

Article

Impact of COVID-19 Outbreak Risk Perception on Willingness to Consume Products from Restaurants: Mediation Effect of Risk Attitude

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Abstract: The COVID-19 outbreak caused huge losses for the catering industry. The outbreak's influence on consumers' risk perception and risk attitude was an important factor for these heavy losses. The aim of this study was to investigate the change in epidemic risk perception, risk attitude, and the consumers' willingness to consume products from restaurants during the spread of the COVID-19 epidemic. The study collected 502 questionnaires at the end of 2021, and structural analysis was conducted using SPSS 26.0 and AMOS 20.0 statistical programs. The results showed that consumers' awareness of the coronavirus pandemic (consumers' epidemic risk perception) had a significant positive effect on their decision-making behavior under uncertain conditions (risk attitude); consumers' decision-making behavior under uncertain conditions (risk attitude) had a significant negative effect on their willingness to purchase from restaurants; consumers' awareness of the coronavirus pandemic (consumers' epidemic risk perception) had a significant negative effect on their willingness to consume products from restaurants; and risk attitude played a mediating role in the influence of consumers' epidemic risk perception on their willingness to consume products from restaurants. This study can provide guidance and reference for restaurants on how to deal with the epidemic situation, help them undertake risk prevention work and reduce losses, and promote the healthy and sustainable development of the restaurant.

Keywords: COVID-19; epidemic risk perception; risk attitude; willingness to consume products from restaurants; mediation effect



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1. Introduction

In late 2019, the outbreak of COVID-19 hit the global economy hard, with heavy losses in transportation, tourism, catering, and accommodation [1]. The catering industry is more directly and prominently affected by the COVID-19 outbreak because of its characteristics such as frequent personnel flow, high concentration of personnel, and relatively closed space [2]. China's catering industry was the first to be hit by the COVID-19 outbreak, which has cost the catering industry about 500 billion yuan in retail sales in just seven days of the Chinese New Year. With the spread of the COVID-19 outbreak in the world, outside China, the impact of the world's catering industry is growing [3]. A large number of restaurants have been closed, fewer people go to restaurants, and the catering industry has been in a state of stagnation, which has led to a significant drop in employment and social income, causing huge losses to the social economy [4]. It is also detrimental to the health and human well-being, particularly those related to the United Nations' sustainable development goals (SDG3), halving food waste at the retail and consumer levels by 2030 (SDG12.3) [5,6]. The reason for the heavy losses of the catering industry under the COVID-19 outbreak situation lies not only in the characteristics of the catering industry itself, the prevention policies,

and so on. The outbreak's influence on consumers' risk perception and risk attitude was also an important reason for the heavy losses in the catering industry.

The research on risk perception, risk attitude, and willingness to consume products from restaurants has attracted extensive attention in academic circles. The concept of risk perception is first put forward in the field of psychology, and it refers to the subjective feeling and understanding of various objective risks in the external environment [7]. Wojciech Kolanowski studied young Turkish and Polish consumers' perceptions of food safety risks when they ate out by using a questionnaire, and young Polish consumers were found to be less aware of food safety risks when eating out than in Turkey [8]. By using linear regression and the Cragg model, Yenerall investigated the effects of risk aversion and risk perception associated with dining in restaurants on restaurant utilization and expenditure during the initial reopening phase of the COVID-19 pandemic [9]. There are many methods to detect and measure risk perception, including the cultural theory of risk and psychological measurement paradigm [10].

Risk attitude refers to the degree of people's aversion or preference for uncertain outcomes [11]. Yang introduced the concept of a risk attitude when studying how festival participants' fear of COVID-19 affects their behavioral intentions [12]; Albert Lee used risk attitudes to study the impact of COVID-19 on the lives of students in Hong Kong [13]. Nur Afifah Mursyida Zaujan introduced the concept of risk attitude into his research on the effect of a smartphone app's intervention on consumers' perception of food poisoning prevention when dining out [14]; Jing Hou studied the risk attitude in food safety governance [15].

As for the willingness to consume products from restaurants, scholars have put forward many opinions, though it is thought to be the premise of consumer behavior. At present, the influencing factors of a consumer's willingness to consume products from restaurants include the influence of consumer experience and the influence of consumer-perceived value on consuming products from restaurants [13].

Previous studies have explored the relationship among risk perception, risk attitude, and consuming willingness, and found that risk perception and risk attitude have a certain impact on consumers' willingness to consume products from restaurants. Kun Qian examined the acceptability of eating insects from the context of the behavioral immune system (BIS). BIS is a psychological mechanism that can detect the potential presence of pathogenic parasites and thus prevent individual contact with the parasite through a combination of a risk perception and risk attitude questionnaire and a picture semantic association experiment; the results indicated that promoting the sanitary and hygienic perception of insect food may reduce revulsion at entomophagy and promote uptake, and that the BIS plays a mediating role in this process [16]. Flaviana Ivy Febian used the health belief model (HBM), collecting data from older Malaysian consumers using a structured questionnaire. HBM is a health education model that can change people's behavior by intervening people's perception, attitude, and belief, and the study used this model to investigate the effects of perceived susceptibility, perceived impairment, and willingness to consume functional foods on older consumers. The results showed that perceived barriers and cue to action significantly affect older consumers' intention to consume functional foods [17]. However, in the light of the COVID-19 outbreak, efforts to explore the relationship among the three studies are still lacking.

