Exploring social media use and its impact on knowledge and behavior during Covid-19 in China

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ABSTRACT

An extended Cognitive Mediation Model (CMM) was constructed to examine the public's knowledge acquisition and preventive behavioral intentions during the COVID-19 pandemic in the context of social media in China. This extended CMM incorporated three additional variables compared with the original CMM: risk perception, interpersonal communication, and behavioral intention. The motivations for social media use, including surveillance gratification, guidance, anticipated interaction, and risk perception, were positively associated with social media attention, elaboration, and interpersonal communication. Elaboration and interpersonal communication were positively associated with factual and structural knowledge acquisition, which in turn positively influenced behavioral intention. Differential mediation effects were observed: significant indirect effects from motivations to factual knowledge involved elaboration and the combination of attention and elaboration, while all mediation effects from motivations to structural knowledge were significant. Furthermore, mediation paths from motivations to behavioral intention were primarily significant when involving elaboration and structural knowledge, but not factual knowledge. Theoretical and practical implications are discussed.

1. Introduction

The outbreak of the COVID-19 pandemic in late 2019 had a severe and global impact on public health, underscoring the importance of effective information dissemination. During this period, the public's need for accurate information about COVID-19, its progression, and preventive measures became paramount. Social media platforms like Facebook, Instagram, Twitter, WeChat, Weibo, and TikTok emerged as crucial tools for raising scientific awareness and disseminating preventive knowledge.

To harness the potential of social media in public health emergencies, it is vital to understand the public's cognitive processes and behavioral intentions during such crises. The Cognitive Mediation Model (CMM), proposed by Eveland (2001), offers a framework for understanding how people acquire knowledge and form behavioral intentions through media use. The CMM has been extensively applied to traditional media in healthcare issues [1], [2], a small amount of research has also been applied to social media, such as the study on Canadians' travel knowledge acquisition of Huang (2023) and Covid-19 Vaccine of Xie (2022) during the pandemic.

The core constructs of the Cognitive Mediation Model (CMM) include media use motivations, information processing, and knowledge acquisition. Media use motivations, such as surveillance gratification and anticipated interaction, drive individuals to engage with news content, influencing knowledge acquisition directly and indirectly through news elaboration [1]. The CMM is a theoretical framework that explores how media information influences individual behavior and knowledge acquisition through cognitive and psychological processes. The model integrates insights from uses and gratifications research, news information-processing research, and cognitive psychology [5]. The model emphasizes the roles of media use, information processing, personal reflection, and social interaction in the acquisition of knowledge and behavioral change. Specifically, CMM posits that individuals encounter information through media, process it cognitively through reflection and dialogue, and ultimately form attitudes and behaviors.

Initially applied in political communication, CMM has been extended to health communication, examining knowledge acquisition related to cancer [2], H1N1 influenza [6], and breast cancer [7], [8]. This study further extends CMM by incorporating new variables such as risk perception and interpersonal communication. By doing so, it aims to provide a comprehensive understanding of how social media influences public knowledge acquisition and preventive behavioral intentions during the COVID-19 pandemic, thereby enriching the theoretical framework and offering practical insights for managing public health emergencies.

This research has great hope in providing knowledge contributions in the relationship between social media, community habits and the pandemic that occurs. so that all elements of society and government are able to anticipate early for mitigation if an outbreak occurs in the future.

2. Theorical Framework

2.1. Motivations and Social Media Attention

According to uses and gratifications theory and the CMM, the motivations for social media use primarily include surveillance gratification, guidance, anticipated interaction [1], [9], [10], and risk perception [7]. Surveillance gratification refers to individuals' tendency to use media for information about their social environment [1], [11]. This leads individuals to use social media to process information and learn from the news [12]. Studies have shown that surveillance gratification is positively associated with the public's attention to government news in online media [13].

Guidance motivates individuals to obtain information from the media to make decisions [14]. Anticipated interaction reflects one’s motivation to follow news through the media to ensure that upcoming conversations contain information for social use [15]. Guidance and anticipated interaction predict individuals' attention to public affairs news [16] and influence news attention and elaboration [17]. Risk perception drives individuals to seek information in the media based on their perceptions of risk to reduce anxiety and improve health behaviors [18]. Previous research indicates that risk perception can positively predict individuals' attentional behavior, such as pursuing breast cancer examination [8].

