

Analysis of the Influencing Factors of Seeking Intention on COVID-19 Risk Information: A Cross-Sectional Study

Nan Li¹, Wei-Xin Zhang¹, Yan-Yan Sun¹, Ting Li¹, Wei-Dan Cao², Qing-Hua Yang³, Xin-Yao Zhang¹

¹School of Public Health, Jilin University, Changchun, People's Republic of China; ²Edward R. Murrow College of Communication, Washington State University, Pullman, WA, USA; ³Bob Schieffer College of Communication, Texas Christian University, Fort Worth, TX, USA

Correspondence: Xin-Yao Zhang, School of Public Health, Jilin University, 1163 Xinmin Street, Changchun, People's Republic of China, Tel +86 13194352232, Email food@jlu.edu.cn

Background: Information seeking, as an important part of the prevention and control of infectious diseases, can lead to positive outcomes by reducing uncertainty and alleviating panic. However, most previous studies have limited their analysis to individual-level psychosocial factors, and little is known about how social-level factors influence individuals' information-seeking intentions.

Methods: The cross-sectional survey was conducted from July 30, 2020 to August 15, 2020 in China. We used a convenience sampling strategy to recruit participants from among the Internet users. The structural equation model was used to identify the incentives associated with coronavirus disease 2019 (COVID-19) risk information-seeking intention.

Results: In this study, the responses of 871 Internet users who reflected a response rate of 85% were analyzed. Information-seeking intention was found to be directed by informational subjective norms (ISNs), perceived information need, risk knowledge, the sense of community (SOC), and negative affective responses, and ISNs were found to be the strongest driving factor. Individuals with a stronger SOC, which was associated with greater pressure and expectations, show negative affective responses. COVID-19 risk knowledge can affect the information-seeking intention of Internet users not only directly but also indirectly through their perceived information need. In addition, more risk knowledge was associated with a lower perceived risk likelihood.

Conclusion: When formulating risk communication strategies, governments and health institutions should take targeted measures to improve the public's SOC and knowledge. This will provide an opportunity to explore the role of individual cognition and environmental risk information in public health.

Keywords: COVID-19, seeking intention, sense of community, internet user, planned risk information seeking model

Introduction

In December 2019, the first case of an unknown viral pneumonia was detected and reported in Wuhan, China, which aroused global attention. This illness eventually came to become what we now know as the COVID-19 pandemic. The world has fallen into a sudden public health crisis as the pandemic has evolved. COVID-19 has not only hit the existing global public health governance systems¹ but also greatly challenged public health information dissemination and risk management globally.² People felt uncertain about future expectations during the early stages of the COVID-19 outbreak, particularly in China. The urgent need for information on COVID-19 has led to more information-seeking behavior.³ Research on risk information suggests that seeking information can reduce uncertainty, help people respond to potential threats effectively, and relieve emotional stress.^{4,5} Nevertheless, mere ignorance is not typically a motivator for information seeking. People are motivated to seek information only when they realize that they are ignorant and the fact that they are missing information becomes salient. Sufficient information can help people make better decisions, such as taking appropriate preventive measures to reduce the possibility of contracting the COVID-19 infection. Therefore, information seeking can be considered an effective means for people to prevent, respond to, and recover from health threats.

This study is based on the Planned Risk Information Seeking Model (PRISM) developed by Kahlor (2010) to focus on the Internet users' COVID-19 risk information-seeking intention and its drivers during the early epidemic in China. PRISM has proved its stability in public health risk studies, such as general health risks,⁶ sexual health and cancer information-seeking,^{7,8} Ebola,⁹ Zika Virus,¹⁰ and COVID-19 risk information seeking and avoidance.¹¹ PRISM has strongly predicted the risk information-seeking intention and provided a framework to understand information-seeking behavior of individuals in risk situations.

Although PRISM considers a range of psychosocial factors, it does not include the sense of community (SOC) concepts related to broader social characteristics.^{12–14} In this study, we also aim to provide a starting point for understanding the emerging risk communication environment (eg, COVID-19). The expanded PRISM will help us better understand the increasing role of a SOC in emerging risk environments. Poplin (1972) identified the SOC as a powerful motivation to comply with or conform to perceived conformity norms, indicating that a stronger SOC was associated with greater pressure for conformity or compliance perceived by community members. Other studies have reported that the SOC could alleviate individuals' negative affective experience¹⁴ and trigger community participation behavior.¹⁵

However, to our knowledge, no study has investigated how the SOC would influence the individual's relevant cognition and information-seeking behavior under risk situations, particularly the Internet users' information-seeking behavior in the context of the COVID-19 risk. Thus, it is necessary to prove the utility of SOC. It is important to identify if and in what ways it is related to risk information-seeking behavior. To solve this logical problem, we tried to "place" this concept within PRISM, which has been proven to be of particular importance for risk communication efforts.

In this study, we attempted to achieve three research objectives. First, we aimed to map the major determinants of COVID-19 risk information-seeking behavior. The relationships among these predictors were also analyzed. Second, we aimed to explore the complex role that current knowledge (as of July 30, 2020) may play in COVID-19 risk information-seeking intention and its predictors and whether current knowledge leads to information needs in the face of new stimuli. Finally, we aimed to validate the driving effect of the SOC in COVID-19 risk information-seeking behavior and accordingly provide a new reference for developing risk management strategies at the social level.

Theoretical Framework and Hypotheses

PRISM, which is primarily rooted in the risk information seeking and processing model (RISP) and the theory of planned behavior (TPB), maps predictors of risk information seeking at the individual-level and emphasizes the deliberate nature of information seeking.⁶ PRISM suggests that risk information-seeking intention is directly predicted by three TPB variables, namely attitudes toward the behavior, subjective norms, and perceived behavioral control, as well as affective risk responses and knowledge insufficiency. This distinguishes the model from RISP, which has model predictors working primarily through information insufficiency in their impact on seeking. In further contrast to RISP, PRISM has only focused on the information seeking dimension. More specifically, PRISM outperforms both TPB and RISP models in explaining health risk information-seeking behavior of individuals.¹⁶

Given that China was the first to report and carry out COVID-19 risk prevention and control efforts, identifying information-seeking behavior of Chinese individuals is of great significance for health information-seeking research and global public health security. To this end, we assumed and tested a conceptual model on the basis of PRISM (see Figure 1). The concept of the SOC is concentrated in the research of COVID-19-related information, which is the key to this work. We herein focused specifically on how personal risk knowledge and the SOC influence information-seeking intention during early stages of the COVID-19 outbreak.

