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Interpersonal risk communication matters more than media risk communication in its impact on individuals’ trust and preventive behaviors during COVID-19

Zakir Shah, Lu Wei *

College of Media and International Culture, Zhejiang University, Hangzhou, China

ARTICLE INFO

Keywords:
COVID-19
Preventive behaviors
Risk communication
Trust

ABSTRACT

A cross-sectional survey study from 1496 respondents was conducted to investigate how interpersonal risk communication and media risk communication foster individuals’ interpersonal trust and trust in scientists during the ongoing COVID-19 pandemic. Findings reveal that interpersonal risk communication is significantly related to interpersonal trust and trust in scientists, but have no direct association with preventive behaviors. Media risk communication is significantly associated with preventive behaviors and increases individuals’ trust in scientists while having no effect on interpersonal trust. Preventive behaviors are significantly influenced by both interpersonal trust and trust in scientists. In addition, trust mediated the association between risk communication and preventive behaviors.

1. Introduction

The coronavirus (COVID-19) started in late 2019 in China’s Hubei province and has now spread worldwide [1]. It has negative impact on people's physical, mental, and social wellbeing [2–4]. Moreover, the epidemic not just created a significant risk to physical health but also necessitated the rapid and profound adoption of social distancing and other preventive behaviors as the primary method for preventing the spread of disease and death [5,6]. These steps and behaviors included staying at home, social distancing, wearing face masks, gloves in public places, washing hands, using hand sanitizer, closing educational institutions, offices, markets, forced segregation, and a ban on public gatherings [7]. Extant literature has identified various individual, psychological and social factors that shape individuals' willingness to comply with preventive measures [7–9]. However, the deployment of COVID-19-related preventive behaviors is still fairly unexplored and needs further exploration. Therefore, the current study intends to investigate the predictors of individuals' preventive behaviors, especially during the COVID-19.

Past research demonstrates that risk communication (interpersonal risk communication and media risk communication) is an important tool for disease control and prevention [10–13]. Risk communication can be described as the exchange of information between stakeholders (i.e., government institutions, the public, scientists, communications media, professional organizations) on the nature, severity, importance, or control of the risk [14,15]. It is one of the more critical determinants that develop and encourage dialogue between different stakeholders and decision-makers, and also fosters individuals' trust [16]. The current study examines the effect of risk communication on two types of trust such as interpersonal trust and trust in scientists. Interpersonal trust refers to a person's belief that the other person in the exchange relationship will not exploit his/her vulnerabilities [17]. While, trust in scientists is

* Corresponding author.
E-mail address: drluwei@zju.edu.cn (L. Wei).

https://doi.org/10.1016/j.ijdrr.2022.103369
Received 24 April 2022; Received in revised form 29 September 2022; Accepted 7 October 2022
Available online 15 October 2022
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typically a type of social or institutional trust, which indicates impersonal trust ascribed to individuals working in enterprises – as opposed to customized trust in a known person [18].

For a quick and effective response to a disaster, the media play a critical role in communication between researchers, scientists, development of trust, and educating the public regarding the adoption of preventive measures [19–22]. Further, the media depiction of scientific issues increased the public’s scientific knowledge and is associated with the development of individuals’ trust in scientists [23–25]. Trust in science and scientists has a positive correlation with the perceived risk of COVID-19 and a negative correlation with distrust of all who give advice on preventive behaviors [26].

Similarly, interpersonal communication also has an effective role in developing individuals’ trust and influencing their attitudes and behaviors [27–29]. Interpersonal communication refers to the interaction of two or more individuals based on consanguinity, common business interactions, or other social covenants [30]. The quality of interpersonal communication whether face to face or via different media outlets plays a significant role in establishing interpersonal trust [17]. In the field of crises and health communication, prior research demonstrates that trust has a significant impact on individuals’ emotions and protective behaviors [31,32]. In interpersonal risk communication, past research has shown the importance of doctor-patient communication in vaccination attitudes and behavior [33,34], but there is a lack of research that explored the impact of interpersonal risk communication with family, friends, coworkers, etc., and media risk communication on individuals’ attitudes and behaviors, especially during the COVID-19. Moreover, no prior research has explored the role of interpersonal risk communication in fostering interpersonal trust and trust in scientists which in turn can influence individuals’ preventive behaviors, especially in a risk situation. To fill this research gap, this study intends to investigate the role of risk communication (interpersonal risk communication and media risk communication) in the development of individuals’ trust and in influencing their preventive behaviors.

