

Public Risk Perception Attribution Model and Governance Path in COVID-19: A Perspective Based on Risk Information

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Background: Risk perception is a key factor influencing the public's behavioral response to major public health events. The research on public risk perception promotes the emergency management system to adapt to the needs of modern development. This article is based on a risk information perspective, using the COVID-19 event as an example. From the micro and macro perspectives, the influencing factors of public risk perception in major public health events in China are extracted, and the attribution model and index system of public risk perception are established.

Methods: In this paper, the five-level Likert scale is used to collect and measure the risk perception variable questionnaire through the combination of online and offline methods (a total of 550 questionnaires, the overall Alpha coefficient of the questionnaire is 0.955, and the KMO test coefficient $t=0.941$), and through independent samples *t*-test, correlation analysis, multiple regression analysis and other methods to draw relevant conclusions.

Results: The results showed that gender and age were significantly associated with risk perception ($p<0.005$), and education level was significantly negatively associated with risk perception ($p<0.005$). Risk information attention and risk perception were significantly positively correlated ($p<0.005$), media credibility was significantly positively correlated with risk perception ($p<0.005$), while risk information identification and media exposure had no significant interaction with risk perception ($p=0.125$, $p=0.352$).

Conclusion: Factors such as gender, age, education level, place of residence, media exposure, media credibility, risk information attention, and recognition lead to different levels of risk perception. This conclusion helps to provide a basis for relevant departments to conduct public risk management of major public health events based on differences in risk perceptions.

Keywords: public health events, risk perception, influencing factors, COVID-19, risk information

Introduction

Based on the national perspective, improving the level of risk perception and risk prevention capabilities, and strengthening the ability to deal with major public health incidents have become the top priority of the current response to major public health incidents. As the public is an integral part of the risk communication of major public health events, facing the complexity and uncertainty of crises, they often have certain subjective judgments about objective risks. Subjectively existing personal characteristics, knowledge and experience, the way of cognition of accurate things, the nature and severity of objectively existing risk information, the degree of control, etc., will cause differences in public perceptions of risk. And then in turn the public perceptions of risk will have an impact on decision-making. These major public health incidents have warned the country and the public. Risk perception, risk prevention, and risk response are indispensable and vital. Risk perception is a crucial factor that affects the public's behavioral response in emergencies. Therefore, it will be a new research perspective to think about the management and decision-making of major public health events from the perspective of the differences in public perception of risks. At the same time, from the stand point of communication, the Internet and the media as "super communicators" will also have a particular impact on the public's risk perception in the construction of risks and the spread of content, which provides a new perspective for the operation

of the risk society. We can analyze the risk information sharing and communication mechanism, based on its role and operating mechanism in the risk society, to study the extent to which the public's risk perception level is affected by various factors. Therefore, based on the public perspective, this article analyzes the impact of public change on public risk perception during the epidemic, to provide public views and the government with certain opinions and suggestions.

Literature Review

Risk perception is people's psychological feeling, understanding, and construction of unexpected events. Existing research believes that the public's risk perception manifests a psychological state of individual subjective evaluation of target risk.¹⁻³ The public is aware of the emergence of risks, which stimulates the psychological state of responding to risks. Further, it generates demand for risk-related information and emergency behavior based on subjective judgment.⁴ The public's risk perception belongs to the process of responding to risk information.⁵

The difference in public perception of risk is due to the mechanism of action of different influencing factors. Existing research shows that the influencing factors of risk perception are diversified. Scholars have studied the influencing factors of risk perception from different perspectives. From a micro level, the differences in individual attributes of the public will lead to different levels of risk perception among individuals.⁶ The most typical one is that gender has different effects on risk perception. Gender plays a vital role in forming risk perceptions and coping strategies.⁷

There is a correlation between an individual's age, education, and risk perception. Research has found that when individuals' age, education level, and occupation are different, the impact on risk perception is significantly different.^{8,9} The related disaster experience will also increase the public's risk perception level. Different familiarity will have a significant impact on different aspects of risk perception. Residents' experience is directly related to the public's risk perception level under emergencies.¹⁰⁻¹² In terms of external influencing factors, existing studies mostly explore the impact on risk perception from the perspectives of risk information, government trust, social media public opinion, and community environment. Selective reporting of risk information will increase the public's risk perception, and information and related risk consultation activities will affect people's risk perception level.^{13,14}

In terms of social information, online public opinion essentially constructs the public's risk perception and becomes an essential reference for taking response actions. Research has found that social media exposure is positively related to the formation of risk perception. Social media provides experts with a platform to quickly convey accurate information about dangers, but it also provides a way for others to spread rumors.¹⁵ In addition, some scholars have compared the risk perception levels of different countries. The results show that spatial distribution will lead to different distributions of risk perception. Level of trust in information and social vulnerability will have a significant impact on different aspects of risk perception.^{16,17} By enhancing community participation and information participation, the risk perception level can be effectively reduced.¹⁸ Risk communication has a direct two-way positive effect on risk protection behavior, and risk perception plays an intermediary role between risk communication and risk protection behavior.^{14,19}

Studies have shown that the level of individual risk perception will be affected by many factors such as psychology, society, culture, system, and individual attributes. The influencing factors of risk perception are diverse.^{20,21} However, most of the existing research starts from the micro-level or the macro-level, and more is based on the individual factor level or the external influence factor level. But it's lack of a comprehensive consideration of the micro and macro-level factors to explore the impact of risk perception. This article takes the COVID-19 as an example, comprehensively considers the micro and macro-levels to construct a public risk perception attribution model, explores the governance path of public risk perception in emergencies from the perspective of risk information, and discusses the public under major public health incidents. The influencing factors of risk perception broaden the scope of research in public health safety, which is conducive to providing a basis for risk perception governance.

Research Design

Model Construction and Research Assumptions

From a realistic perspective, the risk exists objectively, but it is also a product of a psychological process. Therefore, research on risk perception should not ignore political, cultural, and institutional factors to analyze individual subjective

judgments in isolation, but should focus on specific issues. Interpretation is made under the social background. Among them, the influencing factors can be mainly divided into individual characteristics, one internal cause, and social media communication, and risk information, two external causes.

Based on collating relevant theoretical knowledge and combining it with the current public risk perception status, this paper selects three variables of individual demographic characteristics, media and risk information to study the unknown and severity perception of risk, which is shown in Figure 1. The detailed explanation of each indicator can be found in Table 1.

According to the model of influencing factors, it was found that factors such as gender, age, education level, place of residence, media exposure, media credibility and other factors have a particular impact on the public's risk perception.