In the context of the COVID-19 pandemic, the relationship between the public motivations and media attention was studied, for example, [3] pointed out that anticipated interaction was associated with media attention. Therefore, the following hypothesis is proposed:

H1: Public motivations for social media use, including (a) surveillance gratification, (b) guidance, (c) anticipated interaction, and (d) risk perception during the COVID-19 pandemic, are positively associated with social media attention.

2.2. Motivations and Elaboration

Elaboration is the process through which an individual connects new pieces of information in novel ways using information stored in the knowledge network. [19] confirmed that environmental surveillance and anticipated interaction positively predict elaboration in political communication. Individuals motivated by guidance can trigger deep, interconnected thinking about information [20]. In the context of the COVID-19 pandemic, the motivations of surveillance gratification and anticipated interaction were related to elaboration [3]. Thus, the hypothesis is as follows:

H2: The public's social media use motivations, including (a) surveillance gratification, (b) guidance, (c) anticipated interaction, and (d) risk perception during the COVID-19 pandemic, are positively associated with elaboration.

2.3. Motivations and Interpersonal Communication

Interpersonal communication involves individuals discussing relevant content with their network, such as family, friends, colleagues, or health care providers [7], [21]–[23]. The public's motivations to use social media during the COVID-19 pandemic not only promoted social media attention and interpretation but also impacted interpersonal communication. [24] noted that public motivations during the epidemic significantly influenced interpersonal communication through social media. For example, [25] indicated that women with high-risk perception tend to engage in more breast cancer-related discussions within their networks, and [7] found that risk perception about breast cancer is positively associated with interpersonal communication. Therefore, we postulate the following hypothesis between motivations and interpersonal communication:

H3: The public's motivations for surveillance gratification, guidance, anticipated interaction, and risk perception are positively associated with interpersonal communication during the COVID-19 pandemic.

2.4. Social media Attention and Elaboration

Social media use greatly facilitated interpersonal communication [26], and interpersonal communication became an important arena for obtaining health information during the COVID-19 pandemic [7], [27] demonstrated that attention to media channels was associated with interpersonal communication. Thus, the hypothesis is as follows:

H5: The public's social media attention is positively associated with interpersonal communication during the COVID-19 pandemic.

2.5. Knowledge Acquisition

Knowledge about COVID-19 acquired by the public mainly consists of factual knowledge and structural knowledge [7]. Factual knowledge includes informational nodes in personal knowledge, typically obtained through internet searches, representing basic, fragmented knowledge such as terms and concepts. Structural knowledge involves how concepts within a field are related, forming a connected set of knowledge, such as theorems and theories [28]. Social media attention is crucial for knowledge acquisition about COVID-19. During the pandemic, the public in China used social media platforms like Weibo, WeChat, and TikTok to obtain information, helping them accumulate initial knowledge about COVID-19. Additionally, according to Lee's augmented CMM, elaboration is associated with both factual and structural knowledge [7]. In the context of the COVID-19 pandemic, the research of [3] pointed to the fact that media attention and elaboration are related to the knowledge pandemic knowledge. So, the hypotheses are as following:

H6: The public's social media attention to the COVID-19 pandemic is positively associated with (a) factual knowledge and (b) structural knowledge about the COVID-19 pandemic.

H7: The public's elaboration is positively associated with (a) factual knowledge and (b) structural knowledge about the COVID-19 pandemic.

The previous study found that discussion can increase people's level of political knowledge [29], and discussions involving confirmatory feedback and cueing were associated with greater levels of knowledge than other types of discussions [30]. Interpersonal communication is also associated with knowledge [7]. Interpersonal communication through social media stimulates individuals to think, interpret conversation content, and link news information with their existing knowledge structures. The CMM model originated in political communication, and later research found it used in health communication as well, and by the same token we can posit the following hypothesis:

H8: Interpersonal communication during the COVID-19 pandemic is positively associated with (a) factual knowledge and (b) structural knowledge.

2.6. Behavioral Intention

The outcome variable of the original CMM is knowledge acquisition. Meanwhile, knowledge is a critical in predicting decision-making behaviors [31], thus, this study extends the outcome variable from knowledge acquisition to behavioral intention, which is more practical for the COVID-19 pandemic. Previous studies have also used behaviour as a dependent variable, for example, [11] extended the dependent variable to include precautionary behaviors during the H1N1 pandemic. Behavioral intentions to avoid infection, such as wearing masks, washing hands, and avoiding

crowded areas, are crucial in containing the pandemic. [6] found that elaboration, interpersonal communication, and knowledge were positively related to behavioral intentions during the H1N1 pandemic. In the context of Covid pandemic, [4] adapted the CMM to study the news elaboration in news curation of social media, and found that news elaboration and knowledge has a significant positive impact on curatorial news. Therefore, the hypothesis is as follows:

H9: (a) Elaboration, (b) interpersonal communication, (c) factual knowledge, and (d) structural knowledge are positively associated with preventive behavioral intention during the COVID-19 pandemic.