2. Theoretical background and hypothesis development

2.1. Risk communication and trust

Trust in risk decision-making is critical to the development of appropriate and acceptable risk-management options [35]. Research indicates that trust predicts collaboration among individuals, proper risk management, and team performance [36]. Trust can be described in different concepts such as cognitive trust and affective trust. In cognitive trust, the individual propensity to trust is based on the knowledge, expertise, trustee competency, and reliability of the source [36,37]. While an effective foundation of trust, people make emotional investments in trust relationships, show sincere care and concern for the wellbeing of associates, believe in the inherent quality of these kinds of interactions, and believe that such feelings are rewarded [38].

In the context of science communication, prior research focuses on modern technologies such as a genetically modified organisms or nuclear waste [25,39,40]. However, there is a lack of research that examined how risk communication with family, friends, relatives, community members, etc. predict individuals’ interpersonal trust and trust in scientists. Research reveals that peer influence and observing the activities of neighbors, friends, family members, etc., exert a significant impact on individuals’ attitudes and risk mitigation behaviors [41]. Social exchange variables like interpersonal interaction, quality and history of social exchange, and tie strength play an important role in nurturing interpersonal trust [42]. These factors act as a source of closure by eliminating doubts, and confusion and facilitating the development of interpersonal trust between individuals. Similarly, individuals develop beliefs about science and basic scientific knowledge through formal and informal education. All who rely primarily on scientific experts believe that scientists are the only ones who know the reality in all matters of science and also that the public should not have a say in scientific decision-making. Basic and scientific knowledge are acquired through education and exposure to different types of media [24]. Scientific representations in the media have been shown to affect public opinion regarding science and, as a result, are linked to individuals’ trust [23,24]. These examples provide evidence of the active role of risk communication in fostering individuals’ trust. However, detailed insights on how risk communication between family members, friends, co-workers, and community members build individuals’ trust are still lacking. Therefore, in this study, we are examining two possible bases for the establishment of interpersonal trust and trust in scientists as sources of information during the COVID-19 (media risk communication and interpersonal risk communication).

2.2. Media or interpersonal risk communication

Communication scholars agree that different communication outlets from mass media to interpersonal communication have different influences on individuals’ attitudes and behaviors [43]. Exposure to media and interaction with other individuals are the main sources and antecedents of fostering individuals’ trust and influencing their behaviors [44,45]. For example, Korhonen et al. [46], showed that exposure to health-related information on mass media was significantly associated with smoking cessation among men only, while, interpersonal health communication was a significant predictor of smoking cessation among both genders. Similarly, Desmet & Spanje et al. [47], demonstrate that for less sophisticated citizens, the mass media and interpersonal communication have a positive effect on individuals’ democratic performance perceptions. However, Lee [45], indicates that the interaction between media use and healthy lifestyle behaviors is enhanced among those who have less interpersonal health communication with their family and friends.

Previous research has confined to the direct effect of exposure to media and interpersonal communication on individuals’ attitudes and behaviors. A lack of research examined the simultaneous effect of media communication and interpersonal communication on individuals’ trust and behaviors. The current study examines both the effect of interpersonal risk communication and media risk communication on fostering individuals’ trust and influencing their preventive behaviors. Furthermore, the researchers are interested to explore individuals’ intentions of reception and acceptance of risk information via interpersonal communication or media risk com-
munication. Respondents’ intentions of reception and acceptance of risk information are based on their frequency of exposure to media, and their risk communication with family, friends, relatives, classmates, co-workers, and community members. Therefore, the current study assumes that;

**H1.** Individuals are more likely to use interpersonal communication for risk information than media risk communication.

**H2.** Interpersonal risk communication has a significant association with preventive behaviors.

**H3.** Media risk communication has a significant association with preventive behaviors.

### 2.3. Risk communication and interpersonal trust

In a democratic society, the power of media in building individuals’ trust has been widely recognized in the field of media communication. Both mass media and social media facilitate individuals to improve their interaction, and trust with each other [40]. Trust is considered a fundamental element in human interaction that helps individuals to search and find reliable information in a virtual environment where users generally are anonymous and do not have face-to-face interaction [48]. The new media communication has increased the online social interaction between individuals which has a remarkable positive or negative impact on their interpersonal trust [49]. However, building trust in media communication is more difficult than it is in the real world because one’s true identity is difficult to verify [38]. In online media communication, individuals are generally more inclined to respond, show their aggressive mood, and are less bound by societal norms of how to behave in public than they were in face-to-face interaction [49]. On the other hand, in the face to face communication, individuals are generally reluctant to offend a person having an opposing view. It is generally used to transmit information between individuals involved so as to provide meaning to their interaction [50]. Interpersonal communication is more powerful than that media communication in obtaining information and enhancing individuals’ knowledge about an issue [30]. Research reveals that interpersonal communication such as getting advice from parents, doctors, friends, or colleagues can develop and enhance trustworthy relationships, and also can influence individuals’ behaviors and relationships [51]. Prior studies indicate that higher quality of communication between patients and doctors is positively associated with a high level of trust that may ultimately contribute to better health consequences [52]. Therefore, this study assumes the following hypotheses:

**H4.** Interpersonal communication has a positive relationship with interpersonal trust.

**H5.** Media risk communication has a positive relationship with interpersonal trust.

### 2.4. Risk communication and trust in scientists

Individuals know little about science or scientists. Despite their relative favorable views of scientists and their role in improving the quality of life (i.e., in the realms of medicine, food, and the environment), individuals’ knowledge of scientists and philosophy of science is still poor [53]. The majority of people learn about scientists through media exposure, especially media coverage of scientific issues and research or scientists’ depiction in movies [54]. Science risk communication involves telling individuals about social risks as well as informing individuals about the scientist’s political views, particularly when the scientist discusses a contentious or politicized scientific problem publicly [53]. Public trust in scientists is an essential component in trying to understand the conceptual framework by which media use leads individuals to reject (or accept) scientific information about an issue [18], and also plays a critical role in shaping individuals’ trust towards the scientists.

On the other hand, media coverage of scientific issues stimulates interpersonal communication between individuals that are likely to increase the salience of an issue, and influence individuals’ attitudes and behaviors [55]. Similarly, individuals’ knowledge and attitudes about science and technology are developed through interpersonal communication, particularly in the context of news media information or public conferences [56]. Furthermore, communication between individuals on specific issues may help them understand these complex issues, connect with prior knowledge, and then finally make informed decisions [57]. In the field of health communication, high-quality interpersonal communication between patients and clinicians may lead to greater patients’ knowledge, satisfaction, adherence to treatment plans, and high trust in medical experts [58]. Scholars have previously looked into the impact of media coverage on fostering interpersonal discussion about an issue’s importance and familiarity. The current study, on the other hand, extends previous research by looking at the impact of media risk communication and interpersonal communication on individuals’ trust in scientists. Thus, we suggest the following hypotheses:

**H6.** Media risk communication has a positive relationship with trust in scientists.

**H7.** Interpersonal risk communication has a positive relationship with trust in scientists.

### 2.5. Trust and preventive behaviors

Trust is an important factor in the effectiveness of risk communication [59]. Effective communication contributes to the development of individuals’ trust towards the stakeholder which in turn may influence their adaptive behaviors [60]. For example, interpersonal trust is essential for effective relations between individuals and the community and provides a key basis for healthcare provision [61]. Interpersonal trust may facilitate doctor-patient communication, allows practitioners to encourage necessary changes to their behaviors, as well as allows the patient to take a more independent decision on medication [62]. Therefore, interpersonal trust is conceived of as a distal factor that can affect individuals’ behavioral responses to a risky situation. A number of studies have focused on the development of interpersonal trust and its impact on individuals’ behavioral intentions such as social engagement, risk reduction behaviors, organizational citizenship behavior, job satisfaction, innovative behaviors, prosocial behaviors (i.e, knowledge sharing),
greater patients’ knowledge, and adherence to treatment plans [52,58,63]. However, there is a lack of research that explores the impact of interpersonal trust on individuals’ preventive behaviors, especially during the COVID-19.

Trust is crucial in influencing individuals’ attitudes and behaviors about science and risky issues [39,64]. Mostly, individuals have no knowledge and direct experience of scientific phenomena, therefore, they often use trust as a heuristic, or information substitute when determining whether to accept or reject the experts’ claim regarding a particular issue [18,39]. It will be useful to promote general trust in science and scientists, especially to promote public acceptance of mass vaccination against the virus when misinformation and conspiracy theories prevail [26]. Since research organizations and scientists are often the sources of both preventive advice and communications educating the public about COVID-19 threats, those who trust science and scientists are more likely to view COVID-19 as a real threat and adopt risk-reduction recommendations [65]. Therefore, the study suggests the following hypotheses.

H8. Interpersonal trust has a significant relationship with preventive behaviors.

H9. Trust in scientists has a significant relationship with preventive behaviors.

Previously, we have hypothesized that interpersonal risk communication and media risk communication may positively affect individuals’ interpersonal trust and trust in scientists which in turn can influence their preventive behaviors. Thus, it logically may be possible that interpersonal trust and trust in scientists can mediate the effect of interpersonal risk communication and media risk communication on individuals’ preventive behaviors. This idea suggests an indirect effect of media risk communication and interpersonal risk communication on preventive behaviors via an individual’s level of interpersonal trust and trust in scientists. Thus, the study assumes the following hypotheses;

H10. Interpersonal trust mediates the association between interpersonal risk communication and preventive behaviors.

