Bulletin of Chinese Academy of Sciences

Volume 35 | Issue 3 Article 6

March 2020

Proposals for Coping with "Psychological Typhoon Eye" Effect Detected in COVID-19

XU Mingxing
CAS Key Laboratory of Behavioral Science, Institute of Psychology, Chinese Academy of Sciences, Beijing 100101, China; School of Transportation, Fujian University of Technology, Fuzhou 350118, China

See next page for additional authors

Abstract

Psychological typhoon eye (PTE) effect describes the public's irrational panic and response to major emergencies. This phenomenon is reported and named by LI Shu and his colleagues after the Wenchuan earthquake. During the outbreak of COVID-19 in 2020, we conducted a worldwide survey to investigate the safety concerns and risk perception of the COVID-19 epidemic from participants staying in five areas of different levels of risk (high-risk, moderate and high-risk, moderate-risk, low-risk, and very lowrisk areas). This effect appears to hold for COVID-19. Specifically, participants staying abroad showed more safety concerns or fears of the COVID-19 epidemic than participants staying in China. The people at zero distance were at the center of the PTE and were the most calm. On the basis of the cumulative findings on the PTE, we propose four targeted solutions for individuals and organizations with the power of discourse to improve the quality of risk communication and management.

Keywords

COVID-19; psychological typhoon eye effect (PTE); ripple effect; safety concerns; risk perception

Authors

XU Mingxing, ZHENG Rui, RAO Lilin, KUANG Yi, YANG Shuwen, DING Yang, LI Jianglong, and LI Shu

Corresponding Author(s)

LI Shu [1,2*]

1 CAS Key Laboratory of Behavioral Science, Institute of Psychology, Chinese Academy of Sciences, Beijing 100101, China

2 Department of Psychology, University of Chinese Academy of Sciences, Beijing 100049, China

LI Shu Chair of Academic Committee of Institute of Psychology, Chinese Academy of Sciences (CAS) & Department of Psychology, University of Chinese Academy of Sciences, Editor-in-Chief of *Acta Psychologica Sinica*, Founding President of Committee of Psychology in Decision Making, Chinese Psychological Society, and Chair of Scientific Committee of International Congress of Applied Psychology (ICAP) 2022. His research has been founded by several prestigious foundations such as National Basic Research Program of China (973 Program) and the Major Projects of the National Social Science Foundation of China. He published his research both in Chinese and English which has appeared in over five-dozen of journals such as *Psychological Science*, *Journal of Experimental Psychology*: *General*, and *Acta Psychologica Sinica*. He is the author of the academic book 'An Equate-to-Differentiate Way of Decision-Making'. His research featured in major media outlets such as *ScienceNet*, *Sina*, *Sohu*, *Hexun*, and *The Washington Post*. E-mail:lishu@psych.ac.cn; s.li@UNSWalumni.com

Citation: XU Mingxing, ZHENG Rui, RAO Lilin, KUANG Yi, YANG Shuwen, DING Yang, LI Jianglong, LI Shu. Proposals for Coping with "Psychological Typhoon Eye" Effect Detected in COVID-19 [J]. Bulletin of Chinese Academy of Sciences, 2020 (3): 273–282.

Proposals for Coping with "Psychological Typhoon Eye" Effect Detected in COVID-19

XU Mingxing[1,4], ZHENG Rui[1,2], RAO Lilin[1,2], KUANG Yi[1,2], YANG Shuwen[1,2], DING Yang[1,2], LI Jianglong[3], LI Shu[1,2]

1. CAS Key Laboratory of Behavioral Science, Institute of Psychology, Chinese Academy of Sciences, Beijing 100101, China;
2. Department of Psychology, University of Chinese Academy of Sciences, Beijing 100049, China;
3. School of Economics and Management, University of Chinese Academy of Sciences, Beijing 100190, China;
4. School of Transportation, Fujian University of Technology, Fuzhou 350118, Fujian Province, China;

