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COVID-19 information on social media and preventive behaviors: Managing the pandemic through personal responsibility

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ABSTRACT

In the face of a pandemic, social media have found to be vital information channels that might exert a positive influence on people's preventive behaviors. However, little is known about the underlying processes that may mediate or moderate the relationship. The present study examined the relation between novel coronavirus disease (COVID-19) information consumption on social media and preventive behaviors, as well as the mediation role of personal responsibility and moderation role of health orientation. A sample of 511 online participants (mean age = 32.47 years) responded to anonymous questionnaires regarding COVID-19 information consumption on social media, health orientation, personal responsibility, and preventive behaviors. Bias-corrected bootstrap method was used to test the moderated mediation model. Results indicated that after controlling for participants' age, gender, education, income, and insurance, personal responsibility mediated the relationship between COVID-19 information consumption on social media and preventive behaviors. Meanwhile, the direct relation between COVID-19 information consumption on social media and preventive behaviors, and the mediation effect of personal responsibility were moderated by health orientation. The present study can extend our knowledge about how risk information consumption on social media is related to one's behavioral outcomes. Implications and limitations about the present study are also discussed.

1. Introduction

The outbreak of the respiratory disease caused by the novel coronavirus (COVID-19) become world news since January 2020, when the virus broke out and spread across the globe rapidly. As the pandemic continues to unfold, over 100 million infection cases and more than two million related deaths have been reported on February 2021. During infectious disease outbreaks, social media has functioned as a vital information avenue that enables users to stay up to date on the latest news about the disease at their own convenience, as well as provide information and guidelines for infection prevention precautions (Liu, 2020; Oh et al., 2020; Xavier et al., 2013). China, one of the countries that have successfully contained COVID-19, offers valuable lessons to rely on social media for public health education in fighting against the pandemic. For instance, Liu (2020) found that during the COVID-19 outbreak, a majority of Chinese participants were exposed to COVID-19 related information from a verity of digital media channels (e.g. Weibo, WeChat, TikTok, and online news media), which exerted positive influence on preventive behaviors. Similarly, Lin et al. (2020) found that the extensive amount of COVID-19 information facilitated by mass and social

media were associated with the public's perception of susceptibility and severity regarding COVID-19 infections, and contributed to their subsequent engagement in preventive behaviors against contracting COVID-19.

Despite that social media's role in affecting the public's behaviors for disease prevention has been a focus of communication research in the past decade, one of the less celebrated aspects of this study was that, based on the Chinese context, it investigated the mediation role of personal responsibility in the distal relationship between COVID-19 information consumption on social media and individuals' preventive behaviors. Personal responsibility for health implicates individuals' choices and actions with regard to daily activities in helping determine his or her health status (Minkler, 2016). In the context of the outbreak of a highly contagious disease, elevating messages of personal responsibility over national wide crackdowns on businesses and requirements for people in public spaces has been a consistent approach among governors. For instance, among the various types of COVID-19 related information on social media, preventative measures that encourage personal responsibility for combating the disease (e.g., social distancing, wearing masks, and avoiding large crowds) has been one of

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the key topics (Chen et al., 2020). Whilst, Nygren and Olofsson (2020) found that Swedish government has relied on both online and offline news media to broadcast daily information and instructions for self-protection techniques, encouraging personal responsibility to stop the virus from spreading. However, the question of whether social media are effective to influence peoples' perception of personal responsibility for health, as well as their subsequent behavioral outcomes has yet to be fully explored.

Thus, to fill this research gap, the present study aims to examine how COVID-19 information consumption on social media shapes audiences' perception of personal responsibility for health, and in turn, exert a positive influence on their preventive behaviors against contracting the disease. Meanwhile, as published scholarship has documented the existence of individual-level differences within populations with respect to the likelihood of individuals engaging in health behaviors (Dutta-Bergman, 2005), this study also examines the moderation role of health orientation in the relationships between COVID-19 information consumption on social media, personal responsibility, and preventive behaviors. It is likely that health-oriented people, who consumed COVID-19 information on social media, are more likely to ascribe the responsibility to individuals and engage in preventive behaviors (see Fig. 1).

