



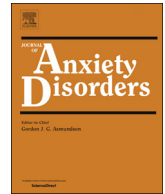
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Media use and acute psychological outcomes during COVID-19 outbreak in China

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ABSTRACT

The COVID-19 outbreak in China led to an extraordinary threat to public health and wellbeing. This study examined the psychological impact of media use among people indirectly exposed to the disease during the initial phase of the outbreak. We conducted an internet-based survey on January 28, 2020 (one week after the official declaration of person-to-person transmission of the coronavirus). Media use (media forms, content of media exposure, and media engagement) related to the outbreak and psychological outcomes (positive and negative affect, anxiety, depression, and stress) of 917 Chinese adults was assessed. A series of multivariable regressions were conducted. The results showed that use of new media, rather than traditional media, was significantly associated with more negative affect, depression, anxiety, and stress. Viewing stressful content (i.e., severity of the outbreak, reports from hospital) was associated with more negative affect and depression. Media engagement was also associated with more negative affect, anxiety, and stress. However, viewing heroic acts, speeches from experts, and knowledge of the disease and prevention were associated with more positive affect and less depression. The study suggested new media use and more media engagement was associated with negative psychological outcomes, while certain media content was associated with positive psychological impact. The present study highlights the need for timely public health communication from official sources and suggests that reduced exposure to new media may be beneficial.

1. Introduction

The outbreak of the novel coronavirus disease (COVID-19) has put health authorities in China and around the world on high alert. The coronavirus has taken the lives of more than 4500 people in China by May, 2020 (Organization, 2020). Deaths and infections are likely to increase until the outbreak is contained. Cities in Hubei Province were cordoned off, the Lunar New Year holiday break was extended, and travel restrictions were announced, affecting millions of people.

In a severe public health emergency like this, the media plays an important role in mobilizing the community, providing authoritative information and emotional support, helping isolated individuals feel connected and allocating resources (Hawkins, McIntosh, Silver, & Holman, 2007; Perez-Lugo, 2004; Wicke & Silver, 2009). People also have a great need for information from the media to make sense of the situation, and to protect their health. Information-seeking behaviors may reduce anxiety caused by uncertainty during a disease outbreak or

disaster (Heath & Gay, 1997; Lachlan, Spence, & Seeger, 2009). However, while helpful, media exposure may also create new problems. Large volumes of information may amplify the perception of risk, and fear-based messages by the media may have negative effects on media consumers who cannot discern real versus fake news, or view more balanced media coverage of the event (Kasperson et al., 1988). This “infodemic” has the potential to affect population mental health and wellbeing.

Exposure to potentially distressing media content may negatively impact those who see it. Media use was associated with negative psychological outcomes in multiple disasters. For example, increased frequency of viewing newscasts during war was associated with greater anxiety among the Jewish population in Israel (Bodas, Siman-Tov, Peleg, & Solomon, 2015). After the 911 terrorist attack in the United States, those who watched television images frequently are reported to be more likely to have post-traumatic stress disorder (PTSD) and depression compared with those who did not

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(Ahern et al., 2002).

In the last two decades, new forms of media, such as social media and internet communication technology, have emerged, gradually replacing traditional media (McDonald & Dimmick, 2003). These new forms of media are making a huge impact on disaster and emergency communications. People have mainly used social media to interact with the public and collect crowd-sourced information (Schroeder, Pennington-Gray, Donohoe, & Kioussis, 2013). According to a review study, both traditional and new media disaster coverage are associated with negative psychological outcomes (Pfefferbaum et al., 2014). However, evidence suggested a potential differential impact on mental health of traditional and new forms of media coverage. For example, among young people indirectly exposed to September 11 via media, more PTSD symptoms were reported in those who saw reports on the Internet compared with television/printed media (Saylor, Cowart, Lipovsky, Jackson, & Finch, 2003).

