Short communication

Social media use in China before and during COVID-19: Preliminary results from an online retrospective survey

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ABSTRACT

Background: More people reported symptoms of stress, anxiety and depression during the outbreak of the coronavirus (COVID-19). They might have increased their social media use during the outbreak of COVID-19 compared to before COVID-19.
Methods: An online retrospective survey was conducted on a total sample of 10,963 participants. Social media use patterns before and during COVID-19, Social media addiction (SMA), and mental health problems (stress, anxiety, and depression) were assessed.
Results: This study found that, compared with before COVID-19, weekly social media use was significantly increased during COVID-19 (from 17.2 to 21.4 h). Nearly 40% of SMA respondents increased their weekly social media use ≥ 3.5 h. The prevalence rate of was 6.8%, and the prevalence rates of moderate or severe stress, anxiety, and depression were 10.8%, 26.4%, and 18.2%, respectively, during COVID-19. Female gender, experiencing moderate or severe stress, and SMA were associated with increased weekly social media use ≥ 3.5 h. Male gender, experiencing moderate or severe stress, anxiety, depression, and increased weekly social media use ≥ 3.5 h were associated with SMA.
Conclusions: This study suggests a significant increase in social media use and a relatively high prevalence rate of SMA in China during COVID-19. Our findings identify factors associated with increased social media use and SMA that could be used to develop psychological interventions to prevent SMA during the COVID-19 epidemic.

1. Introduction

Social media addiction (SMA) has become an important clinical concern, although it is not an officially recognized mental disorder. Excessive use of social media can negatively impact important areas of individuals' lives. Excessively use social media linked to anxiety, depression, self-injurious behavior, suicide risk and suicidal ideation, low levels of self-esteem, low school connectedness, and poor academic performance (Bányai et al., 2017; Espinoza and Juvonen, 2011; Keles et al., 2020; Monacis et al., 2020; Sampasa-Kanyinga et al., 2019; Shafi et al., 2019; Shensa et al., 2017).

The coronavirus (COVID-19) pandemic led to stay-at-home mandates and quarantines to contain the virus (Li et al., 2020). Home quarantines and social distancing have widely increased emotional

distress in society (Gao et al., 2020; Qiu et al., 2020; Wang et al., 2020). Studies have reported a 17–48% prevalence of depression and 23–28% prevalence of anxiety (at least moderate) (Gao et al., 2020; Qiu et al., 2020; Wang et al., 2020).

As easily accessible means to help people seek emotional relief, social media is often overused and over relied upon, leading to a series of adverse consequences, such as SMA (Brand et al., 2016, 2019). Many studies have demonstrated increased consumption of Internet products during COVID-19. According to a report of the China Internet Network Information Center (CNNIC, 2020), Chinese used the Internet for an increase of 3.2 h per week during COVID-19 compared with before COVID-19. However, few studies have specifically examined social media use during COVID-19.

The primary objective of this online retrospective survey was to

assess the impact of COVID-19 on social media use among people from the general population of China by comparing social media use before and during the outbreak of COVID-19. This study also aimed to explore factors related to SMA and changes in social media use.

2. Methods

2.1. Sample, procedure, and participants

The data were collected between May 7, 2020, and August 3, 2020. An Internet-based recruitment method was used in this cross-sectional, retrospective online survey study. Participants were enrolled through Internet-based advertisements, such as websites and social media. The participants were 18 years of age or older and Chinese literate. All of the participants were informed about the purpose, procedures and measurements, potential risks and possible benefits of the study before the survey. They were also informed that all of the participants' confidentiality would be protected in this anonymous survey research. Electronic informed consent was required from all of the respondents for participation in the study. After obtaining electronic informed consent, eligible participants were asked to complete a questionnaire, which mainly covered issues related to addictive behaviors (the behaviors of social media use and Internet game playing, smoking behaviors, and drinking behaviors, reported elsewhere). Participants could withdraw from the study at any time but were required to answer all of the questions if they chose to finish the research. A total of 10,963 questionnaires were collected with no missing data. The study protocol was approved by the Ethics Committee of Sir Run Shaw Hospital, an affiliate of Zhejiang University, Medical College (No. 20200505-33).

2.2. Measures

2.2.1. Socio-demographics

Socio-demographic variables included gender, age, degree of education, employment status, marital status, and region.

