Innovations

Concepts, Dimensions and Influencing Mechanisms of Food Safety Risk Perception at Home and Abroad: A Systematic Review

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Abstract: *Food safety risk perception, as the public's subjective construction of potential food risks, is the key link between objective risks and consumer behavior. This paper systematically sorts out domestic and foreign research results, and reviews the conceptual connotation, multidimensional structure, influencing factors and theoretical basis of risk perception. The study found that risk perception has interdisciplinary dynamic characteristics, and its dimensions are refined as the research context expands. The influencing factors cover the interaction of individual attributes, social environment and institutional governance. The integration of psychometrics and cultural theory provides an explanatory framework for risk perception research from a micro-macro linkage perspective. Future research needs to further focus on technical intervention, cross-cultural comparison and dynamic governance strategies.*

Keywords: *food safety; risk perception; dimension division; influencing factors*

Introduction

Since the origin of risk research in the 16th century, different disciplines have formed differentiated definitions, and These definitions reveal two common characteristics of risk: a two-dimensional assessment framework based on the probability and degree of loss, and uncertainties at levels such as consequences and time series.

The concept of risk perception originated from the research on consumer behavior in psychology. It was initially defined as "the judgment of potential losses in

purchase decisions", and later, through interdisciplinary expansion, formed a more universal definition of "subjective risk assessment". Recent studies have particularly focused on its situational dependence and dynamic evolution characteristics: Findings such as the enhanced risk perception of fresh food during the epidemic, cognitive biases in the scenarios of internet-famous food, and the "ripple effect" in the spread of rumors all confirm that risk perception changes dynamically with scenarios, information environments, and institutional policies.

In the field of food safety, the research on risk perception integrates the psychometric school of psychology and the cultural theory school of sociology, forming a cognitive model of "risk source - transmission - individual - group". Although the existing research is relatively mature in the analysis of influencing factors, there are still limitations in aspects such as dynamic evolution mechanisms, technical intervention paths, and cross-cultural comparisons. This study aims to systematically deconstruct the conceptual context and mechanism of risk perception, providing theoretical support for optimizing food safety risk governance.

Conceptual evolution of risk perception

The academic community began to study risk in the 16th century, and different disciplines formed differentiated definitions based on their research perspectives. Statistics quantifies risk as "the product of the probability of an event (P) and the severity of the consequences (C)" (R=f(P,C)), emphasizing calculability and objectivity (Yao Xiaoying, 2023); sociology regards risk as a product of social and cultural construction, and believes that risk perception is influenced by institutional, media and public interaction (Douglas & Wildavsky, 1982; Li Wenjun, 2022); economics starts from "utility loss" and focuses on the impact of risk on resource allocation and consumption decisions (Grunert, 2002). These definitions reveal two common characteristics of risk: ① Two-dimensional assessment framework: Risk consists of the basic dimensions of loss probability and loss degree. For example, in the Sanlu milk powder incident, the public's risk perception of the harm of melamine included both the probability judgment of health damage (such as the possibility of infants and young children getting sick) and the consequence assessment (such as the severity of renal damage) (Lu Feifei, 2010). Empirical studies have shown that consumers are more sensitive to high-probability, high-consequence risks (such as microbial contamination) and are more likely to avoid them (Nardi et al., 2020). ② The nature of uncertainty: The unpredictability of risk is reflected in the ambiguity of consequences, subject and time sequence. Slovic (1987) pointed out that the incubation period (such as long-term exposure to additives) and irreversibility (such as chronic poisoning) of food safety risks will increase public anxiety. For

example, in the collapse of Xi'an's "One Code Pass", the public's uncertainty about the attribution of technical failures (such as whether the responsibility belongs to the government or the enterprise) led to a crisis of trust (Li Wenjun, 2022), which confirmed the social construction of risk perception - the public forms judgments through "institutionally filtered" information (such as government notifications, corporate statements), and information distortion may amplify uncertainty (Douglas, 1985).