The different characteristics of new media and traditional media may influence users differently. New media includes multiple sources of content: the quantity of information increased, but the quality of messages is uncontrolled (Resnyansky, 2014). Unlike the constrained content on traditional media, the crowd-sourced information was not regulated by standards and norms, therefore people may view very different content via traditional and new media forms. In addition, new media is multi-media, which includes video, audio, images, and print. This means new media typically involves focused and purposeful processing of information, and may influence users through multiple perceptual pathways (Houston, Pfefferbaum, & Reyes, 2008). Moreover, traditional media is mass media without interaction, while new media is social, so interaction occurs and people get more engaged within a new media environment (Sun, Rubin, & Haridakis, 2008). The interactive nature of new media may have both positive and negative impact in the disaster. On one hand, in the disaster context, social media helped survivors manage their feelings and memories, facilitated collective coping (Tandoc & Takahashi, 2017), and provided emotional relief and community support (Neubaum, Rösner, Rosenthal-von der Pütten, & Krämer, 2014). On the other hand, the negative emotion expressed on social media may impact viewers negatively (Macias, Hilyard, & Freimuth, 2009). Therefore, it is worth investigating how traditional and new media use affect people who were indirectly exposed to the COVID-19 outbreak via media.

Disaster media coverage often includes a variety of content, resulting in a diversity of exposure. Some media contents were associated with psychological outcomes. For example, a recent study examining the association between media use and PTSD following a major Typhoon reported media exposure to drowning and citizens' emotional reactions was associated with PTSD, while media exposure to heroic acts and information about the typhoon was associated with less PTSD (Hall et al., 2019). However, another study found no measurable benefit to seeing heroic or "positive" images after September 11 attack (Saylor, Cowart, Lipovsky, Jackson, & Finch, 2003). In addition, graphic image media exposure was associated with mental-health symptoms after the Boston Marathon bombings (Holman, Garfin, Lubens, & Silver, 2020). By examining the various contents in the media, we can obtain a more accurate picture of the media impact in the outbreak.

Studies have examined adverse psychological outcomes associated with media use after trauma among directly affected respondents in different contexts, such as conventional terrorism (Slone, 2000), bioterrorism (Dougall, Hayward, & Baum, 2005), war (Bodas et al., 2015), and natural disasters (Hall et al., 2019). To our knowledge, media use and the effects of media use during a severe epidemic has seldom been studied. Unlike other emergencies, the novel coronavirus is easily spread with no specific treatment available, so it acts as an invisible but persistent threat to people. Following the COVID-19 outbreak in China, infection control measures, such as travel restrictions, isolation procedures, and public gathering bans, were announced to contain the outbreak. Therefore, people have been highly dependent on information in

the media, especially for those not directly affected by the disease. Understanding how widespread media coverage during this life-threatening epidemic may play a role in people's psychological well-being is a critical issue.

Studies on disaster media coverage and psychological outcomes have mainly examined long-term psychological outcomes, including PTSD, depression, anxiety, stress reactions, and substance use (Pfefferbaum et al., 2014). According to a report from the World Health Organization, during epidemic outbreaks individuals are likely to experience a variety of acute psychological reactions as a consequence to their exposure (Van Bortel et al., 2016). Meanwhile, witnessing the traumatic course of the infection in others can result in fear and anxiety about becoming ill or dying themselves (Van Bortel et al., 2016). Moreover, access to reliable information about an outbreak is widely supported as a key resource to maintain wellbeing. However, few studies have examined the association between engagement with traditional and new media and acute psychological consequences among populations who are uncertain whether they will become infected and who are also exposed to the disease indirectly via the media.

The current study investigated (1) the mental health condition and media use of a population-based sample during the initial phase of the COVID-19 outbreak in China, and (2) the psychological impact of media exposure on people indirectly exposed to the disease, as neither the respondents nor anyone they knew were reported infected with COVID-19. The current study extends the literature by examining the impact of different forms of media (traditional and new media), differences in media exposure content, and media engagement on psychological outcomes during an epidemic outbreak.