H11. Interpersonal trust mediates the association between media risk communication and preventive behaviors.

H12. Trust in scientists mediates the association between interpersonal risk communication and preventive behaviors.

H13. Trust in scientists mediates the association between media risk communication and preventive behaviors.

3. Methodology

3.1. Data collection procedures

A cross-sectional online survey was conducted during the time period from January 31st to February 9th, 2020, an early phase of the COVID-19 outbreak in China. Survey data was collected by Sojump, a professional online survey company in China. The company provides a sampling service of 2.6 million registered respondents distributed throughout China. Within this sampling frame, a random sampling strategy was employed. Despite the under-representativeness of the Chinese population, this sampling strategy is a time-efficient way to explore public reactions and attitudes during the outbreak of COVID-19. In terms of the sampling procedure, Sojump first randomly selected 2840 users from its 2.6 million-user pool and asked them to participate in the online survey through the email invitation. A total of 1656 respondents finished the questionnaire, with a response rate of 58.3%. However, cases that were incomplete or did not pass the attention checks were deleted. After that, data was analyzed using a total of 1496 valid questionnaires.

The sample covered 31 provinces, municipalities, and autonomous regions across mainland China. The sample consisted of 729 (48.7%) males and 767 (51.3%) females, and the mean age was 31 years old. In terms of work status 81% (n = 1211) respondents have full-time jobs, 5.7% (n = 86) have part-time job, 12.8% (n = 193) were not formally employed, 0.4 (n = 6) were retired from their jobs. With respect to education, 4.7% of the sample (n = 71) were high school graduates or below, 16% (n = 238) were technical school current students or graduates, 70.2% (n = 1050) were current college students or graduates, and 9.1% (n = 137) were postgraduates.

4. Measurement

4.1. Interpersonal risk communication

To assess interpersonal risk communication and media risk communication, the measurement scale was adapted from the study of Lin & Lagoe [66], and Coleman, [43]. The scale measures the amount of information the participants received from various communication sources by asking questions “in the past week, how often did you exchange information about the new coronavirus pneumonia with individuals like (1) family, (2) friends, (3) relatives, (4) colleagues/classmates, (5) community workers, and (6) others?” All the items were measured on a five-point Likert scale ranging from 1 = No to 5 = Very frequently. In this study, the Cronbach alpha was 0.913.

4.2. Media risk communication

To measure media risk communication, the scale was adapted from the study of Lin & Lagoe [66], and Coleman, [43]. The participants were asked that how often did they obtain information about the novel coronavirus pneumonia through these media channels such as (1) newspapers and magazines, (2) television, (3) radio, (4) News client (such as the People’s Daily client, today’s headline news client, etc.), and (5) internet search engine (such as Baidu, etc.). All the items were measured on a five-point Likert scale ranging from 1 = No to 5 = Very frequently. The Cronbach alpha for the current study is 0.857.
4.3. Trust variables

To measure participants’ level of interpersonal trust, and trust in scientists, the study adapted a four-items scale for each construct from the study of Huang et al., [67]. Example items for interpersonal trust included: I think that the other person tells the truth, I feel that the other person is honest with me, I feel that the other person will handle joint expectations fairly, and I think that the other person will not misguide me. In this study, the Cronbach Alpha is 0.824. For measuring participants’ trust in scientists, the items included: they are trustworthy, their level of expertise is convincing, they put people's health first, and I trust them. Here, the Cronbach Alpha is 0.849. All the items were measured on a five-point Likert scale ranging from 1 = completely disbelieve to 5 = believe.

4.4. Preventive behaviors

To measure individuals’ preventive behaviors, this study adapted a scale from the study of Liu et al., [68]. Example items included such as wearing a mask in public places, trying to maintain social distance, avoiding going to parties lately, trying to avoid traveling on public transport, giving proper attention to my diet, paying attention to a good rest and exercise, and avoiding shaking hands with others. The Cronbach Alpha is 0.868. All the items were measured on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

4.5. Data analysis

Smart PLS v.3.2.7 software was used to analyze the collected data. PLS-SEM is thought to be the best method for predicting the relationship between constructs in studies [69,70]. Some of the most popular SEM applications include path analysis, reliability test, second-order factor analysis, regression models, covariance structure models, and correlation structure models [69,70]. PLS-SEM is a better option since the aim of this study is to identify the key underpinnings that determine individuals’ trust. Thus, the measurement model was first evaluated by checking its reliability and validity, and the structural model was analyzed in the second phase.