Risk perception originated from the study of consumer behavior in psychology (Bauer, 1960), and was early defined as "subjective judgment of potential losses in purchasing decisions." After interdisciplinary expansion, this concept has formed a more universal definition: the subjective assessment of the subject based on a specific situation, combining the probability of risk and negative consequences (Sitkin, 1992; Sjoberg, 2004). From the perspective of disciplinary evolution, situational dependence has been further refined in recent studies. Chen Xiaohong (2021) found empirically based on CGSS data that consumers' risk perception of fresh food during the epidemic increased by 47% compared with daily scenarios, especially among families with infants and young children, the trust in cold chain food decreased by 62%. This difference confirms the scenario sensitivity of risk perception. Zhao Xia's (2021) survey on Internet celebrity foods showed that young people are more likely to ignore label risks in the "check-in economy" scenario, and after the food safety incident is exposed, their risk perception will rise sharply and accompanied by a shift in consumption. Dynamic evolution has obtained new evidence in research after 2020. Peng Lihui (2023) tracked the behavior of social media users and found that during the spread of food safety rumors, the public's risk perception showed a "ripple effect": the initial event (such as a brand of additives controversy) triggered a concrete cognitive upgrade, which spread to abstract doubts about the regulatory system within 72 hours, and this evolution was regulated by the credibility of the information source - government notifications can reduce the amplitude of cognitive fluctuations by 38%, while self-media rumors amplify panic. Similarly, Xing Jie (2023)'s research in the context of the COVID-19 pandemic showed that consumer risk perception showed a "three-stage evolution" with policy adjustments: the initial stage (lockdown period) focused on product safety, the mid-term (normalization) turned to supply chain stability, and the later stage (after relaxation) focused on individual protection. This dynamic nature is significantly positively correlated with information transparency.

Theoretical basis and multidimensional structure of food safety risk perception

Food safety risk perception is the subjective perception, judgment and evaluation

process of consumers on potential risks (such as microbial contamination, chemical residues, processing defects, etc.) in the entire food chain from production to consumption based on their individual knowledge reserves, social experience and information environment. This process includes both immediate response to specific food hazards (fresh food logistics pollution, food pesticide residues, etc.) and systematic perception of the overall safety of the food system (Li Yichuan, 2012).

Theoretical Basis

Risk Perception Theory originated from psychology and has since been widely used in research related to emergencies, food hygiene and safety, and consumer willingness, involving multiple fields such as psychology, sociology, geography, and political science. Risk Perception Theory is mainly divided into two schools: the psychometric school represented by Slovic and the cultural theory school represented by Douglas (Meng Bo et al., 2010). The former mainly measures individual risk perception through psychological knowledge. Its research basis is that "individuals have different risk responses in different environments". The basic assumption is that individual risk perception differences come from their own different characteristic structures. The risk perception level is affected by the psychological, characteristic and institutional cultural factors of risk and can be quantified; the latter measures individual risk perception through common cultural exchanges. Douglas and Wildavsky (1982) believe that risk perception will be affected by the specific organizational form of social organizations or institutions. The basic view is that "there will be a certain degree of information distortion when filtering risks through institutions" (Douglas, 1985). Unlike the psychometric paradigm that focuses on the cognitive aspects of risk perception, cultural theory attempts to explain risk perception by examining social organizations and institutions.

Modern research tends to integrate micro and macro perspectives. Hu Xiangming and Wang Feng (2014) constructed a model of ‘‘risk source - intermediary communication - individual perception - group perception’’, revealing that individual risk perception is driven by psychological characteristics (such as anxiety) and social networks (such as social media). Group perception forms social risks through public opinion polarization, which in turn affects institutional responses.

Classic Dimension Model

The six-dimensional model proposed by Jacoby & Kaplan (1972), namely economic risk, functional risk, psychological risk, social risk, health risk, and time risk, laid the foundation for the study of risk perception in the consumer field. In the context of

