

Does Party Affiliation Matter? A Moderated Moderation Examining Literacies, Foreign Social Media Use, and Political Affiliation on COVID-19 Misperceptions in China

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As concerns about misinformation have increased during the COVID-19 pandemic, abundant research has attempted to understand its patterns and consequences. Although much evidence has demonstrated the benefits of media, health, and science literacy enhancement in combating misinformation, less is known about whether each type of literacy would exert distinctive influences on misperceptions. More importantly, no empirical investigation of this kind has centered on a non-Western context (i.e., China), which has a drastically different media and political landscape compared with the West. With a survey of 720 nationally recruited Chinese citizens, this study shows that although new media literacy carries the most weight in COVID-19-related misperception reduction, the general public would benefit from media-health-science triad literacy curricula. Frequent exposure to foreign social media may confuse and sow misperceptions among highly literate and overconfident individuals. Findings further challenge traditional views of one-party rule and show that ideological differences do exist between party-affiliated members and the general public in influencing their subsequent perceptions and decision making. Future interventions and strategies should be developed based on individuals' media diet and party affiliation.

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Riddled with purposefully or unintentionally crafted conspiracy theories and fake news, COVID-19 misinformation has caused public chaos and threatened our society's intellectual and health well-being (World Health Organization, 2021). A plethora of research has therefore grappled with the problem of misinformation, and two lines of literature have yielded fruitful results: the correction effort to debunk misinformation (Tully, Bode, & Vraga, 2020; Xiao, 2022) and the preventive measures to increase individuals' capabilities to discern misinformation (e.g., Jones-Jang, Mortensen, & Liu, 2021). In particular, the preventive measures to increase the level of literacy, including health literacy, media literacy, and science literacy, demonstrate prominent effectiveness in reducing health-related misperceptions (e.g., Kim & Tandoc, 2022). However, less work has considered whether different types of literacy carry different weights in decreasing COVID-19 misperceptions in which health, science, politics, and mass communication are inexorably intertwined. More importantly, much misinformation research has focused on the Western context and seldom paid attention to other cultural contexts, such as China (Bridgman et al., 2020; Enders et al., 2021; Lee, Choi, & Britt, 2021). As such, this study attempts to extend the literacy framework to the context of China and validate its effectiveness in lowering misperceptions.

Moreover, prior research has documented a moderating effect of social media use in forming misperceptions (e.g., Li, Cui, Kaminga, Cheng, & Xu, 2021; Qin et al., 2022). Although media censorship has protected the Chinese general public from misinformation to a certain extent, research shows that the proliferation of misinformation has surged on social media during the COVID-19 pandemic (e.g., Lu, 2020). Although foreign social media platforms, such as Facebook and Twitter are blocked in China, individuals nowadays, especially the younger generation, manage to use Virtual Private Networks (VPN) to bypass the firewall for information acquisition (e.g., McDonald, 2017). Considering the heated and polarized debates about COVID-19 on Facebook and Twitter (e.g., Vraga & Bode, 2021), whether and how Chinese individuals' perceptions would be affected by those contradictory opinions merits further exploration. Last, previous studies show an imperative moderating influence of political affiliation in misperception formation (Borah, 2022). However, no research to date has investigated whether and how party affiliation among the Chinese public would influence the outcome. This remains underexplored since prior research tends to simplify Chinese public opinion based on the one-party system in China (e.g., Harmel & Tan, 2012). However, recent studies indicate that Chinese individuals have diverse and more liberal perspectives and values about social issues (e.g., Pan & Xu, 2018); the differences in political affiliation also distinguish party-affiliated individuals from the general public (Ji & Jiang, 2020). Specifically, party members hold more progressive and modern opinions about a wide range of social, political, and international issues (Ji & Jiang, 2020). These novel trends and findings drive the examination of the moderating role of political affiliation in the misinformation age.

In sum, using an empirical survey of 720 Chinese individuals, this study aims to achieve three main purposes: (1) to validate the relationship between types of literacy and COVID-19 misperceptions in the context of China, (2) to identify the moderating influence of foreign social media use, and (3) to further explore the moderating role of political affiliation that may impact misperception formation.

Types of Literacy and Misperceptions

Defined as “cases in which people’s beliefs about factual matters are not supported by clear evidence and expert opinion” (Nyhan & Reifler, 2010, p. 305), misperceptions erode public trust toward authoritative health organizations and cause confusion during public health crises (e.g., Flynn, Nyhan, & Reifler, 2017). Indeed, during the COVID-19 pandemic, studies identified a long list of misperceptions about cures, prevention measures, and vaccination (Bridgman et al., 2020) that may have devastating health consequences. Past research has highlighted three types of literacies that are critical in reducing health-related misperceptions: media literacy (Koltay, 2011), health literacy (Kim & Tandoc, 2022), and science literacy (Sharon & Baram-Tsabari, 2020). Media literacy has been defined as individuals’ capabilities to critically evaluate, critique, and synthesize media information (Koc & Barut, 2016); it helps individuals discern facts from misinformation and prevent misperception formation (e.g., Borah, Su, Xiao, & Lee, 2022; Koc & Barut, 2016). For example, individuals with a greater ability to critically consume new media information are less likely to develop health-related misperceptions (Xiao, Su, & Lee, 2021). Similarly, in the context of China, research shows that a higher level of media literacy protects individuals from falling prey to COVID-19-related misinformation (Su, Lee, Xiao, Li, & Shu, 2021).