The current study takes epidemic risk perception as an independent variable, consumers' risk attitude as an intermediary variable, and consumers' willingness to consume products from restaurants as a result variable. The first aim of this paper is to study the changes of consumers' risk perception, risk attitude, and willingness to consume products from restaurants in the COVID-19 situation and advance existing theories; moreover, a second objective was to use epidemic risk perception and risk attitude to predict consumers' willingness to consume products from restaurants. Upon the conclusion of the study, the goal is to provide management suggestions for restaurants, enable the enterprises to fully realize the important influence of consumers' epidemic risk perception and risk attitude to consumers' willingness to consume products from restaurants, and adjust the manage-

ment countermeasure according to changes in consumers' epidemic risk perception and risk attitude. This will help the enterprises normalize risk prevention and control, allow resumption and other work to reduce losses, and promote the survival and development of restaurants.

2. Literature Review and Research Hypotheses

2.1. Literature Review

2.1.1. Risk Perception

The concept of risk perception refers to the subjective feeling and understanding of various objective risks in the external environment. At present, there is no unified conclusion on the definition of risk perception. It is now thought that the earliest risk research was that done by O.K. Burrell on the impact of scientific analysis psychology on investment behavior. Bauer proposed the application of risk in the management field and interpreted risk perception as consumer awareness and subjective perception [18]. Hugstad, Taylor, and Bruce considered risk perception to be the risk a consumer may feel when purchasing a product or service [19]. McCaffrey divided risk perception into probability perception and loss perception [20]. Wang Wei-quan suggested that a high level of risk perception may lead to over-amplification of the individual's influence on negative events, resulting in risk aversion [21]. Yeung and Morris proposed that, at any stage of consumer purchase, when consumers perceive security risks, their purchasing behavior will change accordingly. Scully and Joanne argued that consumers' perception of risk tends to be higher than the actual level of risk, and consumers' reaction to risk tends to be excessive and irrational.

There are many methods to measure risk perception. One of the most important research methods is the psychological measurement paradigm, which was put forward by many scholars and mainly represented by Slovic [10]. These scholars classified the risk according to its characteristics to understand why people react differently to risk. The main tool of this method is the questionnaire, with some subjective multiple-choice questions, the results of which determine the participants' risk perception of a particular event. Roselius classified risk perception into four categories: financial, physical, time, and hazard risk [22]. Jacoby and Kaplan [23] further subdivided risk perception into five dimensions: functional, physical, psychological, social, and financial risk. Mumel added time risk on this basis, and the study of risk perception focuses on these six aspects. Xie and others found that duration, control, severity of consequences, and familiarity also affect risk perception [24]. Zhou divided the perception of earthquake risk into four factors: probability, fear, influence, and control [25]. Liu and Hu believe that the psychological attribute of risk perception is stronger, and that the subjective evaluation of events made by the subject reflects different values under different cultural and ideological backgrounds and it is both a psychological paradigm and a cognitive process [26].

The concept of risk perception is widely used in the field of consumption. Due to the asymmetry of information, consumers cannot accurately predict the outcome of purchase, and this kind of psychological pressure to the uncertain result is the consumer's risk perception in the process of consumption. Under the influence of risk perception, consumers may change their original attitude towards products, reevaluate the purchasing suggestions made by the people around them, and, finally, change their purchasing intention and behavior. The COVID-19 outbreak will have an impact on the risk perception of consumers, consequently affecting their willingness to consume products from restaurants. In this study, risk perception was combined with an epidemic background, and epidemic risk perception was used as an independent variable to study its predictive effect on consumer's willingness to consume products from restaurants.

In previous studies on risk perception and willingness to consume products from restaurants, Wojciech Kolanowski studied young Turkish and Polish consumers' perceptions of food safety risks when they ate out by using a questionnaire, and young Polish consumers were found to be less aware of food safety risks when eating out than Turkish

consumers [8]. Marcel Levy de Andrade, through structured questionnaires, evaluated the knowledge, risk perception, and optimistic bias of food handlers and consumers of restaurants and the relationship of these variables with the FBD risk of these establishments, and the results showed that consumers may have incorporated a sense of affection and identity to a place, associating it with making their own meals at home. Therefore, the consumer may not differentiate restaurants with regard to food safety [27].

2.1.2. Willingness to Consume

Scholars in the academic circle have put forward several opinions on the definition of consumer will. Consumers' willingness to consume is the premise of consumer behavior. Ajzen first defined willingness to consume as the likelihood that a consumer will consume a product or service [28]. Schiffman, Kanuk, and Wisenbult (2010) held that willingness to spend is the probability or subjective probability that a consumer is willing to spend on a product [29]. Kotler thought that the consumption intention is a subjective attitude which will influence a consumer's future consumption behavior because of the consumption behavior of others or themselves. Bi suggested that willingness to spend is the possibility that consumers will buy a product again after they have a better understanding of the product [30]. The academic circle's view on consumption willingness is generally regarded as the enthusiasm and subjective attitude of consumers in producing consumption behavior and making a consumption decision, which is affected by a change in other factors.

In terms of the influencing factors of consumers' willingness to spend, Spiggle and Sewall considered that the factors that have a direct impact on consumers' purchasing behavior are mainly the characteristics of consumers [31]. At present, the main influencing factors for willingness to consume are as follows: (1) the influence of consumer experience on consumer willingness, where the consumer experience is when the consumer uses the goods or services and influences whether the consumer will make a second consumption; (2) the effect of consumer-perceived value on consuming willingness, and the fact that the evaluation of a product after use is user-perceived value, which has an important effect on consumers' consuming willingness [32–34].