2. Conceptual framework

2.1. Social media and preventive behaviors

Social media refers to the internet-based applications and platforms through which users create and exchange content, interactions and collaborations. The rapid advance of social media has changed how people deliberately and incidentally consume and are exposed to a variety of information. Statistics show that, in 2020, an estimated 3.6 billion people were using social media (e.g., Facebook and Twitter) worldwide, and the number was projected to continue to grow (Clement, 2020). Relative to the downward trend of traditional media (e.g., newspaper and television) in meeting audiences' information needs, an increasing number of people are using social media and other information technologies for news consumption and health information acquisition (Gong and Verboord, 2020; Liu, 2020; Liu and Jiang, 2019; Xinhuanet, 2018; Cokley, 2013). For instance, almost half of the US population received news from Facebook (Flintham et al., 2018). In China, about 42% of the Chinese online population used Sina's Weibo to stay informed with the latest and breaking news (Thomala, 2019). With such a large and growing user base, social media become a prime venue for Chinese people to engage in dialogue and exchange information (Liu et al., 2016).

Possibly the appeal of social media as a prominent information source is the up-to-date and accessible nature of information on these platforms (Liu, 2020). Thanks to advanced technologies, social media platforms routinely apply personalization algorithms to ensure the content presented to the user is relevant and engaging (Ansgar et al., 2017). Besides, users have opportunities to engage in the news process through interactive participation such as liking, commenting, sharing, and posting online (Khan, 2017). Through this, social media provide

personalized news feed to the information client based on the information consumption activities and preferences of oneself and others within his/her social networks (Perantatos et al., 2012). What users are exposed to largely depends on a great extent on the interest and behaviors of those with whom they connect via the medium (Bergström and Belfrage, 2018; Holton et al., 2015). For instance, in order to have a better understanding of what is occurring and how it might impact a person and those he/she loves during times of crisis, users tend to engage in reciprocal information and communication activities (e.g., share, exchange, and discuss COVID-19 information) on social media to manage potential risks.

Disaster sociologists and communication scholars have posited that social media are effective tools for rapid information seeking and sharing and could generate positive outcomes such as support provision and preventive behaviors (Liu et al., 2016; Liu, 2020; Oh et al., 2020). For example, Gamboa et al. (2019) found that social media are effective health communication tools to promote users' preventive practices against arboviral diseases. Likewise, Li and Liu (2020) conducted a study during the outbreak of the COVID-19 pandemic and suggested that, as people used social media more frequently and spent much time on social media, they were likely exposed to more COVID-19 information which were positively related to their preventive behaviors. However, research has provided compelling evidence that there is more than a bivariate association between information consumption on social media and preventive behaviors. The cognitive process between life events and how individuals respond to environmental cues is worth studying. For instance, Liu (2020) suggested that risk information consumption on digital media might elicit one's health related concerns, which subsequently promote their preventive practices. Choi and Jeong (2020) found that exposure to anti-smoking messages was associated with individuals' attribution of individual responsibility, which in turn, influenced their attitudinal outcomes. As such, a moderated mediation model is discussed in the next sections.

2.2. The mediation role of personal responsibility

The explosive spread of coronavirus has spurred two distinct debates on the role of social and personal responsibility for preventions in reducing risks from COVID-19 infection. The need for infection prevention raises questions pertaining the respective responsibilities of the authorities and each individual in reducing the exposure to risk factors, to avert infections before it occurs. On the one hand, in a continuing effort to slow the spread of COVID-19, governors worldwide have implemented preventative measures such as strict immigration controls (Park et al., 2020; Wang et al., 2020), temperature check and health screening for suspected people (Li et al., 2020; Zhang et al., 2020), and quarantine measures for symptomatic patients (Nussbaumer-Streit et al., 2020; Sjödin et al., 2020). On the other hand, personal responsibility for their own (health) outcomes is particularly critical since there are no licensed vaccines or clinical therapies for this disease. In response to the growing disillusionment with limits of medicines and pressure to contain health costs, people realize that one's own behaviors play a significant role in combating the disease. Therefore, governors strongly encouraged personal responsibility to prevent infections and stop the spread of COVID-19, and social media appear to be a promising avenue to pass the message to a wider audience. In China, in parallel with strict quarantine and travel restrictions, the health authorities rely heavily on social media (e.g., Weibo and TikTok) to disseminate information and instructions for self-protection techniques, such as self-isolation and quarantine, avoiding large gatherings and seeking remote medical advice (Liu, 2020). Whilst "stayhome" and "safehand" has become the top coronavirus-related hashtags on Twitter and Instagram to urge people to take responsibility and reduce the spread of infections (Matyus, 2020).