5. Results

Constructs’ reliability and validity were assessed through Cronbach’s alpha (CA), factor loadings (FL), composite reliability (CR), and average variance extracted (AVE). Table 1 shows the results of CA, FL, CR, and AVE, which indicates that all the values of CA, FL, CR, and AVE are in the acceptable range recommended by Fornell & Larcker [71], and Hair, Gabriel, & Patel, [72].

Similarly, convergent and discriminant validity of the constructs were assessed by using the criterion and Heterotrait-monotrait (HTMT) (Fornell & Larcker, [71]. The square root of each construct's average variance extracted should be higher than its correlation with other constructs. As shown in Table 2, the AVE values for each construct are higher than its correlation with other variables, while in Table 3, the values for all constructs also passed the threshold value of HTMT < 0.9, indicating the establishment of discriminant validity.

### Table 1

| Items  | Loadings | CA   | CR    | AVE |
|-------|----------|------|-------|-----|
| Beh1  | 0.756    |      |       |     |
| Beh2  | 0.754    |      |       |     |
| Beh3  | 0.700    |      |       |     |
| Beh4  | 0.651    | 0.868| 0.897 | 0.556|
| Beh5  | 0.811    |      |       |     |
| Beh6  | 0.812    |      |       |     |
| Beh7  | 0.730    |      |       |     |
| IT1   | 0.785    |      |       |     |
| IT2   | 0.921    |      |       |     |
| IT3   | 0.812    | 0.849| 0.898 | 0.690|
| IT4   | 0.796    |      |       |     |
| TS1   | 0.812    |      |       |     |
| TS2   | 0.782    | 0.824| 0.884 | 0.656|
| TS3   | 0.793    |      |       |     |
| TS4   | 0.849    |      |       |     |
| Chan1 | 0.524    |      |       |     |
| Chan2 | 0.898    |      |       |     |
| Chan3 | 0.708    | 0.857| 0.891 | 0.630|
| Chan4 | 0.892    |      |       |     |
| Chan5 | 0.878    |      |       |     |
| Inter1| 0.802    |      |       |     |
| Inter2| 0.868    |      |       |     |
| Inter3| 0.878    | 0.913| 0.932 | 0.696|
| Inter4| 0.816    |      |       |     |
| Inter5| 0.841    |      |       |     |
| Inter6| 0.796    |      |       |     |

Note: CA = Cronbach Alpha, CR = Composite Reliability, AVE = Average Variance Extract.
### Table 2
Discriminant validity.

| Behaviors                  | Media risk communication | Interpersonal trust | Interpersonal risk communication | Trust in scientists |
|----------------------------|--------------------------|--------------------|----------------------------------|---------------------|
| Media risk communication   | 0.746                    |                    |                                  |                     |
| Interpersonal trust        | 0.189                    | 0.793              |                                  |                     |
| Interpersonal risk         | 0.145                    | 0.067              | 0.830                            |                     |
| communication              |                          |                    |                                  |                     |
| Trust in scientists        | 0.110                    | 0.260              | 0.171                            | 0.834               |
|                            |                          | 0.241              |                                  | 0.810               |

### Table 3
Heterotrait-montrait ratio (HTMT).

| Behaviors                  | Media risk communication | Interpersonal trust | Interpersonal risk communication | Trust in scientists |
|----------------------------|--------------------------|--------------------|----------------------------------|---------------------|
| Media risk communication   | 0.186                    |                    |                                  |                     |
| Interpersonal trust        | 0.167                    | 0.095              |                                  |                     |
| Interpersonal risk         | 0.114                    | 0.300              | 0.190                            |                     |
| communication              |                          |                    |                                  |                     |
| Trust in scientists        | 0.254                    | 0.136              | 0.290                            | 0.194               |

### 5.1. Structure equation modeling

The collinearity issue was evaluated before testing the structural model. As a general guideline, a VIF value of 5 and higher indicates the existence of a collinearity problem [72]. In the current study, the VIF values for all variables are less than the threshold value of 5, indicating that the findings of the structural model in this study are not affected by collinearity.