Ample research also showed the importance of science literacy to form an informed citizenry during the COVID-19 pandemic (Austin & Johnson, 1997; Glick, Wolff, & Carrasco-Labra, 2021). Science literacy refers to the capability to engage with science-related issues; scientifically literate individuals have a general understanding of scientific inquiries and constructs and can draw conclusions based on scientific knowledge and facts (Miller, 2004; Snow & Dibner, 2016). Findings about the effectiveness of science literacy on perceptions and behaviors, however, remain somewhat inconclusive. Specifically, some found a positive effect of science literacy (Fernbach, Light, Scott, Inbar, & Rozin, 2019; He, Chen, Xiong, Zou, & Lai, 2021; Sharon & Baram-Tsabari, 2020). For example, by investigating 500 Japanese individuals, research found that individuals with higher science literacy had lower misleading attitudes and beliefs about COVID-19 (Motoki, Saito, & Takano, 2021). Some, however, showed that science literacy may have a certain negative impact on perceptions (e.g., Kahan et al., 2012). For instance, Drummond and Fischhoff (2017) suggested that highly scientifically literate individuals are more likely to have polarized perceptions about controversial health and political issues.

In addition, relatedly, scholars emphasized that health literacy is equally important in combating misinformation (e.g., Damian & Gallo, 2020; Okan, Messer, Levin-Zamir, Paakkari, & Sørensen, 2022; Paakkari & Okan, 2020). Many scholars assert that health literacy is fundamentally intertwined with and reliant on science literacy (e.g., Grace & Bay, 2011). However, science literacy definitions vary based on the goals emphasized by the rationale, such as economic, personal, democratic, or cultural aims (Snow & Dibner, 2016). Notably, science literacy “has only recently started to focus in concrete ways on empirical links to decisions and action” (Snow & Dibner, 2016, p. 36). In contrast, health literacy definitions exclusively center on the promotion and maintenance of good health for individuals, communities, and societies (Snow & Dibner, 2016). The emphasis on fostering civic engagement and decision making has long been a hallmark in health literacy research and practices (Snow & Dibner, 2016). In terms of operationalization, science literacy is often associated with understanding and proficiency in the technical aspects of scientific knowledge (He, Chen, Xiong, Zou, & Lai, 2021; Miller, 2004; National Science Board [NSB], 2018), while

health literacy is more concerned with challenges in accessing and using information for healthcare decisions, disease prevention, and health promotion (Norman & Skinner, 2006; Parker, Baker, Williams, & Nurss, 1995). Therefore, the distinct conceptual focus and operationalization of health literacy set it apart as a unique and indispensable concept, particularly in the investigation of health misperceptions.

Health literacy has been traditionally defined as “the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand, and use information in ways that promote and maintain good health” (World Health Organization, n.d.). As new media technologies afford people various electronic health tools for information seeking and self-diagnosis, electronic health (e-health) literacy has become rather imperative in helping individuals navigate through the Internet filled with true and false information (Norman & Skinner, 2006). Defined as “the ability to seek out, find, evaluate and appraise, integrate, and apply what is gained in electronic environments toward solving a health problem,” e-health literacy’s protective effect has been receptively highlighted in prior research (e.g., Do et al., 2020; Norman & Skinner, 2006). For instance, through a cross-sectional study of 1873 Chinese college students, (Li et al., 2021) found that individuals with greater e-health literacy had more positive and correct perceptions and acceptance of COVID-19 preventive measures; e-health literacy was also a more important predictor of positive behaviors compared with traditional health literacy. Similar findings with subtle discrepancies emerged in a three-wave panel survey of 1,023 Asian respondents, in which a greater level of e-health literacy is related to lower engagement in misleading behaviors but not lower misperceptions (Kim & Tandoc, 2022).

Taken together, although the relative importance of media, science, and health literacies in reducing misperceptions and promoting positive behaviors during the pandemic has been suggested, research has yet to validate their effectiveness in the context of China. Moreover, considering the conflicted findings in previous literature, this study aims to further evaluate and compare the distinctive effect of three types of literacy on COVID-19 misperceptions.

H1: Higher media literacy is negatively associated with COVID-19 misperceptions.

RQ1: How is science literacy associated with COVID-19 misperceptions?

RQ2: How is health literacy associated with COVID-19 misperceptions?

RQ3: Which type of literacy carries the most weight in COVID-19 misperception reduction?

The Role of Foreign Social Media Use

A robust literature has suggested that the level of literacy and literacy-related perceptual outcomes may vary based on the frequency of social media use (Qin et al., 2022; Xiao et al., 2021). For instance, more frequent use of social media was associated with improved health literacy, media literacy, and science literacy (Li & Liu, 2020; Zhang, Wu, Chen, & Su, 2022). Unfortunately, during the COVID-19 pandemic when social media platforms played a key role in breeding and proliferating misinformation, intensive social media use was also linked to various kinds of COVID-19-related misperceptions and conspiracy thinking (e.g., Bridgman et al., 2020; Enders et al., 2021; Lee et al., 2021; Meppelink, Bos, Boukes, & Möller, 2022; Vraga

& Bode, 2021). In particular, frequent social media users are more likely to have inaccurate beliefs about the origin, transmission, prevention methods, and treatment related to COVID-19 (e.g., Meppelink et al., 2022; Xiao et al., 2021).