Cultivation theory, proposed by Gerbner and Gross (1976), suggests that constant information consumption to media content cultivates

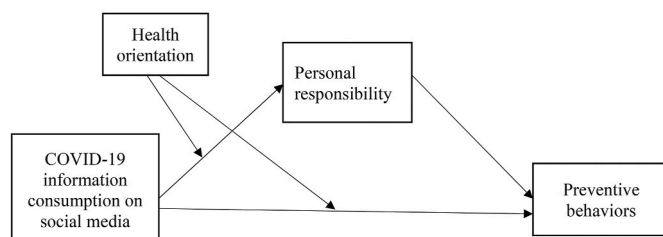


Fig. 1. Conceptual framework.

audiences' values, beliefs, attitudes, and desires. According to cultivation theory, the more time that audiences spend consuming media (e.g., newspaper and television), the more likely their perceptions of the world will align with what the media depict. Despite that the majority of research utilized television as the media to study cultivation theory in the past decades, the theory is increasingly applied to social media contexts (e.g., [Intravia et al., 2017](#); [Tang et al., 2021](#); [Tsay-Vogel et al., 2018](#); [Wei et al., 2020](#)). More importantly, after decades' development and extension, cultivation theory is no longer limited to describe how media shape audiences' views toward the world. The theory has been widely applied in marketing and health contexts to investigate how media exposure might influence people's understanding toward a brand or a disease, and change their purchasing and health behaviors ([Li et al., 2019](#); [Wei et al., 2020](#)). For instance, [Wei et al. \(2020\)](#) employed a mixed-method approach to investigate the influence of exposure to tweets. Their findings supported the cultivation effects of tweets about a particular brand on people's attitudes toward that brand. [Li et al. \(2019\)](#) also used cultivation theory to study how televised media content influence audiences' cancer related knowledge, beliefs and behaviors. Cultivation theory not only offers an explanation as to how social media users established a belief of personal responsibility in combating COVID-19, but also accounts for subsequent behavioral effects such as the engagement of preventive practices ([Stein et al., 2019](#)). Cultivation theory describes a hierarchical phenomenon following the prolonged exposure to media contents – reaching from cognitive changes to behavioral outcomes ([Nabi and Sullivan, 2001](#)). Whereas, attribution theory ([Kelley, 1973](#); [Weiner, 2006](#)) posits that information often carries with implicit attributions, which might influence one's judgement of responsibility and subsequent behaviors. For instance, if an event that happens to oneself is seen as personally controllable, such as wearing face masks to reduce the spray of droplets and keeping hands clean to prevent the spread of virus, people would likely to believe that individuals are responsible for the event, and engage in desired behaviors. As social media continue to provide massive amounts of COVID-19 related information, including governmental efforts in the prevention, the domestic and international epidemic situation, and the advocacy of self-responsibility to mitigate spread of the disease, recipients are led to believe that collective and individual efforts are essential in response to COVID-19. Through judging one's contributions for the event, people would evaluate and change behaviors to obtain desired outcomes ([Cheng et al., 2017](#)). Personal responsibility beliefs regarding the COVID-19 prevention are strengthened and people are likely to engage in positive prevention practices. Thus, the first hypothesis is put forth:

H1. COVID-19 information consumption on social media will have an indirect effect on preventive behaviors, mediated by personal responsibility.

