The Roles of Worry, Social Media Information Overload, and Social Media Fatigue in Hindering Health Fact-Checking

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Abstract
Health misinformation has become a salient issue on social media. To lower the risk of health misinformation, fact-checking matters. However, most existing studies investigated fact-checking from the journalism angle, while little is known about how information-seekers’ social media use affects their fact-checking behaviors. Also, it remains unclear how individuals’ health worry is associated with health fact-checking. Based on the O-S-O-R model, this study explored the underlying mechanism through which health worry and social media might hinder users’ fact-checking. Specifically, with a two-wave panel survey conducted in China during the COVID-19 pandemic, this study showed that individuals’ worry about COVID-19 increased social media information overload, which resulted in social media fatigue that could reduce health fact-checking. Also, the direct relationship between worry and fact-checking was not significant, but was completely mediated by social media information overload and social media fatigue. The findings demonstrate the negative roles of worry and social media in inhibiting users’ fact-checking behaviors. Important theoretical and practical implications for promoting effective fact-checking are discussed.

Keywords
fact-checking, worry, social media information overload, social media fatigue, COVID-19, O-S-O-R model

Introduction
During public health crises, misinformation—the false or inaccurate information regardless of intentional authorship—(Southwell et al., 2019) can undermine adoption of evidence-based public health measures and hasten the spread of the pandemic (van der Meer & Jin, 2020). Particularly, misinformation has increasingly become a salient issue on social media. Incomplete, misleading, and inaccurate information is not uncommon on social media, due to the fast pace of user-generated content dissemination and the lack of editorial process and regulation (Carlson, 2020). To respond to the threat of health misinformation, fact-checking matters. Fact-checking refers to the process of verifying factual assertions to determine their accuracy and veracity (Shapiro et al., 2013). Benefits of fact-checking in the health arena have been documented, such as better understanding of health condition, quality medical decision-making, greater empowerment, and health improvement (Bode & Vraga, 2018; D. K. L. Lee & Ramazan, 2021).

This study contributes to the thriving fact-checking and health communication literature in two important ways. First, most studies investigated fact-checking from the journalism angle, considering it as a journalistic practice (Graves et al., 2016; Luengo & García-Marín, 2020). Although recent years have witnessed a growing interest in exploring fact-checking from the ordinary information-seekers’ perspective, this limited line of research mainly examined how individuals’ fact-checking behaviors are affected by their personal characteristics, such as demographic factors (Brenes Peralta et al., 2022), media literacy (D. K. L. Lee & Ramazan, 2021), and health knowledge (Krause et al., 2020). There is insufficient knowledge of how social media use affects...
information-seekers’ fact-checking. The present study takes into account social media information overload, a salient feature of today’s complicated social media information environment, and social media fatigue, a common mental state as a result of social media use, and investigates how these two social media-specific factors affect fact-checking behaviors.

Second, the health communication scholarship has widely documented the role of health worry in predicting individuals’ response to health risks and promoting health behavior change (Freimuth & Hovick, 2012; Milne et al., 2000), while scant research has examined how worry can be associated with fact-checking. This study aims to test mediation pathways to identify what mechanisms are integral to the process by which individuals’ health worry might affect health fact-checking.

Based on the O-S-O-R model (Markus & Zajonc, 1985), the current study postulates the staged roles of worry, social media information overload, and social media fatigue in hindering fact-checking during the COVID-19 pandemic. The findings will enable communication scholars and practitioners to better understand the negative role of health worry and social media, and to formulate effective health communication strategies to cope with the challenge of health misinformation. The following section first reviews the O-S-O-R model and then explains the basis for theoretical advancement.

**Conceptual Framework**

The O-S-O-R stands for Orientation 1 (also called pre-orientation)–Stimuli–Orientation 2 (post-orientation)–Response. This model explains how individuals’ pre-orientation influences their exposure to certain stimuli, which results in post-orientation that eventually determines behavioral response (Markus & Zajonc, 1985). Specifically, the pre-orientation variables (O1) are the intrinsic personal characteristics that affect to what extent individuals process the stimuli. The stimuli (S) indicate any environmental factor that triggers inner states of feelings and emotional responses to that environment. The post-orientation component (O2) signifies the processes that audiences go through in dealing with stimuli before delivering behavioral response, denoted by (R). Two advantages of O-S-O-R model make it a suitable theoretical foundation for this study. First, its full process-mediating mechanisms can offer valuable insights into how individual information-seekers indirectly develop their health-related behavior in the information environment. Second, beyond the S-O-R model, the inclusion of personal characteristics (O1) helps understand antecedents of exposure to stimulus (Yoo, 2014). Thus, the O-S-O-R model allows communication researchers to more thoroughly explore individual characteristics, environmental stimulus, and attitudinal and behavioral consequences.