Abstract: "Psychological typhoon eye" (PTE) effect describes irrational public panic about and response to major emergencies. This phenomenon is reported and named by LI Shu and his colleagues after the Wenchuan earthquake. During the outbreak of COVID-19 in 2020, we conducted a worldwide survey to investigate the safety concerns and risk perception of the COVID-19 pandemic from participants staying in five areas of different levels of risk (high-risk, moderate to high-risk, moderate-risk, low-risk, and very low-risk areas). This effect appeared to hold for COVID-19. Specifically, participants staying abroad showed more safety concerns or fears of the COVID-19 pandemic than participants staying in China. The people at zero distance were at the center of the PTE and were the calmest. On the basis of the cumulative findings on the PTE, we proposed four targeted solutions for individuals and organizations with the power of discourse to improve the quality of risk communication and management.
DOI: 10.16418/j.issn.1000-3045.20200226001-en

Keywords: COVID-19; psychological typhoon eye (PTE) effect; ripple effect; safety concerns; risk perception

In January 2020, the COVID-19 pandemic broke out in Wuhan city, Central China, and then swept across the country within a short time. The strong contagious nature and the unknown cause and pathogenesis of COVID-19 all subject its prevention and control to unprecedented challenges. During the pandemic, panic and fear are humans' instinctive response to various hazards lurking in surroundings. It is worth noting that, according to previous findings, objective hazards are seldom exactly consistent with subjective fear. Although hazards are objective realities, there are no so-called real risks or objective risks [1]. To accurately portray real psychological experience of the public toward COVID-19, our team surveyed the risk perception of the Wuhan epidemic from participants staying in five areas of different levels of risk. Our research aimed to further reveal the relationship between objective hazards and subjective fear to explore whether the public follow the ripple effect or the psychological typhoon eye (PTE) effect.

1 From ripple effect to PTE effect

At the early stage of risk study, researchers held that individuals' subjective risk perception is the very manifestation of objective risks. They pointed out that the panic caused by hazards should be like ripples triggered by a stone thrown into the water, creating the ripple effect [2]. In the risk center, the public risk perception peaks. As the effect of the hazard event spreads outward like ripples, the risk perception of individuals not residing in the risk center gradually decreases.

However, survey data indicate that the objective risks of the external environment are not consistent with the internal subjective risk perception. After the outbreak of Wenchuan earthquake on May 12, 2008, the research team led by Li Shu, Institute of Psychology, Chinese Academy of Sciences (CAS), conducted a planned large-scale survey on residents in the devastated area and those in non-devastated areas. The team found that people at the zero distance were at the center of PTE and were the calmest [3]; that is, with the subjective judgment of local disaster getting intensified, residents estimated that extremely devastated areas' demand for physicians and psychological workers reduced, and the probability of the outbreak of large-scale infectious diseases and the frequency of taking measures for earthquake safety also decreased. This is also confirmed by other researchers during the same period [4]. Follow-up surveys further reveal that such effect was not temporary but remained in devastated and non-devastated areas after 1, 4, and 11 months after the earthquake [5]. Therefore, Li Shu's team dubbed such phenomenon "typhoon eye" [6]. PTE effect means that individuals

Received: 2020-2-28
Supported by: Major Project of National Social Science Foundation of China (19ZDA358, 18ZDA332); Key Project of National Social Science Foundation of China (16AZD058); National Natural Science Foundation of China (71771209)

have a calmer mind and a lower risk perception when getting closer to the risk center. The study on the PTE effect, once published, has attracted the academic circle's attention. Noah Gray, Senior Editor for *Nature*, pointed out that the research on the PTE effect is conducive to predicting public response to emergencies, and warned surveyors to keep prudent and critical when interviewing survivors and evaluating post-disaster relief, because the information provided by victims may be affected by the PTE effect.

2 Potential mechanism of the PTE effect

Despite multiple supporting evidence for the research on the PTE effect currently, there is a lack of research on the mechanism of the PTE effect. Overall, there are four types of possible mechanisms interpreting and predicting the PTE effect.

(1) Benefit judgment

Some researchers held that the main cause of cognitive bias between residents of the risk center and those of non-risk-center areas is that residents living near hazard facilities such as nuclear station, although faced with life threats, are often presented with benefits such as job opportunities and salary increase [7–9]. Thus, individuals shape strategic risk perception.

(2) Psychological immunization

Maderthaner et al. [10] maintained that frequent contact with potentially threatening objects may produce familiarity and habitation and thus reduces the perceived hazard. However, Li et al. [5], through three rounds of longitudinal study after the outbreak of the Wenchuan earthquake, found that even 11 months after the earthquake, individuals still show a significant PTE effect. Despite the passage of time, it does not show the results as expected by the theory of psychological immunization. Thus, whether such mechanism can explain the effectiveness of the PTE effect remains to be further discussed.