2.3. The moderation role of health orientation

Health orientation depicts one's willingness to take care of his or her health, and has been defined as "a goal-directed arousal to engage in preventive health behaviors" ([Moorman and Matulich, 1993](#), p.210). Thus, health orientation would promote health behaviors that are intertwined by the commitment toward maintaining one's health ([Dutta and Feng, 2007](#); [Moorman and Matulich, 1993](#)). Rather than an interest that is triggered by situational factors (e.g., being diagnosed with COVID-19 infection), health orientation emphasizes individuals' intrinsic interest to stay healthy ([Dutta, 2007](#); [Dutta and Feng, 2007](#); [Dutta-Bergman, 2005](#)). Not all individuals are health-oriented, and research has demonstrated the existence of motivational difference within populations with respect to health attitudes and behaviors ([Dutta-Bergman, 2004](#)). To the extent that people are concerned about their health, they typically behave in ways to reduce personal risks and maintain good health. Empirical evidence has supported that individuals with greater intrinsic interest in health-related issues would be

more likely to engage in health-related behaviors. For example, people who have higher levels of health orientation are more likely to take an active role in patient-provider communication to make medical decisions collaboratively ([Dutta-Bergman, 2005](#)). Likewise, [Dutta and Feng \(2007\)](#) found that health-oriented individuals are more likely to participate in online health support groups. In the face of COVID-19, health orientation can be an important construct that facilitates resilience and coping. Health-oriented people are likely to make full use of information to cope with potential risks of the disease, such as taking personal responsibility to engage in preventive practices.

The present study thus constructed a moderated mediation model to examine personal responsibility as a mediator in the relationship of COVID-19 information consumption on social media and preventive behaviors. Meanwhile, this study also investigated whether the direct influence of COVID-19 information consumption on social media on preventive behaviors and the mediation effect of personal responsibility were moderated by health orientation. It was hypothesized that the direct relationship between COVID-19 information consumption on social media and preventive behaviors, and the indirect relationship mediated by personal responsibility would be moderated by health orientation, with these effect being stronger for individuals with higher health orientation. Thus, two hypotheses were proposed:

H2. The indirect effect of COVID-19 information consumption on social media on preventive behavior through personal responsibility is contingent on individuals' health orientation. The effect is stronger for those who have higher levels of health orientation.

H3. Health orientation moderates the relation between COVID-19 information consumption on social media and preventive behaviors, with the relation being stronger for individuals with higher levels of health orientation.

3. Methods

3.1. Sample and procedure

This study was approved by the Institutional Review Board of the authors' affiliated institution. To recruit appropriate subjects, a commercial marketing research firm helped set up the online survey. Data from the online survey, which was conducted from February 13 to February 25, 2020, were utilized. With informed consent, a total of 511 respondents completed the survey. In the sample, the average age was 32.57 years (ranging from 18 to 60 years), 40.3% ($n = 206$) were male, 74.8% had some college or have obtained college degrees, 77.7% had a monthly income below 12,000 Chinese Yuan (CNY), 85.9% had an insurance, and 72% resided in urban cities. Details of descriptive statistics are shown in [Table 1](#).

Table 1
Sample characteristics.

	Number (%)
Gender (being male)	206(40.3%)
Age, <i>M (SD)</i>	32.57(9.79)
Education	
Below college	129(25.2%)
College	258(50.5%)
Above college	124(24.3%)
Income (CNY)	
< 6001	196(38.4%)
6001 to 12,000	201(39.3%)
> 12,000	114(22.3%)
Health insurance	
Yes	439(85.9%)
No	72(14.1%)
Residence	
Urban	368(72.0%)
Rural	143(28.0%)

3.2. Measurement

Preventive behaviors were measured by asking: “Over the past two weeks, have you done any of the following to reduce the risk of infection from the coronavirus?” Fifteen pieces of positive prevention advice against contracting COVID-19 advocated by China’s health authorities were presented (Chinese Center for Disease Control and Prevention, 2020), such as “deliberately cancelled or postponed work-related travel plans”, “reduced the amount you use public transport”, “keep away from crowded places”, and “washed hands with soap and water more often than usual”. Dichotomized responses (1 = yes, 0 = no) were added up to indicate the degree to which one engages in preventive behaviors (M = 9.36, SD = 2.88).

COVID-19 information consumption on social media was measured by three questions derived from prior research (Liu and Jiang, 2019). Respondents were asked on a five-point Likert scale (1 = never, 5 = always) about the frequency of exposure to COVID-19 related information on three different social media forms (e.g., Weibo, WeChat, and TikTok) in the past one month. Participants’ answers to all of the questions were averaged into a composite score (M = 3.13, SD = 0.90, Cronbach’s alpha = .63).