Alongside the basis of the O-S-O-R model, we also aim to extend this theory from the following two perspectives. First, much of the O-S-O-R research considered media use, such as news consumption and campaign exposure, to constitute stimuli (S). This line of research has largely examined traditional mass media (H. Lee & Kwak, 2014; Yoo, 2013), ignoring the characteristics of an information environment in the context of social media. As a highly interactive communication platform, social media allows users to actively engage in online information. Unlike traditional media, where strict editorial policies in media institutions control the amount of information disseminated and filter out low-quality information, on social media the abundance of unregulated information makes it challenging for users to identify and process correct information. With always-on internet access, especially on mobile devices, individuals cannot escape the digital torrent of information. Thus, in this study, we focused on two social media-specific mediating factors, namely social media information overload as the stimulus (S), and social media fatigue as the post-orientation (O2).

Second, prior O-S-O-R research mainly examined individuals’ stable preexisting characteristics, such as intrapersonal traits (Paek, 2008), cultural values (Zhao, 2012), and education background (H. Lee & Kwak, 2014), as the pre-orientation (O1) variable; scant research has explored the role of one’s mental response to health risks as the O1 factor. During public health crises, understanding individual characteristics that tap into affective processes to health risks is crucial. In China, the context of this study, COVID-19 is considered as a life-threatening disease to many people, and thus evokes strong emotional responses. Echoing the literature that highlights the role of one’s affective reaction to threat in health prevention (Chae & Lee, 2019; Rogers, 1975), this study investigated how health-related worry, as the pre-orientation (O1), would influence social media use and health fact-checking. The inclusion of worry in the O-S-O-R model is consistent with the literature on emotions that underscores the significant role emotions play in influencing how individuals interact with threatening stimuli they encounter in their environment. People’s negative emotions (e.g., worry and anxiety) are often associated with uncertainty, low personal control, and high physiological arousal, which would affect their responses to misinformation (Weeks, 2015).

In light of the above, one mediation pathway was proposed as follows: one’s worry about COVID-19 (O1) triggers social media information overload (S), which leads to social media fatigue (O2), which in turn reduces fact-checking (R). This conceptual model is illustrated in Figure 1. It is important to note that despite the focus of the health setting (e.g., COVID-19), the findings from this study would offer meaningful insights that can be applied to other domains of communication research regarding social media use and fact-checking. The following sections discuss the main concepts of this study (e.g., worry, social media information overload, social media fatigue, and fact-checking).

**Worry as Pre-Orient**

In the current study, worry was treated as the pre-orientation (O1) variable. According to the O-S-O-R model, perception orientation such as audience characteristics (e.g., structural,
cultural and motivational attributes) is a predisposing factor that influences people’s subsequent media activity. Worry is one’s emotional state, representing the negative affective response to risks (Freimuth & Hovick, 2012). Griffin et al. (1999) emphasized that worry is a recurrent mental state provoked by a hazard, and can motivate information seeking and processing about the risk more than would the cognitive components of risk perception. Although a variety of emotions may drive media use and information behaviors, this study focused specifically on worry. During the COVID-19 pandemic, uncertainties about the spread of the virus contributed to a climate of escalated worry. Also, with the emerging climate of misinformation, public confusion further exacerbated the already-existing worry and anxiety about the virus (Wiederhold, 2020).

Social Media Information Overload as Environment Stimulus

A stimulus in the O-S-O-R model is the environmental factor that arouses individuals’ internal reactions to that environment. In this digital age, the information environment is getting increasingly complex and dynamic. The present study selected social media information overload as a stimulus. Information overload refers to a state induced by the large amount of information exceeding one’s capacity to assimilate and digest (Hunter, 2004). When individuals search for certain content, they might encounter too much information, or the complexity of information is beyond their information-processing capacity (Jiang & Beaudoin, 2016). On social media, users often share information with each other. When they receive an excessive amount of information from unwanted human networks, their thought patterns are disrupted and pushed to a limit (Barrett et al., 2021). Particularly during the pandemic, social media has been used extensively to connect with one another and provide informational and emotional support, either supplementing or substituting traditional channels such as face-to-face conversations and gatherings (Liu et al., 2021). The intensive use of social media can result in information overload, which has been shown to be a trigger of negative consequences of social media usage (Laato et al., 2020).