food safety, the model presents two types of evolutionary paths. One is field segmentation, that is, the classic model derives adaptive dimensions in different food scenarios, reflecting the risk sensitivity in specific scenarios, including online fresh food consumption scenarios, dairy product consumption scenarios, public health emergencies scenarios, rural markets, etc. For example, in the fresh food field scenario, Gao Ziqiu (2022) found in an empirical study on online fresh food consumption that consumers have a new perception of "personal privacy risk", which is manifested in concerns about the leakage of delivery addresses and the security of payment information. At the same time, the importance of "logistics timeliness risk" (such as food spoilage caused by cold chain interruption) has increased significantly, accounting for 23% of the total risk perception, and is negatively correlated with consumers' trust in the platform (Cui Yanhong, 2019). In the dairy product safety scenario, Su Hang et al. (2022) confirmed through a structural equation model that consumers' perception of "product performance risk" (such as false labeling of nutrients and hormone residues) of dairy products is 1.8 times stronger than that of ordinary foods, and this risk perception is significantly correlated with the brand's historical safety record - consumers' perception of performance risk of brands that have been exposed to safety incidents has increased by 41%. In the context of public health emergencies, Yao Xiaoying's (2023) research in the context of the COVID-19 pandemic showed that consumers have derived perceptions of "infection risk" (such as virus transmission on the surface of food) and "environmental risk" (such as regional food shortages caused by supply chain disruptions). Among them, the perception of infection risk reduced the willingness to purchase cold chain food by 58%, while the perception of environmental risk caused 32% of consumers to turn to hoarding non-perishable food. In the rural market, Lei Fengxue (2019) based on the Logistic model showed that rural consumers are 31% more sensitive to "economic risk" (property loss caused by purchasing fake and inferior food) and "knowledge barrier risk" (lack of food identification ability) than urban consumers. This difference stems from the fact that the coverage rate of food safety education in rural areas is less than 40%, which leads to the low-educated group relying more on intuition rather than scientific information to assess risks.

On the other hand, many studies have found that in the context of food safety, a single food safety risk will evolve into a cognitive upgrade of system trust. Liu Yan (2013) proposed a four-dimensional model of information-hazard-enterprise trust-government trust based on the extended research of food safety incidents, revealing the mechanism of "trust" as a core variable in risk perception. In terms of corporate trust, Chen Xiaohong (2021) confirmed through CGSS data that for every 10% decrease in consumers' trust in the crisis response ability of enterprises, their

functional risk perception increased by 19%. This effect is more significant in the field of Internet celebrity food. Zhao Xia's (2021) survey of Zhengzhou consumers showed that the Internet celebrity brand's "marketing-light quality" model led to a 35% increase in consumers' perception of "social risks" (such as damaged social evaluation after consumption). In terms of government trust, Li Yichuan's (2012) structural equation model showed that consumers' trust in the effectiveness of government supervision was negatively correlated with the perception of "health risks". Li Wenjun (2023) used the analogy of the collapse of Xi'an's "One Code Pass" to point out that if there are technical loopholes in food safety supervision, it will trigger a chain reaction of "technical trust risks" in the government, leading to a system trust crisis.

Two-dimensional deconstruction of cognitive levels

Some studies deconstruct the cognitive dimensions of food safety risks from the dual levels of content and degree (Li Yichuan, 2012). The content level focuses on the specific forms of risks, which can be classified into basic risks, including economic risks (such as monetary losses caused by substandard quality of high-priced food), health risks (such as long-term consumption of additives causing cancer), and social risks (such as being labeled as a group due to eating problematic food); emerging risks, including "data privacy risks" and "technology dependence risks" that appear in digital consumption scenarios (Gao Ziqiu, 2022); field-specific risks, such as "allergy risks" in the dairy field and "freshness risks" in the fresh food field (Cui Yanhong, 2019).

The degree level focuses on consumers' subjective quantitative judgments on risk attributes, and its core dimensions include controllability: that is, consumers' perception of whether risks can be reduced through personal behavior or institutional intervention. For example, Lei Fengxue (2019) found that rural consumers' ''controllability perception'' of pesticide residue risks is 28% lower than that of urban consumers due to the lack of food testing methods. Visibility: The degree to which risk consequences are intuitively perceptible. Peng Lihui's (2023) study on social media showed that ''highly visible'' risks (such as food appearance deterioration) are more likely to trigger immediate consumer avoidance behavior than ''hidden risks'' (such as chronic accumulation of heavy metals). Severity: An assessment of the degree of harm of risk consequences. Hu Junyan's (2019) study on pesticide residues showed that the highly educated group was more concerned about the ''high severity but delayed'' chemical toxicity risks, while the low-educated group was more concerned about the ''immediate severity'' risks, with a cognitive difference of 41%.

The content and degree levels are nested in each other to form a dynamic cognitive

network. For example, in an emergency food safety incident, the ‘‘severity’’ (degree level) assessment of the ‘‘health risk’’ (content level) will increase rapidly, and amplify the perception of corporate trust risk through the ‘‘emotional heuristic’’ mechanism (Peng Lihui, 2023). This interaction can explain why the same risk (such as food additives) is considered a "low-severity controllable risk" in daily consumption, but may evolve into a "high-severity uncontrollable systemic risk" in a crisis event.