(3) Cognitive dissonance

Some researchers deem that the main way of reducing dissonance, if individuals cannot change their residence, is to change their beliefs and attitudes about living in a potential risky situation [3–5]. People living near the center of the devastated areas are more likely to believe that the risk is low at the site. This does not apply to residents in the non-risk-center areas, and thus they do not have to change their attitudes. As Li et al. [5] pointed out, as it is difficult to manipulate levels of cognitive dissonance in a field study, a test of the applicability of Festinger's theory of cognitive dissonance to situations such as this will have to be left for future laboratory studies.

(4) The description–experience gap

Residents in the risk center perceive risks through their experience of negative events. This is called experience-based decision-making. Individuals not living in the risk center perceive risks through media description. Experience-based decision-making tends to estimate that the incidence of a small probability event is low [11–15], thus giving rise to risk perception bias between residents of non-risk-center areas and those of the risk center.

3 The TPE effect detected in COVID-19

It is obvious that the risks caused by COVID-19 are different from those of Wenchuan earthquake in 2008 and even those of SARS in 2003. In the Wenchuan earthquake, the epicenter was the only and definite source of risks; during SARS, the risk sources were concentrated in Beijing, Guangdong, and Hong Kong, with few cases reported from other areas. As for the COVID-19 pandemic, although Wuhan was the hardest hit area, the objective risk sources have spread across the country and even to other countries and regions. There are still objective risk sources around even though people do not reside in Wuhan.

In this context, when it comes to surveying public risk perception or negative emotion such as panic, instructions to be delivered should be prudent and precise. People should tell risk perception of the pandemic in Wuhan from that of the general and surrounding pandemic. In the latter case, the results are likely what the ripple effect predicts, because the PTE effect does not make hypothesis or prediction: people far away from Wuhan city (e.g., people living in Beijing) will have a higher risk perception of a local epidemic (epidemic in Beijing) than the risk perception of the Wuhan epidemic held by people living in Wuhan; or to put it another way, Beijing residents have greater safety concerns about Beijing epidemic than Wuhan residents about Wuhan epidemic. The PTE effect explores the cognitive bias of residents far away from the risk center when they evaluate or predict the safety concerns of the public at the center of risk sources (Wuhan residents in this study). To figure out the differences between the PTE effect and the ripple effect and explore whether the PTE effect can be detected in the COVID-19 pandemic, our research team conducted a survey comprising participants from multiple countries on February 20–25, 2020.

3.1 Methods

3.1.1 Participants

Through Wechat groups such as overseas university alumni alliance groups and donor groups, we surveyed 351 participants living in China and abroad (according to the residence self-reported in the questionnaire). The participants aged 18 or above responded, free of charge, to the questionnaire provided by Wenjuanxing (an online survey tool). See Table 1 for the composition of samples.

Table 1 Demographic variables ($N = 351$)

Variable		Percentage（%）	Variable		Percentage（%）
Gender	Male	41.0	Risk area	Very low-risk	23.6
	Female	59.0		Low-risk	19.7
Age	＜20	4.0		Moderate-risk	25.4
	20–30	46.4		Moderate to high-risk	18.8
	30–40	23.1		High-risk	12.5
	40–50	13.4	Identity	People with no case reported around and not having contacted any case	72.4
	＞50	13.1		People knowing confirmed cases in communities nearby	19.1
Residence	China	63.5		Relevant medical staff or pandemic control personnel	1.1
	Outside China	36.5		Close contacts	0.3
				Confirmed or suspect cases	0.6
				Others	6.6

3.1.2 Variable measurement

The online questionnaire helped us record four demographic variables, that is, gender, age, residence, and identity (Table 1). According to the pandemic map launched by Tencent News on February 25, 2020 (Fig. 1) and the number of confirmed cases in the location of participants (the number was calculated by province within China and by state overseas. The data were in accordance with the pandemic data released on the official website of National Health Commission of the People's Republic of China as of February 25). According to the severity of COVID-19, we divided the locations of participants into five levels, namely, very low-risk area, low-risk area, moderate-risk area, moderate to high-risk area, and high-risk area. See Table 2 for details of these five risk levels.