Health orientation was measured by examining participants’ motivational tendency to keep oneself or others in good health, and avoid COVID-19 infection, which was derived from previous research (Snell et al., 1991). Participants were required to indicate to what extent they agree with two statements: “I strive to keep myself healthy and avoid COVID-19 infection”, and “I want to prevent my family and friends from getting COVID-19”. Responses were scored on a five-point scale (1 = strongly disagree, 5 = strongly agree). A higher score represented a higher level of health orientation (M = 4.44, SD = 0.73, Cronbach’s alpha = .94).

Personal responsibility was measured by asking participants to indicate the extent to which they think that individuals are responsible for prevention and stopping the spread of COVID-19 infections. Participants were given response options ranging from 1 = ‘no responsibility at all’ to 5 = ‘very high responsibility’ (M = 4.63, SD = 0.62).

Control variables included respondents’ socio-demographic characteristics, such as age, gender (1 = male, 0 = female), education (ranging from 1 = middle school or below to 5 = postgraduate or above), personal

monthly income (1 = 3000 CNY or below; 6 = 18,001 CNY or above), and health insurance (0 = no, 1 = yes).

3.3. Statistical analysis

First, the analysis of descriptive statistics was conducted using SPSS 23.0 (see Table 2 for details). Second, the mixed model was tested using model 8 from the SPSS macro PROCESS (Hayes, 2013), which has been designed to test a mixed model including both mediating and moderating variables. Statistically significant relationships among the focal variables were examined using Bootstrapping procedures, which resampled the distribution by 10,000 with 95% confidence intervals.

4. Results

H1 predicted that COVID-19 information consumption on social media will increase preventive behaviors through the mediation of association with personal responsibility. As depicted in Table 3, the direct effect of COVID-19 information consumption on social media on preventive behaviors was not significant. However, the effect of COVID-19 information consumption on social media on personal responsibility was significant ($\beta = 0.09, p = 0.003$), and personal responsibility, in turn, led to more preventive behaviors ($\beta = 0.56, p = 0.009$). The bootstrapping approach supported this mediation effect, with confidence intervals (CI) between 0.010 and 0.100. Therefore, H1 was supported.

H2 predicted that health orientation would moderate the indirect relationship between COVID-19 information consumption on social media and preventive behaviors. The relationship is stronger for those who have higher levels of health orientation. As shown in Table 3, for individuals with both high (Mean + 1SD) and medium (Mean) health orientation, the indirect effects were significant (high health orientation: CI: [0.012, 0.140]; medium health orientation: CI: [0.001, 0.066]), supporting H2.

H3 predicted that health orientation will also moderate the relation between COVID-19 information consumption on social media and preventive behaviors, with the relation being stronger for individuals with higher levels of health orientation. As shown in Table 3, at a low level of health orientation (Mean - 1SD), COVID-19 information consumption on social media was negatively and significantly related to preventive

Table 2
Descriptive of the key variables.