Social Media Fatigue as Post-Orientiation

Post-orientation is also called an organism in the O-S-O-R model, which refers to an individual’s internal perceptual and physiological state as a result of environment stimulus. Social media fatigue was chosen as the post-orientation factor in this study. Social media fatigue is defined as one’s self-evaluated feeling of exhaustion that is induced by social media usage (A. R. Lee et al., 2016; Zheng & Ling, 2021). Social media users may have difficulties in managing high levels of communication loads with others, leading to the feeling of tiredness (Ravindran et al., 2014). Also, when communicating with peers on social media, individuals tend to maintain a positive personal image; they are expected to respond to online messages quickly and sustain growing ties. Under such circumstances, people need to expend much time and energy, resulting in exhaustion or even social burnout (Ngien & Jiang, 2021). Due to social media fatigue, users often avoid information seeking from social media, which reduces sources of useful advice (Dai et al., 2020).

Fact-Checking as Response

Most research has investigated fact-checking as a journalistic practice in media organizations to guarantee the veracity and correctness of news reporting (Graves et al., 2016), but scant research has explored individual users’ fact-checking behavior. The present study centered on fact-checking by information-seekers, and viewed it as a behavioral response to risks (e.g., COVID-19). Individuals can verify information using their own judgment, such as whether the information source is credible, whether there is evidence available to accept or reject the information, and the coherence in the way the message is organized (Brenes Peralta et al., 2022). If they are unable to reach a conclusion, they can look to outside sources to verify the news (e.g., friends, health care providers, and institutional sources) (Tandoc et al., 2018). In addition, many fact-checking websites, such as Factcheck.org, and health information services website (e.g., WebMD) can be utilized by laypeople to evaluate the quality of news and to locate reliable health information (D. K. L. Lee & Ramazan, 2021). Individual users’ fact-checking plays a critical role in improving their health knowledge, which aids in correct decision-making, enhancing coping skills, and alleviating anxiety (Barua et al., 2020).

Literature Review

Path 1: From Worry to Social Media Information Overload

Psychology literature suggests that worry is motivational and involves action tendency to devise a solution to the problem, such as information seeking (S. Y. Lee & Hawkins, 2016).
Individuals who are concerned and worried about a crisis situation are more likely to be receptive to information. Worriers often require more information before making a decision than those who do not worry (Yang & Kahlor, 2013). The social media environment offers a wide variety of opportunities for users to seek health information. People who worry about the pandemic might devote great efforts to acquire information from social media. With constant exposure to a large volume of information, they would feel overwhelmed. In addition, worriers tend to interpret an ambiguous event (e.g., COVID-19) in a more threatening way. They selectively focus on and process threat-related information. Thus, worry is likely to hamper their information-processing skills, increasing information overload (Chae et al., 2016). Similarly, worry might also escalate individuals’ perceived obstacles to processing information and making appropriate decisions (Cole & Rothblum, 2014). Based on the literature, the following hypothesis is advanced:

**H1:** Worry is positively related to social media information overload.

**Path 2: From Social Media Information Overload to Social Media Fatigue**

The speed of information production and dissemination is rapidly growing on social media, while users’ capacity to effectively process information does not increase at the same pace. When the transmitted information quickly reaches users’ cognitive threshold, they will feel too exhausted to handle new information (Liu et al., 2021). Also, when individuals are exposed to much complicated or irrelevant information, they might also experience fatigue, because such information will not be logically presented in a way that users can easily understand (Fu et al., 2020). Moreover, information overload also comes from excessive social interactions on social media. Users are compelled to respond to their social media friends, which requires considerable effort. Particularly, people often use multiple social media platforms and engage in various discussions with others concurrently, resulting in mental resources being spread too thinly to meaningfully process messages from each conversation and leading to a sense of exhaustion (Kaufhold et al., 2020). Southwell (2005) concluded that information overload would negatively affect people’s processing system, resulting in presented information not being effectively processed and stored. Faced with a large amount of health information disseminated on social media, individuals’ unproductive information processing can increase their concerns about failure, and cause stress, fatigue, and exhaustion. Consistent with past research on the negative effect of information overload, the second hypothesis is put forth:

**H2:** Social media information overload is positively related to social media fatigue.

**Path 3: From Social Media Fatigue to Fact-Checking**

When individuals experience mental fatigue from social media use, their attention to media content will be reduced, thus negatively affecting information evaluation, filtering, and recall. Users who feel tired after putting too much effort to deal with communication demands on social media tend to have more information avoidance to escape from negative emotions (Guo et al., 2020). Social media fatigue is also negatively related to people’s information efficacy (i.e., confidence in acquiring and applying information). This discourages them from further evaluating and analyzing information, thus reducing fact-checking tendencies (Park, 2019). Although the relationship between social media fatigue and fact-checking has not been empirically tested, some past studies may offer explanations. For example, Islam et al. (2020) found that fatigued social media users did more sharing of unverified information. Thus, it is highly possible that they do not verify the sources of information encountered. Dhir et al. (2019) examined antecedents and consequences of social media fatigue, indicating that social media fatigue can reduce users’ psychosocial well-being. And ample evidence has shown that negative emotions are associated with low levels of critical information evaluation and differentiation (Eppler & Mengis, 2004). Consistent with the literature on the negative role of social media fatigue, the third hypothesis is proposed:

**H3:** Social media fatigue is negatively related to fact-checking.

**Path 4: From Worry to Fact-Checking**

Despite the investigation of indirect effect, this study also explored whether worry, as a pre-orientation factor, might also have a direct effect on fact-checking. This is an unexamined area, and the exploration offers a fresh perspective to the O-S-O-R literature that emphasizes the indirect effect only. Given that worry is considered as an affective response to risk that may lead to risk-reduction behavior, health worry has the potential of directly increasing health fact-checking. This argument can be supported by several theories. For example, according to Wilson’s (1997) theory of information behavior, individuals’ information behavior is prompted by their cognitive, affective, or physiological needs. For instance, when individuals worry about suffering from a disease, they are more inclined to collect and evaluate information that can be used for self-protection. The risk information seeking and processing model also underscores that affective response to risks is a significant driver of subsequent information seeking and processing (Griffin et al., 1999).

However, another line of research suggests that worry might have a negative direct relationship with fact-checking.
One’s emotional burdens (e.g., too much worry) would lower their motivation and ability to interpret information. Also, scholars found that people who worry about getting a serious health problem may avoid information when it is distressing (Kuang & Wilson, 2017). They avoid information to prevent further anxiety if risk awareness calls into question their potential for disease (Brashers et al., 2002). Thus, considering that past research has demonstrated both a beneficial and counterproductive role of worry, and no previous study has explicitly examined the direct relationship between worry and fact-checking, the following research question is proposed:

**RQ:** Does worry directly increase or decrease fact-checking?

## Methods

### Sampling

A two-wave online survey was conducted during the COVID-19 pandemic in China. The recruitment of participants was implemented by a commercial survey company (www.wjx.cn), which has over 2.6 million online panel members in China. In February 2020, the company sent out 3,492 invitations to its online panel members, and 1,094 completed the Wave 1 survey, with a response rate of 31.3%. In May 2020, the Wave 2 survey was disseminated to Wave 1 respondents, and 73.3% of them finished it (n=802). The selection of a 3-month interval between waves was consistent with research designs of past research that examined similar topics, such as the effects of health-related worry (Chae & Lee, 2019) and health misinformation. Both the response rate and retention rate were satisfactory for opt-in panel surveys (Sauermann & Roach, 2013).

This study included respondents who have completed both surveys. The average age of the sample was 31, slightly younger than the Chinese population median of 38.4. About half (54%) were female, which is in line with the roughly equal gender ratio in China. Also, approximately half (53%) had a monthly personal income between 3,001 and 9,000 Chinese Yuan (CNY), consistent with the national average income of CNY7,540. In addition, about 75% had college education. Although this percentage is higher than the population’s education level (54% having college education), it is in accordance with the increasing trend of tertiary education in China (China National Bureau of Statistics, 2020). More details about participant characteristics are shown in Table 1. The study protocol was approved by the relevant Ethics Review Committee. Respondents’ informed consent was also obtained.

### Measurement

**Worry** was measured with three items adapted from prior research (Zhao & Nan, 2016). Respondents were asked to rate their worry about COVID-19 over the past week, how worried about catching coronavirus tomorrow, how worried they would be, and if they were to develop symptoms of coronavirus, how worried they would be (Maier et al., 2015). Respondents were asked to report their level of agreement with three state-of-the-art worry measurement (Jiang et al., 2018). Respondents were asked to report their level of agreement with three state-of-the-art worry measurement (Jiang et al., 2018). The selection of a 3-month interval between waves was consistent with research designs of past research that examined similar topics, such as the effects of health-related worry (Chae & Lee, 2019) and health misinformation. Both the response rate and retention rate were satisfactory for opt-in panel surveys (Sauermann & Roach, 2013).