2. Method

2.1. Procedures and participants

Evidence of person-to-person transmission of the COVID-19 was first disclosed to the public by the National Health Commission on January 20, and self-quarantine was suggested. We conducted an internet-based survey one week after this declaration, on January 28. This study was approved by the ethical committee of Tianjin Normal University. All participants were informed of the study purpose, and provided consent to participate.

We conducted an internet-based survey using Tencent Questionnaire. Multiple participation was avoided by recording the device IP address. The advertisement of the study and questionnaire link were initially shared via WeChat Moments (a popular Chinese social media platform) by several teachers and students from Tianjin Normal University. Uninfected adults who saw the link were encouraged to participate in the study and share the link to more people via a snowball sampling method.

2.2. Measures

2.2.1. Media use

Thirteen questions following previous research (Hall et al., 2019) were used to examine participants' media exposure during the initial phase of the COVID-19 outbreak.

Forms of media use (i.e., traditional and new media use) were assessed with five items: one for traditional media and four for new media. Respondents indicated the number of total hours in the last week that they were exposed to coverage of the disease outbreak via traditional media (e.g., television, radio, newspapers); and new media (e.g. online news sites, via pictures, videos, and news, or text updates on social media). We listed the most popular new media channels in China. The four items on new media use were summed to create a new media use score.

Six questions assessed the frequency of types media content participants viewed on a five-point scale from 0 = never to 4 = often. An

Table 1
Descriptive statistics and correlations among study variables (N = 917).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2	.456**																				
3	-.043	-.01																			
4	-.111**	-0.057	0.04																		
5	0.026	0.06	-0.009	.091**																	
6	.087*	0.06	0.054	0.006	-0.023																
7	.117**	0.051	-0.001	0.014	0.038	.634**															
8	-0.065	0.061	.161**	0.042	0.024	.299**	.148**														
9	0.046	0.057	.183**	0.001	0.014	.278**	.219**	.438**													
10	.137**	.072*	.113**	0.015	0.039	.352**	.264**	.450**	.572**												
11	-0.007	0.023	.125**	0.007	0.036	.202**	.115**	.332**	.311**	.395**											
12	.093**	0.053	.141**	-0.042	-0.008	.224**	.159**	.334**	.422**	.495**	.368**										
13	0.057	0.027	.141**	0.038	.106**	.239**	.176**	.313**	.381**	.501**	.390**	.677**									
14	.101**	0.063	0.044	0.008	-0.01	.981**	.771**	.283**	.283**	.355**	.195**	.224**	.241**								
15	-.087*	-.084*	-.092**	0.014	-.078*	.123**	0.037	.082*	.068*	.090**	.102**	.085**	0.043	.111**							
16	0.017	0.028	.113**	0.019	0.022	.257**	.151**	.413**	.339**	.400**	.213**	.299**	.285**	.249**	.138**						
17	.145**	.098**	-0.061	0.009	.139**	.079*	.114**	0.038	.164**	.248**	.136**	.198**	.262**	.094**	.035	.084*					
18	-.124**	0.009	0.037	0.001	-.120**	.214**	.093**	.199**	.151**	.210**	.186**	.232**	.171**	.200**	.154**	.210**	.073*				
19	-.154**	-.097**	-.101**	0.016	-.249**	.059	-0.006	0.008	-.087**	-.075*	-.005	0.027	-0.025	0.047	0.016	0.004	-.253**	.358**			
20	-.122**	-0.053	-0.03	0.035	-.163**	.091**	0.017	0.036	-0.018	0.043	0.033	0.037	0.035	.080*	.067*	0.048	-1.36**	.475**	.693**		
21	-.072*	-0.031	-0.078*	0.03	-.204**	.130**	0.051	.068*	-0.002	0.045	0.048	0.052	0.003	.120**	.080*	0.045	-1.20**	.479**	.730**	.782**	
Mean	28.59	1.51	1.67	0.9	4.32	12.53	3.04	3.93	3.92	3.7	3.65	3.54	3.56	15.57	0.48	3.01	28.59	22.91	10.77	11.07	12.32
SD	9.5	0.5	0.47	0.3	0.79	10.71	3.23	0.94	0.82	0.91	0.96	0.91	0.93	13.01	0.5	1.04	6.02	7.42	3.27	3.01	3.45