2.7. The Extended CMM

Based on the previous research hypotheses, we constructed the extended Cognitive Mediation Model (CMM). This model hypothesizes that motivations for social media use, including surveillance gratification, guidance, anticipated interaction, and risk perception, are positively associated with news attention, news elaboration, and interpersonal communication. These factors, in turn, positively influence factual and structural knowledge acquisition, which subsequently impacts behavioral intentions. This extended model provides a comprehensive framework to understand the public's knowledge acquisition and preventive behaviors during the COVID-19 pandemic within the context of social media use in China. The hypothesized model is shown in Figure 1.

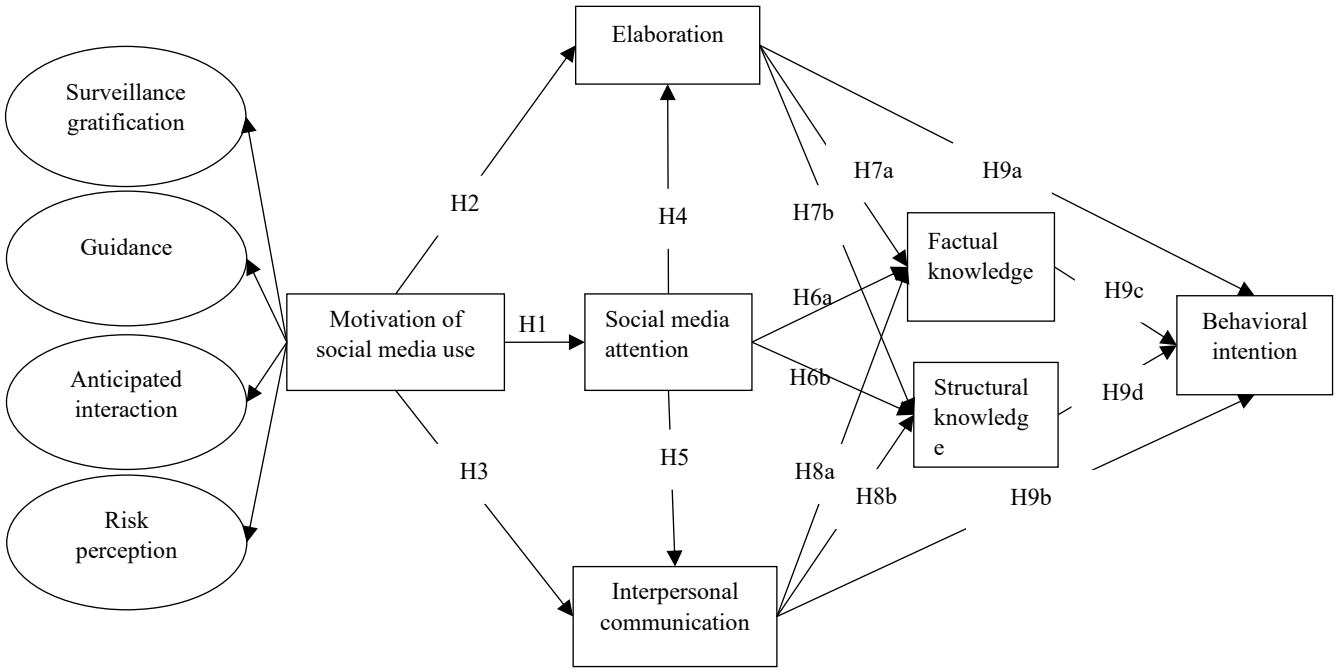


Fig. 1. The Hypothesized extended cognitive mediation model. H= hypothesis

3. Method

Participants in this study were recruited from three of the top ten most influential social media platforms in China: WeChat, Sina Weibo, and Douban. WeChat, the most widely used mobile communication app in China, offers features such as Moments, official accounts, and mini-programs. Sina Weibo is the largest social networking site in China and the world's largest Chinese-language community, functioning as an open public platform. Douban, a community network based on shared interests, integrates blogs, friendships, groups, and collections.