Information-Seeking Intention (Intention)

Information-seeking behavior in risk situations was identified as any activity undertaken through various intermediaries and interpersonal channels aimed at reducing the gap in knowledge.¹⁷ In empirical studies, it is often reflected by information-seeking intention. Ajzen¹⁸ proposed that behavioral intention is an indicator of people's subjective probability and degree of effort to perform a certain behavior. Whether individuals are engaged in a behavior greatly depends on their behavioral intentions. Accordingly, this study takes the risk information-seeking intention as the main dependent variable.

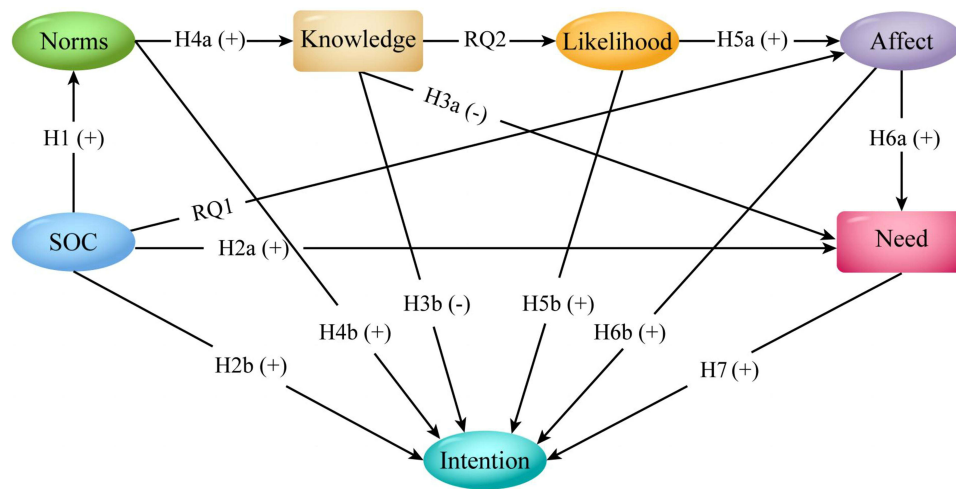


Figure 1 Structural model for COVID-19 risk information seeking.

Sense of Community (SOC)

Chinese culture is typically characterized by collectivism and has high compliance with social order.¹⁹ In the early stages of COVID-19, people transmitted and exchanged information throughout the community. The impact of information on the people's cognition and emotions can reportedly shape their risk awareness and create an atmosphere that encourages their participation in crisis management.²⁰ Recent findings suggest that the SOC resulting from several social aspects may serve as psychological motivation to encourage people to participate in community activities and maintain their involvement over time.^{21,22} The SOC refers to one's sense of belonging and identity and mainly includes four key components: membership, influence, integration/fulfillment of needs, and shared emotional attachments.²³ Because ours is an individual-based model, we chose to focus on attachments, also referred to as psychological SOC.

Strong SOC will generate compliance motivation and consensual validation needs, thus creating subjective norms.^{23,24} For instance, if potential information seekers believe that people who are close to them want them to seek information about COVID-19 risks, whether they comply with these wishes of the people around them may be determined by the strength of their SOC. If they have a strong SOC, they are more likely to comply with seeking norms, whereas if they have a low SOC, they may be less likely to comply with seeking norms about the COVID-19 risks. Based on the above arguments, we present the first hypothesis as follows:

H1: Internet users with higher SOC have more informational subjective norms.

A higher SOC strengthens people's sense of responsibility, making them more willing to process information requests from others and minimize the negative impact of cognitive needs caused by information asymmetry.²⁵ In addition, Talo et al²⁶ suggested that a SOC increases personal participation activities, including discussions and information seeking. Furthermore, a SOC reportedly leads to problem-focused coping behaviors²⁵ and prompts community members to share information with others and make offline activities online.^{27,28} Thus, when the emotional attachment function of the community is threatened or destroyed, defending one's SOC can trigger information-seeking behavior.^{29,30} This leads to the following hypothesis:

H2: The SOC positively influences Internet users' need for COVID-19 risk information (a) and their information-seeking intention (b).

In terms of mental health, original findings of the Canadian Community Health Survey (CCHS 1.1; Statistics Canada, 2002) showed that a stronger SOC predicted lower severity and shorter duration of depression.¹⁴ Identifying whether or not this means that the SOC is negatively correlated with disease severity or negative affective responses (eg, depression, loneliness, and fear) requires further research, which leads to our first research question below:

RQ1: How is the SOC related to Internet users' negative affective responses?

COVID-19 Risk Knowledge (Knowledge)

The core principle of the RISP model is the sufficiency principle, which factors in perceived current knowledge and information insufficiency. It reflects the difference between the knowledge people have gathered and the knowledge they expect to gather; this difference serves as a motivator for seeking risk-related information.^{31,32} This relationship is used as a reference in PRISM, and people who have identified that their current knowledge does not match their expected knowledge level will be more motivated to seek information to fill this knowledge gap.⁶ Applying this to the current context, when individuals perceive that their risk knowledge is insufficient, they will actively seek risk information, and conversely, when they perceive their risk knowledge to be sufficient, they will stop seeking risk information.^{33,34} Therefore, we propose the following as our third hypothesis:

H3: Higher COVID-19 risk knowledge will result in lower level of information need (a) and reduce information-seeking intention (b).

Risk perception is usually determined by one's knowledge because individuals equipped with knowledge about diseases better evaluate their possibility of contracting these diseases.^{35,36} Seo³⁷ identified lack of knowledge as the major obstacle to implementing risk response behavior. Thus, knowledge can be seen as a form of self-empowerment that influences one's risk perception and promotes the awareness needed for behavior change. However, some researchers have a conflicting opinion. Bettman and Park³⁸ pointed out that more risk knowledge was associated with lower perceived risk likelihood, which was consistent with the conclusion of Shen et al.³⁹ More specifically, if Internet users fully understand COVID-19-related knowledge, they will be able to avoid infection risk with dietary changes, proper hand hygiene, and maintaining social distancing, thus minimizing the risk of COVID-19 infection. If the COVID-19 risk knowledge of Internet users is insufficient, they may not be able to accurately estimate risk severity and may even overestimate the negative consequences of COVID-19. Therefore, it is crucial to explore the relationship between COVID-19 risk knowledge with risk perception of Internet users. This leads to our next question:

RQ2: Is there a significant correlation between COVID-19 risk knowledge and perceived risk likelihood? What is the effect?