As far as individual characteristics are concerned, existing studies have found that the public's gender, age and personal risk knowledge level will significantly affect the public's risk perception. Studies have shown that there are differences in individual characteristics of risks in different situations, for example, men and women have different risk perceptions of natural risks.²² In terms of chemical risk perception, the study found that the risk perception level of men is higher than that of women.²³ Risk perception is positively correlated with active coping in COVID-19, and men are more likely to take active coping methods than women.²⁴ Perceptions of cannabis-related risk become more lax with age, especially among adults, emerging adults, and middle-aged adults.²⁵ The level of risk perception for glaucoma is influenced by urban residence.²⁶ In Australia, Aboriginal people have significantly higher levels of anxiety: they are more often afraid, feel that they are likely to catch the virus, and if they do, they think it is very harmful. Living with children under the age of 18 and in small rural towns are key factors associated with fear of COVID-19 and First Nations identity.²⁷

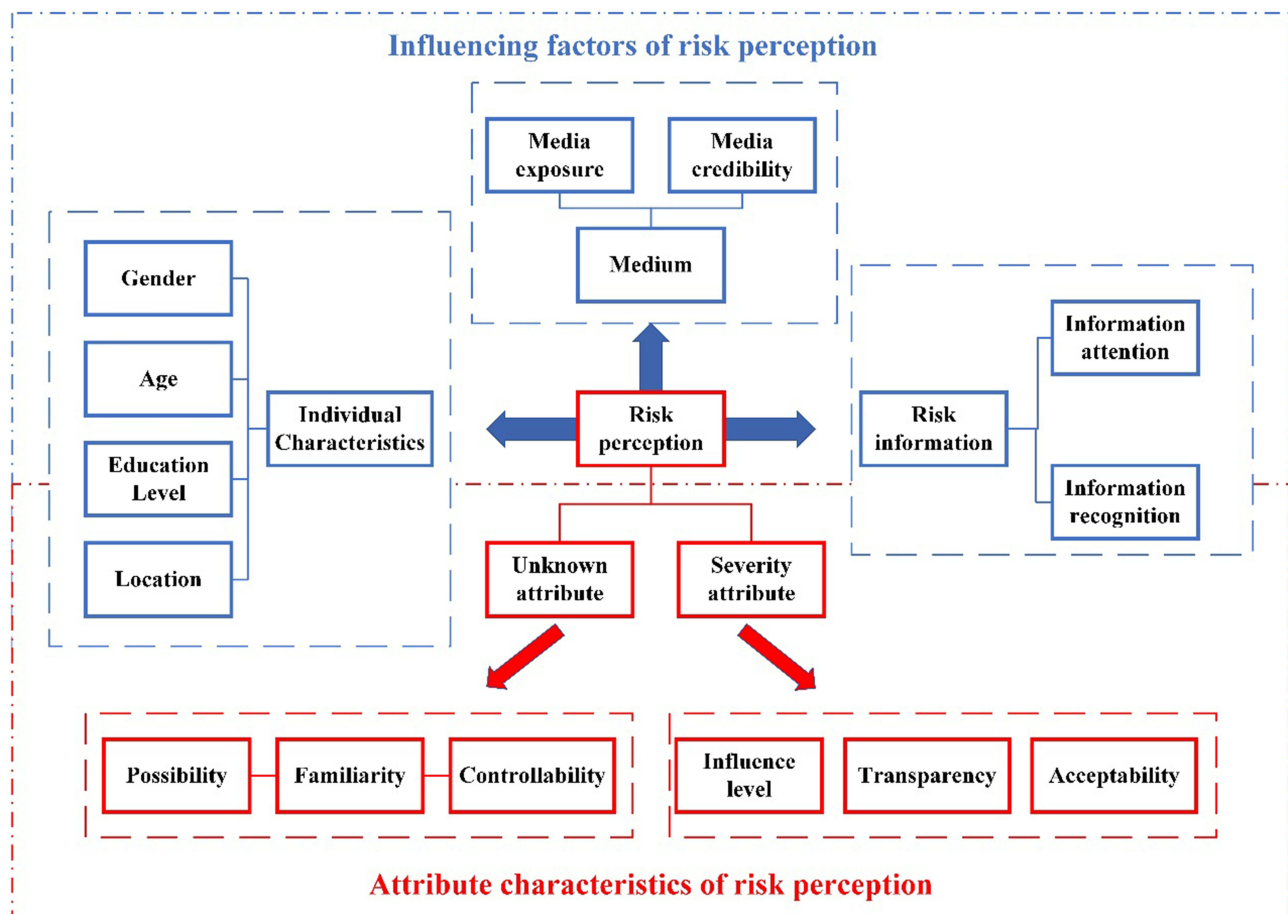


Figure 1 The model of risk perception influencing factors.

Table 1 Definition of Model Construction

Category	Variable	Interpretative Statement
Individual characteristics	Gender	Divided into male and female by sex
	Age	Classified by age group, it can be divided into “under 18 years old”, “18–28 years old”, “29–40 years old”, “41–60 years old” and “over 60 years old”
	Education level	According to education level, it can be divided into “junior high school and below”, “senior high school or technical secondary school”, “junior college”, “undergraduate”, “master’s degree and above”
	Location	It is divided into “rural” and “urban” according to residence
Risk information	Information attention	Attention to risk information such as novel coronavirus, number of confirmed cases and medical level,
	Information recognition	Trust and recognition of risk information such as novel coronavirus, number of confirmed cases and medical level
Medium	Media exposure	The media exposure is detailed as the change of daily reading newspaper, listening to radio, watching TV news, daily viewing news APP (Tencent News, Today’s Headlines, etc.) and daily use of social media (microblog, WeChat, QQ) after the outbreak of the epidemic
	Media credibility	The degree of trust in mainstream media (such as People’s Daily, Xinhua News Agency, etc.), local government official websites, and professional media (such as Doctor Lilac, etc.) that release information

Based on this, combined with the existing research results on individual characteristics and risk perception, in order to further study the impact of individual characteristics on risk perception in COVID-19, we make the following assumptions:

Hypothesis 1: Different genders lead to differences risk perception, and the level of men is generally higher than that of women.

Hypothesis 2: Citizens of different ages have significant differences in risk perception.

Hypothesis 3: The difference in education level affects risk perception, and the two are inversely proportional.

Hypothesis 4: Differences in residence affect the level of risk perception, and citizens living in rural areas have a higher level.

At the same time, existing studies have shown that media exposure has a role in influencing personal anxiety levels during the COVID-19 pandemic.²⁸ Information exposure and consumption during outbreaks may alter people’s risk perceptions and trigger behavioral changes that ultimately affect the development of the disease.²⁹ When individuals consider travel, credible media, information, and information sources can reduce risk perceptions of COVID-19.³⁰ There is a positive correlation between selective media exposure (SMEX) and PRP, media source credibility (MSC) There is no obvious correlation with PRP.³¹ Based on this, combined with existing research on media factors and risk perception, in order to further study the impact of media on risk perception in COVID-19, we make the following assumptions:

Hypothesis 5: Media exposure affects the level of risk perception, and the two are directly proportional.

