temporarily barred from entering their campuses to study and stay there, which may have affected the lives and mental health of college students [13]. On the one hand, college students need to learn the coursework and do homework online through laptops, tablets, or smartphones. On the other hand, being worried about the spread of COVID-19, cell phones and computers were frequently used by college students to obtain and exchange information during their non-class time. Consequently, individuals who stayed at home could have engaged in more social media usage during COVID-19 [14]. Gao [15] and his colleagues, who recruited 4872 participants from 31 provinces and autonomous regions in China, found that more than 80% of citizens reported being frequently exposed to social media. Considering that devoted and excessive amounts of time spent on mobile social media are symptoms of problematic usage, plethoric social media use among college students may easily change into problematic mobile social media use during COVID-19 [16].

The relationship of problematic mobile social media usage and depressive symptoms during the COVID-19 pandemic

The COVID-19 pandemic is a prolonged stressful event that increased the levels of depressive symptoms among college students. First, COVID-19 concern (i.e., concern over their personal safety and security) was positively related to depressive symptoms [17]. Depressive symptoms are characterized by a combination of depressive

Citation: Jiang Y. The Effect of Problematic Mobile Social Media Usage on Depressive Symptoms of Chinese College Students: Moderating Effect of COVID-19. Austin J Mult Scler & Neuroimmunol. 2022; 6(1): 1033.

emotional states, including feelings of sadness, hopelessness, and worthlessness [18]. Furthermore, fear or concern at home might be expected to affect the formation of cognitive structures and the loss of control of life, among these college students [19]. Second, because of home isolation, students are required to use social media for classes and examinations. The more time that college students spent staring at a mobile phone or computer screen was significantly positively associated with depressive symptoms [20]. Against this setting, the following hypothesis was proposed:

Hypothesis 1 (H1): Compared with college students who were unaffected by the COVID-19 outbreak, the level of depressive symptoms in those affected will be significantly higher.

Moreover, COVID-19 is a major stressor for college students, because the outbreak was sudden and highly contagious. According to coping style theory, if individuals adopt a negative coping style to deal with a challenging situation, it leads to a decrease in happiness [21]. Students exchanged information about the COVID-19 pandemic and chatted with friends via mobile social networks for emotional support and to reduce uncertainty. Meanwhile, social media can have positive or negative effects on an individual's health. When they get negative information frequently (e.g., the number of new infections, deaths, and the lack of supplies), they fall into a state of self-blame and helplessness because of their inability to change the status quo. Moreover, self-blame has a negative relationship with depressive symptoms during the COVID-19 pandemic [22]. Research by First et al. [23] found that both traditional and social media usage were associated with a higher level of depressive symptoms among US adults during COVID-19. A meta-analysis has found that the more time spent on social network sites, the more individuals will feel loneliness and depressive symptoms [24]. Similarly, Zhong [25] and his colleagues found that the excessive use of social media may lead to depressive symptoms in Chinese people during COVID-19. Summing up the above, hypothesis 2 is proposed:

Hypothesis 2 (H2): Problematic media usage is negatively related to depressive symptoms of college students during COVID-19.

The moderating effect of the influence of COVID-19

Situational factors such as subjective feelings or beliefs may moderate the relations between problematic mobile social media usage and depressive symptoms. In other words, the COVID-19 pandemic had different influences on psychological health and these influences need to be examined. In China, researchers investigated the stress levels and influencing factors of the general population under the COVID-19 quarantine policy and found that compared with the city (Hubei or other provinces) where the participants lived, the self-rated severity of the epidemic in their region was more strongly correlated with their perceived stress [26]. Therefore, perceived stress may be more affected by subjective than objective factors. During COVID-19, the relationship between problematic mobile social media usage and depressive symptoms may be stronger. Analogously, during the 2009 H1N1 epidemic, 176 undergraduate students who were in quarantine and 243 students who were not suspected of being H1N1 positive, were recruited into study. The findings revealed that the quarantined group had a significantly lower ratio of dissatisfaction with control measures than the nonquarantined group did and no significant difference was found between the quarantined and the nonquarantined groups for negative psychological consequences [27]. However, since COVID-19, no study has examined the impact of subjective evaluations of exposure to the pandemic on mental health. In conclusion, Hypothesis 3 is proposed:

Hypothesis 3 (H3): The influence of COVID-19 moderated the relationship between problematic mobile social media usage and depressive symptoms.

In the current investigation, college students are divided into unaffected and affected groups. The levels of problematic mobile social media usage and depressive symptoms are compared in the two groups. Thereafter, the relationship between problematic mobile social media usage and depressive symptoms and the moderating effect of the influence of COVID-19 were explored (Figure 1).

Methods

Participants

During March and April 2020, 3123 participants from Shanghai provinces were recruited to complete the online survey in this study. Participants completed the online survey anonymously in their spare time. The demography of the subjects was as follows: 63.3% were female, 36.7% were men; 29.1% were freshmen, 23.8% were sophomores, 24.3% were juniors, and 22.8% were seniors. Of these students, 71.2% were the only child in their families. Additionally, 47% of fathers and 43% of mothers had a bachelor's degree or above. Questionnaires were created to ascertain whether students' academic performance has been affected by COVID-19. If students reported "yes," they were included in the "affected group," and others were placed in the "unaffected group". Last, 2056 students reported that they were affected by COVID-19, and 1067 students made up the "unaffected group".