Informational Subjective Norms (Norms)

The concept of informational subjective norms (ISNs) is derived mainly from the concept of subjective norms in the TPB, which is a psychosocial variable. Subjective norms are defined as perceived social pressures on individuals to perform or not perform a particular behavior.⁴⁰ In PRISM, ISNs is a powerful direct driving force for risk information-seeking behavior^{6,41} and indicates that people tend to respond to social expectations and actively seek information.^{16,42} This suggests that people may take the initiative to communicate to maintain social relationships and a good social image, which may increase their desire to obtain more knowledge.⁴³⁻⁴⁵ Accordingly, we present the following hypothesis:

H4: ISNs have a positive effect on Internet users' COVID-19 risk knowledge (a) and information-seeking intention (b).

Perceived Risk Likelihood (Likelihood)

Risk perception is used to describe people's attitude toward risk.⁴⁶ Risk studies have shown that upon risk exposure, risk perception motivates people to adopt healthy behaviors to avoid negative consequences.⁴⁷ Risk perception comprises perceived severity and likelihood.⁴⁸ In this paper, we study risk perception by defining *perceived risk likelihood*, which represents one's awareness of the likelihood of contracting COVID-19.

Risk perception has a wide range of applications in the field of social science; the results have unanimously shown that perceived risk likelihood leads to negative affective response and thus helps information-seeking intention.^{49,50} People who perceive high risk of contracting COVID-19 are reportedly the most likely to take preventive measures.⁵¹ For example, individuals who think that the likelihood of contracting COVID-19 infection is very low may avoid keeping themselves informed on the topic and consider it a highly unlikely event. Conversely, those who think the likelihood is

high may actively seek information on the topic to obtain more knowledge and thus reduce the risk severity. Accordingly, we propose the following hypothesis:

H5: Perceived risk likelihood has a positive effect on Internet users' negative affective responses (a) and information-seeking intention (b).

Negative Affective Responses (Affect)

Using COVID-19 as an example, affective risk response refers to the affective valence people would experience when considering potential COVID-19 risks, mainly in the form of negative valence, such as worry or fear.^{6,52} According to PRISM, this negative affective response may influence individuals' perception of COVID-19 risk information needs. More specifically, negative affective response contributes to stimulating individuals' desire for information, which in turn generates COVID-19 risk information-seeking intention.^{53,54} Social psychological studies have shown that negative affective responses stimulate the propensity to act and prepare for action.^{55,56} This means that the feelings of worry, fear, or powerlessness may directly promote risk information-seeking behavior. Therefore, we present the following hypothesis:

H6: Negative affective response positively influences Internet users' need for COVID-19 risk information (a) and their information-seeking intention (b).

Perceived Information Need (Need)

Perceived information need (described as information insufficiency in the RISP model) refers to an individual's cognitive need for information sufficiency. PRISM proposed that perceived information need positively predicts information-seeking intention, and several studies have corroborated this relationship.^{7,57,58} Accordingly, we present our final hypothesis:

H7: Perceived information need positively affects Internet users' information-seeking intention.

Methods

Study Participants and Data Collection

The questionnaire survey was conducted online from July 2020 to August 2020. The survey was conducted online as it was the fastest way to collect data at that time. Convenience sampling was adopted in this research, which is consistent with the sampling methods used in many similar studies.^{54,59,60} The survey was voluntary and anonymous, completing the questionnaire was considered as informed consent.

In China, Wenjuanxing is a well-known platform for distributing professional online questionnaire-based surveys (<https://www.wjx.cn/>, accessed on 30 July 2020). It has a large number of potential sample population to ensure the randomness of sampling and the reliability of inferences. After developing the questionnaire, we used the platform to send it to Internet users of different age groups and locations. Before formally starting with responding to the survey, participants had to read the purpose and protocol of the study and confirm their agreement. They were allowed to stop the survey at any time.

The following were exclusion criteria of this study: (1) age < 18 years; (2) not having used the Internet in the past six months; (3) duplicate IP addresses; and (4) incomplete and dishonest answers (eg, clicking the same answer for all questions). Through the platform, we sent the survey link to 1100 adults who participated in the survey. We received 1026 complete responses. After eliminating 155 invalid responses, data from 871 responses were used in the final analysis. Respondents were invited to take the 15–20-min survey and given bonus compensation after completing the survey.

Measures

The questionnaire was initially prepared in English and then translated into Chinese. To ensure the clarity and readability of the questionnaire, a pretest was conducted before launching the survey. The measurement items in this study were adapted from PRISM and other relevant literature in the field of risk research.

PRISM Constructs

Adapted from previous studies,^{6,40} four items reflecting an individual's information-seeking intention were measured on a 5-point Likert scale of 1 (strongly disagree) to 5 (strongly agree) (Cronbach's $\alpha = 0.84$), for example "I intend to seek information about COVID-19 risk from the Internet." ISNs, adapted from Kahlor (2010) and Ajzen (1991), were measured by assessing five items on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) (Cronbach's $\alpha = 0.85$). A sample item was "Others expect me to seek information about my COVID-19 risk." Perceived risk likelihood, adapted from Weinstein⁴⁸ and Chung et al⁶¹ was measured by two items on a scale of 1 (highly unlikely) to 5 (highly likely) (Cronbach's $\alpha = 0.91$). A sample item was "How likely are you to get infected with COVID-19 in the next year?" Based on Kahlor (2010) and Griffin et al (1999), we asked participants whether they felt worry or fear about their COVID-19 risk. Two items were used to measure negative affective responses on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) (Cronbach's $\alpha = 0.84$). The perception of participants' knowledge during the early stages regarding COVID-19 was measured by one item.^{6,52} "Please estimate your knowledge regarding COVID-19 on a scale of 0 (knowing nothing) to 100 (knowing everything you could possibly know about the topic)." Next, to measure the perceived information need, they were asked to estimate^{6,52} "How much more knowledge you need to know about your personal COVID-19 risk" on a scale of 0 (not needed at all) to 100 (you need to know everything about COVID-19).

Sense of Community

Three items adopted from previous studies were used to measure the SOC of Internet users.^{62,63} A sample item was "I think my community is a good place for me to live." The items were answered on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree (Cronbach's $\alpha = 0.75$).

Statistical Analysis

SPSS 24.0 was used to analyze the demographic information of the sample and conduct reliability-validity tests. AMOS 24.0 was used for evaluating the measurement and structural equation models. A *P* value of <0.05 was defined as statistically significant.