After finding the VIF values, the path coefficient was evaluated with a bootstrap resampling procedure to assess the significance of the hypothesis. The findings showed that individuals used media risk communication (Mean = 2.54) more frequently than interpersonal risk communication (Mean = 2.98) during the COVID-19, leading to rejection H1. Similarly, as shown in Fig. 1, the findings indicate that interpersonal risk communication has no significant relationship with preventive behaviors (β = 0.025, p > 0.05), leading to rejection H2. (See Table 4)

However, media risk communication has a significant association with preventive behaviors (β = 0.156, p < 0.01), leading to accepting H3. Furthermore, interpersonal risk communication is significantly associated with interpersonal trust (β = 0.165, p < 0.01) and trust in scientists (β = 0.150, p < 0.01), leading to support H4 and H6. Though media risk communication has no significant effect on fostering individuals’ interpersonal trust (β = 0.024, p > 0.05), leading to reject H5, it is significantly related to individuals’ trust in scientists (β = 0.081, p < 0.05), supporting H7. Likewise, interpersonal trust (β = 0.089, p < 0.05), and trust in scientists (β = 0.171, p < 0.01) are significantly associated with individuals’ preventive behaviors, leading to confirming H8 and H9. Furthermore, the values of SRMR are 0.067, and NFI is 0.88 which are in the acceptable range for a valid model fit.

![Fig. 1. The structural modeling.](image_url)

### Table 4
Path coefficients, mean, SD, T-Values, P-values.

|          | β      | M     | SD    | T-values | P-values | Results       |
|----------|--------|-------|-------|----------|----------|---------------|
| H2       | IRC->PB| 0.025 | 0.024 | 0.027    | 0.919    | 0.359         | Not supported |
| H3       | MRC->PB| 0.156 | 0.159 | 0.028    | 5.628    | 0.000         | Supported     |
| H4       | IRC->IT| 0.165 | 0.165 | 0.029    | 5.608    | 0.000         | Supported     |
| H5       | MRC->IT| 0.024 | 0.025 | 0.031    | 0.758    | 0.449         | Not supported |
| H6       | IRC->TSC| 0.150 | 0.153 | 0.025    | 6.136    | 0.000         | Supported     |
| H7       | MRC->TSC| 0.081 | 0.081 | 0.025    | 3.251    | 0.001         | Supported     |
| H8       | IT->PB  | 0.089 | 0.092 | 0.025    | 3.553    | 0.000         | Supported     |
| H9       | TSC->PB | 0.171 | 0.171 | 0.031    | 5.435    | 0.000         | supported     |

Note: IRC = Interpersonal risk communication, MRC = Media risk Communication, IT = Interpersonal Trust, TSC = Trust in scientists, PB = Preventive behaviors, M = Mean, SD = Standard deviation, β = Beta.
5.2. Indirect effect

The findings show indirect effects of interpersonal risk communication on preventive behaviors through higher level of interpersonal trust (β = 0.015, t-values = 3.000, p < 0.01) and trust in scientists (β = 0.026, t-values = 3.818, p < 0.01). (See Table 5). These results supported H10 and H12. The indirect effect of media risk communication on preventive behaviors through interpersonal trust is not significant (β = 0.002, t-values = 0.708, p > 0.05), leading to reject H11. However, media risk communication has significant indirect effect on preventive behaviors via trust in scientists (β = 0.014, t-values = 2.857, p < 0.01). The findings supported H13.

6. Discussion

The current research work reveal that interpersonal risk communication is significantly associated with interpersonal trust and trust in scientists but has no significant direct relationship with preventive behaviors. However, media risk communication is significantly associated with preventive behaviors and fosters individuals’ trust in scientists, while it has no significant interaction with interpersonal trust. Both interpersonal trust and trust in scientists significantly influence individuals’ preventive behaviors.

In response to the first hypothesis of the study, the results demonstrated that interpersonal risk communication may not be the substitute source of risk information at the time of crisis. The mean of the constructs indicated that media risk communication was the most useful outlet of information during the COVID-19. The findings are in line with the previous research of Rodriguez [55], that showed that traditional media were the most frequently accessed and the most useful outlets of information. Individuals who engage less in interpersonal risk communication are more likely to use media for risk information than individuals who frequently communicate with others about a risk or crisis [73]. Findings for H2 show that interpersonal risk communication has no direct effect on preventive behaviors. The results contrast with the previous research of Han and Xu, [74]; and Vreese [44], where they found a significant effect of interpersonal communication on individuals’ opinions and behaviors. However, regarding H3, the results show that media risk communication has a significant effect on individuals’ preventive behaviors during the COVID-19. The findings are consistent with the previous research demonstrating that exposure to risk communication and media dependency had a significant positive effect on individuals’ risk perception, vaccination intentions, and preventive behaviors [19,66,75].

Regarding the H4 & H6, the findings determine a positive significant effect of interpersonal risk communication on interpersonal trust and trust in scientists. The results are consistent with the previous research of Bstieier & Hemmert [42], and Lai et al., [17]; where they found that the quality of online or face-to-face interpersonal communication, social exchange, and tie strength foster interpersonal trust between individuals.