However, it is worth noting that the media landscape in China largely differs from that of the West. On one hand, the Chinese Communist Party (CCP) keeps a tight rein on social media platforms (Yang & Liu, 2014). Multiple studies found that not only do Chinese social media closely reflect the agenda of the mainstream media (Chen, Su, & Chen, 2019) but they also implement censorship strategies to remove sensitive public comments and stamp out undesirable content that may stir up social disturbances (Su & Xiao, 2021). Although these measures are under harsh criticism (Tai & Fu, 2020), they paid off remarkably during the COVID-19 pandemic, when misinformation was rampant. Specifically, Su et al. (2021) found that domestic social media use was not significantly associated with any widely circulated COVID-19 misperceptions. On the other hand, China has set up a digital barricade against foreign social media sites such as Facebook, Twitter, and Instagram, but the "great firewall" has not stopped numerous younger, liberal, and digitally literate Chinese citizens from flocking to the "external websites" for information acquisition (McDonald, 2017). Exposure to polarized and contradictory information about COVID-19 via foreign social media sites may cause confusion among and implant misperceptions in this group of individuals. That being said, no research has examined the moderating role of this particular type of social media use among the Chinese general public. Thus, this study proposes the following question:

RQ4: How does foreign social media use moderate the relationship between literacy and misperceptions?

The Role of Political Affiliation

COVID-19 is not a pure health issue but a polarized and politicized matter in the West, especially in the United States (Hart, Chinn, & Soroka, 2020). In particular, conservative individuals tend to have more misperceptions that wrongfully associate the pandemic with wrong origins and causes, value intuitive feelings over evidence, and reject prevention behaviors (Borah, Austin, & Su, 2022), while liberals are less susceptible to misinformation and more acceptable of science-based evidence and abide by prevention rules (Young, Maloney, Bleakley, & Langbaum, 2022). Research also documented a significant moderating effect of political affiliation in influencing COVID-19 misperceptions (e.g., Borah, 2022; Borah, Austin, et al., 2022; Weil & Wolfe, 2022). For instance, Borah (2022) revealed that political affiliation moderates the relationship between media literacy and COVID-19 misperceptions, in which conservative individuals with higher self-perceived media literacy had more misperceptions, whereas this effect was not significant among liberals. A study also found that the negative association between health literacy and inaccurate COVID-19 beliefs was moderated by political views and that this particular relationship was almost absent for conservatives (Cameron, Lawler, Robbins-Hill, Toor, & Brown, 2023). Likewise, conservative individuals with greater science literacy are also more likely to hold misperceptions about contested issues such as climate change and human evolution (Drummond & Fischhoff, 2017).

However, admittedly, the political landscape is wildly different in China. China is a one-party state ruled by the CCP (Harmel & Tan, 2012). Owing to the one-party system, the Western coverage of the CCP often accentuates its political unity, autocratic practices, and opposition toward democratic and liberal values

(Gan & George, 2021; "What party control means," 2023). However, putting aside the differences in political systems between the West and China, scholars cautioned against "the tendency to regard the party as the main culprit of illiberalism in the Chinese society" (Ji & Jiang, 2020, p. 2). Glossing over the ideological differences between CCP-affiliated members and the general public could also be grossly mistaken, as they did contribute to nuances in decision making (Dickson, 2014; Sun, D'Alessandro, & Johnson, 2014). For instance, by analyzing data from seven national surveys, Ji and Jiang (2020) found that "contrary to the popular perception of the party as the champion of illiberal authoritarianism, CCP members are actually the relatively more liberal and enlightened group in the Chinese society" (p. 2).

Moreover, as COVID-19-related misinformation proliferates on foreign social media sites, exposure to China-related misinformation (e.g., the COVID-19 virus is made in a Wuhan lab) may be inevitable (Himmelboim et al., 2023). Because of mounting tensions between the United States and China, political content that depicts China or the CCP as a "totalitarian regime," an "authoritarian camp," and "the opposite of democracy" is also prevalent on foreign media platforms (Babones, 2021; Beckley & Brands, 2022). Thus, it is assumable that exposure to these kinds of information may generate confusion, create perceptual dilemmas, and cause behavioral complexities among CCP-affiliated individuals (e.g., Bail et al., 2018; Erisen, Redlawsk, & Erisen, 2018). Although this study has no intention to discuss the political disputes between the West and China, we are motivated to further examine political affiliation as a moderator in processing COVID-19-related information. This exploration would provide a more comprehensive picture of how Chinese citizens interact with misinformation.

RQ5: How do literacies, foreign social media use, and political affiliation interact to influence COVID-19 misperceptions?