Results

Demographic Characteristics of Internet Users

Table 1 below shows the demographic characteristics of participants. Notably, 90.6% of participants reported using the Internet to search for health-related topics. In terms of the gender, men searched for such topics more than women

Table 1 Demographic Characteristics of Participants (N = 871)

Characteristics	Classification	Frequency	%
Gender	Male	491	56.4
	Female	380	43.6
Age	<35	579	66.5
	≥35	292	33.5
Education	Below a bachelor's degree	197	22.6
	Bachelor's degree or above	674	77.4
Family's yearly earnings (CN¥)	<100,000	358	41.1
	≥100,000	513	58.9
Health information search experience	Yes	789	90.6
	No	82	9.4

Abbreviation: CN¥, Chinese Yuan.

(56.4%). In terms of age, 66.5% of the respondents were aged <35 years and the remaining were aged ≥ 35 years. The proportion of respondents with a bachelor's degree or above was 77.4%, while the remaining were relatively less educated. Almost 41.1% of the respondents earned less than CN¥ 100,000 per family per year.

Reliability, Validity, and Confirmatory Factor Analysis

As for the reliability test, the Cronbach's α values ranged from 0.75 to 0.91, which were higher than the threshold value of 0.70.⁶⁴ The corrected item-total correlation of each measurement item ranged from 0.55 to 0.84, which is higher than the recommended value of 0.50,⁵⁴ and the composite reliability values ranged from 0.76 to 0.91 (greater than the threshold value of 0.70),⁶⁵ indicating that the scale has high reliability. In terms of the validity test, the average variance extracted (AVE) values ranged from 0.51 to 0.84, which is greater than the threshold of 0.50,⁶⁶ and the standard factor loading of each measurement item was greater than 0.50,⁶⁷ indicating good convergent validity of the model. The square root of AVE of each latent variable was greater than its highest correlation with any other variables, and thus, all constructs used in the model had adequate discriminant validity.⁶⁸

Structural Equation Model Analysis

Model Fit Testing

Table 2 shows the overall fit evaluation results of the structural equation model. There are three classifications of fit indices: absolute fit indices, incremental fit indices, and parsimony fit indices.⁶⁹ As shown in Table 2, the actual values of all fit indices fell within the range of suggested values. Consequently, the hypothetical model proposed in this study fits the actual observation data well.⁶⁴

Research Hypothesis Testing

The results of the hypotheses testing are shown in Figure 2.

The SOC can directly affect COVID-19 information-seeking intention of the Internet user. The standardized path coefficient of H2b was 0.12 (H2b; $t = 2.51$, $P < 0.05$). The SOC could also indirectly influence information-seeking intention through ISNs and negative affective responses, and the path coefficients of the SOC to ISNs and negative affective responses were 0.58 (H1a; $t = 12.96$, $P < 0.001$) and 0.13 (RQ1; $t = 3.18$, $P < 0.01$), respectively. These findings

Table 2 Fitting Indices of the Structural Equation Model

Fit Index	Recommended Value	Actual Value	Fit Effect
Absolute fit indices			
χ^2/df	<5.00	4.30	Accepted
GFI	>0.90	0.93	Accepted
AGFI	>0.90	0.91	Accepted
RMSEA	<0.08	0.06	Accepted
Incremental fit indices			
CFI	>0.90	0.94	Accepted
TLI	>0.90	0.93	Accepted
IFI	>0.90	0.94	Accepted
Parsimony Fit Indices			
PNFI	>0.50	0.74	Accepted
PGFI	>0.50	0.67	Accepted
PCFI	>0.50	0.75	Accepted

Note: χ^2/df : the ratio of chi-square to the degrees of freedom.

Abbreviations: GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; RMSEA, root mean square error of approximation; CFI, comparative fit index; TLI, the Tucker–Lewis index; IFI, incremental fit index; PNFI, parsimonious normed fit index; PGFI, parsimonious goodness-of-fit index; PCFI, parsimonious comparative fit index.

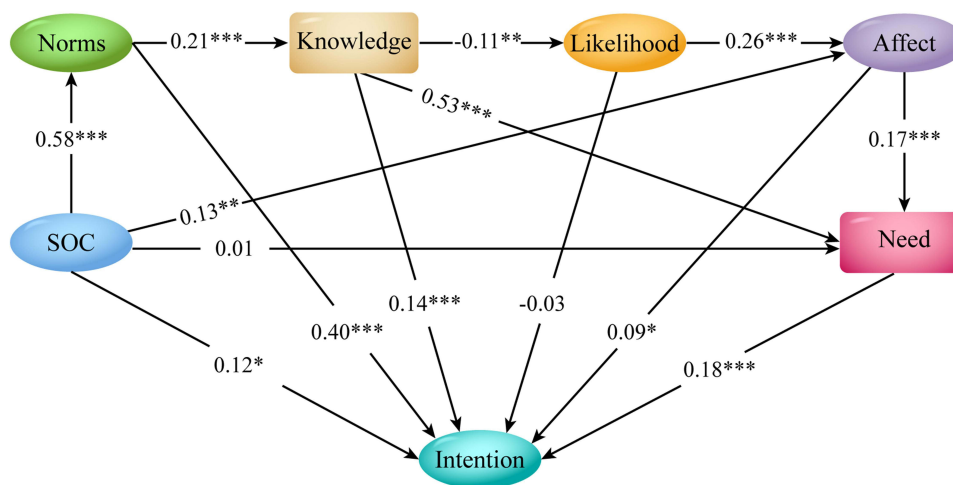


Figure 2 Standardized path coefficients of the structural equation model. *** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$.

support H1 and H2b. Responses to RQ1 indicated that the SOC was positively related to Internet users' negative affective responses. The findings did not support H2a as no statistically significant relationship was identified between the SOC and perceived information need (H2a; $t = 0.39$).

The second objective focused on the role of COVID-19 risk knowledge in the process of information seeking. We believed there was a direct correlation between knowledge and perceived risk likelihood. The results revealed that the relationship had significant negative correlation, with a coefficient of -0.11 (RQ2; $t = -2.96$, $P < 0.01$). Surprisingly, the path coefficients of COVID-19 risk knowledge to perceived information need and information-seeking intention were 0.53 (H3a; $t = 18.55$) and 0.14 (H3b; $t = 3.63$), respectively, and the P value was less than 0.001 , indicating that COVID-19 risk knowledge was positively correlated with perceived information need and information-seeking intention. However, the results were not in accordance with our research hypotheses. Therefore, the findings did not support H3a and H3b.