Hypothesis 6: Media credibility affects the level of risk perception, and the two are directly proportional.

In terms of the relationship between media and information, the study found that fear and protection were positively associated with media attention and risk perception, while anger and negative thinking weakened attention and perception. Furthermore, all responses depended on media trust, which mediated the influence of media attention.³² The public’s risk perception of genetically modified foods can be affected by the acceptance of risk information.³³ Based on this,

combined with existing research on risk information and risk perception, in order to further study the impact of risk information on risk perception in COVID-19, we make the following assumptions:

Hypothesis 7: The degree of risk information attention affects the level of risk perception, and the two are directly proportional.

Hypothesis 8: The degree of risk information acceptance affect risk perception, and the two are directly proportional.

Investigation Method

In this paper, the questionnaire is selected for data collection. In this questionnaire, the measurement of risk perception variables is in Likert five-level scale, and the two are in direct proportion. The questionnaire is divided into four parts: basic personal information(BPI), risk information attention(RIA), media communication channels(MCC), and risk perception measurement(RPM). The questions in the questionnaire are all single-choice questions, in which risk information attention, media communication channels, and risk perception measurements are all tested using the Likert five-level scale. The question design and coding of the questionnaire are shown in Tables 2 and 3.

Table 2 Questionnaire Design and Coding Situation of BPI and RIA

Variable	Index	Measurement Question Type	Coding
Basic personal information	Gender	Your gender	Male=1, female=2
	Age	Your age	Under 18 years old=1, 18–28 years old=2, 29–40 years old=3, 41–60 years old=4, and over 60 years old=5
	Education level	Your education	Junior high school and below=1, high school or technical secondary school=2, College=3, undergraduate=4, master and above=5
	Place of residence	Your current residence	City=1, Rural=2
Risk information attention	Information attention	Symptoms and characteristics of new coronavirus infection	Strongly disagree=1, relatively disagree=2, generally agree=3, relatively agree=4, strongly agree=5
		The transmission route and prevention method of the new coronavirus	
		The impact of the new coronavirus on life (going out, food, supplies, etc.)	
		The number of confirmed cases and deaths per day	
		Epidemic research and judgment by professionals	
		Help information for hospitals and patients	
		How to treat the new coronavirus infection	
		Conditions and precautions for self-isolation	
		Stories of typical characters in the fight against the epidemic	
		Message to cheer for the affected areas and front-line personnel	
		Talk about the boring life at home	

(Continued)

Table 2 (Continued).

Variable	Index	Measurement Question Type	Coding
	Information recognition	I am very concerned about the development of the new crown pneumonia epidemic	
		I think the possibility of a cure for the new coronary pneumonia infection is extremely high	
		I think vaccination can effectively prevent new coronary pneumonia	
		I think the current social epidemic prevention work is in place	
		I think the current epidemic information is open and transparent	
		I think the future work/study progress will not be affected	

Table 3 Questionnaire Design and Coding Situation of MCC and RPM

Variable	Index	Measurement Question Type	Coding
Media communication channel	Medium contact measurement	After the outbreak, your daily time of reading newspapers, listening to the radio, and watching TV news changes	Significant decrease=1, slight decrease=2, basically unchanged=3, slight increase=4, large increase=5
		After the outbreak, the change in the length of time you browse news apps (Tencent News, Today's Headlines, etc.) every day	
		After the outbreak, how long you use social media (Weibo, WeChat, QQ) every day	
	Media credibility measurement	Mainstream media (such as People's Daily, Xinhua News Agency, etc.)	Very distrust=1, relatively distrust=2, general trust=3, relatively trust=4, very trust=5
		Local government official website	
		Professional media (such as Doctor Lilac, etc.)	
		Weibo celebrities or well-known public accounts	
		WeChat group, circle of friends and other news	
		Allows me to be informed of the current development of the epidemic in time	Strongly disagree=1, relatively disagree=2, generally agree=3, relatively agree=4, strongly agree=5
		Can alleviate my panic about the epidemic	
		Public opinion supervision can be carried out in the fight against the epidemic	
		You can popularize science and warn people around	

(Continued)

Table 3 (Continued).

Variable	Index	Measurement Question Type	Coding
Risk perception measurement	Unknown measurement	The possibility of the occurrence and spread of the COVID-19 is very high	Strongly disagree=1, relatively disagree=2, generally agree=3, relatively agree=4, strongly agree=5
		People have weak control over the COVID-19	
		The risk of the COVID-19 is potential	
	Hazard measurement	COVID-19 has had a huge impact on the economy	
		COVID-19 has a great impact on current life	
		The COVID-19 has great long-term harm to society	

To ensure that the options of the questionnaire are straightforward and easy to understand, the layout is reasonable, and the reliability and validity are correct, a 5-day questionnaire test was carried out before the questionnaire was issued. A total of 46 tests were invited, and their responses to the questionnaire, options, logic, layout, and other opinions and suggestions were collected, so as to adjust and modify the questionnaire, and distribute the questionnaire through the questionnaire star. A total of 550 people participated in the questionnaire filling. After deleting the questionnaires that were too short of filling in and the options were repeated, a total of 534 questionnaires were obtained.

Empirical Results and Analysis

Reliability and Validity Test

This article uses Cronbach's Alpha coefficient to analyze the data and options and obtain a reliability analysis table. The reliability coefficient will fluctuate between 0–1 according to different variables, and the closer the value is to 1, the more reliable it is. When the coefficient exceeds 0.7, the reliability is high. In [Table 4](#), it shows the Cronbach's Alpha coefficient of all variables is greater than 0.8, and the overall questionnaire reliability can reach 0.955. So the information reliability in the table is consistent with the overall reliability, and the reliability level is high.

The coefficients of the KMO test will fluctuate between 0–1 according to different variables, and the closer the value is to 1, the better the validity of the questionnaire. In [Table 5](#), the KMO test coefficient is 0.941, and according to the importance, of the spherical test, the significance of this test is infinitely close to 0, which meets the requirements of factor analysis.

Table 4 Reliability Test

Variable	Number of Items	Cronbach's Alpha Coefficient
Risk information attention	11	0.925
Risk information recognition	6	0.896
Media exposure	3	0.908
Media credibility	9	0.899
Risk perception unknown	3	0.811
Risk perception hazard	3	0.847
Overall reliability	35	0.955

Table 5 Validity Test

KMO sampling appropriateness number		0.941
Bartlett's Test of Sphericity	Approximate chi-square	14,242.351
	Degree of freedom	595
	Significance	0.000

Statistical Description of the Sample

The frequency analysis of demographic variables is shown in Table 6. According to the analysis results, the numerical characteristics of demographic variables cover the overall distribution of the survey subjects. The mean value represents the central tendency, and the standard deviation represents the fluctuation. The final analysis is carried out according to the frequency of the variable, and the result distribution meets the requirements of the sampling survey.