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## Table 1. Sample Characteristics.

| Number (%) |
|------------|
| Age, M (SD) | 31.03 (8.16) |
| Gender     |             |
| Male       | 368 (46.0%) |
| Female     | 434 (54.0%) |
| Education  |             |
| Middle school or below | 5 (0.6%) |
| High school/vocational school | 175 (21.8%) |
| College degree | 557 (69.5%) |
| Postgraduate | 65 (8.1%) |
| Income (CNY) |             |
| <3,001    | 131 (16.3%) |
| 3,001 to 6,000 | 212 (26.4%) |
| 6,001 to 9,000 | 212 (26.4%) |
| 9,001 to 12,000 | 139 (17.3%) |
| 12,001 to 18,000 | 76 (9.5%) |
| >18,000  | 32 (4.0%) |
| N        | 802         |

**Note.** SD = standard deviation; CNY = Chinese Yuan.
use social media make me feel exhausted”; (2) “Using social media makes me feel tired”; and (3) “Using social media is a burden to me.” A 5-point Likert-type scale (from 1 = strongly disagree to 5 = strongly agree) was used. The higher score demonstrated more fatigue from social media use (Wave 1: M = 2.53, SD = 1.00, Cronbach’s alpha = .84; Wave 2: M = 2.51, SD = 1.01, Cronbach’s alpha = .85).

Fact-checking was measured by four items drawn from previous research (Zhao & Tsang, 2022). Respondents were asked to report how often they fact-checked COVID-19 information from the following channels: (1) “searching on search engines”; (2) “browsing official websites of governmental/health agencies”; (3) “reading the news”; and (4) “visiting fact-checking sites.” A 5-point Likert-type scale was used (from 1 = never to 5 = frequently). Responses were averaged to create one scale. The higher its score, the higher level of fact-checking (Wave 1: M = 2.89, SD = 0.61, Cronbach’s alpha = .74; Wave 2: M = 2.84, SD = 0.62, Cronbach’s alpha = .73).

Demographics, including age, gender (1 = male, 0 = female), education (from 1 = middle school or below to 5 = postgraduate), and personal monthly income (from 1 = CNY3,000 or below to 6 = above CNY18,000), were controlled to reduce confounding effects.

**Statistical Analysis**

We performed an autoregressive cross-lagged model to test the hypotheses and research question. This analysis can be used to investigate the impact of one variable measured at one time point on another variable measured at a later time point. This model also allows to test the autoregressive relationships between variables (e.g., whether the Time 1 variable might have an impact on itself at Time 2). The autoregressive cross-lagged model enables us to evaluate bidirectional relationships as well as temporal order of the relationships. Specifically in this study, the model included (1) autoregressive links for all focal variables (e.g., Wave 1 health worry → Wave 2 health worry; Wave 1 fact-checking → Wave 2 fact-checking) and (2) cross-lagged links based on O-S-O-R predictions from Wave 1 to Wave 2 (e.g., Wave 1 health worry → Wave 2 social media information overload; Wave 1 social media information overload → Wave 2 social media fatigue). Following previous research’s approach (Kim & Tandoc, 2022), the error terms among variables within time were allowed to covary if suggested by modification indices. To reduce potential confounding effects on the dependent variable, fact-checking at Wave 2 was also regressed on demographic variables.

**Results**

The goodness of structural equation modeling (SEM) model fit was evaluated using (1) a value less than .06 for root-mean-square error of approximation (RMSEA), (2) a value of standardized root-mean-square residual (SRMR) less than .08, and (3) comparative fit index (CFI) value of .95 or above (Hu & Bentler, 1999). Our SEM model had a satisfactory fit, χ²/df = 3.89, p < .001; RMSEA = .058 (90% CI: .040–.077); CFI = .975; and SRMR = .037. The model proposed in this study provided a more parsimonious fit for the data than some reasonable alternatives. The Bentler–Raykov squared multiple correlation coefficients indicated the following variance: health worry, 23.52%; social media information overload, 20.34%; social media fatigue, 14.05%, and health fact-checking, 25.98%.

Among the four demographic variables, income was positively associated with fact-checking behaviors (β = .09, p < .05), while age, gender, and education did not have a significant relationship with fact-checking behaviors.