ISNs were positively correlated with information-seeking intention. We found the path coefficient to be 0.40 (H4a; $t = 8.37$, $P < 0.001$), and it was the most powerful driving force for information-seeking intention. Similarly, the path coefficients of H6b and H7 were 0.09 and 0.18 , which were significant at a 5% level (H6b; $t = 2.56$) and 0.1% level (H7; $t = 4.90$), respectively. The path coefficient between perceived risk likelihood to information-seeking intention was -0.03 (H5b; $t = -1.00$), indicating that perceived risk likelihood was not significantly related COVID-19 risk information-seeking intention directly. Hence, the findings supported H4a, H6b, and H7 but no H5b.

In addition, upon exploring the other three relationships, namely those between ISNs and COVID-19 risk knowledge (H4a; $t = 5.81$, $P < 0.001$), perceived risk likelihood and negative affective responses (H5a; $t = 6.90$, $P < 0.001$), and negative affective responses and perceived information need (H6a; $t = 5.08$, $P < 0.001$), their standardized path coefficients were 0.21 , 0.26 , and 0.17 , respectively. ISNs were found to positively influence COVID-19 risk knowledge, and perceived risk likelihood had a positive influence on negative affective responses, and negative affective responses remarkably influenced perceived information need; therefore, the findings supported H4a, H5a, and H6a.

Discussion

Our research offered insight into the SOC. As predicted, the SOC was an important predictor of risk information-seeking behavior. Our findings showed that a stronger SOC was associated with a higher tendency to exhibit behavioral control and prediction functions,⁷⁰ followed by actively seeking information to fend off risks. The stronger the SOC, the more likely it is that one would perceive external pressure and expectations, which means that a stronger the sense of belonging to the local community is associated with greater inclination to achieve the integration of personal and community interests.^{23,24} When individuals could not play their role in acquiring health information, they frequently turned to interpersonal social networks to gather and disseminate information. When all information resources are difficult, the interpersonal network is particularly magnified to resist health risks.⁷¹ In this situation, individuals with a strong SOC often play the role of resource linker and tend

to increase the overall frequency of information seeking in the way expected, thus making the act of acquiring information a spontaneous and a community-oriented act. The integration of personal and community's health interests is reflected in the context of expectations and community mutual assistance. Emotional and spiritual attachment to the community has an undeniable significant effect on an individual's life satisfaction, stress management, and positive life attitude, among other aspects. When individuals feel attached to their community and community members, they can more successfully integrate into the organization. Although our research focuses on COVID-19 risk information-seeking intention and individuals' SOC, our research results may be limited by different community backgrounds as the level of health knowledge differs among communities, which may even lead to the spread of more misinformation and less exposure to positive health information-seeking behavior. Further research in a larger sample is needed to strictly assess whether the relationships contained in our conceptual model are applicable to different community backgrounds and their impact.

Unexpectedly, a higher SOC was found to be associated with more negative affective responses, which is inconsistent with the report of Fujiwara and Kawachi.⁷² Thus, with regard to affective responses, the SOC may not always be negative, depending on the given circumstances. Furthermore, an individuals' concept of the SOC is obfuscated by different research contexts. For example, in the Western culture, the SOC refers to the common psychology of the community, whereas the SOC in this paper is used in the context of providing information or advice to individuals regarding COVID-19 risk. In other words, people engage in community interaction because they expect the community to be a more substantial source of COVID-19 information, indicating that the ultimate goal is to meet their own needs. However, when people meet their own interests, they will also be bound by the community responsibility.⁷³ We believe that people will achieve better mental health only when their information behavior conforms to the expected results; otherwise, they will be affected by cognitive disorders and negative emotional experiences like stress, anxiety, and fear. Therefore, when developing risk communication strategies, individuals should be encouraged to reflect and review their environment and feelings, thus distracting them from negative thoughts and feelings by alleviating excessive responsibility.

The fruitful contributions to PRISM made by COVID-19 risk knowledge are noteworthy. For instance, there was a positive relationship between COVID-19 risk knowledge and information-seeking intention, and individuals with more COVID-19 risk knowledge were more likely to pursue information-seeking behavior rather than avoid seeking information. This result was inconsistent with our research hypothesis perhaps because of the differences in characteristics of individuals. Sufficient risk knowledge enabled individuals to obtain great sense of achievement and satisfaction in risk communication, which also urged individuals to seek more information to maintain a good image. We found that risk knowledge may affect a person's assessment of information need and leads to increased desire for knowledge to cope with the new challenge, which was consistent with Hovick's⁷ results. Not surprisingly, higher COVID-19 risk knowledge was associated with lower level of perceived risk likelihood, which also means that risk perception ability based on risk knowledge varies to different degrees. Research shows that for better evaluation of disease severity, it is critical to collect data on illness phenotypes, treatment details, and actual outcomes in patients with COVID-19. This can effectively eliminate delayed diagnosis, thus decreasing the risk of secondary infections in COVID-19 patients.^{74,75} Therefore, in the practice of risk management, more attention should be paid to the complex role of risk knowledge.

In this study, we explored the predictors of COVID-19 risk information-seeking intention. We identified ISNs to be the strongest driving factor of information-seeking intention, suggesting that the individuals who perceived higher pressure or expectations from the outside were more likely to actively seek information on COVID-19 risk, and this finding is supported by various previous studies.^{6,11,31,56} Moreover, the implications of uncertainty about health outcomes were all the more increased during the pandemic. The public was vulnerable to negative experiences of anxiety, nervousness, fear, and even emotional burnout, which would also lead to information-seeking behavior.^{6,52,58} Consistent to previously published studies,^{6,10} we identified a positive relationship between information need and information-seeking intention.

In addition, our study has some other noteworthy findings. Affective responses to risk depend on whether the risk is controllable and whether the potential seeker of information perceives a higher likelihood of getting infected, suggesting that the individuals with a higher perceived likelihood of contracting COVID-19 have more negative affective responses, which is in agreement with previous studies.^{6,52} We also found the perceived pressure and expectations to be directly correlated with the depth of COVID-19 risk knowledge.^{32,34}

Strengths and Limitations

This study discussed the Internet users' intention to seek information about COVID-19 risk. To our knowledge, this is the first study to focus on the influence of the SOC on risk information-seeking intention. This unique perspective of this study can provide valuable references for future research on risk management and help governments and health institutions develop better effective risk communication strategies.