The Conceptual Model

Figure 1 illustrates the proposed conceptual model previously discussed: various forms of literacy may contribute to mitigating the consequences associated with misinformation (Kim & Tandoc, 2022). However, the efficacy of literacy in reducing misperceptions may be contingent on social media utilization (Qin et al., 2022). Specifically, heightened exposure to misinformation and contentious content on social media platforms could attenuate the beneficial impact of literacy on reducing misperceptions (Meppelink et al., 2022). Moreover, this moderated relationship may be further influenced by political affiliation, potentially leading to biased perceptions or confusion that affect misperception formation in the context of COVID-19 (Borah, 2022; Ji & Jiang, 2020).

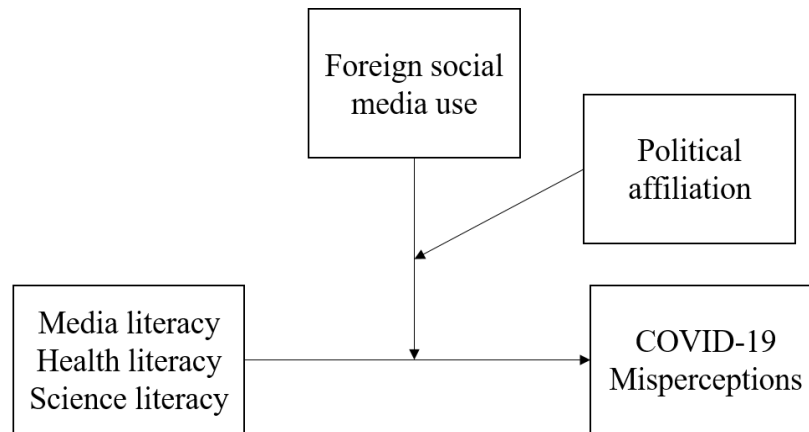


Figure 1. The conceptual model.

This particular model contributes to prior literature in two important ways. First, although the effectiveness of health, media, and science literacy in fostering an informed citizenry has been extensively documented (e.g., Kim & Tandoc, 2022; Koltay, 2011; Sharon & Baram-Tsabari, 2020), scant research has examined these interconnected concepts and parsed their individual effects on mitigating misperceptions. By elucidating the impact of each form of literacy on misperception reduction, this model furnishes empirical evidence about the relative importance of different literacies in combating misinformation, thereby indicating potential avenues for theoretical development and intervention implementation. Second, this model enriches our comprehension of misperception formation and reduction within a non-Western context, where the information environment, media usage patterns, and political milieu markedly differ from those in the West (Harmel & Tan, 2012; Pan & Xu, 2018; Sun et al., 2014). By scrutinizing the moderating roles of foreign social media usage and political affiliation, this model provides a unique perspective on discerning whether and how cultural factors should be integrated into future research endeavors concerning misinformation.

Method

Participants and Procedures

We recruited a national sample of 772 participants aged 18 and above from 27 provinces across China via Credamo in December 2022. Credamo is an online survey company with a national and diverse participant pool; its sample has been used in various social science research and demonstrated validity and reliability (Gong, Zhang, & Sun, 2021). Fifty-two individuals were excluded because of failure of attention checks and incompleteness. The final sample consisted of 720 individuals ranging in age from 18 to 58 ($M_{age} = 31.09$, female = 57.78%); 93.75% of the participants received a bachelor's degree or above, and 91.4% earned a monthly income of 2,000 RMB or above. Approximately 99.17% of the participants have received the COVID-19 vaccination. Detailed demographic information is listed in Table 1.

Table 1. Demographic Information (N = 720).

	Full sample (N = 720)			
	N	%	Range (years)	M(SD)
1. Age			18–58	31.09(8.24)
2. Gender				
Female	416	57.78%		
Male	304	42.22%		
3. Education				
Junior high school and below	3	0.42%		
High school	42	5.83%		
Bachelor's degree	540	75%		
Master's degree and above	135	18.75%		
4. Income				
Below 2,000 RMB	62	8.61%		
2,000–5,000 RMB	128	17.78%		
5,000–8,000 RMB	175	24.30%		
8,000–10,000 RMB	136	18.89%		
Over 10,000 RMB	219	30.42%		

Measures

Media Literacy. The 10-item critical consumption subscale in the New Media Literacy Scale (Koc & Barut, 2016; Xiao et al., 2021) was used to assess participants' levels of new media literacy. Responses were measured with a Likert-type scale ranging from "strongly disagree" (0) to "strongly agree" (6; $M = 4.09$, $SD = 0.42$, $\alpha = 0.79$). Sample items included "I can distinguish different functions of media"; "I am able to determine whether or not media contents have commercial messages"; and "I can compare news and information across different media environments."

Science Literacy. The 10-item Science Literacy Scale (National Science Board, 2018) with true-or-false questions was used to assess participants' levels of science literacy. Responses were summed to form the final scale with a higher score indicating greater science literacy ($M = 7.68$, $SD = 1.15$). Sample items included "The sun goes round the earth (False)"; "The center of the Earth is very hot (True)"; and "All radioactivity is manmade (False)."