Information consumption	Never	Rarely	Sometimes	Often	Always
Weibo	120 (23.5%)	75 (14.7%)	71 (13.9%)	118 (23.1%)	127 (24.9%)
WeChat	30 (5.9%)	5 (1.0%)	107 (20.9%)	197 (38.6%)	172 (33.7%)
TikTok	192 (37.6%)	104 (20.4%)	110 (21.5%)	52 (10.2%)	53 (10.4%)
Health orientation	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Oneself	1 (0.2%)	12 (2.3%)	50 (9.8%)	163 (31.9%)	285 (55.8%)
Others	1 (0.2%)	7 (1.4%)	46 (9.0%)	153 (29.9%)	304 (59.5%)
Personal responsibility	No at all responsible	Somewhat responsible	Neutral	Mostly responsible	Complete responsible
	0	1 (0.2%)	36 (7.0%)	114 (22.3%)	360 (70.5%)
Preventive behaviors				No or NA	Yes
1. Deliberately cancelled or postponed a social event, such as meeting friends, eating out etc.				36 (7.0%)	475 (93.0%)
2. Deliberately cancelled or postponed work-related travel plans				128 (23.0%)	383 (75.0%)
3. Deliberately cancelled or postponed personal travel plans				114 (22.3%)	397 (77.7%)
4. Reduced the amount you use public transport (buses & MRT; should we include taxi/grabs?)				58 (11.4%)	453 (88.6%)
5. Reduced the amount of time you spend outside your home				18 (3.5%)	493 (96.5%)
6. Took time off work to avoid infections				435 (85.1%)	76 (14.9%)
7. Kept one or more of my children out of school to avoid contact with other children				368 (72.0%)	143 (28.0%)
8. Kept one or more of my children out of school because s/he exhibited flu-like symptoms				462 (90.4%)	49 (9.6%)
9. Kept away from crowded places (shopping malls, supermarkets etc.)				99 (19.4%)	412 (80.6%)
10. Kept away from healthcare institutions (hospitals, polyclinics etc.)				118 (23.1%)	393 (76.9%)
11. Kept away from people who exhibit flu-like symptoms				161 (31.5%)	350 (68.5%)
12. Used face masks more frequently				115 (22.5%)	396 (77.5%)
13. Increased the amount I clean or disinfect things that I might touch (e.g. door knobs)				192 (37.6%)	319 (62.4%)
14. Washed my hands with soap and water more often than usual				92 (18.0%)	419 (82.0%)
15. Got the influenza vaccine (flu shot, flu jab)				486 (95.1%)	25 (4.9%)

Table 3

Regressions testing personal responsibility as a mediator and health orientation as a moderator in the relationship between COVID-19 information consumption on social media and preventive behaviors.

	Effect	SE	95%CI	p
CICSM → PB	-.08	.14	[-.354, .197]	.576
CICSM → PR	.09	.03	[.029, .143]	.003
PR → PB	.56	.21	[.142, .976]	.009
CICSM → PR → PB	.05	.02	[.010, .100]	.043
	Health orientation values	Effect	Boot SE	95%CI
Conditional direct effect: CICSM → PB	<i>M</i> – 1SD	-.69	.18	[-.698, –.403]
	<i>M</i>	-.08	.13	[-.342, .187]
	<i>M</i> + 1SD	.67	.17	[.341, .789]
Conditional indirect effect: CICSM → PR → PB	<i>M</i> – 1SD	-.03	.03	[-.124, .016]
	<i>M</i>	.02	.02	[.001, .066]
	<i>M</i> + 1SD	.06	.03	[.012, .140]

CICSM: COVID-19 information consumption on social media; PR: Personal responsibility; PB: Preventive behaviors.

behaviors (CI: [-0.698, –0.403]). At a high level of health orientation (*Mean* + 1SD), a positive and significant relationship between COVID-19 information consumption on social media and preventive behaviors was also revealed (CI: [0.341, 0.789]). Whereas, at the medium level of health orientation, no significant relationship between COVID-19 information consumption on social media and preventive behaviors was found. H3 was supported.

5. Discussion

The present study examined personal responsibility and health orientation as two potential mechanisms linking COVID-19 information consumption on social media to preventive behaviors. Results indicated that personal responsibility partially mediated the relationship between COVID-19 information consumption on social media and preventive behaviors. The direct relationship between COVID-19 information consumption on social media and preventive behaviors, and the mediation effect were moderated by health orientation. These findings extend the previous literature by explaining the individual differences in the relationship between risk information consumption and preventive outcomes.

As expected, the hypothesis that personal responsibility mediates the relationship between COVID-19 information consumption on social media and preventive behaviors is supported. This finding is novel and can provide certain evidence for the developmental extension of the cultivation theory. Specifically, repeated COVID-19 information exposure on social media can elicit people's perception of personal responsibility in combating the spread of COVID-19 and, in turn, increase preventive behaviors. Three main reasons should be addressed. First, as people continue to receive a large amount of COVID-19 information on social media, among which information that encourages personal responsibility for self-prevention and public health accounts for a great proportion, their beliefs regarding personal responsibility strengthened, and they are likely to adhere to preventive measures suggested by the health authorities. Another plausible reason is the collectivistic culture in China that supports massive social coordination (Logan and Barbara, 2020). In a collectivist society (e.g., China, Singapore, and South Korea),