By reference to the items [3,5] adopted in the questionnaire targeting the Wenchuan earthquake, we selected two issues of public concern as the measurement indexes of people's subjective fear of the pandemic in Wuhan (objective risk): (1) the estimated highest price of a surgical mask that Wuhan residents are willing to offer; (2) the estimated number of delayed days for primary, secondary, and tertiary schools in Wuhan in 2020 required by the Ministry of Education of the People's Republic of China. Specific measurement items are described below:

(1) The highest price of a surgical mask that Wuhan residents are willing to offer is CNY______ according to your estimate (range: CNY 0–1 000).

(2) The number of delayed days for primary, secondary, and tertiary schools in Wuhan in 2020 is ______ days according to your estimate (range: 0–100 days).

This practice inherited the estimation method of risk perception of the Wenchuan earthquake [3]; that is, the higher the participants' risk perception of the COVID-19 pandemic in Wuhan, the higher the numeric value (CNY/day), and vice versa.

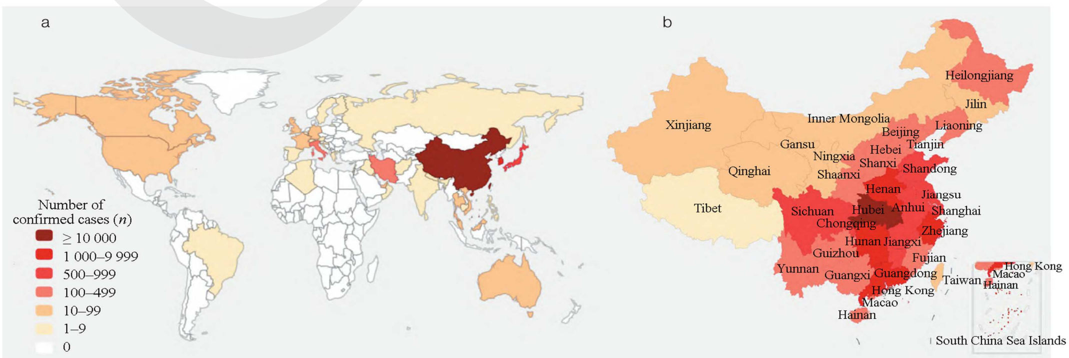

Fig. 1 World pandemic map (a) and the pandemic map of China (b) released by Tencent News on February 25

Table 2 Risk levels of locations of participants (country/region)

Risk level of participants' location	Total cumulative confirmed cases (n)	Area (region/country)
Very low-risk	0—19	Qinghai, Tibet, Macao, Australia, Germany, France, the UK, Canada, Italy, Russia, Belgium, New Zealand, Ireland, Denmark, the Netherlands, Indonesia
Low-risk	20—199	Yunnan, Hainan, Guizhou, Tianjin, Shanxi, Liaoning, Jilin, Gansu, Xinjiang, Inner Mongolia, Ningxia, Hong Kong, Chinese Taiwan, the US, Singapore, Malaysia
Moderate-risk	200—699	Jiangsu, Chongqing, Sichuan, Heilongjiang, Beijing, Shanghai, Hebei, Fujian, Guangxi, Shaanxi, South Korea
Moderate to high-risk	700—9 999	Guangdong, Henan, Zhejiang, Hunan, Anhui, Jiangxi, Shandong, Japan
High-risk	> 10 000	Hubei

3.2 Results

To investigate participants' risk perception of the COVID-19 pandemic in Wuhan with different distances from Wuhan, we adopted three approaches to define "distance."

3.2.1 Objective (physical) distance and subjective (mental) distance

We carried out hierarchical regression analysis in which the log value (lg objective distance) of participants' objective (physical) distance (km) from Wuhan city/participants' self-rated subjective (mental) distance from Wuhan city ① served as the independent variable, mask offer/number of delayed days served as the dependent variable, and gender and age were regarded as control variables.