Health Literacy. The eight-item eHealth Literacy Scale (eHEALS; Norman & Skinner, 2006) was used to assess participants' levels of health literacy. Responses were measured with a Likert-type scale ranging from "strongly disagree" (0) to "strongly agree" (6) and averaged to form the final scale ($M = 4.13$, $SD = 0.44$, $\alpha = 0.78$). Sample items included "I know where to find helpful health resources on the Internet"; "I know how to use the health information I find on the Internet to help me"; and "I have the skills I need to evaluate the health resources I find on the Internet."

COVID-19 Misperceptions. Five widely circulated COVID-19 misperceptions in China were selected to form a misperception scale (e.g., *China Daily*, 2022). Responses were measured with a Likert-type scale ranging from “strongly disagree” (0) to “strongly agree” (6) and summed to form the final scale ($M = 8.24$, $SD = 2.16$). Sample items included “Garlic and alcohol can cure COVID-19”; “Mosquitoes and catkins can spread the coronavirus”; “COVID-19 vaccination will alter human DNA”; and “COVID-19 vaccination will infect you with the virus.”

Foreign Social Media Use. Foreign social media use was assessed using one item—“How frequently do you use foreign social media such as Facebook and Twitter?”—on a Likert scale ranging from “never” (0) to “almost always” (6; $M = 2.04$, $SD = 1.20$).

Political Affiliation. Participants’ political affiliation was measured using a multiple-choice question, “What is your political status?” 49.44% identified as the general public with no party affiliation, followed by members of the CCP (25.42%), minor political party members (0.42%), members of the Communist Youth League (23.06%), and members of the nonaffiliates (1.67%). Since all forms of political membership are associated with the ruling party CCP (The State Council Information Office of the People’s Republic of China, 2021), to make meaningful interpretations, we recoded political affiliation as the general public (49.44%) and the CCP-affiliation (50.56%).

Covariates. Based on prior research (Borah, 2022; Borah, Austin, et al., 2022), control variables included age, gender, education, income, and COVID-19 vaccination status.

Results

To analyze the first hypothesis and RQ1 through RQ3, multiple regression controlling for age, gender, education, income, and COVID-19 vaccination status was employed. PROCESS Macro model 1 for SPSS Statistics 22.0 and Process Macro model 3 for SPSS Statistics 22.0 were used to examine RQ4 and RQ5 (Hayes, 2018). Zero-order Pearson correlations are listed in Table 2.

H1, RQ1, and RQ2 explored how three types of literacy were associated with COVID-19 misperceptions and RQ3 probed the relative weight of each type of literacy. As shown in Table 3, greater media, health, and science literacies were significantly associated with lower COVID-19-related misperceptions, in which media literacy had the highest negative effect ($\beta = -0.19$, $p = .001$), followed by science literacy ($\beta = -0.15$, $p < .001$) and health literacy ($\beta = -0.12$, $p = 0.039$). Thus, the first hypothesis was supported.

Table 2. Correlation for All Variables (N =720).

	1	2	3	4	5	6	7	8	9	10
1. Age	-									
2. Gender	-0.15**	-								
3. Education	-0.12**	0.06	-							
4. Income	0.40**	-0.14**	0.25**	-						
5. Media literacy	0.16**	-0.14**	0.05	0.33**	-					
6. Science literacy	-0.10**	-0.02	0.06	-0.09*	-0.04	-				
7. Health literacy	0.15**	-0.15**	0.02	0.33**	0.77**	-0.06	-			
8. Foreign social media use	0.01	0.01	0.09*	0.16**	0.17**	0.19**	-0.11**	-		
9. Political affiliation	0.35**	-0.12**	-0.31**	0.18**	0.16**	0.14**	-0.03	-0.10**	-	
10. Misperceptions	-0.02	0.05	-0.02	-0.14**	-0.29**	-0.27**	-0.13**	0.05	-0.08*	-

Note. * $p < .05$, ** $p < .01$.

Table 3. Multiple Regression Model (N = 720).

	COVID-19 Misperceptions		
	β	SE	p
1. Age	0.05	0.01	0.254
2. Gender	-0.01	0.16	0.872
3. Education	0.03	0.16	0.500
4. Income	-0.08	0.07	0.069
5. Media literacy	-0.19**	0.29	0.001
6. Science literacy	-0.15**	0.07	0.000
7. Health literacy	-0.13*	0.27	0.039
R^2		0.12**	
F for R^2		13.22**	

Note. * $p < .05$, ** $p < .01$.

RQ4 investigated the moderating role of foreign social media use (Table 4). As shown in Figure 2, two significant two-way interactions emerged from the results ($b_{media\ literacy} = 0.43$, $SE_{media\ literacy} = 0.15$, $p = .005$; $b_{health\ literacy} = 0.38$, $SE_{health\ literacy} = 0.14$, $p = .007$). Specifically, among individuals with high media and health literacies, frequent foreign social media consumers had more COVID-19 misperceptions compared with users with low foreign social media use; among individuals with low media and health literacies, the levels of COVID-19 misperceptions are similarly high regardless of their foreign social media use.

Table 4. Multiple Regression Models Predicting Two-Way Interaction Effects between Media Literacy and Foreign Social Media Use, and between Health Literacy and Foreign Social Media Use, on COVID-19 Misperceptions (N = 720).