Analysis of the Difference in the Influencing Factors of Public Risk Perception

To study the differences in different dimensions of risk perception influencing factors, this section analyzes the differences in public risk perception in demographic variables such as gender, age, education level, and residence.

The results are shown in Table 7 and Figure 2. According to the value of independent-sample t, the significance test of the difference in risk perception on gender is 0.018, which is significantly less than 0.05, indicating a gender difference. It

Table 6 Frequency Analysis of Demographic Variables

Variable	Options	Frequency	Percentage	Average Value	Standard Deviation
Gender	Male	206	39%	1.61	0.49
	Female	328	61%		
Age	Under 18	6	1%	3.11	0.88
	18–28 years old	148	28%		
	29–40 years old	175	33%		
	41–60 years old	191	36%		
	Over 60 years old	14	3%		
Education level	Junior high school and below	9	2%	3.55	0.85
	High school or technical secondary school	61	11%		
	Junior college	132	25%		
	Undergraduate	293	55%		
	Master degree and above	39	7%		
Place of residence	City	497	93%	1.07	0.25
	Rural area	37	7%		

Table 7 Analysis of Differences in Gender

Variable	Gender	Number of Cases	Average Value	Standard Deviation	t	Sig. (Double Tail)
Risk perception	Male	206	12.21	2.06	2.371	0.018
	Female	328	11.76	2.13		

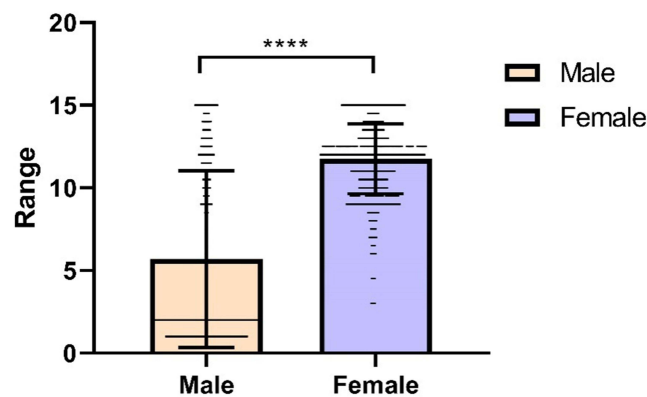


Figure 2 Column chart of gender difference analysis.

Notes: P is the significant differences between groups. ****Means $P \leq 0.0001$.

will affect the level of risk perception. At the same time, the average risk perception of men is 12.21, and the average of women's risk perception is 11.76. So men's risk perception is higher than women's.

Analysis results of the difference in risk perception on age are shown in Table 8 and Figure 3. According to the one-way analysis of variance in the table, the significance test value is 0.00012, which is lower than 0.05, indicating that age has a significant impact on risk perception. This result shows that people of different ages have different levels of risk perception when facing major public health emergencies, and age can be used as an influencing factor in risk perception. According to the results of multiple comparisons, the risk perception level of people aged under 18 is lower than that of people in other age groups. People aged 18–28 have a lower level of risk perception than those aged 29–40.

Analysis results of the difference in risk perception in cultural level are shown in Table 9 and Figure 4. According to the results of the analysis of single-factor variance in the table, the significance test value is 0.035, which is less than 0.05. Therefore, the risk perception is different in cultural levels. According to the results of multiple comparisons, there is a significant difference between the first factor and the fourth factor, and the fifth factor. There is also a substantial difference between the second factor and the fifth factor. The risk perception level of people with junior high school education level and below is higher than that of people with a bachelor's degree or above, and the risk perception level of people with a high school or technical secondary school education is higher than that of people with a master's degree and above. Based on this result, citizens with a lower education level are more sensitive to external risks and have a higher level of risk perception. In contrast, citizens with a higher education level have stronger cognition and judgment capabilities, and relatively low level of risk perception.

Analysis of the difference in risk perception in education level is shown in Table 10 and Figure 5. From the *t*-test results of independent samples of residential and public risk perception. The average value of urban citizens is 11.93. The

Table 8 Analysis of Differences in Age

Variable	Age	Number of Cases	Average Value	Standard Deviation	F	Sig. (Double Tail)	Multiple Comparisons
Risk perception	Under 18	6	7.8333	1.16905	10.12	0.00012	1<2, 1<3, 1<4, 1<5, 2<3
	18–28 years old	148	11.5608	2.15070			
	29–40 years old	175	12.4714	2.00625			
	41–60 years old	191	12.0733	2.11072			
	Over 60 years old	14	11.6429	1.85461			

Notes: 1 represents under 18 years old, 2 represents between 18–28 years old, 3 represents between 29–40 years old, 4 represents between 41–60 years old, and 5 represents over 60 years old.

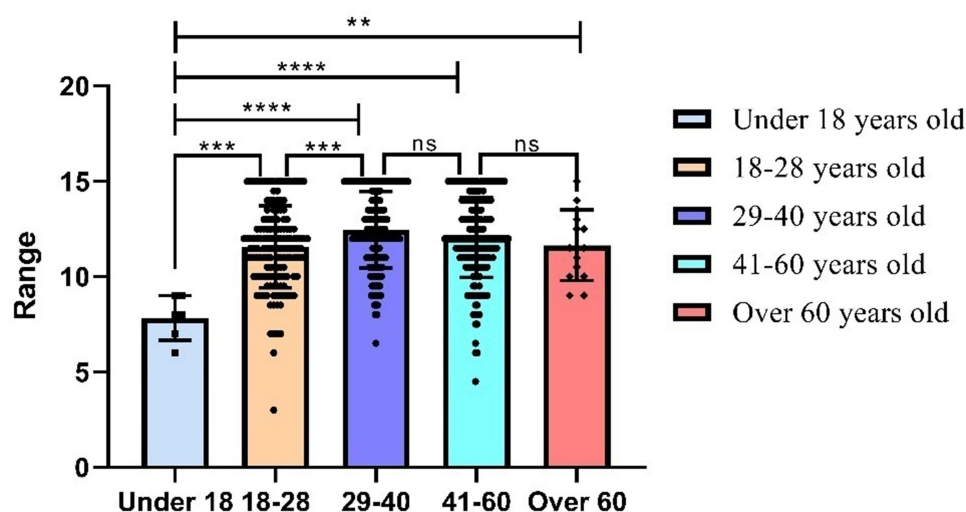


Figure 3 Column chart of age difference analysis.