In response to H5, the results show the insignificant role of media risk communication in fostering individuals’ interpersonal trust. The results contradict the previous research study by Lee, Cappella, & Southwell, [76]; which demonstrate that listening to political talks on the radio and the usage of electronic news is associated with individuals’ interpersonal trust. On the other hand, some other researchers indicate that effective interpersonal communication may reduce media influence on individuals’ attitudes [28,77]. Interpersonal risk communication influence affective and cognitive dimensions of risk, while media only influences the cognitive dimensions.

As expected in H7, the results indicate that media risk communication is positive and significantly associated with trust in scientists. The results are in line with the previous research of Hmielowski et al. [18], and Anderson [23], describing that news media use predicts individuals’ trust in scientists. However, media risk communication on controversial scientific issues sometimes influence individuals’ perception regarding the political ideology and credibility of scientists [53]. For example, the usage of non-conservative media predicts a higher level of trust in scientists than non-conservative media use.

Concerning H8 & H9, the results demonstrate that both interpersonal trust and trust in scientist is significant and positively associated with preventive behaviors. The findings are in line with the previous research work of Borah & Hwang [33], demonstrating that interpersonal trust has a significant positive impact on individuals’ attitudes and behaviors towards vaccination. A longitudinal study from Korea described that individuals with low interpersonal trust were more likely to report suicidal ideation than those with high interpersonal trust [78]. Similarly, the results extend past research indicating that trust in science has played a crucial role in individuals’ engagement in preventive behaviors during the current epidemic as well as in the past crises [79].

Regarding the indirect effect (H10, H12, and H13), the results demonstrate that interpersonal trust and trust in scientists enhanced the effect of risk communication on individuals’ preventive behaviors. The findings are in line with the previous research of Wei, Xu, and Wu [80], indicating that interpersonal trust mediated the effect of doctor-patient communication on patients’ risk perception. The findings indicate that a high level of interpersonal risk communication with family, friends, colleagues, etc. predicts a high level of in-

|  | β   | M   | SD  | T-values | P-values | Results   |
|---|------|-----|-----|----------|----------|-----------|
| H10 | IRC→ IT→ PB | 0.015 | 0.015 | 0.005 | 3.000 | 0.000 | Supported |
| H11 | MRC→ IT→ PB | 0.002 | 0.002 | 0.003 | 0.708 | 0.479 | Not supported |
| H12 | IRC→ TSC→ PB | 0.026 | 0.026 | 0.007 | 3.818 | 0.000 | Supported |
| H13 | MRC→ TSC→ PB | 0.014 | 0.014 | 0.005 | 2.857 | 0.004 | Supported |

Note: IRC = Interpersonal risk communication, MRC = Media risk Communication, IT = Interpersonal Trust, TSC = Trust in scientists, PB = Preventive behaviors, M = Mean, SD = Standard deviation, β = Beta.
terpersonal trust, and individuals with a high level of interpersonal trust engage in more preventive behaviors. When individuals believe that their family, friends, co-workers, colleagues, relatives, etc., are competent, have good intentions, and provide accurate information, they are more likely to show compliance with preventive measures. In addition, Plohl & Musil [65], showed that political conservatism, religious orthodoxy, conspiracy ideation, and intellectual curiosity predict individuals' compliance with preventive behaviors through the mediating role of trust in science. Furthermore, trust in scientists mediated the association between media use and perception of global warming [18]. However, in response to H11, the results indicated that media risk communication has no indirect effect on preventive behaviors through interpersonal trust. One possible reason for this insignificant relationship may be the extensive media coverage of pandemic that influence individuals' attitudes and behaviors in the real world. Similarly, media communication cultivates the perceived social reality, particularly their perception of a pandemic in their neighbors which ultimately may have a negative impact on interpersonal trust. Another, the media system of the country, cultural factors, political ideology, and religious beliefs may also influence individuals' interpersonal trust and preventive behaviors. In addition, individuals are more likely to acquire information from those who are more reliable and trustworthy, and interpersonal trust develops when individuals can interact frequently with each other [81].

6.1. Theoretical implications

Theoretically, by examining the relationship between interpersonal risk communication and media risk communication with individuals' trust, the study extends previous literature on the critical role of risk communication. In interpersonal risk communication, previous research studies have examined the effect of doctor-patient's communication or inter-organizational communication on individuals' trust development. Similarly, prior studies have explored the role of mass media (television and newspaper) in building individuals' trust in science or scientists. However, the current study offers theoretical insights into how individuals' interpersonal trust and trust in scientists are built through risk communication with families, colleagues, neighbors, and others. Further, the study examines the impact of newspapers and magazines, television, radio, News client (such as the People's Daily client, today's headline news client, etc.), and internet search engine (such as Baidu, etc.) on individuals' trust in media risk communication. The study's findings show that interpersonal risk communication has a greater impact on trust than media risk communication. It could be due to individuals' observation of their family members, neighbors, friends, colleagues, etc. activities and behaviors [41]. Individuals are therefore more likely to seek advice and put their trust in individuals with whom they have a sense of similarity or with whom they have a close relationship [51]. However, the study found no link between media risk communication and interpersonal trust.