	COVID-19 Misperceptions		
	Coefficient	SE	p
1. Age	0.02	0.01	0.140
2. Gender	-0.004	0.16	0.980
3. Education	0.05	0.16	0.775
4. Income	-0.16	0.07	0.023
5. COVID-19 vaccination status	-0.03	0.84	0.972
6. Foreign social media use	-1.57	0.62	0.012
7. Media literacy	-2.30	0.35	< 0.001
8. Media literacy*Foreign social media use	0.43	0.15	0.005
R^2		0.33**	
F for R^2		11.06**	
1. Age	0.01	0.01	0.219
2. Gender	0.001	0.16	0.995
3. Education	0.02	0.17	0.905
4. Income	-0.17	0.07	0.019
5. COVID-19 vaccination status	-0.21	0.85	0.805

6.	Foreign social media use	-1.36	0.59	0.020
7.	Health literacy	-2.00	0.32	< 0.001
8.	Health literacy*Foreign social media use	0.38	0.14	0.007
R^2		0.32**		
F for R^2		9.82**		

Note. Output was retrieved from PROCESS MODEL 1 results; * $p < .05$, ** $p < .01$.

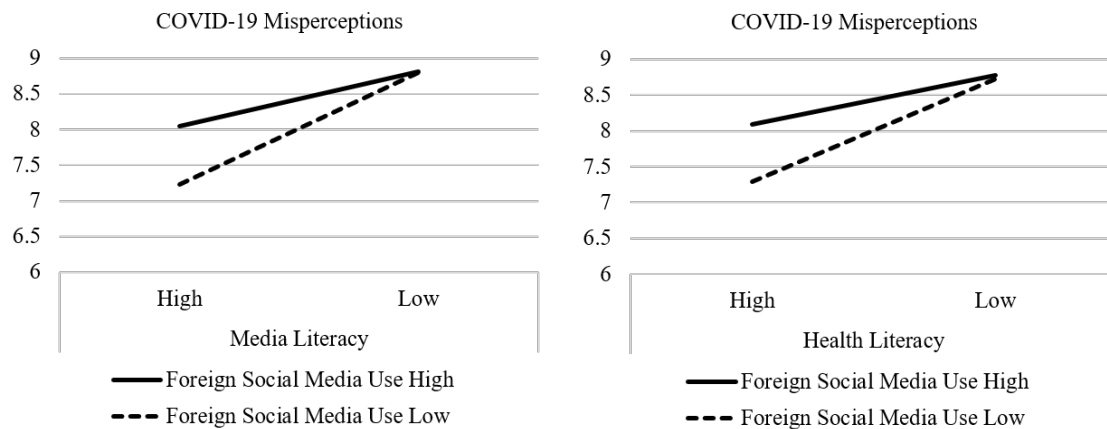


Figure 2. Two-way interaction effect between literacy and foreign social media use on covid-19 misperceptions.

RQ5 further inquired about whether moderation was moderated by political affiliation (Table 5). Results revealed two significant three-way interactions ($b_{media literacy} = 0.90$, $SE_{media literacy} = 0.32$, $p = .006$; $b_{science literacy} = -0.31$, $SE_{science literacy} = 0.11$, $p = .005$). As can be seen in Figure 3, among the Chinese general public, when media literacy was high, high foreign social media use resulted in greater misperceptions compared with those with low foreign social media use; while when media literacy was low, low foreign social media use was associated with greater misperceptions compared with those with high media literacy. This interaction effect was insignificant among CCP-affiliated individuals. As per science literacy (Figure 4), among the Chinese general public, greater foreign social media use led to lower COVID-19 misperceptions when science literacy was high, but frequent foreign social media use was associated with high misperceptions when science literacy was low. This interaction effect was negligent among CCP-affiliated individuals.

Table 5. Multiple Regression Models Predicting Three-Way Interaction Effects between Media Literacy, Foreign Social Media Use, and Political Affiliation, as well as between Science Literacy, Foreign Social Media Use, and Political Affiliation, on COVID-19 Misperceptions (N = 720).

		COVID-19 Misperceptions		
		Coefficient	SE	p
1.	Age	0.02	0.01	0.137
2.	Gender	-0.01	0.16	0.964
3.	Education	0.01	0.17	0.945
4.	Income	-0.15	0.07	0.038
5.	COVID-19 vaccination status	-0.03	0.84	0.967
6.	Foreign social media use	3.40	1.90	0.073
7.	Media literacy	0.09	1.09	0.934
8.	Political affiliation	6.83	2.98	0.022
9.	Media literacy*Foreign social media use	-0.80	0.46	0.084
10.	Media literacy*Political affiliation	-1.71	0.73	0.019
11.	Foreign social media use*Political affiliation	-3.70	1.36	0.007
12.	Media literacy*Foreign social media use* Political affiliation	0.90	0.32	0.006
R^2			0.35**	
F for R^2			8.11**	
1.	Age	0.02	0.01	0.180
2.	Gender	0.08	0.16	0.637
3.	Education	0.02	0.18	0.930
4.	Income	-0.27	0.07	< .001
5.	COVID-19 vaccination status	0.19	0.87	0.823
6.	Foreign social media use	-3.11	1.28	0.016
7.	Science literacy	-1.30	0.45	0.004
8.	Political affiliation	-6.54	2.16	0.003
9.	Science literacy*Foreign social media use	0.39	0.17	0.019
10.	Science literacy*Political affiliation	0.78	0.28	0.005
11.	Foreign social media use*Political affiliation	2.46	0.82	0.003
12.	Science literacy*Foreign social media use* Political affiliation	-0.31	0.11	0.005
R^2			0.25**	
F for R^2			4.08**	

Note. Output was retrieved from PROCESS MODEL 3 results; * $p < .05$, ** $p < .01$.