The autoregressive relationships are demonstrated in Table 2. The stability coefficients for all the focal variables were all positive and significant from Wave 1 to Wave 2, indicating that the respondents’ standings on these variables were stable across time.

H1 posited that worry was positively related to social media information overload. As shown in Table 2, the cross-lagged association between worry (Wave 1) and information overload (Wave 2) was positive and significant (β = .22, p < .001), meaning that the greater the worry about a risk situation, the greater information overload people encounter on social media. Thus, H1 was supported.

H2 predicted that social media information overload was positively related to social media fatigue. The cross-lagged model results in Table 2 illustrated a positive and significant association between social media information overload (Wave 1) and social media fatigue (Wave 2) (β = .17, p < .001), supporting H2.

H3 hypothesized that social media fatigue was negatively related to fact-checking. As displayed in Table 2, the

| Pathway | β   | p   |
|---------|-----|-----|
| Worry (Wave 1) → information overload (Wave 2) | .22 | .000 |
| Information overload (Wave 1) → social media fatigue (Wave 2) | .17 | .000 |
| Social media fatigue (Wave 1) → fact-checking (Wave 2) | -.09 | .002 |
| Worry (Wave 1) → fact-checking (Wave 2) | .05 | .111 |

| Pathway | β   | p   |
|---------|-----|-----|
| Worry (Wave 1) → worry (Wave 2) | .49 | .000 |
| Information overload (Wave 1) → information overload (Wave 2) | .45 | .000 |
| Social media fatigue (Wave 1) → social media fatigue (Wave 2) | .33 | .000 |
| Fact-checking (Wave 1) → fact-checking (Wave 2) | .45 | .000 |
cross-lagged relationship between social media fatigue (Wave 1) and fact-checking (Wave 2) was negative and significant ($\beta = -0.09, p < .01$), supporting H3. Therefore, when users feel exhausted from social media use, they are less likely to check the accuracy of information.

RQ explored the direct effect of worry on fact-checking. As shown in Table 2, the direct cross-lagged relationship between worry (Wave 1) and fact-checking (Wave 2) was not significant ($\beta = 0.05, p = .11$). In light of all the cross-lagged effects mentioned above, social media information overload and social media fatigue completely mediated the relationship between worry and fact-checking. To examine the mediation effect more closely, the bootstrapped confidence intervals (CIs) were checked. Specifically, we tested the pathways from worry (Wave 1) to information overload (Wave 1), from information overload (Wave 1) to social media fatigue (Wave 1), from social media fatigue (Wave 1) to fact-checking (Wave 2), and finally from worry (Wave 1) directly to fact-checking (Wave 2). Fact-checking (Wave 1) was controlled. The bootstrapped results supported the significant mediation effect (CI $[-0.0131, -0.0017]$), as the lower and upper 95% CIs did not include zero.

**Discussion**

Fact-checking plays a key role in today’s complex and dynamic information environment, particularly during public health crises. However, individuals’ uptake of fact-checking has remained low. This study tested mediation pathways derived from the O-S-O-R model to identify the underlying process hindering fact-checking. Specifically focusing on health fact-checking in the context of COVID-19, this study demonstrated the negative roles of worry and social media that lower individuals’ fact-checking behaviors. Several key findings are discussed below.

Although misinformation is considered a concerning issue on social media, prior research has rarely examined how social media could influence one’s fact-checking behaviors. This study investigated two social media-related factors, namely social media information overload and social media fatigue, and showed their negative effects on fact-checking. Consistent with previous findings (Maier et al., 2015; Zhang et al., 2016), information overload was a positive predictor of social media fatigue. Social media has shifted personal communication from face-to-face to online. Users need to process social media messages disseminated by family, friends, online peers, and news organizations. When the amount and the complexity of information exceed individuals’ cognitive processing capacities, the feeling of social media fatigue will increase (Fu et al., 2020). Furthermore, social media fatigue reduced fact-checking. To the best of our knowledge, previous research has not examined this relationship, although the negative effect of social media fatigue on users’ other information behaviors has been noted before. For example, social media fatigue was found to be associated with discontinuous social media usage (Cao & Sun, 2018) and information avoidance (Dai et al., 2020). The present study adds new empirical evidence for the detrimental impacts of social media fatigue, lending support to the conjecture that people’s negative psychological strain (e.g., fatigue) can lead to negative behavioral outcomes (e.g., lack of fact-checking), because they want to avoid further psychological exhaustion (Luqman et al., 2017).