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. 1 age, 2 marital status, 3 sex (1 = male, 2 = female), 4 family reunion (0 = no, 1 = yes), 5 family relationship, 6 new media, 7 traditional media, 8 severity of the outbreak, 9 knowledge of disease, 10 speeches from experts, 11 information from acquaintances, 12 reports from hospitals, 13 people being heroic, 14 media use time, 15 posting information, 16 actively searching, 17 positive affect, 18 negative affect, 19 depression, 20 anxiety, 21 stress. Correlations presented with dichotomous variables are point biserial correlations.

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. 1 age, 2 marital status, 3 sex (1 = male, 2 = female), 4 family reunion (0 = no, 1 = yes), 5 family relationship, 6 new media, 7 traditional media, 8 severity of the outbreak, 9 knowledge of disease, 10 speeches from experts, 11 information from acquaintances, 12 reports from hospitals, 13 people being heroic, 14 media use time, 15 posting information, 16 actively searching, 17 positive affect, 18 negative affect, 19 depression, 20 anxiety, 21 stress. Correlations presented with dichotomous variables are point biserial correlations.

example question is, “How often do you view content on the severity of the outbreak nationally and regionally?” Each of the six items were used as indicators in regression models.

Media engagement was measured with three indicators. First, participants were asked whether they had shared information related to the disease on social media (yes or no). Second, they shared how often they had actively searched for news updates on the epidemic in the last week on a five-point scale from 0 = never to 4 = every day. The third indicator was the summed total amount of time participants used traditional and new media based on the forms of media use measure.

2.2.2. Psychological outcomes

The validated Chinese version of Positive and Negative Affect Scale (PANAS) (Huang, Yang, & Li, 2003; Watson, Clark, & Tellegen, 1988) was used to measure emotional affect. It is composed of two 10-item mood scales, one that measures positive affect and another that measures negative affect. Respondents were asked to rate the extent to which they experienced each emotion on a five-point scale. The sum scores can range from 10 to 50 for each subscale, with higher scores indicating higher degrees of positive or negative affect. In the current study, the time frame adopted was “during the last week.” The Cronbach’s alpha of PANAS in this study was 0.90 for negative affect and 0.84 for positive affect.

We used the validated Chinese version of the 21-item Depression Anxiety Stress Scale (DASS-21) (Gong, Xie, Xu, & Luo, 2010; Lovibond & Lovibond, 1995) to measure depression, anxiety, and stress symptoms. This scale has three subscales for anxiety, depression, and stress, each with seven items. Respondents are asked to respond on a Likert scale from 0 = Does not apply to me at all to 3 = Applies to me very much or most of the time. Each subscale score ranges from 0–21, with higher scores indicating higher degrees of anxiety, depression or stress. Example items include “I felt I was close to panic” for anxiety, “I couldn’t seem to experience any positive feeling at all” for depression, and “I found it difficult to relax” for stress. In the current study, the time frame adopted was “during the last week.” The internal consistencies for each scale for DASS-21 in the current study were as follows: depression, 0.77; anxiety, 0.79; stress, 0.76.

2.2.3. Confounding variables

As the data were collected during the Chinese Lunar New Year holiday break, a time for family reunions in Chinese culture, and home-quarantine was suggested by the authorities, we also asked the participants whether they had been reunited with family (yes or no) and the closeness of the family relationship on a five-point likert-type scale as control variables. Previous studies suggest greater closeness to family members were associated with better psychological health (Campos, Ullman, Aguilera, & Dunkel Schetter, 2014) and less problematic smartphone use (Hawi & Samaha, 2017) which may relate to less social media use. Other confounding variables include sex, age, and marital status.