2.2.2. Social media use

The variable of weekly social media use assessed the time invested using social media per week before and during the outbreak of COVID-19. Weekly social media use was calculated as (daily using time spent on a working day $\times$ 5) + (daily using time spent on a weekend day $\times$ 2). The variable of changed weekly social media use was calculated as the time of weekly social media use during the outbreak of COVID-19 - the time before COVID-19.

2.2.3. Social media addiction

The Bergen Social Media Addiction Scale (BSMAS) was administered to assess social media addiction (SMA) within a 12-month period (Andreassen et al., 2017). The BSMAS comprises 6 items on a 5-point scale from "1 = very rarely" to "5 = very often". The total score ranged between 6 and 30 points. The cutoff score was suggested to be 24 points (Luo et al., 2021). The Chinese version of the BSMAS showed good reliability and validity (Leung et al., 2020). For the variable of changed weekly social media use in this study, the Cronbach's alpha was 0.86.

2.2.4. Mental health (depression, anxiety and stress)

The Chinese version of the 21-item Depression Anxiety Stress Scale (DASS–21) was administered to identify signs of anxiety, depression and stress over the previous week (Chan et al., 2012; Lovibond and Lovibond, 1995). The DASS-21 is a self-report instrument consisting of three subscales, and each of the three subscales is comprised of 7 items on a 4-point scale from "0 = I strongly disagree" to "3 = I totally agree". The recommended cutoff scores for conventional severity labels (normal, mild, moderate, severe, extremely severe) are as follows (multiplied by 2): depression: 0–9, 10–13, 14–20, 21–27, and 28+; anxiety: 0–7, 8–9,

10–14, 15–19, and 20+; and stress: 0–14, 15–18, 19–25, 26–33, and 34+. In this study, the Cronbach's alpha values were 0.89 for stress, 0.90 for depression and 0.88 for anxiety.

2.3. Data analysis

First, Demographic and social media use characteristics and metal health were described via descriptive statistics. Demographic information, mental health, and social media use were compared between men and women. The time invested in social media use before and during the outbreak of COVID-19 was also compared. The χ^2 test or the Mann-Whitney U test (for non-normal distribution data) was used.

Second, bivariate and multivariate logistic regression models were used to explore factors (e.g., age, education, occupation, marriage, living area, mental health problems, and weekly social media use before COVID-19) associated with increased social media use (i.e., increased weekly social media use < 3.5 h $= 0$, increased weekly social media use ≥ 3.5 h $= 1$). Bivariate and multivariate logistic regression models were also used to explore factors (e.g., socio-demographic variables, mental health problems, weekly social media use during COVID-19, and increased weekly social media use) associated with SMA (i.e., BSMAS score $< 24 = 0$, BSMAS score $\geq 24 = 1$). Factors with p ≤ 0.1 at the bivariate analysis were included in a multivariate logistic regression model. Statistical analysis was performed using SPSS software (Version 22.0), with p < 0.05.

3. Results

The total sample comprised 10,963 participants. The sample characteristics was shown in Table 1. The prevalence rate of social media addiction during COVID-19 was 6.8%, with men (8.0%) more than women (6.0%). Nearly 40% of the respondents increased their weekly social media use ≥ 3.5 h. The time invested using social media per week before COVID-19 and during COVID-19 in the overall sample increased from 17.2 (SD: 15.41) hours to 21.4 (SD: 18.42) hours. The average time increase in social media use was 4.2 (SD: 9.43) hours. Women showed a greater increase in time of social media use than men. The prevalence rates of moderate or severe stress, anxiety, and depression were 10.8%, 26.4%, and 18.2%, respectively (see Table 1).

The younger adults (aged < 30 years old) showed greater increase in time of social media use than the older adults (aged ≥ 30 years old), with 5.9 (SD: 10.99) hours vs 3.1 (SD: 8.07) hours, $p < 0.001$. There is no significant difference of the prevalence rate of social media addiction between the younger adults (7.3%) and the older adults (6.5%), $\chi^2 = 2.55$, $p = 0.11$. The younger adults showed significant higher prevalence of mental health problems than older adults (i.e., stress: 12.7% vs 9.5%, $\chi^2 = 27.21$, $p < 0.001$; anxiety: 29.7% vs 24.3%, $\chi^2 = 39.20$, $p < 0.001$; depression: 21.6% vs 16.0%, $\chi^2 = 53.59$, $p < 0.001$).