Measures

Problematic mobile social media usage: Students reported their problematic mobile social media usage in the Problematic Mobile Social Media Usage Assessment Questionnaire [28]. The questionnaire consisted of 20 items (e.g., when you miss your study or work by using mobile social network refresh or chatting for too long, you often feel regret and guilt). The response options were scored on a 5-point scale, where 1 = totally inconsistent, 2 = inconsistent, 3 = not clear, 4 = consistent, and 5 = totally consistent. The internal consistency reliability was 0.93. The higher the score, the higher the level of problematic mobile social media usage.

Depressive symptoms: Depressive symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9), a self-rating depressive symptoms scale based on the diagnostic and statistical manual of mental disorders (DSM-IV) symptomatic criteria for depressive symptoms. This scale is comprised of nine items rated on a four-point Likert-type scale ranging from 1 = none to 4 = almost every day. A higher total score indicates more depression symptoms. The internal consistency reliability was .89 in the present study.

Procedure

First, descriptive statistics were computed (means, standard deviations, correlations) of all variables. Then, the t-test in SPSS 26.0 was used to investigate problematic social network usage and depressive symptoms in both the "affected group" and "unaffected

group.problematic mobile social media usage". Thereafter, the SEM analyses in Mplus 8.0 were used with full-information maximum likelihood estimation to examine the hypothesized relations between, whether it was affected by COVID-19 and depressive symptoms. Thus, the first step was to test the measurement model to assess how well its indicators measure the underlying variable, depressive symptoms. The model fit includes chi-square, compare fit index (CFI), the standardized root mean square residual (SRMR) error and the root mean square error of approximation (RMSEA). A CFI value >0.90, SRMR value of ≤0.08, RMSE value within the range of .05 to .08 would indicate a good fit [29,30]. Finding the measurement model acceptable allowed the examination of the structure model.

Results

Descriptive analysis

Table 1 presents means, deviations, and the bivariate correlation for the variables involved in this study. Furthermore, the *t*-test was used to evaluate whether there was a significant difference in problematic mobile social media usage and depressive symptoms between the "affected group" and the "unaffected group." The results showed that problematic mobile social media usage was significantly positively correlated with depressive symptoms ($p < 0.01$). Moreover, the level of problematic mobile social media usage and depressive symptoms in the "affected group" was significantly higher than in the "unaffected group" ($p < 0.001$).

Moderation effect analysis

First, the measure model of depressive symptoms was estimated (Figure 2), and the model fit is acceptable. $\chi^2(27) = 888$, $p < 0.001$, CFI = 0.94, RMSEA = 0.1, and SRMR = 0.04 (90% CL = 0.095 to 0.107). Although the RMSEA index was above 0.08, the combination of CFI and SRMR indicated an acceptable model fit. Moreover, other scholars have suggested that a RMSEA value within the range of .08 to .1 would indicate an acceptable model fit [31].

The moderation SEM showed that the model fit index is very good (Figure 2). $\chi^2(50) = 1061.8$, $p < 0.001$, CFI = 0.93, RMSEA = 0.08, and SRMR = 0.04 (90% CL = 0.076 to 0.085). The results indicated that the effect of problematic mobile social media usage on depressive symptoms was significant ($\beta = 0.47$, $p < 0.001$), meaning that as problematic mobile social media usage increased, the level of depressive symptoms increased. Moreover, the interaction term between problematic mobile social media usage and COVID-19 influence was statistically significant, which indicates that the effect of problematic mobile social media usage on depressive symptoms is moderated by COVID-19 influence.

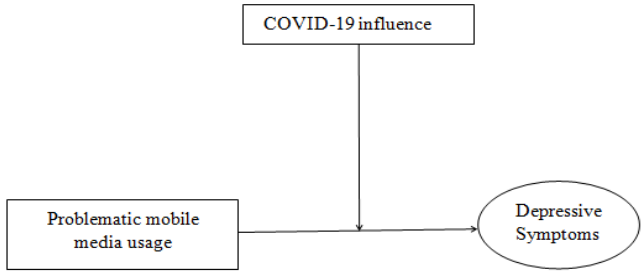

Figure 1: The proposed moderated model.

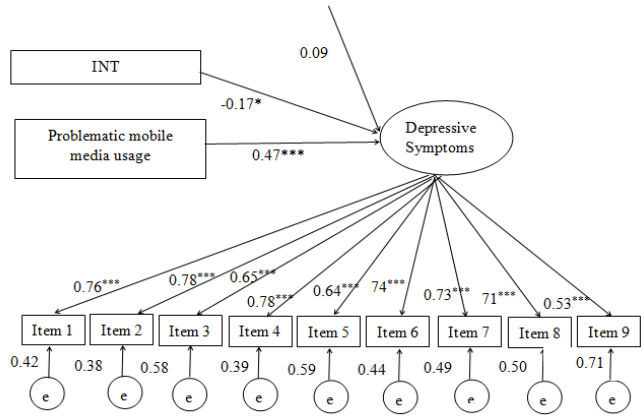

Figure 2: The moderating influence of COVID-19.
INT=Problematic mobile media usage x COVID-19 influence; *p <0.05; **p <0.01; ***p <0.001.