2.3. Data analyses

Statistical analyses were conducted using IBM SPSS 22.0 (IBM, Armonk, NY). Descriptive statistics for variables were presented as means \pm standard deviations. Relationships among the variables were examined using correlation analysis. Separate hierarchical regression analyses were conducted to examine the associations between media use and each of the psychological outcomes, respectively, controlling for sociodemographic variables, family reunion, and family closeness. In each model, control variables were entered in the first step, and media exposure in the second step. The type of media use, contents of media exposure, and media engagement were analyzed separately.

3. Results

Person fit methods were conducted to detect aberrant responses (Meijer & Sijtsma, 2001), and a total of 917 participants were included in the current study. Among the 917 participants, 613 (66.8 %) were women and 304 (33.2 %) were men, with a mean age of 28.6 years ($SD = 9.5$), and 453 (49.4 %) were single. Fifty (5.5 %) participants received a high school diploma, 84 (9.1 %) received vocational education, 425 (46.3 %) received college education, and 358 (39 %) had graduate degree or above. Among the participants, 428 (46.7 %) were students, 394 (43.0 %) were employed in various industries, 18 (2.0 %) were current unemployed, and 77 (8.4 %) were in other occupations. Neither the respondents nor anyone they knew were reported infected with COVID-19. The participants were from 30 provinces, municipalities and autonomous regions in China.

Table 1 shows the descriptive statistics and correlations of media use and mental health symptoms in the sample. Most participants were exposed to multiple media forms and content related to COVID-19.

New media use was significantly associated with more negative affect ($b = 0.262, p < 0.001; R^2$ change = 0.056***), depressive symptoms ($b = 0.088, p = 0.041; R^2$ change = 0.005), anxiety symptoms ($b = 0.141, p = 0.001; R^2$ change = 0.014**), and stress ($b = 0.167, p < 0.001; R^2$ change = 0.023***), but not with positive affect ($b = 0.030, p = 0.494; R^2$ change = 0.009*) after controlling for sociodemographic characteristics, family reunion, and family relationship (see Table 2). No significant unique association was found between traditional media and mental health.

Viewing content on severity of the outbreak was associated with less positive affect ($b = -0.095, p < 0.05; R^2$ change = 0.083***) and more negative affect ($b = 0.081, p < 0.05; R^2$ change = 0.091***). Disease and prevention knowledge was significantly associated with less depressive symptoms ($b = -0.089, p = 0.030; R^2$ change = 0.015*). Speeches from health experts and authorities was associated with more positive affect ($b = 0.150, p = 0.001; R^2$ change = 0.083***), and more negative affect ($b = 0.135, p = 0.002; R^2$ change = 0.091***). Reports from hospitals (e.g., lack of medical supplies, patient cannot be admitted to hospital) were associated with more negative affect and depressive symptoms ($b = 0.148, p = 0.001; R^2$ change = 0.091***). Content on people being heroic was associated with positive affect ($b = 0.176, p < 0.001; R^2$ change = 0.083***). Viewing content was not significantly associated with anxiety and stress (see Table 3).

Table 4 presents the hierarchical regression model of media engagement on psychological symptoms. Media use time was associated with higher level of positive affect ($b = 0.072, p = 0.038; R^2$ change = 0.012*), negative affect ($b = 0.178, p < 0.001, R^2$ change = 0.087***), anxiety ($b = 0.094, p = 0.007; R^2$ change = 0.014**), and stress ($b = 0.134, p < 0.001; R^2$ change = 0.025***), and posting information and actively searching for news updates on the epidemic were associated with higher level of negative affect ($b = 0.097, p = 0.003$ and $b = 0.162, p < 0.001, R^2$ change = 0.087***, respectively).