The investigation of social media information overload and social media fatigue illustrates the negative effect of social media. Navigating the social media information environment might be confusing, frustrating, and overwhelming, due to the fast speed and uncontrolled manner of social media information accumulation. Such negative users’ experience could generate further concerns, fatigue, or, in some cases, anxiety and depression, obstructing the effectiveness of social media to promote health and well-being. This study echoes the increasing advocacy for enhancing awareness and understanding of social media’s risks and adverse outcomes on individuals (Salo et al., 2018). Specifically, the plethora of health information on social media makes the search for desired content more difficult. Beyond inaccessibility, much social media health information is presented in jargon or highly technical language, which further lowers audiences’ comprehension (Sands et al., 2020). Due to the challenge of information overload, individuals’ emotional states would be worsened, for example, experiencing fatigue from social media usage. This is in line with the increasing discussion on the role of social media engagement in amplifying socially undesirable outcomes at an individual level, such as loneliness, depression, and envy (Salo et al., 2018). The negative effects of information overload and social media fatigue on fact-checking also offer support to the shallowing hypothesis of social media use, which states that social media activities, such as sharing and conversing, are likely to result in a decline in reflective thinking and instead promote rapid and superficial thoughts which might lead to cognitive and moral triviality (Baccarella et al., 2018). It is important to note that although social media fatigue had a significant relationship with fact-checking, the effect was small ($\beta = -0.09$). This result might indicate that the effect of social media fatigue on fact-checking behaviors is not entirely straightforward. Some literature suggests that given the high level of cognitive and psychological effort needed to carry out fact-checking task, it is likely that fatigue reduces fact-checking (Islam et al., 2020). However, others contend that social media fatigue would prompt users to escape from excessive use of social media for information, but turn to their trustworthy information sources (Dhir et al., 2019). This tendency might have the potential of increasing fact-checking to obtain accurate information from reliable sources. In the existing literature, the relationship between social media fatigue and fact-checking has not yet been empirically tested. It remains unclear whether fatigue is as strong as other documented factors (e.g., media literacy, health literacy) in influencing
fact-checking (D. K. L. Lee & Ramazan, 2021; Wojtowicz, 2020). The nascent research in this area, particularly mechanisms through which fatigue is linked to reduced fact-checking, merits further academic attention.

Another key objective of this study is to provide some preliminary insights into the relationship between pre-orientation (e.g., worry) and behavioral response (e.g., fact-checking), an under-researched area in the existing literature. The results showed that worry did not have a significant direct effect on fact-checking. Instead, its effect was indirect, mediated by social media information overload and social media fatigue. This result is both consistent and inconsistent with past studies. On the one hand, the finding is in line with the mediation perspective in the O-S-O-R model that identifies mechanisms underlying the relationship between pre-orientation and audience outcomes. Some previous empirical studies found similar indirect effects of pre-orientation factors on behavioral outcomes. For instance, Zhao (2012) examined public concerns about the environment between China and the United States, and found that personal values as individuals’ pre-orientation characteristics indirectly predicted their willingness to sacrifice for the sake of the environment, via the mediators of informational media use and perceived severity of environmental issues. On the other hand, the insignificant effect of worry also runs counter to prior research in the risk and health communication domain. Inducing worry and fear about health risks has been widely considered as an effective strategy for health communication efforts. The health campaign literature suggests to emphasize the danger of health risky behaviors, thereby increasing the likelihood that people will engage in less risky behaviors (Yzer et al., 2012). However, in the current study, health worry was not associated with health fact-checking, a risk-reduction behavior. This finding may join some of the evidence to challenge the viability of the “risk-as-feelings hypothesis” that underscores emotional reactions to risks as determinants of people’s behavior (Loewenstein et al., 2001).

A growing body of research has demonstrated that worry would lower, rather than increase, coping actions, and thus may not always lead to self-protective health behaviors (Brewer et al., 2007). In sum, the lack of relationship between pre-orientation and behavioral response remains intriguing and invites further research.