In the aspect of willingness to consume products from restaurants and its influencing factors, Chung-Te Ting constructed a contingent valuation model to study the importance of pre-processed services in the context of a possible restaurant service crisis [35]; Lalwani studied young couples in Singapore, and found that a spousal relationships have a significant impact on whether or not they go to a fancy restaurant. In a value–attitude–behavior model study [36], Jinhyun Jun found that customers' health values and attitudes toward low-fat or low-calorie foods had an effect on their willingness to consume products from restaurants [37]; David Marshall used a mixture of correspondence analysis, cluster analysis, and discriminant analysis to investigate the interaction between British and Australian students in eating situations, places, and food choices [38]; Joo Ahn and others used the method of linear regression to analyze the impact of brand value on the customer satisfaction of fast food restaurants, and investigated how customer satisfaction further affects consumers' willingness to spend—the results showed that food quality, brand image, brand awareness, and brand association were important factors affecting customer satisfaction, and there was a positive correlation between customer satisfaction and customers' willingness to consume [39].

In the aspect of research on the relationship between public health emergency and willingness to consume products from restaurants, Arif Billah used the theory of planned behavior, and investigated the factors that affected consumers' willingness to consume halal food during the epidemic in southern Thailand. The results showed that consumers' habits and knowledge of halal food significantly influenced their behavior [40]. Maria studied the impact of the 2019 new coronavirus epidemic on the eating habits of Italian consumers, and the results showed that the impact of the epidemic on consumer behavior can be divided into changes in food buying, eating habits, and other behaviors [41]. On the basis of the above research, this paper introduces the concept of epidemic risk perception

and risk attitude to study its impact on consumers' willingness to consume products from restaurants.

2.1.3. Risk Attitude

Risk does not refer to the likelihood of loss in everyday life, but rather to uncertainty, including loss and gain, and risk attitudes refer to the degree of aversion or preference that people have for the outcome of such uncertainty. At present, there is no consensus on the precise definition of risk attitude. Weber, Blais, and Betz considered risk attitudes to be the attitudes and preferences of individuals when making economic decisions in uncertain future situations [42]. Schroeder, Tonsor, Pennings, and Mintert believe that risk attitude is the individual's willingness to accept risk consistently in different situations: risk seekers tend to choose higher risk decisions, risk-neutral people will choose the average rate of return in different situations, and risk-averse people tend to minimize future risks in their decision-making [43]. Zhang and Wei defined risk attitudes as different risk choices made by different individuals for the same situation, which are influenced by individual preferences, social status, and economic conditions [44]. The risk attitude referred to in this paper is the willingness of consumers to bear the risk when facing uncertainty in the process of restaurant consumption in the context of an epidemic situation.

At present, there are many methods to measure risk attitude. Because the questionnaire survey method is simple and easy to operate, the cost of time and resources is low, and the requirements for the cognitive ability and understanding ability of the subjects are low. Combined with the specific situation of this study, this paper adopts the questionnaire survey method of the direct measurement method to measure the risk attitude.

The influencing factors of risk attitude of scholars mainly include individual difference, external environment, and risk perception.

From the perspective of individual difference, the main influencing factors of risk attitude are age, education level, and income level. Zhou and colleagues found that, among risk-neutral individuals, the male samples were more than the female samples, while, in risk aversion and risk preference, the male samples were less than the female sample [45]. Arrow found that, the higher the individual's income level, the stronger the risk-averse attitude. However, in a study by Friend and Blume, they found that, the higher the individual's income level, the higher the proportion of risky assets in their total assets [46]. The influence of external environment on individual risk attitude is mainly reflected in scale reward, economic field, and risk-sharing. In terms of scale rewards, Binswanger found in a gambling experiment that, as the rewards increased, the participants became more risk-averse [47].

As far as the field of economic activity is concerned, Elke found a high correlation between the field of economic activity in which an individual participates and their risk attitude in the course of measuring the scale [42]. In terms of risk-sharing, Wang and Huang (2016) found that individuals are less risk-averse when sharing risk than when taking it alone, with this effect being particularly pronounced among vulnerable groups [48].

From the perspective of risk perception, Palich and Ray proposed that risk perception influences individual decision-making by influencing an individual's risk attitude [49]. Lv found that risk preference has an indirect effect on an enterprise's willingness to purchase insurance through a study on the impact of managers' risk attitude and risk perception on their decision-making. This indirect effect is achieved through the mediating role of risk perception [50].

2.2. Research Hypotheses

On the basis of the above literature review, this study uses the COVID-19 outbreak as a backdrop to study the relationship between epidemic risk perception and a consumer's willingness to consume products from restaurants under the influence of the outbreak, link the risk perception with consuming willingness at restaurants through risk attitude, and

study how epidemic risk perception affects customers' consuming willingness with regard to restaurants through risk attitude.