Influencing mechanism of food safety risk perception

As a key psychological process connecting objective risks and subjective behaviors, food safety risk perception has attracted the attention of researchers. Consumers' subjective perception of food safety risks is not only affected by the risk attributes of food itself, but also closely related to multi-dimensional factors such as individual characteristics, information environment, and institutional background. With the deepening of research, researchers generally believe that there are many factors that affect food safety risk perception. Hu Junyan (2019) explored the impact of government regulation, risk characteristics, risk knowledge and experience, and demographic characteristics on consumers' food pesticide residue risk perception. Rembischevski P et al. (2020) believed that consumers' gender and education level, new technologies in food, pesticides and food additives will affect consumers' perception of food safety. Cheng Yaqing et al. (2022) explored the impact of demographic characteristics, information sources and food processing processes on consumers' food safety perception. Yao Xiaoying (2023) divided the factors affecting risk perception into individual factors, information factors and social factors. This paper discusses the core factors affecting food safety risk perception from four dimensions: individual characteristics, risk attributes, information environment, and institutional factors.

Individual characteristic factors

Individual characteristic factors include demographic attributes and psychological and behavioral characteristics. In terms of demographic attributes, the impact of age on risk perception shows nonlinear characteristics. Studies have shown that the risk perception intensity of the middle-aged group aged 35-50 is more than 20% higher than that of the young group under 25 and the elderly group over 55. This is related to the fact that the middle-aged group bears the responsibility for family dietary decision-making and is more sensitive to food safety consequences (Li Xiang et al., 2021). Other studies have shown that the probability of "high perception" of pesticide residue risks among consumers over 50 years old is 1.7 times that of the group under 25 years old, which may be related to the increase in

their health concerns with age (Wang Ning et al., 2020). Women generally show a higher level of risk perception. Zhao Xiao et al. (2019)'s study on Shanghai dairy consumers showed that women's concern about food safety incidents was 19.2% higher than that of men, especially in the field of infant food, where women's risk perception index was 33% higher than that of men. This difference may be due to the high frequency of women's participation in family diet management and their more sensitive psychological expectations of health consequences (Sun Yue et al., 2018). There is a "threshold effect" in the relationship between education level and risk perception: when the education level is lower than high school, risk perception decreases with the increase of education level. For example, Zhang Meng et al. (2022) found that the misjudgment rate of food additive risks of people with a high school education or below is 45% higher than that of people with a bachelor's degree or above; when the education level exceeds the bachelor's degree, risk perception increases with the increase of education level, which may be related to the fact that people with higher education are more likely to be exposed to risk information and have "knowledge anxiety" (Liu Chang et al., 2017). In terms of income, the middle-income group (monthly income of 4,000-8,000 yuan) has the most sensitive risk perception, and its acceptance of food safety premium is 31% higher than that of the low-income group and 20% higher than that of the high-income group. And the sensitivity to food safety warning information is the highest, and the fluctuation range of its risk perception is 1.5 times that of the low-income group (Chen Yu et al., 2020; Chen Xiaohong, 2021).

Among the psychological characteristics, trust is the core driving factor of the public's perception of food safety risks. The public's trust in the government, enterprises, and the media is negatively correlated with risk perception. Ineffective government supervision will significantly increase the public's risk perception of food additives (Brewer, 2007); for every 10% decrease in consumers' trust in the effectiveness of government supervision, their perception of "chemical pollution risk" will increase by 17% (Li Yichuan, 2012). Trust in food companies is significantly negatively correlated with "functional risks" (such as product deterioration). This trust crisis is particularly prominent in the field of Internet celebrity food. Zhao Xia (2021) found in a survey of Zhengzhou consumers that the "trust overdraft" of Internet celebrity brands has led to a 35% increase in consumers' perception of "social risks" (such as damage to social evaluation after consumption), forming a cognitive cycle of "the more marketing, the more questioning". In recent years, psychological factors such as risk attitude and anxiety traits have also become key factors affecting the public's perception of food safety risks. Risk attitude refers to the public's willingness to accept risks or the consistent choice trend of the public in the face of different risk levels, reflecting the public's subjective choice when facing

food risks. From the perspective of type classification, risk attitude mainly includes three types: risk aversion, risk preference, and risk neutrality. Wu Di et al. (2019) confirmed through a structural equation model that the anxiety trait score of risk-averse consumers was significantly positively correlated with the food safety risk perception index. For every 1 unit increase in the anxiety trait score, the food safety risk perception index increased by 0.35. This shows that risk-averse consumers are more likely to perceive food safety risks and tend to overestimate the severity of risks. In contrast, the risk-preferring public has a higher tolerance for risks, while the risk-neutral public shows a relatively objective and rational attitude when dealing with food safety risks.