**Implications for Research and Practice**

This study has several important theoretical implications. First, it provides a fresh perspective to the O-S-O-R model by focusing on the negative role of social media. Different from past O-S-O-R research that mainly explored how news use and campaign exposure can exert positive impacts, such as health campaign to promote health behavior change (Namkoong et al., 2017), and political news consumption that increases political participation (H. Lee & Kwak, 2014), the present study demonstrates the process through which social media use may have a detrimental effect on fact-checking behaviors. Specifically, taking into account users’ experience in the social media information environment, we examined social media information overload that reflects the poor quality of the online information environment, and social media fatigue, the negative mental state as a result of social media use. Second, this study extends the O-S-O-R model by testing a different type of pre-orientation (health worry), and a different behavioral outcome (health fact-checking), providing additional empirical support for the applicability of O-S-O-R model in the health context. Theoretically, the model proposed in the current study accounts for a combination of factors that relate to affective response to risks, external media environment, an individual’s psychological response to the media information environment, and one’s behavioral response as the distal outcome. All these aspects provide a nuanced understanding of the processes inhibiting health fact-checking. Third, the present study also offers theoretical implications for the field of health communication. The role of social media in hindering health fact-checking suggests the need for a more refined examination of social media usage behavior. Close attention should be paid to users’ experiences within the social media environment (e.g., information overload vs. easy-to-navigate information environment), and the subsequent psychological outcomes (e.g., fatigue). In addition, the insignificant direct effect of health worry on fact-checking diverges from past research on the positive impact of threat appraisal on health protection behaviors. How health worry can be translated into health fact-checking remains an under-researched area. To have a more nuanced understanding of this relationship, we call for future research to explore under what circumstances, one’s worry about health risks can lead to fact-checking behaviors, and systematically signify the mechanisms that underlie the effect of health worry on health fact-checking. Finally, aside from the health context, the findings from this study can complement research in the broader area of communication, such as the contexts of environmental and science communication, where misinformation frequently occurs. The process-mediating mechanism highlighted in this study informs future research to explore pre-orientation as an antecedent of exposure to stimuli from the social media environment, and post-orientation as a result of social media usage experience that affects individuals’ fact-checking behaviors.

This study also provides important practical implications. First, although reinforcing individuals’ worry about a health risk has been widely utilized to promote health behavior, the principle of worry might not be effective for campaigns targeting health fact-checking, an information behavior. It remains unclear to what extent worry can keep a health threat salient but would not trigger too much information acquisition, causing information overload. We call for more formative research before the implementation of health campaigns to understand what is a reasonable amount of worry to draw
target audiences’ attention to the health issue, while avoiding too much emphasis on risks that may deter their fact-checking behaviors. Second, given the negative roles of social media information overload and fatigue, users should exert some control over their social media use. For example, they can focus on more preferred and reliable social media sources for health information, apply topic filters to reduce the number of incoming messages, and have more productive conversations with online peers. Social media providers can also help users cope with information overload by strategies such as pushing less irrelevant information, controlling the amount of advertising, reducing the frequency of system updates, and providing users with guides to learn new features. Third, to promote effective health fact-checking, targeted intervention programs are essential. People should be instructed on the criteria for evaluating the quality of health information obtained online. Past research summarized several key evaluation criteria, such as content accuracy, disclosure of authors, source credibility, currency of information, website design, usability, documentation of claims, number and quality of links, and contact information (Kalichman et al., 2006; Zhao & Tsang, 2022).

Limitations and Directions for Future Research

The limitations of this study should be noted. First, the sample is skewed toward young adults in the age range of 20–40 years. Although this distribution does not deviate from common users of social media, the conclusion from this study might not be well applied to other age groups that have different levels of digital literacy and communication demands. Future research should include various age groups to better reflect the characteristics of a wider range of social media users. Second, despite the use of two-wave panel surveys, it is difficult to make strong claims of causality. Alternative specifications of the relationships in the proposed model could not be ruled out. Future research can extend this study in an experimental setting to reach a more convincing conclusion about the causal relationship among variables along the mediation pathway. Third, the measurement of fact-checking only examined whether people generally check fact through different channels. To have a more accurate assessment of users’ fact-checking behaviors, future research should specifically measure whether and how they check the veracity of any particular fact. Fourth, this study is conducted in the context of China, a highly collectivistic society. Chinese people could experience more stress due to the social norm of reciprocity that requires them to make greater efforts to maintain social media connections with others. Considering the different cultural orientations, findings from this study may not be well generalized to more individualistic countries. Future research can examine the model in other societies to test the external validity of the findings. Finally, this study merely examined one pathway connecting health worry, social media information overload, and social media fatigue to health fact-checking. Only a small proportion of variance in the dependent variable (fact-checking) was predicted. Many other factors could be in play as well to influence fact-checking behaviors. Thus, we call for future research that explores more mediation and moderation pathways leading to health fact-checking.

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