Notes: P is the significant differences between groups. **Means $P \leq 0.01$, ***Means $P \leq 0.001$, ****Means $P \leq 0.0001$, ns means $P > 0.05$.

average value of rural citizens is 11.95 which is greater than the urban average. But the difference between the two is not apparent. The results show the significance test of the difference in risk perception in residential areas is 0.971, which is greater than 0.05. Therefore, there is little difference in risk perception among people in different places of residence.

Correlation Analysis of Factors Affecting Public Risk Perception

Risk information attention, risk information recognition, media exposure, and media credibility are all significantly positively correlated with the unknown of risk perception and the risk of risk perception. The variables that are particularly related to risk perception in the correlation analysis in the above table are used as independent variables. The public risk perception unknown and risk are combined into the overall level of risk perception. The overall level is used as the dependent variable, combined with the formula to carry out multiple regression analysis. The results are shown in Table 11 and Figure 6.

Further, multiple regression analysis was performed on each variable in Table 12. The result shows: the constant p-value of the multiple regression model composed of the respective variables and the dependent variable risk perception is 0.000, which is less than 0.05, ensuring the usability of the model. In terms of the multiple regression analysis, the significance test value of gender is 0.005, which is less than 0.05. The regression coefficient reaches the significance

Table 9 Analysis of Differences in Education Level

Variable	Education Level	Number of Cases	Average Value	Standard Deviation	F	Sig. (Double Tail)	Multiple Comparisons
Risk perception	Junior high school and below	9	13.33	2.24	2.602	0.035	1>5, 1>4, 2>5
	High school or technical secondary school	61	12.34	2.25			
	Junior college	132	12.10	2.16			
	Undergraduate	293	11.80	2.02			
	Master degree and above	39	11.45	2.23			

Notes: 1 stands for junior high school and below, 2 stands for high school or technical secondary school, 3 stands for junior college, 4 stands for undergraduate, 5 stands for master's degree and above.

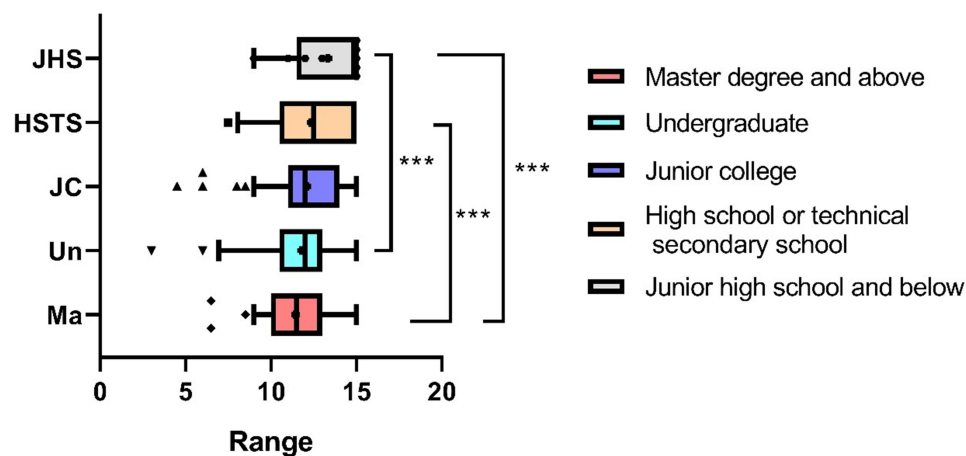


Figure 4 Box diagram of analysis of differences in cultural level.

Notes: P is the significant differences between groups. ***Means $P \leq 0.001$.

level, and the standardization coefficient is -0.106 . Therefore, the gender factor has a relatively apparent negative correlation with the level of risk perception. The significance value of the risk information attention degree is 0.000 , which is less than 0.05 . The regression coefficient has reached the significance level, and the standardized coefficient is 0.251 , indicating that the attention degree of risk information and the risk perception level are significantly positively correlated. The significance value of the media credibility is less than 0.05 . The regression coefficient has reached the significant level, and the standardized coefficient is 0.354 , indicating that the media credibility and risk perception level are significantly positively correlated.

It is worth noting that the significance test of education level is close to 0.05 . The significance tests of risk information recognition and media exposure are 0.125 and 0.352 respectively. The regression coefficient does not reach the significance level, has no relationship with the risk perception level. However, in the previous single-factor analysis of variance and correlation analysis, it was found that there are significant differences in risk perception in the degree of education, risk information recognition and media exposure. It indicated that these three variables have “false associations” in the single-factor analysis. The important results presented in the correlation analysis are due to the uncontrolled influence of other variables. In the regression analysis of education level and risk perception, the two have a certain degree of relevance. These two variables can play a role in explaining each other in the analysis. When using the one-way analysis of variance method to analyze the relationship between education level and risk perception, it is found that there is a significant difference between them. Still in the regression analysis method, the significance value is close to 0.05 , which is likely to be affected by the age variable. Through the above data analysis, the results of the hypothesis test are summarized in Table 13.

Discussion

The results of this paper show that, in terms of individual characteristics, gender has a significant impact on the public's risk perception level, and men have higher risk perception than women, which is consistent with some research results. For example, studies have shown that in real situations, there are gender differences in risk perception and risk behavior, all risk components are gender biased, and men's risk perception level is more likely to increase and respond with risk behavior.³⁴ There are also studies showing that women have greater fears and negative expectations about the health-related consequences of COVID-19 than men. The differences in the research results are mainly due to the different

Table 10 Analysis of Differences in Residence

Variable	Place of Residence	Number of Cases	Average Value	Standard Deviation	t	Sig. (Double Tail)
Risk perception	City	497	11.93	2.11	-0.37	0.971
	Rural area	37	11.95	2.23		

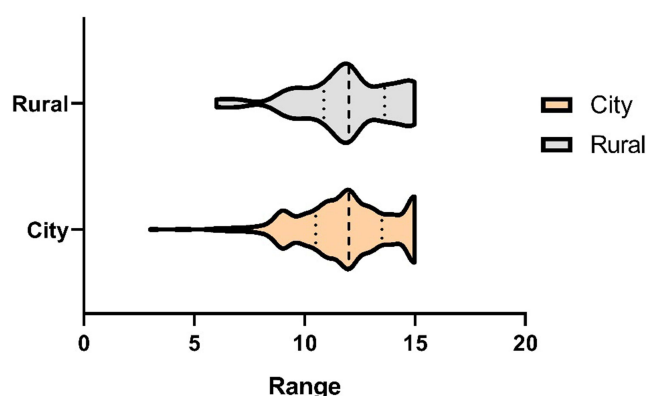


Figure 5 Violin chart of difference analysis of residence.

research dimensions of risk perception. This paper mainly studies the influence of gender on risk cognition and coping behavior. From a psychological perspective, women are more likely than men to develop risk fear.²⁴ The relationship between risk coping behavior, risk perception and fear will be the focus of next research.