2.2.1. Epidemic Risk Perception and Willingness to Consume Products from Restaurants

Epidemic risk perception is an individual's subjective feeling and understanding of the objective risk in the external environment. With the impact of the COVID-19 outbreak on the individual's risk perception, an individual's consuming willingness with regard to restaurants may also change. If an individual has a high level of epidemic risk perception, they may be inclined to reduce activities such as food consumption. Garretson and Kenneth believe that, when consumers perceive significant risks in the process of consumption, their willingness to purchase will be affected to some extent [51]. Taylor puts forward the theory of consumer risk perception and points out that consumers are influenced by different degrees of risk perception when they make purchases [52]. In addition, different products and individuals vary with different degrees of risk, and uncertainty arises when the consequences of a purchase are unpredictable; thus, risk perception is always a part of the consumer's decision-making process. In addition to the impact of the epidemic and the lack of information on food and beverage products, consumers have a sense of risk, therefore the uncertainty of consumers' perception has a strong relationship with the quantity of information on the epidemic and on food and beverage products. That is to say, the epidemic risk perceived by consumers in the process of food consumption will directly affect their purchase intention. Based on the above analysis, the following hypothesis is proposed:

Hypotheses 1 (H1). *Consumers' epidemic risk perception has a significant negative effect on their willingness to consume food at restaurants.*

2.2.2. Epidemic Risk Perception and Risk Attitude

Individuals' attitude towards risk and their preference for decision-making are called risk attitude. In the actual judgment process, the individual's risk attitude will display different characteristics in different situations. The COVID-19 outbreak changes the environmental situation of an individual, which may lead to a change in the individual's risk attitude. Yang put the interactive terms of risk perception and risk attitude into the model and found that the regression coefficient was significant. Therefore, there was an influencing relationship between risk perception and risk attitude [53]. Chen also argued that the interaction between risk perception and risk attitude leads to the difference of risk management between ex-ante and ex-post [54]. Pan and colleagues found that farmers' risk attitude influenced their food risk perception and health risk perception, which further influenced their pesticide-use behavior [55]. Based on the above analysis, the following hypothesis is proposed:

Hypotheses 2 (H2). *Consumers' epidemic risk perception has a significant positive effect on their risk attitude.*

2.2.3. Risk Attitude and Willingness to Consume Products from Restaurants

Risk attitude affects the way that individuals respond to uncertainty. This attitude to risk is also reflected in the individual's attitude to consumption. Therefore, it plays an important role in the individual's willingness to consume. A study by Costa-Font and Gil on consumers in the Euro-Mediterranean region found that the formation of risk attitudes among consumers in different regions affected their acceptance of goods [56]. A telephone survey of 1009 participants in Italy by Prati and others found that risk attitudes were important predictors of willingness [57]. Zhou and others distributed a questionnaire to consumers in Changsha and found that the consumers' attitude towards goods was affected by external factors and had an impact on their willingness to buy goods [58]. In a study of the factors that influence consumers' willingness to pay for genetically modified food, Yin and others found that the risk attitude of consumers towards genetically modified

food is an important factor that influences their willingness to pay [59]. Based on the above analysis, the following hypothesis is proposed:

Hypotheses 3 (H3). *Consumers' risk attitude has a significant negative effect on their willingness to consume at a restaurant.*

2.2.4. The Mediating Role of Risk Attitude

The influence of the epidemic situation on an individual's risk perception will change an individual's risk attitude, which, in turn, will affect their willingness to consume products from restaurants. Epidemic risk perception may also directly affect said willingness. Prati and team found that risk attitude is the most important component in predicting willingness, and it is further predicted by risk perception [57]. A study of Spanish consumers by Martinez-Poveda and others found that the willingness and acceptance of consumers to buy goods is largely determined by the risks they perceive in the goods [60]. Yang and Chen found that there is an interaction between risk perception and risk attitude, which affects the behavior of subjects [53,54]. A study of consumer attitudes toward genetically modified food in recent years, conducted by Wang and others, found that both risk perception and return affect consumers' willingness to purchase genetically modified food [61]. According to the background of this study, consumers' risk perception of the epidemic situation will influence their risk attitude and willingness to consume food. Based on the above analysis, the following hypothesis is proposed:

Hypotheses 4 (H4). *Risk attitude plays a mediating role in the influence of consumers' epidemic risk perception on their willingness to consume products from restaurants.*

3. Methodology Design

3.1. Questionnaire Design

This study combined literature analysis and expert opinion to select dimensions and design the questionnaire. The questionnaire is divided into four parts: basic information of respondents, epidemic risk perception scale, risk attitude scale, and restaurant consumption willingness scale. A five-point Likert scale, ranging from 'Strongly disagree' to 'Strongly agree', measured epidemic risk perception, risk attitude, and restaurant consuming willingness.

The first part is the basic information of the subjects, including sex, age, education, occupation, and disposable income.

The second part the risk perception of the respondents was measured using the modified version of the Adrian Ludwig Richter pneumonia risk perception scale developed by Xi Juzhe and others [62]. Epidemic risk perception was measured on a scale of 1 to 5 from 'Strongly disagree' to 'Strongly agree'. The results were measured from three aspects: severity, controllability, and susceptibility, and it includes four questions: I have a strong feeling about my chances of getting COVID-19; I'm very worried about getting COVID-19; I'm sure that once you get COVID-19, it can have a very serious impact on your health; I think the spread of the COVID-19 is very difficult to control.

The third part is measuring the risk attitude of the respondents and clarifying their risk preference using the Adrian Ludwig Richter scale, from 'Strongly disagree' to 'Strongly agree', to measure the risk attitude. The scale used by Yangzhen in the previous article is revised in this paper [44], including six questions: I'm not a risk-taker; During the COVID-19, I paid more attention to restaurant disinfection measures (such as tableware disinfection/contactless thermometer); During the COVID-19, I preferred to takeout and pack rather than eat in a restaurant; Around the time of the COVID-19, the frequency of my dining out dropped considerably; During the COVID-19, I was more concerned about the dining environment in the restaurant (such as dining in a separate space); During the COVID-19, I paid more attention to the safety measures during the service of the restaurant staff (such as wearing a mask).