Multivariate logistic regression models revealed that female gender (OR $= 1.29$, $p < 0.001$), age < 30 years old (OR $= 0.59$, $p < 0.001$), and higher stress (OR $= 1.23$, $p = 0.001$) were identified as risk factors ($\chi^2 = 243.79$, $p < 0.001$) to increased weekly social media use. Male gender (OR $= 0.79$, $p = 0.003$), stress (OR $= 2.56$, $p < 0.001$), anxiety (OR $= 1.94$, $p < 0.001$), depression (OR $= 1.82$, $p < 0.001$), and weekly social media use during COVID-19 ≥ 30 h (OR $= 1.90$, $p < 0.001$) were identified as risk factors ($\chi^2 = 608.07$, $p < 0.001$) to SMA (see Table 2).

4. Discussion

This online retrospective survey enrolled 10,963 participants and found a significant increase in social media use during the COVID-19 pandemic compared with before COVID-19 (from 17.2 to 21.4 h). Nearly 40% of the respondents increased their weekly social media use ≥ 3.5 h. The prevalence rate of social media addiction was 6.8% during COVID-19, with men having it more commonly than women.

The study found a high prevalence rate of moderate or severe stress

Table 1

Demographic characteristics, mental health problems, and social media use overall and for males and females.

	Overall (n = 10963) M (SD)/n (%)	Male (n = 4689) M (SD)/n (%)	Female (n = 6274) M (SD)/n (%)	p-value
Age	33.38 (10.03)	34.89 (10.14)	32.26 (9.79)	<0.001
Education				<0.001
High school or lower	919 (8.4)	458 (9.8)	461 (7.3)	
College or higher	10044 (91.6)	4231 (90.2)	5813 (92.7)	
Occupation				<0.001
Unemployed/retired	408 (3.7)	138 (2.9)	270 (4.3)	
Employed	10555 (96.3)	4551 (97.1)	6004 (95.7)	
Marriage				<0.001
Married	6529 (59.6)	3017 (64.3)	3512 (56.0)	
Unmarried	4434 (40.4)	1672 (35.7)	2762 (44.0)	
Living area				0.053
Urban	10410 (95.0)	4476 (95.5)	5934 (94.6)	
Rural	553 (5.0)	213 (4.5)	340 (5.4)	
Mental health problems [a]				
Stress	1181 (10.8)	590 (12.6)	591 (9.4)	<0.001
Anxiety	2896 (26.4)	1367 (29.2)	1529 (24.4)	<0.001
Depression	1995 (18.2)	984 (21.0)	1011 (16.1)	<0.001
Weekly social media use (hours)				
Before COVID-19	17.20 (15.41)	16.99 (15.39)	17.35 (15.43)	<0.001
During COVID-19	21.40 (18.42)	20.67 (17.89)	21.95 (18.19)	<0.001
Changed weekly social media use (hours)	4.20 (9.43)	3.68 (8.47)	4.59 (10.06)	<0.001
Increased weekly social media use ≥ 3.5 h	4058 (37.0)	1552 (33.1)	2506 (39.9)	<0.001
Social media addiction	750 (6.8)	376 (8.0)	374 (6.0)	<0.001

Note.

[a] Mental health problems were ranged from moderate to extremely severe.

Table 2

Logistic regression of demographic characteristics and mental health to increased weekly social media use ≥ 3.5 h and social media addiction.

Variable	β	OR (95% CI)	p
Increased weekly social media use ≥ 3.5 h			
Gender (female)	0.26	1.29 (1.19, 1.40)	<0.001
Aged ≥ 30 years old	−0.53	0.59 (0.55, 0.64)	<0.001
Stress[#]	0.20	1.23 (1.08, 1.39)	0.001
Weekly social media use >30 hours before COVID-19	0.07	1.07 (0.97, 1.20)	0.18
Social media addiction			
Gender (female)	−0.23	0.79 (0.68, 0.93)	0.003
Aged ≥ 30 years old	0.13	1.14 (0.97, 1.34)	0.11
Stress[#]	0.94	2.56 (2.07, 3.16)	<0.001
Anxiety[#]	0.66	1.94 (1.56, 2.42)	<0.001
Depression[#]	0.60	1.82 (1.45, 2.29)	<0.001
Weekly social media use ≥ 30 h during COVID-19	0.64	1.90 (1.59, 2.27)	<0.001
Increased weekly social media use ≥ 3.5 h	0.03	1.03 (0.87, 1.23)	0.73

Note: OR: odds ratios; CI: 95% confidence intervals; [#]: Mental health problems were ranged from moderate to extremely severe.