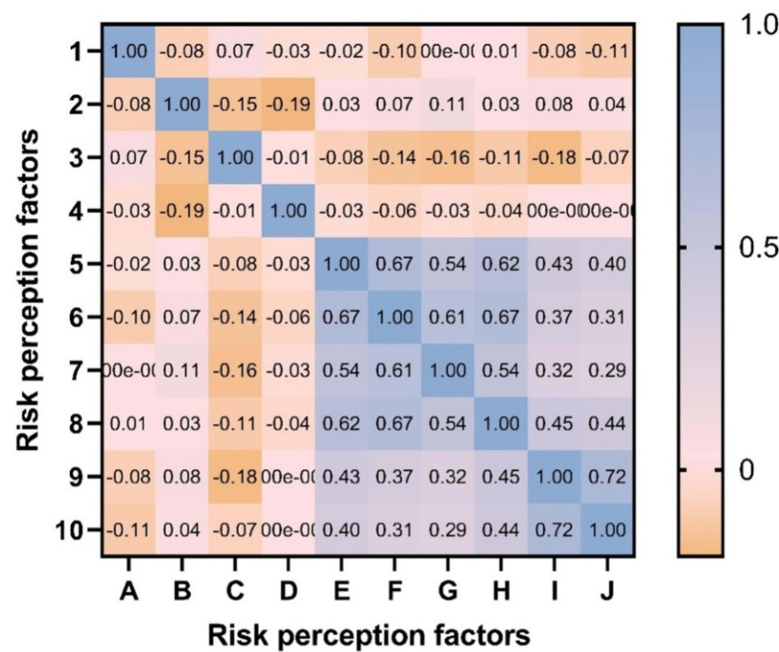
In addition, this study found that age and education level have a significant impact on the public's risk perception level. In the first year of the new crown pneumonia pandemic, educational differences in preventive behavior and risk perception persisted, and perceived effectiveness and trust generally declined.³⁵ At the same time, a study of seven African countries showed that the risk perception level of adolescents was significantly lower than that of other age groups.³⁶

However, the hypothesis that the risk perception of rural residents is higher than that of urban residents is not supported. Existing studies have pointed out that urban residents are also significantly more concerned about the crisis of the living environment than rural residents.³⁷ The difference between the experimental results and the original hypothesis is mainly due to the fact that the reference literature is mainly aboriginal people with high risk perception, and there is a certain difference between aboriginal people and rural residents, resulting in different experimental results due to different sample sizes. Based on this, further refinement of the public characteristics of the residence and then exploring the relationship with risk perception is another focus of the next stage of research.

Table 11 Correlation Analysis of Factors Affecting Public Risk Perception

	Gender	Age	Education Level	Place of Residence	Risk Information Attention	Risk Information Recognition	Media Exposure	Media Credibility	Unknown of Risk Perception	Danger of Risk Perception
Gender	I									
Age	-0.084	I								
Education level	0.066	-0.148**	I							
Place of residence	-0.026	-0.194**	-0.011	I						
Risk information attention	-0.018	0.031	-0.08	-0.026	I					
Risk information recognition	-0.098*	0.071	-0.143**	-0.055	0.673**	I				
Media exposure	0.001	0.105*	-0.159**	-0.028	0.542**	0.612**	I			
Media credibility	0.012	0.026	-0.108*	-0.043	0.621**	0.669**	0.542**	I		
Unknown of risk perception	-0.083	0.075	-0.177**	0.001	0.425**	0.367**	0.317**	0.454**	I	
Danger of risk perception	-0.107*	0.039	-0.07	0.002	0.395**	0.308**	0.294**	0.437**	0.718**	I

Notes: *At the 0.05 level (two-tailed), the correlation is significant. **At the 0.01 level (two-tailed), the correlation is significant.



***Note:**

1-A:Gender 2-B:Age 3-C:Education level 4-D:Place of residence
 5-E:Information attention 6-F:Information recognition 7-G:Media exposure
 8-H:Media credibility 9-I:Unknown 10-J:Danger

Figure 6 Heat map of risk perception and correlation analysis of various factors.

This paper assumes that media exposure has a positive impact on the public's risk perception is not supported. According to existing research, exposure to electronic media and media exposure are independent factors related to accurate perception of the risk of new coronary pneumonia transmission.³⁸ In the post-pandemic context, media credibility has a negative impact on risk perception of COVID-19. This suggests that credible media, information, and sources of information can reduce risk perceptions of COVID-19 when individuals consider travel.³⁹ Therefore, the influence of the available media exposure on the public's risk perception mainly depends on the correctness of the information. When the media exposure of correct information increases, the public's risk perception level will decrease, while the public's risk perception level is under the wrong public opinion. Instead, it will increase.

Table 12 Multiple Regression Analysis

Independent Variable	Unstandardized Coefficient Beta	Standard Error	Standardization Coefficient Beta	t	Significance
(constant)	6.054	0.735		8.233	0.000
Gender	-0.46	0.162	-0.106	-2.831	0.005
Education level	-0.183	0.093	-0.074	-1.966	0.050
Risk information attention	0.072	0.015	0.251	4.718	0.000
Risk information recognition	-0.041	0.027	-0.09	-1.537	0.125
Media exposure	0.04	0.043	0.045	0.931	0.352
Media credibility	0.135	0.02	0.354	6.667	0.000
F=34.839, df=6, P=0.000, R=0.533, R ² =0.276					

Table 13 The Hypothesis Test Results

Serial Number	Independent Variable	Research Hypothesis	Test Result
1	Gender	The public of different genders have significant differences in risk perception, and men have a higher level of risk perception.	Support
2	Age	Citizens of different ages have significant differences in risk perception.	Support
3	Education level	Education level has a negative impact on public risk perception, that is, the higher the education level, the lower the level of risk perception.	Support
4	Place of residence	Citizens in different places of residence have significant differences in risk perception, and citizens in rural areas have a higher level of risk perception.	Not support
5	Media exposure	Media exposure has a positive impact on public risk perception.	Not support
6	Media credibility	The credibility of the media positively affects the public's perception of risk.	Support
7	Risk information attention	The degree of risk information attention positively affects public risk perception.	Support
8	Risk information recognition	The degree of acceptance of risk information has a positive impact on the public's perception of risk.	Not support

This study shows that risk information attention has a positive impact on public risk perception. Research shows that media attention to pandemic information (sum of exposure and attention) is positively correlated with their risk perception (perceived sensitivity and severity) of the disease. Media attention depends on participants' trust in the media as a valid source of information.³² Hypothesis 8: The acceptance of risk information has a positive impact on the public's perception of risk. It is not supported, mainly because the characteristics of risk information need to be further defined. In the process of emergencies, there is correct risk information and some errors. Incorrect risk information will cause the public's risk perception, thus causing risk secondary events. Therefore, we will further refine the definition of risk information in future research to improve the accuracy of the results.