The fourth part is the measurement of the respondents' willingness to consume products from restaurants, adopting the measurement method of the green purchase intention of the Rogoff Theory, and revising the scale of other related studies as per the specific situation of this study [63]. Using the Adrian Ludwig Richter scale, risk attitudes were measured using five responses ranging from 'Strongly disagree' to 'Strongly agree', including four questions: If restaurants open in my city, I intend to go there; If restaurants open in my city, I am interested in visiting them in the coming days: Even without the COVID-19 Vaccine, I'm still willing to go to restaurants during the COVID-19: If restaurant consumption is not possible during the COVID-19, I will feel very uncomfortable.

3.2. Survey and Sample Status

This questionnaire was distributed to the public with the help of the questionstar.com website for distribution and recovery, and through a combination of offline distribution. The restaurants' consumers are the research respondents of this paper. The questionnaires were distributed on 1 November 2021 and collected on 31 December 2021. A total of 586 questionnaires were collected in two months. After screening the questionnaires, 502 valid questionnaires were collected, showing an effective response rate of 85.67%. The basic profile of the respondents is shown in Table 1.

Table 1. Descriptive analysis of basic personal information.

Variables	Measurement Index	<i>n</i>	%	Cumulative Percentage (%)
Gender	M	244	48.61	48.61
	F	258	51.39	100
Age (years)	Under 18	35	6.97	6.97
	18–25	129	25.7	32.67
	26–30	75	14.94	47.61
	31–40	93	18.53	66.14
	41–50	79	15.74	81.87
	51–60	53	10.56	92.43
	Over 60	38	7.57	100
Highest level of education	Senior secondary/technical secondary and below	131	26.1	26.1
	Junior College	92	18.33	44.42
	College	215	42.83	87.25
	Master's degree or above	64	12.75	100
Profession	Administrative organ	53	10.56	10.56
	Entrepreneur	74	14.74	25.3
	Freelancing	82	16.33	41.63
	Student	187	37.25	78.88
	Others	106	21.12	100
Monthly discretionary income	Under 3000 RMB	161	32.07	32.07
	3000–4500 RMB	167	33.27	65.34
	4500–6000 RMB	124	24.7	90.04
	Over 6000 RMB	50	9.96	100
Total		502	100	100

Reliability and validity analysis showed that Cronbach α coefficient of epidemic risk perception scale, risk attitude scale, and willingness to consume products from restaurants scale were all above 0.8; CITC value of all variables was above 0.5; KMO value was above 0.8; and *p*-value was below 0.001. This shows that the questionnaire had good internal consistency, reliability, and stability. The details are shown in Table 2.

Table 2. Reliability and validity analysis of the measurement.

Dimension	Question Item	Standardized Factor Loading 1	Standardized Factor Loading 2	Standardized Factor Loading 3	Degree of Community	CITC	Cronbach's α
Epidemic risk perception	E1	0.144	0.864	−0.311	0.769	0.771	0.914
	E2	−0.019	0.857	−0.343	0.74	0.745	
	E3	−0.001	0.929	−0.342	0.864	0.862	
	E4	0.046	0.912	0.801	0.834	0.839	
	R1	0.81	0.011	0.782	0.726	0.775	
Risk attitude	R2	0.746	0.089	0.816	0.71	0.777	0.934
	R3	0.779	0.095	0.759	0.7	0.76	
	R4	0.836	0.014	−0.311	0.795	0.833	
	R5	0.822	0.043	−0.343	0.794	0.84	
	R6	0.832	0.032	−0.342	0.811	0.851	
Willingness to consume products from restaurants	W1	−0.427	0.019	0.801	0.824	0.831	0.909
	W2	−0.399	0.048	0.782	0.773	0.78	
	W3	−0.36	−0.074	0.816	0.801	0.791	
	W4	−0.434	0.011	0.759	0.765	0.781	

4. Results

4.1. Correlation Analysis

This paper used SPSS software to analyze the correlation among epidemic risk perception, risk attitude, and willingness to consume products from restaurants. The results in Table 3 show that there is a significant positive correlation between epidemic risk perception and risk attitude, a significant negative correlation between risk attitude and willingness to consume products from restaurants, and a significant negative correlation between epidemic risk perception and willingness to consume products from restaurants. Further data analysis was carried out to verify the interaction between the variables.

Table 3. Correlation coefficient matrix of first variable.

	M	SD	Epidemic Risk Perception	Risk Attitude	Willingness to Consume Products from Restaurants
Epidemic risk perception	2.537	0.892	1		
Risk attitude	3.705	0.756	0.303 **	1	
Willingness to consume products from restaurants	2.388	0.618	−0.295 **	−0.604 **	1

Note: M—Mean; SD—Standard deviation; ** $p < 0.01$.

4.2. Regression Analysis and Hypothesis Testing

This section examines the regression analysis of the variable to verify the hypotheses proposed earlier in this paper.