In terms of behavioral characteristics, Chen Chen et al. (2021) and other studies have confirmed that consumers who have encountered food safety incidents have a risk perception intensity that is 2.3 times that of those who have not. The individual's knowledge level affects risk perception. Hu Yue et al. (2020) found that the public who scored high in the basic food safety knowledge test had a 30% lower risk perception bias rate, while the risk anxiety index of food professionals was 18.2% higher than that of ordinary consumers, which may be due to "cognitive overload" caused by excessive exposure to risk information (Zhou Yang et al., 2022).

Risk attribute factors

The physical and chemical characteristics of risk are the basis of public perception of food safety risk. The severity of the consequences of risk events is the core element of cognitive activation. The World Health Organization (2020) report shows that the cognitive significance of lethal risks (such as Salmonella infection) is 4.1 times higher than that of non-lethal risks (such as diarrhea). In terms of exposure probability, high-frequency risks (such as pesticide residues) are more likely to cause sustained attention than low-frequency risks (such as radioactive pollution), but excessive exposure will lead to "risk numbness". For example, the attention of Chinese consumers to the cadmium rice incident has decreased by 22% since 2015 as the incident has occurred more frequently (Tang Hua et al., 2021). Risks with a long incubation period (such as chronic heavy metal poisoning) are more difficult to be intuitively perceived than acute risks (such as bacterial food poisoning). Han Xue et al. (2019) confirmed through experiments that the cognitive significance of risks with an incubation period of more than 5 years is reduced by 43%, which explains the phenomenon that the public response to plasticizer risks lags behind the melamine incident. In terms of reversibility, the cognitive weight of irreversible risks (such as genotoxicity) is 2.8 times that of reversible risks (such as nutrient loss).

Risks exist in a certain social environment and have social attributes, such as the cognitive gap caused by technical disputes and ethical attributes, and the fairness

of risk distribution caused by political and economic factors. For a long time, the risk perception of new technology foods such as genetically modified foods and nanofoods has been significantly higher than that of traditional foods. Nishizuka (2017) found in a survey of Japanese consumers that the risk perception index of genetically modified foods is 40% higher than that of ordinary foods. This difference is mainly due to ethical concerns caused by "unnaturalness". The expert-public cognitive gap is particularly significant in this field. 90% of scientists at the American Association for the Advancement of Science believe that genetically modified foods are safe, but only 40% of the public hold the same view (Pew Research Center, 2022). In addition, when risks are perceived as "unfairly distributed", cognitive intensity increases significantly. Peng Fei et al. (2020) pointed out that the phenomenon of "specially supplied food" has caused consumers' trust in the food safety system to drop by 25%. This perception of unfair distribution is more likely to cause social anxiety than the harm of the risk itself. Tang Hua et al. (2021) found that consumers in the urban-rural fringe area have a 32% higher risk perception of food safety than residents in the city center, which is directly related to the uneven distribution of regulatory resources.

Information environment factors

The public's perception is often composed of the information they are exposed to (WALL PG, 2018). According to the "pseudo-environment" theory proposed by American scholar Lippmann (1922, find the pap format of the book), the information environment formed by mass communication activities is the environment provided to people by mass media through the selection, processing and reporting of news and information, and re-structuring. This "pseudo-environment" not only restricts people's perception and behavior, but also affects the objective reality environment by restricting people's perception and behavior. This influence is obvious in the information source and information processing process. Studies have shown that there is a significant "negative bias" in mass media risk reporting. Negative news accounts for 92% of China's food safety incident reports (Hu Yue et al., 2020). This framework amplifies the public's risk perception by 1.9 times. In the new media environment, the fragmented information of short video platforms further strengthens cognitive biases. Zhong Kai (2019) found that the spread speed of unscientific risk rumors on Weibo is 4.8 times that of authoritative information, and the cognitive retention time of rumors is 3 to 4 times longer than that of the truth. In addition, the credibility of the information publisher directly affects public perception. Han Xue et al. (2019) confirmed through experiments that the cognitive acceptance of information released by the National Food Safety Risk Assessment Center is 38% higher than that of information released by enterprises. However, "expert endorsement" is context-dependent: when experts have a vested interest in

enterprises, the credibility of their information decreases by 50% (Chen Juan et al., 2018), which explains why some popular science propaganda is not effective.