4. Discussion

In the present study, we investigated the association between media use and psychological outcomes in an adult Chinese population indirectly exposed to the COVID-19 outbreak. To the best of our knowledge, this is the first population-based study examining media-related psychological impact during the initial phase of an epidemic outbreak. We found that most people engaged in multiple forms of media and content related to the COVID-19 epidemic. These media use behaviors were significantly associated with acute psychological outcomes.

The first major finding was the different patterns in the significance of the associations between traditional and new media use with psychological outcomes. Using new media was associated with more negative psychological outcomes, including negative affect, depression,

Table 2
Hierarchical regression analyses of media use types on psychological outcomes (N = 917).

	Positive affect			Negative affect			Depression			Anxiety			Stress		
	R ²	R ² change	β	R ²	R ² change	β	R ²	R ² change	β	R ²	R ² change	β	R ²	R ² change	β
Step 1:	.040	–		.037	–		.089	–		.042	–		.061	.061***	–
Age			.127***			–.153***			–.141***			–.116**			–.071
Marital status			.031			.074*			–.014			.005			.021
Sex			–.048			.035			–.089**			–.029			–.081*
Family reunion			.008			.001			.040			.051			.075*
Family relationship			.122***			–.128***			–.240***			–.160***			–.219***
Step 2:	.049	.009*	–	.093	.056***	–	.094	.005	–	.056	.014**	–	.085	.023***	–
Age			.116**			–.168***			–.144***			–.122***			–.081*
Marital status			.030			.066			–.017			.001			.015
Sex			–.050			.018			–.095**			–.038			–.092**
Family reunion			.007			–.001			.040			.051			.073*
Family relationship			.118***			–.125***			–.238***			–.158***			–.218***
New media			.030			.262***			.088*			.141***			.167***
Traditional media			.076			–.039			–.034			–.041			–.021

Note: *p < 0.05; **p < 0.01; ***p < 0.001.
All partial regression coefficients are standardized.
Sex: 1 = male, 2 = female.

anxiety, and stress. These findings suggest a potentially harmful psychological effect of new media use during the initial phase of an outbreak. This is contrasted with traditional media, which showed no significant association with psychological outcomes.

The results are consistent with previous reports of a negative effect of social media use on psychological distress following terrorist attacks (Goodwin, Lemola, & Ben-Ezra, 2018; Monfort & Afzali, 2017), and higher stress levels in social media users compared with traditional media users after Hurricane Sandy (Goodwin, Palgi, Hamama-Raz, & Ben-Ezra, 2013). During disasters, information obtained through social media is provided at increased quantity but with uncontrolled quality (Resnyansky, 2014). Within the dynamic disaster context, messages are shared and viewed that potentially contain a variety of traumatic images, and information that may be distressing. Content analyses of blogs and Twitter messages related to disasters have found users expressing their sadness and grief on social media (Macias et al., 2009).

Audiences exposed to these messages are in turn expected to experience and share their own emotional responses (Rimé, 2009). Therefore, this “emotional contagion” may cause new media users to experience increased negative psychological effects. Social media may also be used to diffuse rumors that can destabilize situations and cause harm (Zhou & Zhang, 2007).

The second major finding was that the amount of exposure to some media content was associated with psychological outcomes. We found an association between viewing content on people being heroic and speeches from experts and the authorities, and more positive affect. Content on disease knowledge and prevention was associated with lower depressive symptoms. These findings suggest that media content that includes information useful for self-protection may be helpful to people during an epidemic outbreak. This may enhance active coping and prevention behaviors which can instill a sense of control. Similarly, previous studies found a positive role of the media in the aftermath of

Table 3
Hierarchical regression analyses of media content on psychological outcomes (N = 917).