The results showed that the regression equation of "lg objective distance" to "mask offer/delayed days" was significant [$F_{\text{mask offer}}$ (3, 347) = 3.36, P = 0.019, R^2 = 0.028, adjusted R^2 = 0.020; $F_{\text{number of delayed days}}$ (3, 347) = 9.48, P < 0.001, R^2 = 0.076, adjusted R^2 = 0.068]. When gender and age were under control, the farther the participants' objective distance from Wuhan city, the higher their estimate of Wuhan residents' offer for masks and the larger their estimated number of delayed days for primary, secondary, and tertiary schools in Wuhan in 2020 ($\beta_{\text{mask offer}}$ = 0.13, P = 0.013; $\beta_{\text{number of delayed days}}$ = 0.24, P < 0.001) (Fig. 2a and 3a).

Similarly, the regression equation of subjective (mental) distance to mask offer/number of delayed days was also significant ($F_{\text{mask offer}}$ (3, 347) = 2.89, P = 0.035, R^2 = 0.024, adjusted R^2 = 0.016; $F_{\text{number of delayed days}}$ (3, 347) = 9.17, P < 0.001, R^2 = 0.073, adjusted R^2 = 0.065). When gender and age were under control, the larger the participants' subjective distance from Wuhan city, the higher their estimate of Wuhan residents' offer for masks and the larger their estimated number of delayed days for primary, secondary, and tertiary schools in Wuhan in 2020 ($\beta_{\text{mask offer}}$ = 0.12, P = 0.028; $\beta_{\text{number of delayed days}}$ = 0.23, P < 0.001) (Fig. 2b and 3b).

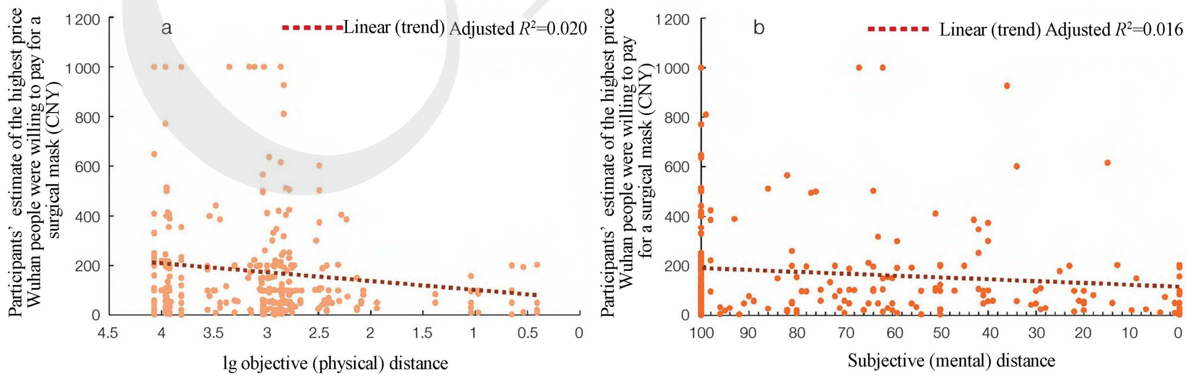

Fig. 2 The relationship between objective (physical) distance (a) and subjective (mental) distance (b) of participants and their estimate of the highest price Wuhan people were willing to pay for a mask

① Objective (physical) distance: Participants' nearest residential distance to Wuhan was 2.55 km and farthest distance was 11 664 km; subjective (mental) distance: The farthest distance was set to be 100 and the closest distance was set to be 0.