Conclusion

In this paper, taking COVID-19 as an example, a risk perception attribution model is established to analyze the differences based on factors such as gender, age, education level, place of residence, media exposure, media credibility, risk information attention, and recognition. Multiple regression analysis is used to explore the public risk perception of major public health events. The empirical research comprehensively considers the micro-level and macro-level risk perception influencing factors. And further explores the influence of individual characteristics, media, risk information and other elements on risk perception, which is helpful in analyzing the public's psychological and behavioral changes in public health emergencies. The following enlightenment has been given to the risk perception of the relevant departments for effective governance of the public:

First, based on the analysis of individual characteristics, gender differences lead to different levels of risk perception. Citizens of different ages have significant age differences. Differences in education level negatively affect public risk perception. The impact of residential factors on the level of risk perception is negligible. Therefore, more emphasis should be placed on reducing the level of risk perception of male groups, and appropriately increasing women's awareness of risk. For citizens with lower levels of education, they should actively promote risk knowledge, guide them to face risks squarely, and increase awareness of prevention. Citizens with higher levels can teach risk prevention skills and improve their ability to respond to public health incidents.

Second, risk information attention is directly proportional to public risk perception. The more attention paid to the epidemic information, the higher the level of risk perception. The level of risk perception is not related to the recognition of risk information. The government should keep abreast of the people's information needs for risk events, set up good

information release channels, popularize professional knowledge and create an excellent public opinion atmosphere as an essential task for stabilizing people's hearts under the epidemic prevention and control.

Third, based on the analysis of media communication, media credibility positively affects public risk perception, expressed as the more trust in a particular media, the higher the level of risk perception. The relationship between media exposure and risk perception is not significant. Therefore, it is necessary to standardize and guide the dissemination of media information, unblock all kinds of mainstream media and professional media and other information dissemination channels, strengthen the management of public opinion on informal media, and reduce the negativity of risk in an all-round way.

This article integrates micro-and macro-level factors to study the public's risk perception, which has a particular innovation, and provides a new research path for scientifically guiding the public's risk response behavior under public health emergencies. But this article still has certain shortcomings and limitations, which can be expanded and improved from the following points in the future: First, increase the sample's representativeness. In the quantitative investigation, continue to increase the sample size or expand the coverage to optimize the research. The second is to refine the research further. Due to community blockade and to meet epidemic prevention and control regulations, this research survey is more based on online questionnaires, with fewer questionnaire samples for field surveys, and the number of questionnaires for people under 18 years of age, junior high school and below education level, and rural populations is relatively large. In the regression analysis of the public risk perception influencing factors of major public health events, it is found that after excluding the influence of other variables, the risk information Attention and media credibility both have a significant positive correlation with risk perception. Therefore, these two variables can be further refined to explore the mechanism and characteristics of risk information attention and media credibility on public risk perception.

Ethics and Consent Statement

The study conforms with the principles outlined in the Declaration of Helsinki. Ethical clearance was obtained from the Ethical Review Committee of Fuzhou University. Data was collected with an online survey completely anonymous. Before starting the survey, respondents were informed: "This questionnaire is part of an academic research project by FZU—FuZhou University and EMRC—Emergency Management Research Center. The data is for scientific use only and is strictly confidential". Informed consent was obtained from all subjects involved in the study. For subjects under 18 years old, parental informed consent has been obtained from the process that their parents shared the questionnaire link with them.

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Disclosure

The authors report no conflicts of interest in this study.

References

1. Han Q, Zheng B, Agostini M, et al. Associations of risk perception of COVID-19 with emotion and mental health during the pandemic. *J Affect Disord.* 2021;284:247–255. doi:10.1016/j.jad.2021.01.049
2. Herbec A, Brown J, Jackson SE, et al. Perceived risk factors for severe Covid-19 symptoms and their association with health behaviours: findings from the HEBECO study. *Acta Psychol.* 2021;222:103458. doi:10.1016/j.actpsy.2021.103458
3. Wu D, Song J, Bian Y, Zheng X, Zhang Z. Risk perception and intelligent decision in complex social information network. *Ind Manag Data Syst.* 2020;121(1):99–110. doi:10.1108/IMDS-10-2020-0566
4. He S, Chen S, Kong L, Liu W. Analysis of risk perceptions and related factors concerning COVID-19 epidemic in Chongqing, China. *J Community Health.* 2020;46(2):278–285. doi:10.1007/s10900-020-00870-4
5. Alegria KE, Fleszar-Pavlovic SE, Ngo DD, et al. The role of risk perceptions and affective consequences in COVID-19 protective behaviors. *Int J Behav Med.* 2021;28(6):801–807. doi:10.1007/s12529-021-09970-4
6. Suvo JGB, Le Masson V, Shaxson L, Luhan MRJ, Hurtado AQ. Navigating risks and uncertainties: risk perceptions and risk management strategies in the Philippine seaweed industry. *Mar Policy.* 2021;126:104408. doi:10.1016/j.marpol.2021.104408