The relationship between epidemic risk perception and risk attitude was analyzed. After regression analysis, the variance inflation factor (VIF) value of the model was below 10, and there was no obvious collinearity. In Table 4, the R^2 of the model is 0.092, meaning that epidemic risk perception accounts for 9.2% of the variance in risk attitudes. The F-test showed that the model passed significantly at a level of $p < 0.01$, which means that the epidemic risk perception must influence the risk attitude. The regression coefficient of epidemic risk perception is 0.303, which means that it has a significant positive influence on risk attitude. This supports H2.

Table 4. Regression model of epidemic risk perception and risk attitude.

	B	SD	Beta	T	p	VIF	R^2	Adjust R^2	F
Constant	3.053	0.112	-	27.247	0.000 **	-	0.092	0.089	F (1376) = 37.993, $p = 0.000$
Epidemic risk perception	0.257	0.042	0.303	6.164	0.000 **	1			

Dependent variable: risk attitude
D-W value: 1.425

Notes: SD—Standard deviation; VIF—Variance inflation factor; R^2 —Coefficient of determination; ** $p < 0.01$.

The relationship between risk attitude and willingness to consume products from restaurants was analyzed. After regression analysis, the VIF value of the model was below 10, and there was no obvious collinearity. In Table 5, the R^2 value of the model is 0.365, meaning that risk attitudes account for 36.5% of the variance in willingness to consume products from restaurants. The F test showed that the model passed significantly, at a level of $p < 0.01$, meaning that the risk attitude must have an effect on the willingness to consume products from restaurants. The regression coefficient of risk attitude is -0.604 , which means that risk attitude has a significant negative effect on willingness to consume products from restaurants. This supports H3 in this study.

Table 5. Regression model of risk attitude and restaurant consuming willingness.

	B	SD	Beta	T	p	VIF	R ²	Adjust R ²	F
Constant	4.218	0.127	-	33.229	0.000 **	-	0.365	0.364	F (1376) = 216.449, p = 0.000
Risk attitude	-0.494	0.034	-0.604	-14.712	0.000 **	1			
Dependent variable: willingness to consume products from restaurants D-W value: 1.552									

Notes: SD—Standard deviation; VIF—Variance inflation factor; R^2 —Coefficient of determination; ** $p < 0.01$.

The relationship between epidemic risk perception and willingness to consume products from restaurants was analyzed. After regression analysis, the VIF value of the model was below 10, and there was no obvious collinearity. In Table 6, the R^2 value of the model is 0.087, meaning that epidemic risk perception can explain 8.7% of the change in willingness to consume products from restaurants. The F test showed that the model passed the F test significantly at a level of $p < 0.01$, which means that the epidemic risk perception must influence consumers' willingness to consume products from restaurants. The regression coefficient of epidemic risk perception is -0.295 , which means that epidemic risk perception has a significant negative effect on willingness to consume products from restaurants. This supports H1 in this study.

Table 6. Regression model of epidemic risk perception and restaurant consuming willingness.

	B	SD	Beta	T	p	VIF	R ²	Adjust R ²	F
Constant	2.906	0.092	-	31.65	0.000 **	-	0.087	0.084	F (1376) = 35.738, p = 0.000
Epidemic risk perception	-0.204	0.034	-0.295	-5.978	0.000 **	1			
Dependent variable: willingness to consume products from restaurants D-W value: 1.493									

Notes: SD—Standard deviation; VIF—Variance inflation factor; R^2 —Coefficient of determination; ** $p < 0.01$.

4.3. Analysis of Mediation Effect

In this study, the product coefficient test is used to analyze the mediation effect. The methods include the Sobel test and bootstrap sampling. The Sobel test has higher requirements and more restrictions on data, which leads to lower test efficiency. At present, the more popular method is bootstrap sampling, which has higher efficiency and does not limit the distribution of mediation sampling.

As shown in Table 7, the mediating effects of first-time risk attitude on epidemic risk perception and willingness to consume products from restaurants were tested. The mediating effects' analysis in Table 6 involved three models: willingness to consume products from restaurants = $2.906 - 0.204 \times$ epidemic risk perception; risk attitude = $3.053 + 0.257 \times$ epidemic risk perception; and willingness to consume products from restaurants = $4.322 - 0.085 \times$ epidemic risk perception $- 0.464 \times$ risk attitude.

Table 7. Mediator analysis table.

	Willingness to Consume Products from Restaurants					Risk Attitude					Willingness to Consume Products from Restaurants				
	B	SD	T	p	β	B	SD	T	p	β	B	SD	T	p	β
Constant	2.906 **	0.092	31.65	0	-	3.053 **	0.112	27.247	0	-	4.322 **	0.131	33.049	0	-
Epidemic risk perception	-0.204 **	0.034	-5.978	0	-0.295	0.257 **	0.042	6.164	0	0.303	-0.085 **	0.03	-2.875	0.004	-0.123
Risk attitude											-0.464 **	0.035	-13.285	0	-0.567
R ²		0.087					0.092					0.379			
Adjust R ²		0.084					0.089					0.376			
F	F (1376) = 35.738, $p = 0.000$					F (1376) = 37.993, $p = 0.000$					F (2375) = 114.450, $p = 0.000$				

Notes: SD—Standard deviation; VIF—Variance inflation factor; ** $p < 0.01$.