However, the study has several limitations. First, the study is based on cross-sectional data from a certain point in time, and the representativeness and generalizability of the sample may be affected by the proportions of younger individuals and individuals with higher educational qualifications. Future studies may benefit from exploring more representative samples and investigating trajectories over a longer period. Secondly, self-reported measures were used in the study, which are prone to recall and social desirability biases. However, these psychological concepts are difficult to measure objectively. Although the method used in this study is the mainstream method in this field, to make the research more rigorous, exploring new verification methods may be a good approach in further studies. Finally, in the measurement of affective risk response, this study only focused on the impact of negative affections on individuals' self-cognition and information behavior. However, previous research has shown that positive affective responses to risk also increase ones' information-seeking intention.⁷⁶ Future studies should also explore the role of positive affections, such as hope and optimism in risk information seeking.

Conclusions

We used PRISM as a reference to construct a conceptual framework of Internet users' risk information-seeking intention. Our research findings expand the current knowledge on the topic by exploring the importance of the SOC in the risk information-seeking process. Upon verifying the robustness of the hypotheses proposed in this study, the conclusions are as follows: (1) risk information-seeking intention is driven by ISNs, perceived information need, risk knowledge, the SOC, and negative affective responses, and ISNs are the strongest driving factor; (2) with the continuous enhancement of the SOC, the pressure and expectation felt by users also increase; However, an overwhelmingly high SOC will impose overload and mandatory value requirements on individuals and will make individuals realize the gap between their real self and their ideal self when feeling guilty and the between their current behavior and ideal behavior, thus leading to negative emotions, such as anxiety and depression; (3) COVID-19 risk knowledge can directly affect information-seeking intention of Internet users and can indirectly influence their information-seeking intention through perceived information need; and (4) higher risk knowledge was associated with lower perceived risk likelihood. Therefore, ISNs should be the primary focus when conducting risk management. Driven by perceived external pressure, people will actively carry out information-seeking behavior to reduce uncertainty. Future research should further explore the factors that may influence ISNs and whether different types of norms (eg, injunctive, descriptive, and subjective) interact with information-seeking behavior. Secondly, attention should be paid to the degree to which the community is satisfied with its members' sense of belonging and affective connection and to the mediating effect of responsibility on the SOC and affective response. Finally, a positive attitude toward learning risk knowledge should be encouraged and cultivated, which will provide an opportunity to explore the role of individual and environmental health risk information seeking.

Ethics

This study scheme was reviewed and approved by the ethics commitment of Jilin University. We conducted this study under the Declaration of Helsinki. Participants were informed that filling in and submitting the questionnaire would be considered as informed consent.

Acknowledgment

We thank all the participants of the present study.

Funding

This work was supported by the Research and Application of Medical and Social Support Index System [20180418083FG] Soft Science Research Project of Science and Technology Department of Jilin Province, and the Research of Network Health Information Behavior and Mental Health Impact Mechanism [SKH2022372].

Disclosure

The authors would like to declare that we have no conflicts of interest for this work.

References

- Soroya SH, Farooq A, Mahmood K., et al. From information seeking to information avoidance: understanding the health information behavior during a global health crisis. *Inf Process Manag.* 2021;58:102440. doi:10.1016/j.ipm.2020.102440
- Chen Q, Song S, Zhao Y. The Impact of Information Overload on User Information Evasion in Public Health Emergencies: an Empirical Study Based on COVID-19 Information Prevalence. *Information Documentation Services.* 2020;41:76–88.
- Bai J, Li XY, Li JW, et al. Information behaviors, cognitive psychology and emotional state of domestic internet users during the epidemic period. *Chine J Med Lib Information Sci.* 2021;30:40–49. doi:10.3969/j.issn.1671-3982.2021.06.006
- Shiloh S, Ben-Sinai R, Keinan G. Effects of controllability, predictability, and information-seeking style on interest in predictive genetic testing. *Pers Soc Psychol Bull.* 1999;25:1187–1195. doi:10.1177/0146167299258001
- Miller SM. Controllability and human stress: method evidence and theory. *Behav Res Ther.* 1979;17:287–304. doi:10.1016/0005-7967(79)90001-9
- Kahlor L. PRISM: a planned risk information seeking model. *Health Commun.* 2010;25:345–356. doi:10.1080/10410231003775172
- Hovick SR, Kahlor L, Liang MC. Personal cancer knowledge and information seeking through PRISM: the planned risk information seeking model. *J Health Commun.* 2014;19:511–527. doi:10.1080/10810730.2013.821556
- Willoughby JF, Myrick JG. Does Context Matter? Examining PRISM as a Guiding Framework for Context-Specific Health Risk Information Seeking Among Young Adults. *J Health Commun.* 2016;21:696–704. doi:10.1080/10810730.2016.1153764
- Yang JZ. Whose risk? Why did the US public ignore information about the Ebola outbreak? *Risk Analysis.* 2019;39:1708–1722. doi:10.1111/risa.13282
- Hubner AY, Hovick SR. Understanding risk information seeking and processing during an infectious disease outbreak: the case of zika virus. *Risk Analysis.* 2020;40:1212–1225. doi:10.1111/risa.13456
- Liu M, Chen Y, Shi D, et al. The public's risk information seeking and avoidance in china during early stages of the COVID-19 outbreak. *Front Psychol.* 2021;12:649180. doi:10.3389/fpsyg.2021.649180
- Bassani C. Five dimensions of social capital theory as they pertain to youth studies. *J Youth Stud.* 2007;10:17–34. doi:10.1080/13676260701196087
- Berry HL, Welsh JA. Social capital and health in Australia: an overview from the household, income and labour dynamics in Australia survey. *Soc Sci Med.* 2010;70:588–596. doi:10.1016/j.socscimed.2009.10.012
- Fowler K, Wareham-Fowler S, Barnes C. Social context and depression severity and duration in Canadian men and women: exploring the influence of social support and sense of community belongingness. *J Appl Soc Psychol.* 2013;43:E85–E96. doi:10.1111/jasp.12050
- Cicognani E, Pirini C, Keyes C, et al. Social participation, sense of community and social well being: a study on American, Italian and Iranian university students. *Soc Indic Res.* 2008;89:97–112. doi:10.1007/s11205-007-9222-3
- Kahlor LA, Wang W, Olson HC, et al. Public perceptions and information seeking intentions related to seismicity in five texas communities. *Int J Dis Risk Reduction.* 2019;37:101147. doi:10.1016/j.ijdr.2019.101147
- Griffin RJ, Dunwoody S, Yang ZJ. Linking risk messages to information seeking and processing. *Ann Int Commun Assoc.* 2013;36:323–362. doi:10.1080/23808985.2013.11679138
- Ajzen I. Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *J Appl Soc Psychol.* 2002;32:665–683. doi:10.1111/j.1559-1816.2002.tb00236.x
- Zeng J, Jiang M, Yuan M. Environmental risk perception, risk culture, and pro-environmental behavior. *Int J Environ Res Public Health.* 2020;18:17. doi:10.3390/ijerph18010017
- Janiszewski C. Preattentive mere exposure effects. *J Consumer Res.* 1993;20:376–392. doi:10.1086/209356
- Omoto AM, Snyder M. Considerations of community: the context and process of volunteerism. *Am Behav Sci.* 2002;45:846–867. doi:10.1177/0002764202045005007
- Li X, Chen H, Li B, et al. Sense of community: concepts, values, theories and advances. *Adv Psychol Sci.* 2015;23:1280–1288. doi:10.3724/SP.J.1042.2015.01280
- McMillan DW, Chavis DM. Sense of community: a definition and theory. *J Community Psychol.* 1986;14:6–23. doi:10.1002/1520-6629(198601)14:1<6::AID-JCOP2290140103>3.0.CO;2-I
- Deline MB, Kahlor LA. Planned risk information avoidance: a proposed theoretical model. *Commun Theory.* 2019;29:360–382. doi:10.1093/ct/qty035
- Bachrach KM, Zautra AJ. Coping with a community stressor: the threat of a hazardous waste facility. *J Health Soc Behav.* 1985;26:127–141. doi:10.2307/2136602
- Talo C, Mannarini T, Rochira A. Sense of community and community participation: a meta-analytic review. *Soc Indic Res.* 2014;117:1–28. doi:10.1007/s11205-013-0347-2
- Koh J, Kim YG. Sense of virtual community: a conceptual framework and empirical validation. *Int J Electronic Commerce.* 2003;8:75–93. doi:10.1080/10864415.2003.11044295
- Blanchard AL, Markus ML. The Experienced "Sense" of a Virtual Community: characteristics and Processes. *ACM Sigmis Database.* 2004;35:64–79.
- Twigger-Ross CL, Uzzell DL. Place and Identity Processes. *J Environ Psychol.* 1996;16:205–220. doi:10.1006/jevp.1996.0017
- Jacquet JB, Stedman RC. The risk of social-psychological disruption as an impact of energy development and environmental change. *J Environ Planning Management.* 2014;57:1285–1304. doi:10.1080/09640568.2013.820174
- Griffin RJ, Neuwirth K, Dunwoody S, et al. Information sufficiency and risk communication. *Media Psychol.* 2004;6:23–61. doi:10.1207/s1532785xmep0601_2
- Yang ZJ, Aloe A, Feeley TH. Risk information seeking and processing model: a meta-analysis. *J Commun.* 2014;64:20–41. doi:10.1111/jcom.12071