A QR code linking to the Chinese questionnaire was distributed across these platforms, inviting users to voluntarily participate. On Sina Weibo, the questionnaire was made public, allowing all users to view it. On WeChat, only users within specific Moments or groups could access the questionnaire. On Douban, the questionnaire was visible only to members of relevant groups discussing COVID-19-related topics. Given the heightened public interest in COVID-19 information during the pandemic,

the questionnaire was shared in large WeChat groups, Douban groups, and communities focused on pandemic discussions.

Participants who completed the questionnaire received a small reward. The survey was conducted from February to March 2021. Respondents who had never used social media to obtain COVID-19 news were excluded. To avoid duplicate responses, submissions from the same IP address were removed, ensuring data validity, and representing the target population accurately.

A total of 742 questionnaires were received, and after excluding invalid responses, 518 valid questionnaires remained, yielding an effective response rate of 69.8%.

3.1. Measures

Demographics, including age (M = 2.91, SD = 1.186; 1 = below 18 years old, 2 = 18-25 years, 3 = 26-30 years, 4 = 31-40 years, 5 = 41-50, 6 = above 51 years old), gender (0 = female, 1 = male; 47.3 percent females), and education level (M = 2.84, SD = .60; 1 = high school or below, 2 = junior college and undergraduate, and 3 = postgraduate).

Surveillance gratification was measured with three items adapted from Katz et al. (1973) on a 5-point scale ranging from 1= strongly disagree to 5 = strongly agree: (a) "the motivation using social media is to follow up on the number of COVID-19 infections, risk areas, etc.," (b) "to understand the government's policy on the prevention of COVID-19," and (c) "to pay attention to special epidemic events." Responses were averaged to create a scale with higher scores indicating higher levels of surveillance gratification (M = 4.13, SD = .85, Cronbach's α = .85).

Guidance was measured using three items adapted from Ho et al. (2013) on a 5-point scale, ranging from 1 = strongly disagree to 5 =strongly agree: (a) "the motivation using social media is to decide 'should I be worried about the risks posed by COVID-19'," (b) "to decide 'whether I should do anything to deal with the possible risks posed by COVID-19'," and (c) "to decide 'what specific measures should be taken to deal with the risks posed by COVID-19'." Responses were averaged to create a scale, with higher scores indicating a higher level of guidance (M= 4.04, SD = .85, α =.86).

Anticipated interaction was measured with three items adapted from Beaudoin & Thorson (2004) on a 5-point scale ranging from 1= least frequent to 5 = most frequent: (a) "the motivation using social media is to stockpile knowledge to discuss COVID-19 with others, " (b) "to advise others on how to deal with the COVID-19 outbreak, " and (c) "to alert others to the risks posed by COVID-19." Responses were averaged to create a scale with higher scores indicating a higher level of anticipated interaction (M = 3.89, SD = .92, α = .87).

Risk perception was measured with three items adapted from Zhang& Yang (2021) and Xi et al. (2020) on a 5-point scale ranging from 1 = least likely to 5 = most likely: (a) "I believe that the physical effects of contracting COVID-19 are severe," (b) "I think that I am at risk of contracting COVID-19," and (c) "I fear at the thought that COVID-19 might infect me." Responses were averaged to create a scale with higher scores indicating a higher level of risk perception (M = 3.73, SD = .91, α = .66).

News attention was measured with three items adapted from Lee et al. (2016) on a 5-point scale ranging from 1 = little attention to 5 = very close attention: (a) "I pay attention to national and local policies on the prevention of COVID-19," (b) "personal precautions and precautions against COVID-19," and (c) "science information on the characteristics and traceability of COVID-19." Responses were averaged to create a scale with higher scores indicating a higher level of news Attention (M = 3.6, SD = .83, α = .98).

News elaboration was measured with three items adapted from Ho et al. (2013) on a 5-point scale ranging from 1 = strongly disagree to 5 = strongly agree: (a) "When I come across information about COVID-19, I stop and think about what I see," (b) "I will carefully think about the information which I see about COVID-19 to understand it better," and (c) " I will connect the information that I see with my own knowledge." Responses were averaged to create a scale with higher scores indicating higher levels of news elaboration (M = 4.1, SD = .83, α = .86).