A summary of the results of the mediation analysis of risk attitudes can be found in Table 8, which contains five relevant indicators: a is the regression coefficient of X to M ; b is the regression coefficient of M to Y ; $a \times b$ is the product of a and b called mediation effect; and c is the total effect and represents the regression coefficient of X vs. Y (without the mediator M in the model). Moreover, 95% BootCI represents the 95% confidence interval calculated from the bootstrap sampling. As can be seen from the data in table, 95% of the BootCI of $a \times b$ does not include the number 0 (significant), and c is significant, therefore risk attitude plays a partially mediating role in the influence of epidemic risk perception on willingness to consume products from restaurants. This supports H4 of this study. As shown in Figure 1 below.

Table 8. Results of the first mediator test.

Variables	c Total Effect	a	b	$a \times b$	$a \times b$ (95% BootCI)	c'	Test Conclusion
Epidemic risk perception=>risk attitude=> willingness to consume products from restaurants	-0.204 **	0.257 **	-0.464 **	-0.119	-0.222~-0.122	-0.085 **	Partial mediation

** $p < 0.01$.

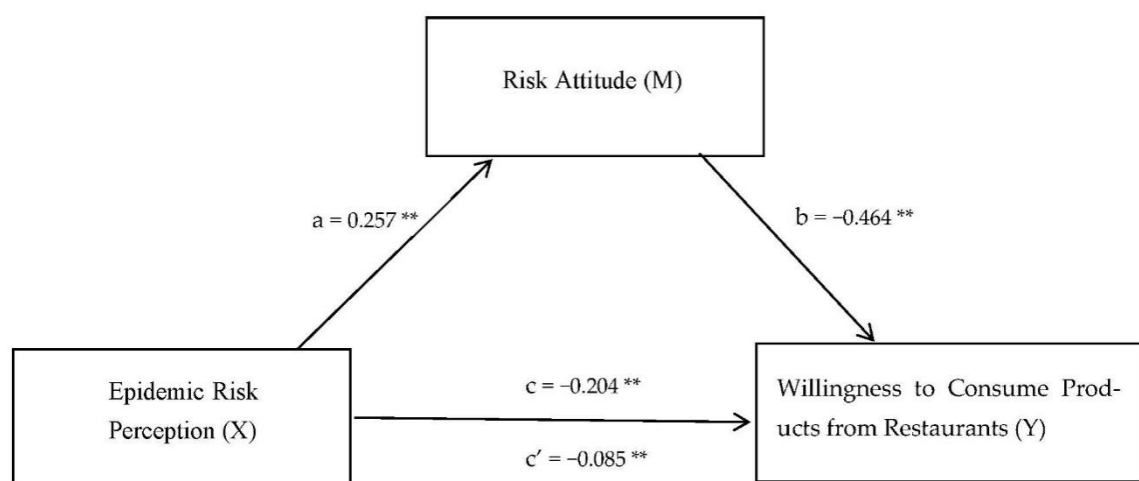


Figure 1. The mediating effect of risk attitude in the relationship between epidemic risk perception and willingness to consume products from restaurants. Notes: ** $p < 0.01$; all presented effects are standardized; a is effect of Epidemic Risk Perceptions on Risk Attitude; b is effect of Risk Attitude on Willingness to Consume Products from Restaurants; c' is direct effect of Epidemic Risk Perceptions on Willingness to Consume Products from Restaurants; c is total effect of Epidemic Risk Perceptions on Willingness to Consume Products from Restaurants.

5. Discussion

The outbreak of COVID-19 makes us more deeply examine the development of the restaurant industry and its own problems. Compared with previous studies, this study, based on the background of the COVID-19 coronavirus pandemic, studies the causes of severe losses in the restaurant industry from the perspective of consumers. The concepts of epidemic risk perception, risk attitude, and willingness to consume products from restaurants were introduced, thereby a new research perspective was obtained. We aimed to investigate the impact of changes in consumers' perception of epidemic risk and risk attitudes on their willingness to spend in restaurants in the context of the COVID-19 pandemic. The results showed that the change of risk perception and risk attitude had a significant effect on consumers' willingness to consume products from restaurants, and that risk attitude played a mediating role in the relationship.

First of all, from the measurement of epidemic risk perception, the outbreak has significantly increased the risk perception of the majority of the population. These results are similar to those from a recent study in the United States that showed a rapid increase in risk perception for COVID-19 over a short time period [64]. Meanwhile, consumers' epidemic risk perception significantly reduced their willingness to consume products from restaurants. The first hypothesis of the study is accepted according to the results shown. This concurs with Yenerall, who investigated the effects of risk aversion and risk perception associated with dining in restaurants on restaurant utilization and expenditure during the initial reopening phase of the COVID-19 pandemic by using linear regression and the Cragg model. Consistent with economic theory, risk aversion and perception decreased the use of in-person restaurant services and increased the probability of using take-out and delivery [9]. Restaurant companies need to make an image and publicity effort during the outbreak to convince consumers that their products and services are sufficiently safe. Elizabeth Yost, integrating the affective decision-making framework, meta-theoretic model of motivation, and optimistic bias theory, proposed a theoretical scheme for understanding constructs that affect consumer motivation while considering the significance of consumers' risk perceptions of the novel coronavirus disease, suggesting that restaurants who accumulated more customer trust by fostering transparency are likely to have more business and quickly recover from the shock [65].