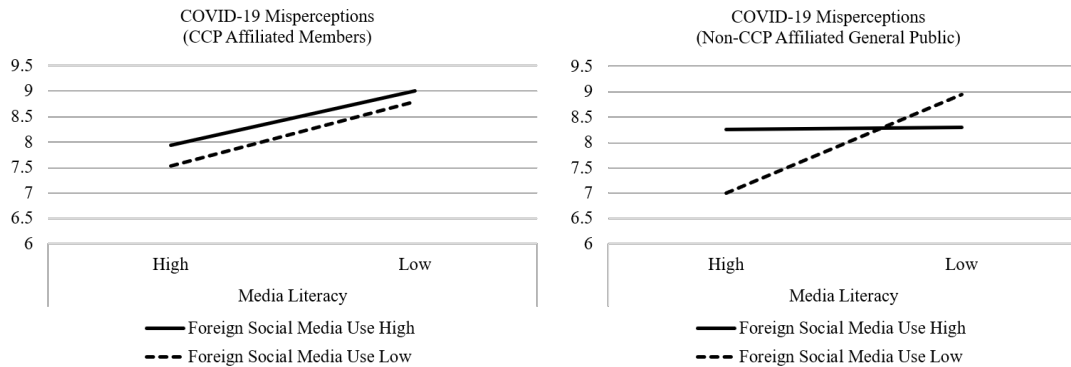


Figure 3. Three-way interaction effect between media literacy, foreign social media use, and party affiliation on COVID-19 misperceptions.

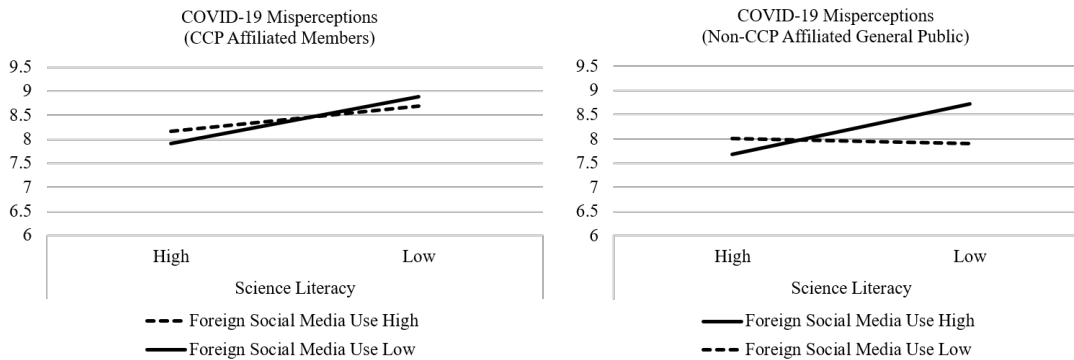


Figure 4. Three-way interaction effect between science literacy, foreign social media use, and party affiliation on COVID-19 misperceptions.

Discussion

Following the concerted effort devoted to addressing misinformation and analyzing personal and social factors that contribute to misperceptions, this study improves our understanding of the interplay among literacy, foreign social media consumption, and political affiliation on COVID-19 misperceptions among the Chinese population. The primary objective of this study is to validate the association between various forms of literacy and COVID-19 misperceptions within the context of China. In line with previous research (Li et al., 2021; Paakkari & Okan, 2020; Xiao et al., 2021), this study demonstrates a positive and protective effect of all three types of literacies—media, health, and science—in a public health crisis. In particular, the ability to evaluate, analyze, and synthesize new media information critically appears to be the most crucial factor that helps people navigate through the complex online environment riddled with misinformation. This finding indeed echoes a large and venerable literature that advocates media literacy education and interventions in the misinformation age (Craft, Ashley, & Maksl, 2017; Vraga, Tully, & Bode, 2022). That being said, considering the small but significant influences of health and science literacies, our study implies that increasing media literacy

alone may not be as effective in reducing misperceptions, especially the ones related to global public crises. Improving individuals' capabilities to locate useful health information and filter health rumors and inaccurate claims, as well as enhancing their scientific consciousness and rational thinking may be of equal importance (Miller, 2004; Norman & Skinner, 2006).