Interpersonal communication was measured with three items adapted from [19] and [11] on a 5-point scale, and respondents were asked to indicate how frequently they discuss issues related to COVID-19 with their (a) family, (b) friends, (c) classmates/colleagues. Responses were given on a 5-point scale ranging from 1 = not at all to 5 = very frequently and then averaged to form a scale with

higher scores indicating a higher level of interpersonal communication (M = 4.0, SD = .79, α = .78). Factual knowledge was measured with three items adapted from [19];[7], and National Health Commission of People's republic of China: (a) "Coughing in public by a person carrying COVID-19 may result in the spread of the virus," (b) "There are human-to-human and object-to-person forms of COVID-19 spread," and (c) "Correct wearing of medical surgical masks is an effective defence against COVID-19." Respondents were required to give answers to the above questions. Factual knowledge is a dichotomous variable and is a scoring term for 0 = the answer is wrong and 1 = the answer is correct. The reliability was tested using the Cooder-Richardson coefficient (KR-20 = 0.997).

Structural knowledge was measured with three items adapted from [19];[7], and National Health Commission of People's republic of China. Respondents were asked to answer the question, "Please judge how well the two concepts in each of the following groups correlate with each other" on a 5-point Likert scale ranging from 1 = very weak to 5 = very strong: "(a) COVID-19 and the Public Health System, (b) COVID-19 and Urban Planning, and (c) COVID-19 and the offline consumer sector." Responses were averaged to form a scale with higher structural knowledge (M = 4.2, SD= .76, α = .71).

Behavioral intentions of individual's preventive COVID-19 were measured with three items adapted from [6], [32] and [33] using a 5-point scale ranging from 1 = least likely to 5 = most likely in which respondents were asked how likely they were to engage in the COVID-19 preventive measures in the next month: (a) "Wearing a mask in public places," (b) "Getting vaccinated against COVID-19," (c) "Complying with temperature checks and presenting a health code when required," (d) "Completing nucleic acid tests as per local travel requirements." (M = 4.3, SD = .73, α = .87).

3.2. Analytical Approach

Structural equation modelling (SEM) tested model fit and hypothesized paths, following a two-step approach: first testing the measurement model, then conducting SEM [34], [35].

Model fit was assessed using the following indices: Relative Chi-square (χ2/df), Root Mean Square Error of Approximation (RMSEA), Normed Fit Index (NFI), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR). SEM analysis was performed using Amos 26.0, and mediating effects were tested using model 6 in the Process plug-in of SPSS.

4. Results and Discussion

Bivariate correlations among key variables are shown in Table 1. Significant zero-order correlations justified including all key variables in subsequent analyses. Table 2 shows that almost all the factor loadings for each latent variable exceeded 5.

Table 1. Bivariate Corralations for the key variables

	1	2	3	4	5	6	7
1. MO	1						
2. AT	.509**	1					
3. EL	.694**	.560**	1				
4. IC	.579**	.531**	.692**	1			
5. FK	.439**	.209**	.428**	.347**	1		
6. SK	.541**	.427**	.559**	.512**	.487**	1	
7. BI	.575**	.345**	.575**	.503**	.583**	.660**	1

Note. * * p < .01 (2-tailed); the motivations are the averages of surveillance, guidance, anticipated interaction, and risk; MO = Motivations, AT = Attention, EL = Elaboration, IC = Interpersonal communication, FK = Factual Knowledge, SK = Structural knowledge, BI = Behavioral intention.

Table 2. Summary of measurement items

Variable (range)	Factor loading	M	SD	Variable (range)	Factor loading	M	SD
SG1	.693	4.150	1.004	EL1	.534	4.090	.957
SG2	.738	4.180	.902	EL2	.513	4.090	.930
SG3	.740	4.070	.987	EL3	.598	4.080	.945
GU1	.742	3.990	.998	IC1	.603	4.190	.926
GU2	.774	4.060	.931	IC2	.760	4.030	.920
GU3	.768	4.080	.940	IC3	.713	3.870	.999
AI1	.678	3.790	1.076	FK1	.676	.850	.360
AI2	.695	3.870	1.025	FK2	.754	.810	.389
AI3	.719	4.020	.990	FK3	.770	.820	.387
RP1	.349	4.190	1.017	SK1	.723	4.370	.917
RP2	.840	3.310	1.289	SK2	.253	3.950	1.025
RP3	.807	3.710	1.195	SK3	.497	4.130	.941
AT1	.868	3.630	.847	BI1	.817	4.520	.850
AT2	.867	3.635	.847	BI2	.570	4.250	.929
AT3	.877	3.638	.857	BI3	.807	4.500	.829
				BI4	.749	4.460	.851

Note: MO = Motivations, AT = Attention, EL = Elaboration, IC = Interpersonal communication, FK = Factual Knowledge, SK = Structural knowledge, BI = Behavioral intention.