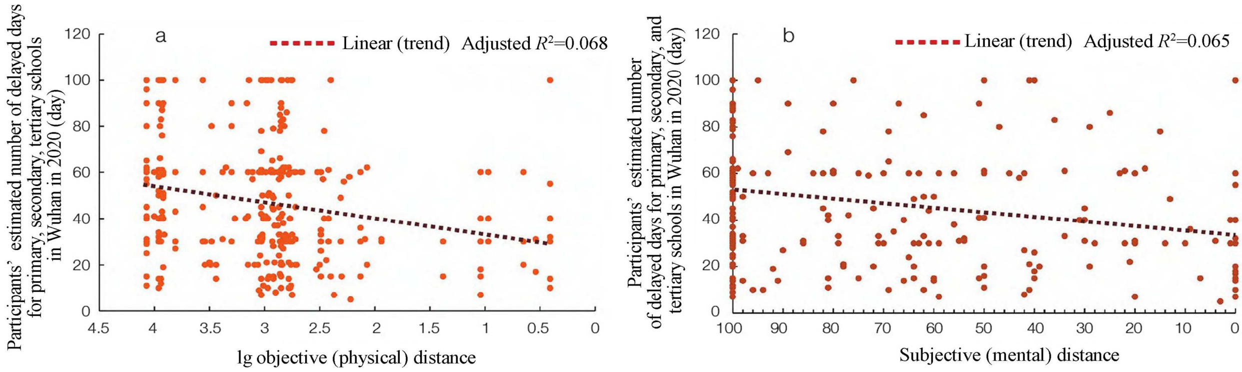

Fig. 3 The relationship between objective (physical) distance (a) and subjective (mental) distance (b) of participants and their estimated number of delayed days for primary, secondary, and tertiary schools in Wuhan

3.2.2 Risk level of participants' residence

According to the pandemic development (cumulative number of confirmed cases) in the residence of participants, we divided participants' residence into five different risk levels (Table 2). The higher risk level of the residence meant closer distance of participants to Wuhan. The results of analysis of variance (ANOVA) of the estimated mask offer and number of delayed days showed that there were significant differences among the participants with different risk levels of residence ($F_{\text{mask offer}}$ (4, 346) = 2.93, P = 0.021, η_p^2 = 0.033; $F_{\text{number of delayed days}}$ (4, 346) = 6.84, P < 0.001, η_p^2 = 0.073). The results of post hoc analysis revealed that in terms of the estimate of the highest offer for a mask, with the increase of the risk level of the participant's residence, the valuation of the highest price that Wuhan people were willing to pay for a mask showed a downward trend. Specifically, the estimated values of the participants in high-risk area were the lowest, showing significant differences with those in moderate-risk area, low-risk area, and very low-risk area (P < 0.01) (Fig. 4a). In terms of estimating the school delay, with the increase of the risk level of the participants' residence, their estimated number of delayed days for primary, secondary, and tertiary schools in 2020 in Wuhan showed a downward trend. Specifically, participants in the high-risk area had the lowest estimate, and the difference with that of the participants in moderate to high-risk area, moderate-risk area, low-risk area, and very low-risk area reached a significant level (P < 0.05) (Fig. 4b).

3.2.3 Residential country of participants (China and abroad)

According to the residential country or region of the participants, they were categorized into the domestic group or the foreign group, and the estimated mask offer and number of delayed days underwent ANOVA. The results showed that the highest price that Wuhan residents were willing to pay for a mask estimated by participants in the foreign group (M = 176.72, SD = 229.78) was higher than that by participants in the domestic group (M = 154.46, SD = 199.70), but there was no significant difference ($F_{\text{mask offer}}$ (1, 349) = 0.90, P = 0.342) (Fig. 5a). The number of delayed days for school estimated by participants in the foreign group (M = 55.13, SD = 24.79) was significantly higher than that by participants in the domestic group (M = 44.35, SD = 25.31); $F_{\text{number of delayed days}}$ (1, 349) = 14.95, P < 0.001, η_p^2 = 0.041) (Fig. 5b).