The second objective of this study is to discern the moderating impact of foreign social media use. While the Chinese population has restricted access to foreign social media, technically proficient individuals can go around the firewall and consume media content posted on Facebook and Twitter (Su et al., 2021). Our finding shows that this specific pattern of social media use does contribute to nuances in misperception formation, and concerns should be primarily directed at those with a higher level of new media literacy and health literacy. This group of individuals is confident about their abilities to discern misinformation from truthful information (Koltay, 2011). This confidence, nonetheless, can easily turn into bold and unwise overconfidence and facilitate the internalization of misinformation (Lyons, Montgomery, Guess, Nyhan, & Reifler, 2021). Thus, it is possible that when facing novel, contradictory, and radical information or well-structured misinformation on foreign social media, their overconfidence and ambition deter them from making rational and deliberate evaluations. Scholars have warned about blindness, which is associated with decreased openness to new information and increased fixation on previous beliefs (Fernbach et al., 2019). More importantly, disparities in the information environment exacerbate this circumstance. Specifically, while health misinformation is not uncommon in Chinese social media, most of it is associated with misleading yet benign traditional medical beliefs (Guo, 2020). Stringent regulations and severe administrative penalties imposed by the Chinese government and affiliated organizations addressing social media misinformation have also effectively curbed its proliferation (Rodrigues & Xu, 2020). In contrast, health misinformation has spread extensively on foreign social media platforms, leading to conflicting narratives, often intertwined with political biases and polarization (Levin, Bukowski, Minson, & Kahn, 2023; Suarez-Lledo & Alvarez-Galvez, 2021). Consequently, individuals with a high perceived health literacy accustomed to the Chinese social media environment are likely to be susceptible to the more equivocal and indiscernible health misinformation on foreign social media platforms. Taken together, this finding points toward necessary strategies or curricula that can help capable and confident individuals realize their deficiencies in a less controlled information environment.

The third objective of this study is to conduct a more in-depth investigation into the moderating role of political affiliation that may influence the formation of misperceptions. Our study reveals an intriguing three-way interaction effect between literacies, foreign social media use, and political affiliation in understanding how the Chinese population processes misinformation. On one hand, the aforementioned effect of overconfidence appears to be more salient among the Chinese general public but not CCP-affiliated groups. This result may reflect the current reality that more CCP-affiliated officials and organizations maintain an active presence on Facebook and Twitter to gain international influence and thus are more seasoned in analyzing foreign social media information compared with the general public (AFP, 2014). On the other hand, among less-media-literate general populations, low foreign social media users have higher misperceptions than those who access Facebook and Twitter more frequently. This outcome may be attributed to their own limitations. As Ji and Jiang (2020) noted, "Instead of being an organization staffed by traditionally minded authoritarians, the CCP actually rules with a base that

has a relatively more modern and progressive mindset than the general public” (p. 13). In other words, the general public—in particular those with antiquated beliefs, limited cognitive capabilities and skills, and restricted access to novel and diverse opinions—is more likely to fall for COVID-19 rumors that align with traditional views and unscientific medicine theories (Lu, 2020). However, frequent foreign social media consumption brings more misperceptions for people with low science literacy. A lack of science literacy is often connected to a negative attitude toward scientific matters, low factual and epistemic knowledge, and illogical reasoning (Motoki et al., 2021; Scheufele & Krause, 2019). With the COVID-19 issue being so politicized and polarized on Facebook and Twitter, individuals with low science literacy are bound to be swayed by the emotional and dramatic narratives embedded in the conspiracy theories and misinformation (Hart et al., 2020; Vraga & Bode, 2021). That being said, in-depth qualitative research is warranted to specify the inner mechanism between the personal characteristics of less-scientific-literate individuals and the message features of misinformation.

This study is not without limitations. First, our use of an online convenience sample, while encompassing a nationwide demographic, may introduce issues related to participant inattention, self-selection biases, and limited diversity representation. This limitation could affect the generalizability of our findings. To enhance validity, future research should consider employing offline surveys with random sampling strategies. Second, we adapted a self-evaluation type of measurement, which has been widely used in prior studies (e.g., Koc & Barut, 2016; Norman & Skinner, 2006), to assess media, health, and science literacies. This decision was primarily motivated by a key consideration: to prevent cognitive overload and survey fatigue among participants by promoting attentiveness during the survey. However, we acknowledge that more precise measurements capturing actual literacy-related knowledge and skills could be beneficial (e.g., The Test of Functional Health Literacy in Adults [TOFHLA]; Parker et al., 1995). Therefore, we encourage future research to explore the integration of non-self-reported scales when investigating similar research topics. Third, as COVID-19 misperceptions vary significantly within the Chinese population, ranging from deeply entrenched to less ingrained, we employed a summed scale to calculate a total score rather than an averaged scale. Future research should consider developing a standardized scale for measuring misperceptions within the Chinese population.

Despite these limitations, this study provides a more refined and comprehensive understanding of the relationship between types of literacies and the internalization of misinformation. As much misinformation research focuses on Western contexts, this study supplements this line of literature by examining the misinformation issue in China, a state that is often known for its tight control over media and ideological utility. The findings of this study point to the potential of a media-health-science triad literacy intervention in helping combat misinformation in public health crises. Results also sustain the important effects of diverse patterns of social media use and political affiliation on decision-making processes within the Chinese population. Tailored strategies should target audiences based on the differences in media diet and party affiliation. Moreover, this conclusion is likely applicable to other nations with comparable political and media landscapes, such as Russia and Singapore (Nekmat, 2020). This assertion stems from the premise that citizens in these contexts are prone to exhibiting similar behaviors in processing and internalizing misinformation (Nekmat, 2020).

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