Before testing the hypotheses, we assessed the model fit for both the measurement model and the extended CMM. The measurement model fit indices indicated an acceptable fit ($\chi^2/df = 2.82$, RMSEA = .06, NFI = .91, CFI = .94, TLI = 0.93, and SRMR = 0.05). In this study, surveillance gratification, guidance, anticipated interaction, and risk perception were considered as a second-order variable representing motivations in the extended CMM. The extended CMM also demonstrated an acceptable model fit ($\chi^2/df = 3.56$, RMSEA = .07, NFI = .88, CFI = .91, TLI = 0.90, and SRMR = 0.06).

4.1. Direct effect Tests

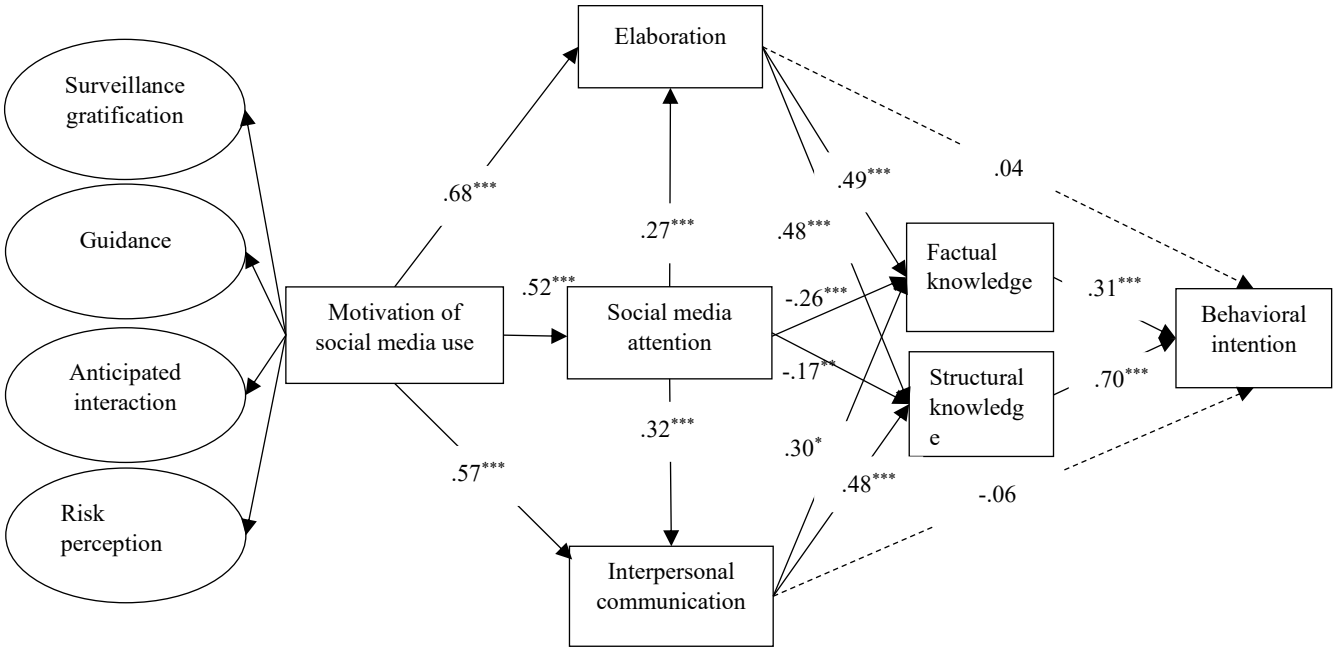
Hypotheses H1, H2, and H3 examine the impact of motivations for social media use. The results indicated that the motivations for social media use were positively associated with news attention ($\beta = .52$, $p < .001$), news elaboration ($\beta = .68$, $p < .001$), and interpersonal communication ($\beta = .57$, $p < .001$), thus supporting H1, H2, and H3. Additionally, we found that news attention was positively associated with news elaboration ($\beta = .27$, $p < .001$) and interpersonal communication ($\beta = .32$, $p < .001$), thereby supporting H4 and H5.