33. Kellens W, Zaalberg R, De Maeyer P. The informed society: an analysis of the public's information-seeking behavior regarding coastal flood risks. *Risk Analysis*. 2012;32:1369–1381. doi:10.1111/j.1539-6924.2011.01743.x
34. Li S, Zhai G, Zhou S, et al. Insight into the earthquake risk information seeking behavior of the victims: evidence from Songyuan, China. *Int J Environ Res Public Health*;2017. 14. doi:10.3390/ijerph15010014
35. Ning L, Niu J, Bi X, et al. The impacts of knowledge, risk perception, emotion and information on citizens' protective behaviors during the Outbreak of COVID-19: a Cross-Sectional Study in China. *Bmc Public Health*;2020. 20. doi:10.1186/s12889-019-8142-x
36. Tenkorang EY. Effect of knowledge and perceptions of risks on Ebola-preventive behaviours in Ghana. *Int Health*. 2018;10:202–210. doi:10.1093/inthealth/ihy009
37. Seo M. Amplifying panic and facilitating prevention: multifaceted effects of traditional and social media use during the 2015 MERS Crisis in South Korea. *Journal Mass Commun Q*. 2021;98:221–240. doi:10.1177/1077699019857693
38. Bettman JR, Park CW. Effects of prior knowledge and experience and phase of the choice process on consumer decision-processes: a protocol analysis. *J Consumer Res*. 1980;7:234–248. doi:10.1086/208812
39. Shen Y, Lou S, Zhao X, et al. Factors impacting risk perception under typhoon disaster in macao SAR, China. *Int J Environ Res Public Health*. 2020;17:7357. doi:10.3390/ijerph17207357
40. Ajzen I. The Theory of Planned Behavior. *Organ Behav Hum Decis Process*. 1991;50:179–211. doi:10.1016/0749-5978(91)90020-T
41. Hovick SR, Liang M-C, Kahlor L. Predicting cancer risk knowledge and information seeking: the role of social and cognitive factors. *Health Commun*. 2014;29:656–668. doi:10.1080/10410236.2012.763204
42. Ho SS, Detenber BH, Rosenthal S, et al. Seeking information about climate change: effects of media use in an extended PRISM. *Sci Commun*. 2014;36:270–295. doi:10.1177/1075547013520238
43. Kahlor L, Dunwoody S, Griffin RJ, et al. Seeking and Processing Information about Impersonal Risk. *Sci Commun*. 2006;28:163–194. doi:10.1177/1075547006293916
44. Kahlor LA. An augmented risk information seeking model: the case of global warming. *Media Psychol*. 2007;10:414–435. doi:10.1080/15213260701532971
45. Ter Hume E. *Information Seeking in a Risky World. The Theoretical and Empirical Development of FRIS: A Framework of Risk Information Seeking*. Enschede: University of Twente; 2008.
46. Sun J, Jiang X, Gao Y, et al. Subhealth risk perception scale: development and validation of a new measure. *Comput Math Methods Med*. 2022;2022:9950890. doi:10.1155/2022/9950890
47. Huang C, Vaneckova P, Wang X, et al. Constraints and barriers to public health adaptation to climate change: a review of the literature. *Am J Prev Med*. 2011;40:183–190. doi:10.1016/j.amepre.2010.10.025
48. Weinstein ND. Perceived probability, perceived severity, and health-protective behavior. *Health Psychol*. 2000;19:65–74. doi:10.1037/0278-6133.19.1.65
49. Yang ZJ, Kahlor L. What, me worry? The role of affect in information seeking and avoidance. *Sci Commun*. 2012;35:189–212. doi:10.1177/1075547012441873
50. Eastin MS, Kahlor LA, Liang M-C, et al. Information-seeking as a precaution behavior: exploring the role of decision-making stages. *Hum Commun Res*. 2015;41:603–621. doi:10.1111/hcre.12062
51. Wise T, Zbozinek TD, Michelini G, et al. Changes in risk perception and self-reported protective behaviour during the first week of the COVID-19 pandemic in the United States. *Royal Soc Open Sci*. 2020;7:200742. doi:10.1098/rsos.200742
52. Griffin RJ, Dunwoody S, Neuwirth K. Proposed model of the relationship of risk information seeking and processing to the development of preventive behaviors. *Environ Res*. 1999;80:S230–S45. doi:10.1006/enrs.1998.3940
53. Luz PM, Brown HE, Struchiner CJ. Disgust as an emotional driver of vaccine attitudes and uptake? A mediation analysis. *Epidemiol Infect*. 2019;147:e182. doi:10.1017/S0950268819000517
54. Yang JZ, Zhuang J. Information seeking and information sharing related to hurricane harvey. *Journal Mass Commun Q*. 2020;97:1054–1079. doi:10.1177/1077699019887675
55. Frijda NH. Emotions and Action. In: Manstead ASR, Frijda N, Fischer A, editors. *Feelings and Emotions*. Cambridge: Cambridge University Press; 2004:158–173.
56. Griffin RJ, Yang Z. After the flood: anger, attribution, and the seeking of information. *Sci Commun*. 2008;29:285–315. doi:10.1177/1075547007312309
57. Kahlor LA, Yang ZJ, Liang MC. Risky politics: applying the planned risk information seeking model to the 2016 US presidential election. *Mass Commun Soc*. 2018;21:697–719. doi:10.1080/15205436.2018.1498900
58. Huang J, Ells K. Risk here vs. risk there: intention to seek information about Gulf Coastal Erosion. *Environ Commun J Nature Culture*. 2021;15:386–400. doi:10.1080/17524032.2020.1853582
59. Baker RK, White KM. Predicting adolescents' use of social networking sites from an extended theory of planned behaviour perspective. *Comput Human Behav*. 2010;26:1591–1597. doi:10.1016/j.chb.2010.06.006
60. Zhang CB, Li YN, Wu B, et al. How WeChat can Retain Users: roles of Network Externalities, Social Interaction Ties, and Perceived Values in Building Continuance Intention. *Comput Human Behav*. 2017;69:284–293. doi:10.1016/j.chb.2016.11.069
61. Chung S, Kim Y, Shim M. Types of perceived risk likelihood and prediction of preventive behaviors: absolute vs. comparative, and conditional vs. unconditional risk perceptions. *Korean J Journalism Commun Studies*. 2022;66:155–187.
62. Long DA, Perkins DD. Confirmatory factor analysis of the sense of community index and development of a brief sci. *J Commun Psychol*. 2003;31:279–296. doi:10.1002/jcop.10046
63. Xin ZQ, Ling XH. Urban residents' community identity: concept, measurement and its correlates. *Psychol Res*. 2015;8:64–72. doi:10.3969/j.issn.2095-1159.2015.05.010
64. Yang Z, Paudel KP, Wen X, et al. Food safety risk information-seeking intention of Wechat users in China. *Int J Environ Res Public Health*. 2020;17:2376. doi:10.3390/ijerph17072376
65. Bagozzi RP, Kimmel SK. A comparison of leading theories for the prediction of goal-directed behaviours. *Br J Soc Psychol*. 1995;34:437–461. doi:10.1111/j.2044-8309.1995.tb01076.x