	Positive affect			Negative affect			Depression			Anxiety			Stress		
	R ²	R ² change	β	R ²	R ² change	β	R ²	R ² change	β	R ²	R ² change	β	R ²	R ² change	β
Step 1:	.040	–		.037	–		.089	–		.042	–		.061	–	
Age (years)			.127***			–.153***			–.141***			–.116**			–.071
Marital status			.031			.074*			–.014			.005			.021
Sex			–.048			.035			–.089**			–.029			–.081*
Family reunion			.008			.001			.040			.051			.075*
Family relationship			.122***			–.128***			–.240***			–.160***			–.219***
Step 2:	.123	.083***	–	.128	.091***	–	.104	.015*	–	.054	.012	–	.078	.017*	–
Age (years)			.079*			–.177***			–.130***			–.126***			–.075*
Marital status			.043			.066			–.018			.005			.015
Sex			–.095**			–.025			–.091**			–.041			–.101**
Family reunion			.005			.004			.045			.050			.076*
Family relationship			.099**			–.132***			–.236***			–.166***			–.220***
Severity of the outbreak			–.095*			.081*			.057			.028			.061
Knowledge of disease ¹			.053			–.028			–.089*			–.071			–.056
Speeches from experts ²			.150***			.135**			–.070			.081			.066
Information from acquaintances			.002			.076*			.032			.017			.054
Reports from hospitals			.018			.148***			.092*			.014			.053
People being heroic			.176***			–.008			–.008			.038			–.028

Note: *p < 0.05; **p < 0.01; ***p < 0.001. All partial regression coefficients are standardized. Sex: 1 = male, 2 = female. ¹Knowledge of the disease and prevention. ²Speeches from experts and the authorities.

Table 4
Hierarchical regression analyses of media engagement on psychological outcomes (N = 917).

	Positive affect			Negative affect			Depression			Anxiety			Stress		
	R ²	R ² change	β	R ²	R ² change	β	R ²	R ² change	β	R ²	R ² change	β	R ²	R ² change	β
Step 1:	.040	–		.037	–		.089	–		.042	–		.061	–	
Age			.127***			–.153***			–.141***			–.116**			–.071
Marital status			.031			.074*			–.014			.005			.021
Sex			–.048			.035			–.089**			–.029			–.081*
Family reunion			.008			.001			.040			.051			.075*
Family relationship			.122***			–.128***			–.240***			–.160***			–.219***
Step 2:	.051	.012*	–	.124	.087***	–	.093	.004	–	.056	.014**	–	.086	.025***	–
Age			.121***			–.167***			–.148***			–.123***			–.081*
Marital status			.031			.073*			–.017			.004			.020
Sex			–.062			–.004			–.092**			–.042			–.097**
Family reunion			.006			–.004			.040			.050			.072*
Family relationship			.123***			–.125***			–.242***			–.159***			–.218***
Media use time			.072*			.178***			.059			.094**			.134***
Posting information ¹			.037			.097**			–.022			.034			.051
Actively searching ²			.052			.162***			.011			.038			.029

Note: *p < 0.05; **p < 0.01; ***p < 0.001.

All partial regression coefficients are standardized.

Sex: 1 = male, 2 = female.

¹ Posting information about the outbreak.

² Actively searching for news updates on the epidemics.

disasters by informing, educating, or enabling communication among people (Njenga, Nyamai, & Kigamwa, 2003). Post-trauma media exposure to heroic acts and information about the disaster were also associated with less PTSD (Hall et al., 2019). The current study expands the literature by demonstrating an acute positive effect of media use during the initial phase of the outbreak.

The negative effect was found in viewing content on reports from hospitals (e.g., lack of medical supplies, patient cannot be admitted to hospital), which was associated with more negative affect and depressive symptoms, as well as information related to COVID-19 outbreak itself (e.g., number of cases of infection and deaths) which was associated with more negative affect and reduced positive affect. Apart from the positive effect, the speeches from experts and the authorities were also associated with more negative affect, which may be attributable to the negative and threatening facts disclosed by them. It is not surprising that psychological distress was associated with viewing stressful content. Similar results have been found: individuals who watched television images of the 911 terrorist attack in the United States frequently showed a higher likelihood to have PTSD and depression compared with those who did not (Ahern et al., 2002). Indeed, media exposure may act as a collective trauma (Lau, Lau, Kim, & Tsui, 2006), and it would prolong acute stress experiences and promote substantial stress-related symptomatology (Holman, Garfin, & Silver, 2014).