people tend to have a strong belief that the community and the country will make efforts to protect them, and those protective processes are coordinated and every single person should take responsibility to work together (Logan and Barbara, 2020). In the face of communal risks that pose danger to all members in a community, the perception of personal responsibility that people have to combat COVID-19 is not independent from the collective system. It would be exceedingly difficult to entirely attribute responsibility to individuals for their own health since the pandemic results from complex interplay of individual and environmental factors. People in collectivist societies not only hold personal responsibility to prevent COVID-19 infections, but also share collective responsibility to fight against the disease and contribute to the public good. As social media users continuously to be exposed to information about the unremitting efforts that the government and the community has made in response to the virus (Molter & DiResta, 2020; Jo and Chang, 2020), they are likely to have a propensity to coordinate their actions. Third, due to the interactive nature of social media, people often encountered COVID-19 information through the interaction with other users. For instance, family members may share and exchange COVID-19 information on WeChat to make sure that people they care about are aware of the risk and practice preventive behaviors to remain healthy (Liu, 2020). Besides, peer influence could also affect people's decision making and behaviors (Andrews et al., 2020; Schaefer et al., 2013). People might post content on social media about how they are following the instructions (e.g., sharing a photo or video of themselves wearing a face masks). On platforms such as Weibo, users can add social distancing tags to the posts. As people continuously encounter and interact this content on social media, COVID-19 prevention can be established as a norm and people would likely to adapt their behaviors to fit the network-wide social norms. As such, they are likely to take personal responsibility to prevent infections that may jeopardise the safety of people in their social networks.

The moderation effects of health orientation can also be explained in several ways. First, health-oriented people usually have an internal locus of control and demonstrate a positive internal atmosphere confronting negative events (Kreidler and Kreidler, 1991). In the face of COVID-19, health-oriented people are more likely to practice health-maintaining actions, such as acquiring information about the disease and treatment or complying with physicians' instructions. Second, given that COVID-19 is a highly contagious and fatal disease, health-oriented people are more likely to realize that, in parallel with personal responsibility to prevent the disease, collective efforts to stop the spread of the disease are equally important to build a safe community. Thus, they are more likely to take personal responsibility and engage in preventive actions. These findings help clarify that one's internal motivation for health is bound to health-maintaining actions through its relation to the perception of personal responsibility. Conversely, the results show that at a low level of health orientation, COVID-19 information consumption on social media was negatively associated with preventive behaviors. This finding was somehow congruent with previous research suggesting that individuals with low internal locus of control are more likely to practice unhealthy behaviors such as smoking and consuming alcohol (Daly et al., 2015). Thus, individuals with low health orientation might have apathetic response toward COVID-19, and they are less likely to act in the public interest.

Beyond showing the underlying mechanisms why COVID-19 information consumption on social media may impact one's preventive outcomes, this study has other theoretical contributions. First, the current study contributes to mass communication scholarship by extending prior media cultivation effects research to address more current research problems that arise during a pandemic outbreak and social media use. This study provides empirical evidence that continue to support the hierarchical phenomenon of cultivation theory – the prolonged exposure to COVID-19 information on social media could exert an influence on audiences' perception of personal responsibility, and further impact their behavioral outcomes. Nevertheless, this study only presents an

initial effort to understand the effect of COVID-19 information consumption on social media. Several questions await for further investigation. For instance, in addition to social media, there are many other information sources such as traditional media (e.g., newspaper and tv) and online news media that might exert effects on individuals differently (Fardouly et al., 2017; Liu and Jiang, 2019). Whether this applied to the current health domain goes beyond the scope of this study but remains an interesting question for future research. Second, the present study is the first to explore the moderating role of health orientation, which can advance our understanding about how individual-difference factors may influence information effects on one's behavioral outcomes. For instance, a great number of studies revealed that information acquisition could impact people's lifestyle choices, and health screening (e.g., Shim et al., 2006), because they may become worried about their health (Liu, 2020), or gain knowledge for maintaining a good health (Shim et al., 2006). Interestingly, the present study enriches the literature with the finding that individual difference in health orientation can explain the variance in the relationship between information and health behaviors.