Table 1: Means, standard deviations, bivariate correlations and *t*-test of variables.

Variables	M	SD	1	2	t
Problematic mobile social media usage	2.99	0.73			11.05***
	-2.68	-0.77	-		
Depressive symptoms	0.67	0.52	0.43**	-	8.32***
	-0.51	-0.5			

Note: *p <0.05; **p <0.01; ***p <0.001. The data outside the brackets were the "affected group" (n1=2056), and the data inside the brackets were the "unaffected group" (n2=1067).

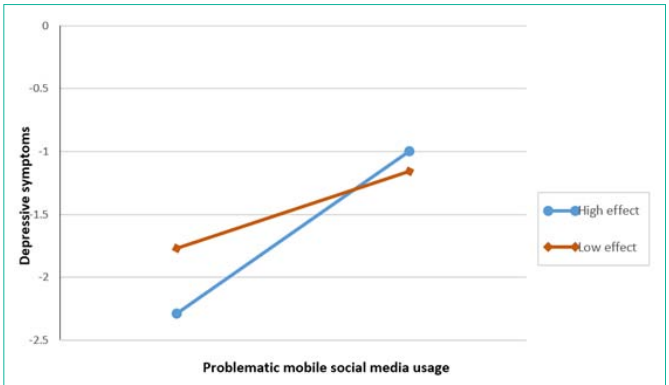

Figure 3: The moderating effect of COVID-19.

Media usage

Social media usage negatively predicted depressive symptoms (simple slope = -0.014, $p < 0.001$). In the "affected group," problematic mobile social media usage negatively predicted depressive symptoms as well (simple slope = -0.017, $p < 0.001$). The simple slopes revealed that the association between problematic mobile social media usage and depressive symptoms was stronger for college students who reported that they were affected by COVID-19 (Figure 3).

Discussion

The current study explored the relationship between problematic mobile social media usage and depressive symptoms and the moderated effect of COVID-19 among college students.

Compared with students who were unaffected by COVID, the

affected students appeared to have significantly higher levels of depressive symptoms, which concurs with previous studies [32]. Additionally, students who were affected by COVID-19 worried excessively about physical health, academic performance, and psychological stress among other aspects. Duan [33] and his colleagues have found that when graduation is affected by the pandemic, it concurrently increases the students' depressive symptoms. In other words, negative cognition was more likely activated in the face of COVID-19; hence, students were vulnerable to depressive symptoms [34]. First, the students affected by COVID-19 may feel more anxious and hopeless when they receive news that friends or a family member have been infected with COVID-19. Furthermore, faced with family and friends infected with COVID-19, these students may be more likely to emphasize their worthlessness. Generally, under stress exposure (COVID-19), individuals' inferences about the meaning of an event regarding their personal characteristics, and attributions about the cause of the event contribute to hopeless and depressive symptoms [35].

The present study found that problematic mobile social media usage was positively correlated with depressive symptoms among college students during COVID-19. Because of the policy of social isolation, college students may spend excessive amounts of time on social media. Prior studies also found that increases in time spent on social media were associated with increases in the level of depressive symptoms [36]. During COVID-19, students were heavily exposed to negative information on social networks, such as a lack of materials for treatment, discrimination, the number of infected people, and so on, which increased depressive symptoms. Furthermore, problematic mobile social media usage such as spending excessive time on social media reduces the time of face-to-face interactions with offline individuals who could support one during COVID-19; this, in turn, relates to depressive symptoms [37].

In support of the current research's hypothesis, the influence of COVID-19 moderated the relationship between problematic mobile social media usage and depressive symptoms among college students. Compared with students who believed that COVID-19 did not influence their lives, the affected individuals were more likely to experience stress. For example, the COVID-related discrimination from overseas media caused stress in college students affected by COVID-19. The stress from discrimination may generate the feeling that there is no place in the world for them and worsens depressive symptoms [38]. Because of worrying about COVID-19, their subjective sleep quality decreased with a rise in the value of depressive symptoms [39].

Several limitations in the current study need to be addressed. First, because the study was cross-sectional, we cannot conclude that problematic social network usage in college students contributes to the development of depressive symptoms. Therefore, the longitudinal study design can strengthen the causal examination for the concerned variables. Second, in our study, the variable of "COVID-19 influence" was taken as a dichotomous variable, and college students could only be divided into "affected group" and "unaffected group." However, the global outbreak of COVID-19 has affected every college student to varying degrees. Future research can be used to explore the relationship between problematic mobile social media usage and the mental health of college students. Finally, there may be other variables that affect depressive symptoms. For example, sleep conditions such as sleep duration, and subjective sleep quality are associated with depressive symptoms [40]. Future research can incorporate sleep quality into the model.

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