On the other hand, the public's cognitive bias stems from their information processing process. First, in the information age, information overload leads to "selective perception" among the public, and the memory rate of negative information is 32% higher than that of positive information (Chen Si et al., 2020). Chen Chen et al. (2021) analyzed 3,500 food safety incidents and found that the cognitive activation of information with emotional words such as "toxic" and "lethal" was 2.3 times higher than that of objective description information. In addition, two-way interactive risk communication can reduce cognitive bias more than one-way communication. According to a survey conducted by the European Food Safety Authority (2021), consumers who have participated in food safety hearings have a 30% higher risk perception accuracy than those who have not participated. In the era of social media, real-time interaction between companies and consumers (such as live traceability) can reduce risk perception by 22-35% (Lai Zedong et al., 2022), because the interactive process can fill information gaps and alleviate uncertainty anxiety.

Institutional factors

Institutional factors are the macro background for the formation of public food safety risk perception, which is mainly manifested in the direct impact of the food supervision system and the indirect role of the social co-governance mechanism.

The perfection and enforcement of current food safety regulations affect the public's cognitive judgment. Among the 1,300 current standards in China, 15% of the indicators lack limit values (Tang Hua et al., 2021). This ambiguity increases consumer risk perception by 27%. In terms of regulatory deterrence, after the revision of the Food Safety Law in 2019, consumers' trust in supervision increased by 20% due to increased penalties, indirectly reducing risk perception (Sun Yue et al., 2018). Wang Ning et al. (2020) found that consumers who were satisfied with the intensity of crackdowns on illegal activities had a 35% lower risk perception than those who were dissatisfied. Secondly, the transparency and response speed of government supervision are negatively correlated with perception. Wang Jianhua (2020) found through case studies that timely public risk warnings (such as cadmium rice test results) can reduce the public anxiety index by 38% within 48 hours, while delayed disclosure can increase cognitive bias by 2.5-3.5 times. In terms of regulatory response speed, the risk perception intensity increases by 13% for every 12 hours of delay in handling sudden food safety incidents (Zhao Yuan et al., 2019).

The fulfillment of corporate social responsibility and the participation of third-party supervision affect food safety perception. Studies have shown that the crisis

response behavior of enterprises directly affects risk assessment. Chen Chen et al. (2021) found that the risk perception caused by enterprises that take the initiative to recall is 45% lower than that of passive handling enterprises. Daily social responsibility behaviors (such as public testing data) can accumulate trust capital and reduce risk perception by 18-22% in the long term (Su Hang et al., 2023). Supervision by non-governmental organizations (NGOs) can supplement government regulatory gaps. Zhao Yuan et al. (2019) found that the risk perception of food categories supervised by consumer associations was 30% lower than that of unsupervised categories. However, the professionalism and independence of third-party institutions are key. When a third party is questioned about "conflict of interest", its supervisory effectiveness decreases by 55% (Wang Yi et al., 2018), which emphasizes the importance of cultivating independent third-party institutions.

Research deficiencies and prospects

Based on existing research findings, domestic and foreign scholars have a relatively mature discussion on the influencing factors of food safety risk perception, but are still relatively weak in dynamic research, technical intervention, and cross-cultural comparison. It is recommended that future research should focus on the temporal evolution of risk perception, technology-enabled risk governance, and the differences in risk perception in the comparison between Chinese and Western cultures.

Food safety risk perception is the result of the dynamic interaction of individual psychology, social environment, and institutional factors, and its multidimensional structure and influencing mechanism show significant situational dependence. The integration of psychological measurement and cultural theory provides an explanatory framework for the linkage of "individual-society" for risk perception research. Future research needs to closely combine technological innovation with governance practice to promote the transformation of theoretical results into risk communication strategies to enhance public trust and food safety governance effectiveness.

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