The last major finding was that media engagement was mainly associated with negative psychological effects. Posting information about the outbreak, actively searching for news updates on the epidemic, and media use time during the last week were associated with more negative affect. Media use time was also associated with more anxiety and stress; nonetheless, a small positive effect was also found for positive affect. This combined association is in line with a previous study on media use during disaster in which interviewees reported negative as well as positive affect during their media usage (Neubaum et al., 2014).

The negative effect of media engagement is consistent with a study following the Boston Marathon bombings that showed six or more hours of daily contact with bombing-related media exposure was more detrimental for mental health (e.g., higher acute stress) compared with direct exposure to the bombings (Holman et al., 2014). Repeatedly engaging with trauma-related information in the media may affect threat appraisals and contribute to negative psychological impacts (Marshall et al., 2007).

4.1. Limitations

The current study had a number of limitations. First, due to its cross-sectional nature, the study could not establish a causal relation between media exposure and psychological outcomes. The link between media exposure and psychological outcomes is likely to be bidirectional. It is possible that media use could increase subsequent negative psychological outcomes, which in turn promotes increased media use as the spread of the epidemic continues. Second, the mechanism underlying the association was not directly assessed. Future studies should further explore possible psychosocial and biological pathways, as previous studies proposed that repeatedly engaging with trauma-related content may encourage ruminative thinking, affect threat appraisals, activate fear circuitry, and contribute to the development of flashbacks (Bourne, Mackay, & Holmes, 2013; Holman et al., 2014; Marshall et al., 2007). Third, we did not control for mental health conditions and media use behaviors before the outbreak; therefore, we could not rule out the possibility that individuals with pre-existing mental health problems or more media use behaviors were more vulnerable to the negative effects of COVID-19-related media exposure. Moreover, since media use was self-reported, recall bias may be present, and the measures may subject to the influence of social desirability. There might also be the possibility of differential recall. Individuals in a better psychological state might be better at recalling positive media content. In addition, Although the DASS-21 subscales can validly be used to measure the dimensions of depression, anxiety, and stress, they also tap a more general dimension of psychological distress. Use of normative data was likely to enhance the utility of the measure (Henry & Crawford, 2005). Finally, the sample in this research consisted of only of Chinese adults. It is uncertain to what extent the results generalize to samples from other countries. Nevertheless, the findings are generally consistent with previous studies demonstrating the association between new media use and mental health, and suggests that individuals should make a choice about how to engage with the media given the possible negative effects on population wellbeing.

5. Conclusion

This study showed that increased media use among indirectly exposed Chinese adults during the COVID-19 epidemic outbreak in China was associated with poorer psychological outcomes. A combined result

of both negative and positive associations between media use and psychological outcomes was found. Psychological distress was mainly associated with the use of new media, viewing stressful content, and more media engagement. However, viewing heroic acts, speeches from experts, and disease knowledge and prevention were associated with more positive affect and less depression. This suggests that public health communication intervention during the outbreak period should involve social and new media campaigns. Official social media accounts representing experts and health authorities can share timely and critical information to the public, and potentially counteract the possible negative effects of other forms of media sharing. Our results also suggest that limiting the time spent engaging in social media during the initial phase of an epidemic outbreak, and reducing viewing stressful content may minimize adverse psychological outcomes. Future studies should investigate the long-term psychological outcomes of media use during and after outbreaks, as well as the mechanism underlying the effects, to promote the mental health of indirectly exposed individuals.

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Declaration of Competing Interest

All authors declare that they have no conflicts of interest with this study.

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