Secondly, the measurement of risk attitude shows that the outbreak of the epidemic will make the risk attitude of consumers toward restaurant consumption increase rapidly in a short time, and there is a positive correlation with the perception of epidemic risk. The second hypothesis of the study is accepted according to the results shown. This result is consistent with a study on the effect of the epidemic situation on healthcare workers' risk perception and their attitude towards epidemic situation, that is, there is a positive correlation between epidemic risk perception and risk attitude [66]; a similar finding was found in another study that looked at men's attitudes about their skin cancer risk [67]. Pang, SM, determined the factors that influence the purchase intention of organic food in Malaysia by applying the theory of planned behavior and the protection motivation theory, and the results showed that perceived vulnerability, response efficacy, self-efficacy, subjective norm, and attitude affect purchase intention towards organic food, as consumers were more likely to have a positive attitude towards organic food when they have adequate information on their vulnerability to a threat and its consequences [68]. Restaurant enterprises should take appropriate service methods to reduce the risk attitude of consumers, such as providing a take-out service and improving the dining environment in the restaurant.

Finally, the measurement of willingness to consume products from restaurants shows that the occurrence of the epidemic has significantly reduced the consumers' willingness to consume products from restaurants and has had a significant negative correlation with epidemic risk perception and risk attitude. In addition, risk attitude plays a partially mediating role in this relationship, that is, epidemic risk perception can directly lead to the decline of consumers' willingness to consume products from restaurants; it can also affect the risk attitude of consumers and indirectly make consumers less willing to spend

on restaurants. The third and fourth hypothesis of the study is accepted according to the results shown. This finding is consistent with a study on consumer perceptions of pesticide use, where there is a negative correlation between consumer risk perception and risk attitudes towards the use of pesticides and whether they buy agricultural products using pesticides [69]; a study on the impact mechanism of consumers' willingness to buy electric vehicles has similar results [70].

6. Conclusions

Against the backdrop of the COVID-19 outbreak, this study considered epidemic risk perception as an independent variable and risk attitude as mediator variable, and performed statistical analysis based on questionnaire responses. On examining the effects of epidemic risk perception on willingness to consume products from restaurants and the mediating effect of risk attitude, the following empirical results were obtained: consumers' perception of epidemic risk has a significant negative effect on consumers' willingness to consume products from restaurants; consumers' perception of epidemic risk has a significant positive effect on their risk attitude; consumers' risk attitude has a significant negative effect on their willingness to consume products from restaurants; and risk attitude mediates the influence of consumers' epidemic risk perception on their willingness to consume products from restaurants. Our research helps to better understand the underlying mechanisms by which outbreaks lead to serious losses in the restaurant industry. Studies of the relationship between epidemic risk perception, risk attitudes, and willingness to consume products from restaurants can also be considered a very primitive aspect, since many of the previous studies analyze the relationship with only one or two variables at the same time.

The findings of this study can be useful for the restaurant industry to carry out risk prevention and resume production in an orderly manner under the COVID-19 outbreak condition to achieve normalization, promoting the sustainable and healthy development of restaurant industry and contributing to the health and human well-being policies of the United Nations' sustainable development goals (SDG3) and to halving food waste at retail and consumption levels by 2030 (SDG12.3) [5,6].

From the point of view of epidemic risk perception, the managers should first properly deal with the epidemic publicity work. The increased degree of epidemic risk perception is the primary reason for the decrease in consumers' willingness to consume products from restaurants. If consumers are fully informed of the specific information about the epidemic and the efforts made by the restaurant industry to deal with the epidemic, it will help reduce consumers' risk perception of the epidemic, and thus ease the reduction in consumers' willingness to consume products from restaurants. This requires the efforts of both governments and enterprises.

From the point of view of risk attitude, enterprises can change the risk attitude of consumers by changing the way of service. This can be done by improving the dining environment in the restaurant, installing cubicles, strictly standardizing the workflow of the staff, ensuring the health and safety of the whole process, launching new business ventures such as take-out, reducing the risk of consumers, and changing consumer preferences for the consumption of products from restaurants. Enterprises also can enhance customers' sense of security and maintain consumers' willingness to consume at restaurants by strengthening health and safety measures. These may include the registration of customers in stores, the measuring of body temperature and disinfection, the establishment of special infection prevention and control teams, the implementation proper disinfection measures, and the guarantee of daily health testing of staff and sanitary management regulations. These measures can put consumers' worries to rest and influence them to pay for restaurant consumption during the COVID-19 outbreak.

Finally, after the COVID-19 epidemic, consumers began to prioritize health and safety over cost and convenience. They are particularly concerned about the transparency of food safety and restaurant operations, and food delivery services are also becoming more

popular. In this context, increased transparency in backstage restaurant operations is critical to attracting customers and improving their perception of safety. These goals can be achieved through various marketing channels such as social media and online review sites that display information about a restaurant's processes, including food preparation and cooking.

7. Limitations and Future Research

There are some limitations in this study. First, this study did not use a more detailed stratification of the sample to compare whether there are differences in epidemic risk perception, risk attitude, and willingness to consume products from restaurants among different age groups, different gender groups, and different income levels. Secondly, our research lacks diachrony. Furthermore, we can test whether the relationship among epidemic risk perception, risk attitude, and willingness to consume products from restaurants changes over time by multiple measurements. A final limitation of this study is that the study participants were all from China, therefore these results and models should be validated by further expanding the sample to other regions. Subsequent work could further break down the study subjects, for example, whether there are differences in the prediction of consumers' willingness to consume products from restaurants among different regions or different populations in terms of epidemic risk perception and risk attitude, and a comparison of before and after the epidemic to study the epidemic risk perception and risk attitude factors to consumers' willingness to consume products from restaurants will predict whether there will be changes.

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