66. Hulland J. Use of Partial Least Squares (PLS) in Strategic Management Research: a Review of Four Recent Studies. *Strategic Management J.* 1999;20:195–204. doi:10.1002/(SICI)1097-0266(199902)20:2<195::AID-SMJ13>3.0.CO;2-7
67. Tracey M, Vonderembse MA, Lim J-S. Manufacturing technology and strategy formulation: keys to enhancing competitiveness and improving performance. *J Operations Management.* 1999;17:411–428. doi:10.1016/S0272-6963(98)00045-X
68. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Marketing Res.* 1981;18:39–50. doi:10.1177/002224378101800104
69. Hooper D, Coughlan J, Mullen MR. Structural equation modelling: guidelines for determining model fit the electronic. *J Business Res Methods.* 2008;6:53–60.
70. Wang KY. Sense of community and political mobilization in virtual communities: the role of dispositional and situational variables. *Observatorio.* 2010;4:73–96.
71. Dutta MJ, Kaur S, Luk P, et al. Health information seeking among Singaporeans: roles and collective contexts. *Health Commun.* 2017;33:433–442. doi:10.1080/10410236.2016.1278493
72. Fujiwara T, Kawachi I. Social capital and health: a study of adult twins in the US. *Am J Prev Med.* 2008;35:139–144. doi:10.1016/j.amepre.2008.04.015
73. Tian XY. The theoretical dimension and practical basis of role theory. *Morality Civilization.* 2012;117–121. doi:10.13904/j.cnki.1007-1539.2012.04.012
74. Chavda V, Chaurasia B, Fiorindi A, et al. Ischemic Stroke and SARS-CoV-2 Infection: the Bidirectional Pathology and Risk Morbidities. *Neurol Int.* 2022;14:391–405. doi:10.3390/neurolint14020032
75. De Luca P, Camaioni A, Marra P, et al. Effect of ultra-micronized palmitoylethanolamide and luteolin on olfaction and memory in patients with long COVID: results of a longitudinal study. *Cells.* 2022;11:2552. doi:10.3390/cells11162552
76. Yang ZJ, McComas KA, Gay G, et al. Information seeking related to clinical trial enrollment. *Communic Res.* 2011;38:856–882. doi:10.1177/0093650210380411

Risk Management and Healthcare Policy

Dovepress

Publish your work in this journal

Risk Management and Healthcare Policy is an international, peer-reviewed, open access journal focusing on all aspects of public health, policy, and preventative measures to promote good health and improve morbidity and mortality in the population. The journal welcomes submitted papers covering original research, basic science, clinical & epidemiological studies, reviews and evaluations, guidelines, expert opinion and commentary, case reports and extended reports. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/risk-management-and-healthcare-policy-journal>