In the test of factual knowledge paths (H6a, H7a, and H8a), the results showed that news attention ($\beta = -.26$, $p < .001$) was negatively associated with factual knowledge, whereas news elaboration ($\beta = .49$, $p < .001$) and interpersonal communication ($\beta = .30$, $p < .05$) were positively associated with factual knowledge. Thus, H7a and H8a were supported.

In the test of structural knowledge paths (H6b, H7b, and H8b), we found that news attention ($\beta = -.17$, $p < .01$) was negatively associated with structural knowledge, whereas news elaboration ($\beta = .48$,

p < .001) and interpersonal communication (β = .48, p < .001) were positively associated with structural knowledge. Therefore, H7b and H8b were supported.

In the test of behavioral intention paths (H9a, H9b, H9c, and H9d), the results showed that news elaboration (β = .04, p = .599) and interpersonal communication (β = -.06, p = .442) were not significantly associated with behavioral intention, thus H9a and H9b were not supported. Meanwhile, factual knowledge (β = .31, p < .001) and structural knowledge (β = .70, p < .001) were positively associated with behavioral intention, supporting H9c and H9d. The empirical result of hypothesized model is shown as Figure 2.



Note. Dotted lines denote hypothesized nonsignificant paths. *p < .05. **p < .01. ***p < .001.

Fig. 2. Results of the extended cognitive mediation model. Structural equation model with standardized coefficients (N = 518).

4.2. Indirect Effect Tests

The test of indirect effects of motivations on factual knowledge, shown in Table 3, indicated that significant mediation pathways from motivations to factual knowledge involve elaboration and the combination of attention and elaboration: MO->EL->FK (β = .053, BootSE = .016, BootLLCI = .024, BootULCI = .084), MO->AT->EL->FK (β = .015, BootSE = .005, BootLLCI = .006, BootULCI = .025). Conversely, the mediation pathways involving only attention or interpersonal communication are not significant.

Table 3. Indirect effect(s) of motivations on factual knowledge

Path	Effect	BootSE	BootLLCI	BootULCI
MO -> AT -> FK	-.024	.013	-.051	.000
MO -> EL -> FK	.053	.016	.024	.084
MO -> IC -> FK	.005	.004	-.002	.013
MO -> AT -> EL -> FK	.015	.005	.006	.025
MO -> AT -> IC -> FK	.003	.003	-.002	.009

Note: MO = Motivations, AT = Attention, EL = Elaboration, IC = Interpersonal communication, FK = Factual Knowledge, SK = Structural knowledge, BI = Behavioral intention.

The test of indirect effects of motivations on structural knowledge, shown in Table 4, revealed that all mediation pathways from motivations to structural knowledge are significant, indicating robust indirect effects through attention, elaboration, and interpersonal communication.

Table 4. Indirect effect(s) of motivations on structural knowledge

Path	Effect	BootSE	BootLLCI	BootULCI
MO -> AT -> SK	.056	.028	.003	.113
MO -> EL -> SK	.125	.038	.053	.203
MO -> IC -> SK	.024	.012	.005	.051
MO -> AT -> EL -> SK	.035	.011	.015	.059
MO -> AT -> IC -> SK	.017	.008	.004	.034

Note: MO = Motivations, AT = Attention, EL = Elaboration, IC = Interpersonal communication, FK = Factual Knowledge, SK = Structural knowledge, BI = Behavioral intention.

The test of indirect effects of motivations on behavioral intention, shown in Table 5, showed that most mediation pathways from motivations to behavioral intention are significant, especially those involving elaboration and structural knowledge. This underscores the importance of these variables in influencing behavioral intention. However, some paths involving factual knowledge and interpersonal communication are not significant.