(10.8%), anxiety (26.4%), and depression (18.2%) during COVID-19, also with men and younger adults having it more commonly than women and older adults. Although the epidemic is well under control, and quarantine measures have been largely lifted in China, the level of emotional distress has not decreased. This finding could be related to the follow-up effects of the COVID-19 epidemic, such as the impairment of financial, economic, and intimate relationship stability. People who experienced moderate or severe stress tended to invest more time in social media using per week and were at greater risk for SMA during COVID-19. Consistent with previous studies (Elhai et al., 2019, 2020; Wolniewicz et al., 2019), moderate or severe depression and anxiety significantly increased the risk of SMA.

Regression analysis also showed that weekly social media use ≥30 h during COVID-19 was significantly increased the risk of SMA. Our results match findings from studies regarding gaming disorder, where time spent on gaming showed significant positive correlation with gaming disorder (Donati et al., 2015; Salam et al., 2019).

Since the COVID-19 epidemic has spread almost all over the world, our findings have clinical and policy implications for the development of an SMA prevention strategy in areas affected by the epidemic. First, high-risk groups for SMA should be identified based on sociodemographic information for early intervention. Our data show that, although women increased more time in social media using, men have had a higher prevalence of SMA during COVID-19. The more common of emotional distress in men than in women is an important reason for this result. Health authorities must pay more attention to this group of people.

Second, reminding people to self-monitor and regulate social media use is essential. Although social media can facilitate communication, provide emotional support, and help people to obtain information about the epidemic, and thus an increase in social media use during COVID-19 is inevitable, our results showed that using social media ≥30 h per week significantly increased the risk of SMA. It might be useful to suggest that the public regulate its social media use by turning off or muting notifications and associated sounds on smartphones/devices and placing mobile devices somewhere where they are not constantly available during nonworking hours (Király et al., 2020).

Third, even if the epidemic is brought under control, people's emotional stress will not immediately decrease. Our findings revealed that people who experience moderate or severe stress, anxiety, and depression are more susceptible to SMA. Therefore, the corresponding psychological support strategies must continue (Bao et al., 2020; CADAPT, 2020). People should be encouraged to seek help if they experience high levels of emotional distress or significant difficulties controlling their social media use (Király et al., 2020).

5. Limitations

There were some limitations of this study. First, the participants were recruited through social media, such as by WeChat and QQ. In addition, the vast majority of the participants lived in cities and had college degrees or more. Thus, the sample was not representative of the general adult population in China. Second, self-report questionnaires can lead to various response biases, including memory recall bias, social desirability bias, and response style bias. Third, this study was a retrospective survey, so the time invested in using social media reported before COVID-19 might not be accurate. There is a strong need for further investigation of how public health events affect social media usage, as well as measures to prevent SMA.

6. Conclusions

The present study provides insight into the impact of the COVID-19 pandemic on social media use patterns. This study suggests a significant

increase in social media use during COVID-19. The prevalence rate of SMA was 6.8% during COVID-19. Male gender, experiencing moderate or severe stress, anxiety, depression, and increased weekly social media use ≥3.5 h were associated with SMA. Our findings could be used to develop psychological interventions to prevent SMA during the COVID-19 epidemic.

Author CRediT statement

Tao Luo: Contributed in conceptualizing and designing the study, analysis and interpretation of data, drafting and revising the article, and final approval of the version to be published.

Wei Chen: Contributed in interpretation of data, drafting the article, and final approval of the version to be published.

Yanhui Liao: Contributed in conceptualizing and designing the study, collecting and interpretation of data, drafting and revising the article, and final approval of the version to be published.

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Authors' contribution

TL and YL conceived the study. TL did the literature review, statistical analyses, and drafted the report. YL collected the data. TL and YL took the lead in interpretating the data and writing the manuscript. WC interpreted the data and commented on the manuscript. All the authors contributed to and have approved the final manuscript.

Ethics approval and consent to participate

The study protocol has been approved by The Ethics Committee of Sir Run Run Shaw hospital, an affiliate of Zhejiang University, Medical College (NO. 20200505-33). Informed consent was communicated and obtained from each participant prior to participation. Participants were informed with the purpose, assessments, potential risks and benefits of the study before survey. All of the obtained data have no personal information, none information from the data can be linked back to the participants.

Declaration of competing interest

The authors declare no conflict of interest.

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