7. Rana IA, Bhatti SS, Aslam AB, Jamshed A, Ahmad J, Shah AA. COVID-19 risk perception and coping mechanisms: does gender make a difference? *Int J Disaster Risk Reduct.* **2021**;55:102096. doi:10.1016/j.ijdr.2021.102096
8. Eryılmaz Türkkan G, Hırca T. The investigation of flood risk perception as a quantitative analysis from socio-demographic perspective. *Nat Hazards.* **2021**;106(1):715–733. doi:10.1007/s11069-020-04488-6
9. Birhanu Z, Ambelu A, Fufa D, et al. Risk perceptions and attitudinal responses to COVID-19 pandemic: an online survey in Ethiopia. *BMC Public Health.* **2021**;21(1):981. doi:10.1186/s12889-021-10939-x
10. Ge Y, Yang G, Wang X, Dou W, Lu X, Mao J. Understanding risk perception from floods: a case study from China. *Nat Hazards.* **2021**;105(3):3119–3140. doi:10.1007/s11069-020-04458-y
11. Chen Y, Feng J, Chen A, Lee JE, An L. Risk perception of COVID-19: a comparative analysis of China and South Korea. *Int J Disaster Risk Reduct.* **2021**;61:102373. doi:10.1016/j.ijdr.2021.102373
12. Finucane ML, Beckman R, Ghosh-Dastidar M, Dubowitz T, Collins RL, Troxel W. Do social isolation and neighborhood walkability influence relationships between COVID-19 experiences and wellbeing in predominantly Black urban areas? *Landsc Urban Plan.* **2022**;217:104264. doi:10.1016/j.landurbplan.2021.104264
13. Freudenstein F, Croft RJ, Loughran SP, Zeleke BM, Wiedemann PM. Effects of selective outcome reporting on risk perception. *Environ Res.* **2021**;196:110821. doi:10.1016/j.envres.2021.110821
14. Siddiqui S, Qamar AH. Risk perception and protective behavior in the context of COVID-19: a qualitative exploration. *Asian Bioeth Rev.* **2021**;13:401–420. doi:10.1007/s41649-021-00181-3
15. Malecki KMC, Keating JA, Safdar N. Crisis communication and public perception of COVID-19 risk in the era of social media. *Clin Infect Dis.* **2021**;72(4):697–702. doi:10.1093/cid/ciaa758
16. Ponce-Pacheco AB, Novelo-Casanova DA, Agustín-Ortiz IN, Garduño-González AB. Risk perception in Unión Juárez, Chiapas, Mexico. *Nat Hazards.* **2021**;106(1):855–879. doi:10.1007/s11069-020-04494-8
17. Vu TV, Vo-Thanh T, Nguyen NP, Nguyen DV, Chi H. The COVID-19 pandemic: workplace safety management practices, job insecurity, and employees' organizational citizenship behavior. *Saf Sci.* **2022**;145:105527. doi:10.1016/j.ssci.2021.105527
18. Ngenyam Bang H, Church Burton N. Contemporary flood risk perceptions in England: implications for flood risk management foresight. *Clim Risk Manag.* **2021**;32:100317. doi:10.1016/j.crm.2021.100317
19. Mushi A, Yassin Y, Khan A, Yezli S, Almuzaini Y. Knowledge, attitude, and perceived risks towards COVID-19 pandemic and the impact of risk communication messages on healthcare workers in Saudi Arabia. *Risk Manag Healthc Policy.* **2021**;14:2811–2824. doi:10.2147/RMHP.S306402
20. Wang J, Guo C, Wu X, Li P. Influencing factors for public risk perception of COVID-19 —perspective of the pandemic whole life cycle. *Int J Disaster Risk Reduct.* **2022**;67:102693. doi:10.1016/j.ijdr.2021.102693
21. Liu C, Huang N, Fu M, Zhang H, Feng XL, Guo J. Relationship between risk perception, social support, and mental health among general Chinese population during the COVID-19 pandemic. *Risk Manag Healthc Policy.* **2021**;14:1843–1853. doi:10.2147/RMHP.S302521
22. Martins B, Nunes A, Loureno L, et al. *Perception of the Flash Flood Hazard by the Population of Mindelo, S.Vicente (Cape Verde).* European Geosciences Union; **2018**.
23. Liu T, Zhang H, Li X, et al. Individual factors influencing risk perceptions of hazardous chemicals in China - ScienceDirect. *Environ Res.* **2020**;186:109523. doi:10.1016/j.envres.2020.109523
24. Hagan JE, Quansah F, Frimpong JB, Ankomah F, Srem-Sai M, Schack T. Gender risk perception and coping mechanisms among Ghanaian University students during the COVID-19 Pandemic. In: *Healthcare.* Vol. 10. MDPI; **2022**:687.
25. Waddell JT. Age-varying time trends in cannabis- and alcohol-related risk perceptions 2002–2019. *Addict Behav.* **2022**;124:107091. doi:10.1016/j.addbeh.2021.107091
26. Ocansey S, Abu EK, Abraham CH, et al. Socio-demographic factors modify awareness, knowledge, and perceived risk of glaucoma in rural and urban residents in Ghana: a population-based survey. *Ther Adv Ophthalmol.* **2021**;13:251584142199809. doi:10.1177/2515841421998099
27. Allan J, Kleinschafer J, Saksena T, et al. A comparison of rural Australian first nations and non-first nations survey responses to COVID-19 risks and impacts: implications for health communications. *BMC Public Health.* **2022**;22(1):1–10. doi:10.1186/s12889-022-13643-6
28. Liu M, Zhang H, Huang H. Media exposure to COVID-19 information, risk perception, social and geographical proximity, and self-rated anxiety in China. *BMC Public Health.* **2020**;20(1). doi:10.1186/s12889-020-09761-8
29. Gozzi N, Tizzani M, Starnini M, et al. Collective response to the media coverage of COVID-19 pandemic on reddit and Wikipedia. *J Med Internet Res.* **2020**;22(10):e21597. doi:10.2196/21597
30. Dang Q. Research on the impact of media credibility on risk perception of COVID-19 and the sustainable travel intention of Chinese residents based on an extended TPB model in the post-pandemic context. *Sustainability.* **2022**;14(14):8729. doi:10.3390/su14148729
31. Niu C, Jiang Z, Liu H, et al. The influence of media consumption on public risk perception: a meta-analysis. *J Risk Res.* **2020**;25(1):21–47.
32. Gardikiotis A, Malinaki E, Charisiadis-Tsitlakidis C, et al. Emotional and cognitive responses to COVID-19 information overload under lockdown predict media attention and risk perceptions of COVID-19. *J Health Commun.* **2021**;26(6):434–442. doi:10.1080/10810730.2021.1949649
33. Qg A, Ny B, Wz C. How consumers' perception and information processing affect their acceptance of genetically modified foods in China: a risk communication perspective – scienceDirect. *Food Res Int.* **2020**;137:109518.
34. Ferrín M. Reassessing gender differences in COVID risk perception and behavior. *Soc Sci Q.* **2022**;103:31–41.
35. Genovese C, Costantino C, Odone A, et al.; COVID-19 Risk Perception Group. A knowledge, attitude, and perception study on flu and COVID-19 vaccination during the COVID-19 pandemic: multicentric Italian survey insights. *Vaccines.* **2022**;10(2):142. doi:10.3390/vaccines10020142
36. Arefi MF, Babaei AP, Barzanouni S, et al. Risk perception in the COVID-19 pandemic; a health promotion approach. *J Educ Health Promot.* **2022**;11. doi:10.4103/jehp.jehp_1162_21
37. Cleland V, Timperio A, Sharman MJ, et al. Test-retest reliability of a self-reported physical activity environment instrument for use in rural settings. *Aust J Rural Health.* **2020**;28(2):168–179. doi:10.1111/ajr.12625
38. Chilanga E, Dzimbiri M, Mwanjawala P, et al. Religion, politics and COVID-19 risk perception among urban residents in Malawi. *BMC Public Health.* **2022**;22(1). doi:10.1186/s12889-022-13858-7
39. Eboreime E, Iyamu I, Afirima B, et al. COVID-19 risk perception among residents of seven sub-Saharan African countries: socio-demographic correlates and predicted probabilities. *Pan Afr Med J.* **2021**;39(1). doi:10.11604/pamj.2021.39.227.28193

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