Table 5. Indirect effect(s) of motivations on behavioral intention

Path	Effect	BootSE	BootLLCI	BootULCI
MO->EL->BI	.068	.031	.011	.133
MO->IC->BI	.011	.009	-.002	.032
MO->AT ->EL->BI	.019	.009	.003	.038
MO->AT ->IC->BI	.008	.006	-.002	.022
MO->AT ->FK->BI	-.015	.008	-.033	.0003
MO->AT ->SK->BI	.025	.011	.006	.049
MO->EL->FK->BI	.033	.012	.014	.059
MO->EL->SK->BI	.031	.013	.008	.059
MO->IC->FK->BI	.003	.003	-.002	.008
MO->IC->SK->BI	.007	.004	.001	.016
MO->AT ->EL->FK->BI	.009	.004	.003	.018
MO->AT ->EL->SK->BI	.009	.004	.002	.017
MO->AT ->IC->FK->BI	.002	.002	-.001	.006
MO->AT ->IC->SK->BI	.005	.002	.001	.011

Note: MO = Motivations, AT = Attention, EL = Elaboration, IC = Interpersonal communication, FK = Factual Knowledge, SK = Structural knowledge, BI = Behavioral intention.

Overall, elaboration and structural knowledge play crucial roles as mediators in the pathways from motivations to both factual knowledge and behavioral intention. Attention and interpersonal communication show variable significance, with attention even showing a negative mediation effect (MO->AT->FK->BI; β = -.015, BootSE = .008, BootLLCI = -.033, BootULCI = -.0003) when factual knowledge is involved.

This study presents an extended Cognitive Mediation Model (CMM) with new variables, significantly enhancing our theoretical understanding of public knowledge acquisition and behavioral intentions during public health emergencies. By incorporating risk perception, interpersonal communication, and behavioral intention, the extended CMM offers a comprehensive framework for explaining individual learning processes and decision-making behaviors in crisis situations. This novel perspective enriches the original CMM, making it more applicable to the dynamic context of public health emergencies.

5. Conclusion

There are several notable findings from this research. Firstly, the inclusion of risk perception as a health-specific motivational factor significantly influenced media attention and interpersonal communication. Consistent with previous research [18], risk perception was positively associated with social media attention and interpersonal communication. The realization of risk likely activates

information-seeking behavior for uncertainty reduction and motivates individuals to seek out information from media sources and their interpersonal networks for both medical information and social support [25], [36]. Secondly, the study confirms the original CMM's assertion that media attention is positively associated with elaboration [1]. Motivations for social media use were positively linked to social media attention, elaboration, and interpersonal communication. Elaboration and interpersonal communication, in turn, were positively associated with acquiring factual and structural knowledge. Interestingly, social media attention was negatively associated with developing factual and structural knowledge, suggesting that the public may have relied more on their judgment of the information they received rather than trust in social media platforms during the COVID-19 pandemic. Thirdly, the indirect effects of motivations for social media use revealed nuanced pathways to knowledge acquisition. Significant mediation pathways from motivations to factual knowledge involved elaboration and the combination of attention and elaboration, while pathways involving only attention or interpersonal communication were not significant. In contrast, all mediation pathways to structural knowledge were significant, highlighting robust indirect effects through attention, elaboration, and interpersonal communication. These findings suggest that while direct engagement with information enhances factual understanding, a broader spectrum of cognitive and communicative activities is essential for developing a deeper, more interconnected knowledge base.

Factual and structural knowledge were positively associated with the public's preventive behavioral intentions regarding COVID-19. However, interpersonal communication and elaboration were not associated with behavioral intentions. These results indicate that knowledge influences the public's protective behaviors during the pandemic, with factual and structural knowledge playing a crucial role in shaping these behaviors. The negative or insignificant effects of other variables could be attributed to the public's heightened rationality during the pandemic, as suggested by [1] and [37]. This study has significant practical implications, particularly in the context of health communication strategies during global crises like the COVID-19 pandemic. Social media plays a critical role in information dissemination and public communication. Future research should further expand the scope of media platforms under investigation, incorporating not only general social media but also specialized platforms dedicated to professional science communication. Moreover, subsequent studies should explore a wider range of scientific knowledge domains to enhance the generalizability and diversity of findings. It is also essential to deepen the analysis of how emerging technologies such as artificial intelligence and big data affect the effectiveness of science communication via new media. Additionally, further theoretical innovation is needed to advance the cognitive mediation model, particularly in addressing the evolving mechanisms underlying audience cognition and behavior in digital environments. This study makes a theoretical contribution by innovating the cognitive mediation model, emphasizing the active and constructive role of audiences in the process of science communication through new media. It also enriches the evaluation framework of science communication effectiveness by constructing a multidimensional and operational model. On a practical level, the findings offer valuable empirical and theoretical support for government agencies, academic institutions, and research organizations seeking to improve their science communication strategies. The study responds to contemporary societal needs and provides a foundation for advancing science communication practices in China and beyond.

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