The findings of this article hold important practical implications for the practitioners of public health education programs. First, during the outbreak of a pandemic, social media provides a verity of information channels that facilitate people's information acquisition, and has functioned to influence their health values, attitudes, and behaviors. Thus, practitioners should rely on new information technologies to provide more instructive disease-related information to reach more people and for their self-protection techniques. Second, given that the direct relationship and indirect relationship between COVID-19 information consumption on social media and preventive behaviors were significant when health orientation at a medium or high level, it is important to increase people's health consciousness, health orientation, and personal responsibility for health. For example, public health program developers can use emotional appeals (e.g., fear of ill and death) to arouse the public's motivation to maintain personal and the community's health. Third, the findings suggest that collectivism may be useful to increase people's engagement with efforts to reduce the spread of COVID-19. Thus, practitioners may use tailed information to strength people's collective identity, and encourage them to take personal responsibility to combat the infectious disease for the community health. Fourth, in addition to social media, health educators and promoters should use other information sources (e.g., traditional media and online news media) complementarily to maximise the influence of health information on audiences' behavioral outcomes.

6. Limitations

With respect to the application of the findings, this study has several limitations. First, the cross-sectional research design might preclude an assessment of causality between COVID-19 information consumption on social media, personal responsibility, health orientation, and preventive behaviors. Thus, future research should use a longitudinal research design or experimental methods to better clarify the causal relationships. Second, this study used online survey that might be affected by sample bias. For instance, the elderly populations might have fewer options for online access to respond to online questionnaires. The sample of this study is skewed toward highly educated people. Besides, participants from hardly-infected cities and from safe cities might respond to the survey differently. For example, when the participants are mainly from hardly-infected cities, their preventive behaviors would be more likely to be regulated by lockdown or family isolation policies, rather than personal responsibility or consumption of COVID-19 information. Thus, the results of this study might not be generalized to the whole population in China. To overcome this problem, scholars should use probability sampling to generate a sample that is representative of the population in which it was drawn. Third, this study only examined the mediation role of personal responsibility. Given that the results supported the mediation hypothesis, it remains unclear whether the

framework is applicable in other sociocultural contexts. For instance, in individualistic societies (e.g., the United States), a person's needs are often prioritized over the needs of a group as a whole, and media coverage of COVID-19 might be different from collectivistic societies. Thus, future research should continue the investigation of mechanisms underlying the distal relationship between risk information consumption on social media and behavioral outcomes in other sociocultural contexts. Forth, the current study was set up in the Chinese context where the government enforces restrictive control over the information on social media, and some foreign social media platforms (e.g., Facebook, YouTube and Twitter) have been blocked. This might have reduced the information diversity and made China as a unique case that rely on the top-down propaganda machine to manipulate COVID-19 information on social media and achieve the goal of public education. Therefore, it is worthwhile to replicate this study in other sociocultural societies, or conducted a comparison research across different countries to extend the scope of research and provide in-depth and comprehensive understanding about the relationships between social media, personal responsibility, health orientation, and preventive behaviors. Fifth, during the time of COVID-19 outbreak, the spread of disinformation have been amplified through the internet. It is likely that false information about COVID-19 on social media might exert an influence on individuals' behavioral outcomes. Future research should base on this study and extent the scope of research to investigate the influence of disinformation about COVID-19.

7. Conclusion

During a crisis like the COVID-19 pandemic, social media have been emerging as important information sources. Despite that research on where people look for health information and how health information influence people's behavioral outcomes has proliferated in the past decade. There remains a paucity of research exploring the underlying mechanisms in the relationship between health information on social media and preventive behaviors. This study provides empirical evidence that personal responsibility in combating the disease mediates the distal relationship between COVID-19 information consumption on social media and preventive behaviors. More importantly, health orientation was found to moderate the effects of COVID-19 information consumption on social media. Future research should continue the investigation of mechanisms underlying the impacts of risk information consumption on social media on behavioral outcomes, and help public health program developers to enhance people's health orientation, personal responsibility for health, and preventive behaviors.

Credit author statement

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