More interestingly, this is the first study that examined the mediating role of trust in the relationship between risk communication and individuals' preventive behaviors. The research also adds to the literature by revealing that interpersonal trust and trust in scientists are associated with individuals' compliance with preventive behaviors during the COVID-19. The findings show that, as compared to interpersonal trust, trust in scientists has a higher association with preventive behaviors. Individuals have confidence in experts for whom they are trained in human nature. As a result, scientists have been designated as world experts, and they can develop models to determine which members of a population are most vulnerable and require protection, particularly in a crisis.

6.2. Practical implications

The study also presents some practical implications. The study shows that interpersonal risk communication is more effective in building individual trust than media risk communication. To improve the effectiveness of risk communication, media professionals, scientists, and public institutions must collaborate to provide transparent, reliable, and accurate risk information and to engage the public in decision-making. Where the government administration or media reach is limited to specific areas of a country, authorities must develop local networks and interact with political and religious leaders, celebrities, or other trusted opinion leaders to build trust and communicate risky information to the public. There should also be a two-way communication channel that promotes mutual learning and knowledge, as well as collaborative problem-solving [82]. Thus, it is critical to have open and public discussions about uncertainty, difficult decisions, trade-offs, and responsibilities, which are frequently overlooked as part of risk communication. According to the study, trust in the source of information is critical for effective risk communication. As a result, the designers of the risk information must determine the channels through which warning messages will be delivered to various target groups, taking into account the necessary technology and intermediary sources. Understanding people's demographics, values, and beliefs, as well as their media consumption patterns and who they trust, is critical for effective risk communication. To strengthen the impact of media communication on individuals' trust, media practitioners must improve the quality of media content as well as the audience's media literacy. Furthermore, during a crisis, the media should portray scientists as trustworthy and credible sources of knowledge. Past research indicates that political ideology can affect individuals' trust in scientists [18,53]. Therefore, scientists must maintain their credibility and objectivity, react quickly to real-world problems, regularly engage and connect with the public, and provide them with understandable research and knowledge about the causes, risks, and possible solutions to a crisis. Moreover, both the media and scientists must consider the importance of value similarity and culture when disseminating scientific information.

6.3. Limitations

Like all research, this study has some limitations. First, the study used cross-sectional survey data that showed that there were limited causal relations between the variables. As the epidemic continues, the interaction between risk communication, individuals' trust, and preventive behaviors must be addressed through longitudinal or experimental research. Second, data were collected only from China, which can't be generalized to other countries. Individual attitudes and behaviors may be influenced by a variety of cultural factors, political and ideological values, and religious beliefs. Future research should take these factors into account to produce more interesting results. Third, to examine the impact of media risk communication on individuals' trust and behaviors, a compara-
tive study is required to decompose media risk communication such as mass media, social media, and exposure to scientific information sites. Similarly, interpersonal risk communication can be divided into three categories: communication with laypeople, communication with health professionals or workers, and communication with scientists. Last, this study investigates the effect of interpersonal trust and trust in scientists on individuals’ preventive behaviors. Other types of trust, such as trust in local or central government, social trust, and trust in the media, must be taken into account in future research.

7. Conclusion

Our study emphasizes how critical risk communication is to building trust among people and influencing preventive behavior during the COVID-19 epidemic. Accordingly, interpersonal risk communication plays a greater role in developing people’s interpersonal trust and trust in scientists than does media risk communication. Communication with family members, friends, coworkers, neighbors, etc., can be essential to improving risk awareness and adherence to preventive measures. Furthermore, media risk communication should be intended in order to reduce pandemic spread by raising awareness levels about the pandemic. Similarly, when people lack interpersonal trust and trust in scientists, an effective pandemic response may be more difficult and may result in high casualties. To build trust and reduce the impact of a pandemic, it is critical to communicate early risk information at the right time and to lay the foundation for the public to engage and follow the suggested measures.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

Acknowledgement

This work was supported by a major project of the National Social Science Fund of China “A study on Media System and Social Trust” (19ZDA325), and by the Fundamental Research Funds for the Central Universities in China.

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