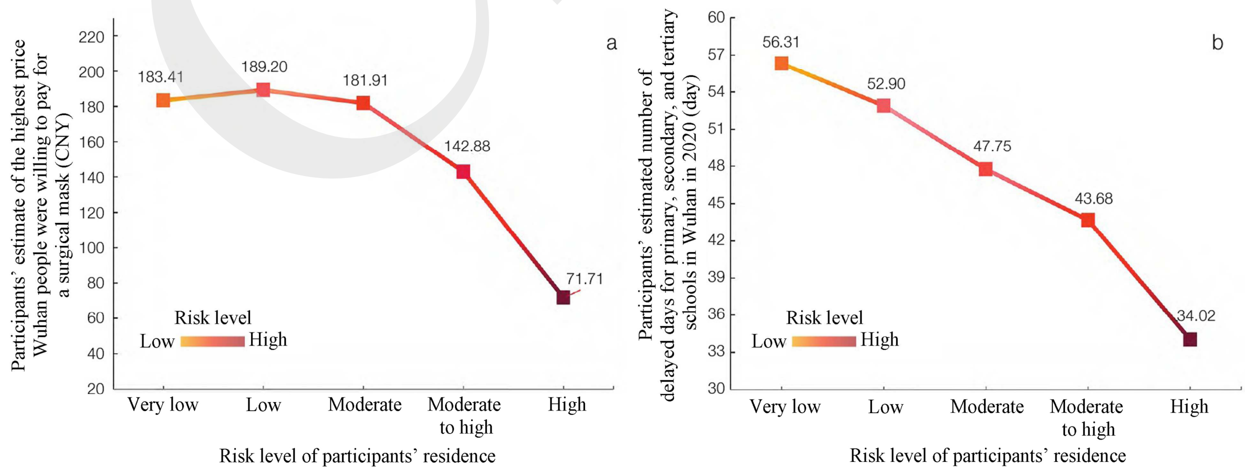

Fig. 4 The relationship between the risk level of the participant's residence and their estimated highest price that Wuhan people were willing to pay for a mask (a) and number of delayed days for primary, secondary, and tertiary schools in Wuhan (b)

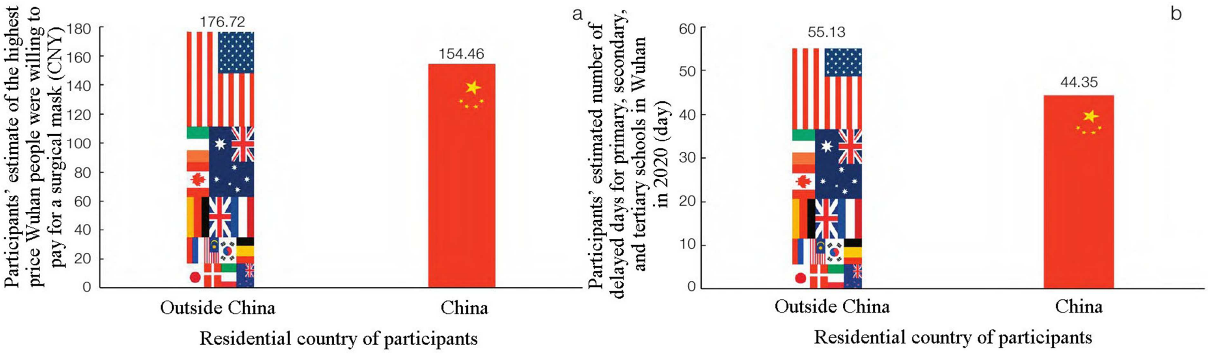

Fig. 5 The relationship between participants' residential country and their estimated highest price that Wuhan residents were willing to pay for a mask (a) and number of delayed days for primary, secondary, and tertiary schools in Wuhan (b)

In short, after reviewing the results shown in Figs. 2–5, we could come up with a definite conclusion that the PTE effect was still detected in the COVID-19 pandemic. In other words, the risk perception of the pandemic in Wuhan by the public far away from Wuhan was significantly higher than that by the public close to Wuhan. The participants in Wuhan, the "PTE center," reported the lowest estimate of the risk level of the pandemic center. That is, they were the calmest people.

4 Discussion and countermeasures

The results of the study reveal that the panic caused by COVID-19 presents a PTE effect rather than a ripple effect. The survey shows that participants living abroad are more worried about the pandemic development in Wuhan than those living in China. The re-confirmation of the PTE effect has positive implications for the policy formulation and emergency management of departments at all levels in response to contingencies. First of all, the accurate description of the manifestations and laws of the PTE effect in hazard events is helpful for relevant departments to formulate targeted intervention strategies in line with timing, local condition, and individuals, thus providing scientific basis and decision-making references for responding to risks in an orderly manner. Secondly, this effect suggests that we should take into full consideration the differences in risk perception of various groups and apply the research results with prudence.

In order to eliminate the influence of the PTE effect and ease the worries and anxieties of domestic and even foreign people about COVID-19, we put forward the following four feasible countermeasures.

(1) It is suggested that the government should better navigate public opinion and adopt differentiated strategies for different areas. For the pandemic center, the government should urge the public to fully realize the seriousness of pandemic prevention and control, strengthen the crisis awareness of local people, and keep the whole city on alert. For non-pandemic center areas, the government should focus on reducing panic, improve information transparency, disclose the latest development of the pandemic in a timely manner, dispel rumors, and inform, in an easy-to-follow way, the public of what the current situation is and what to do.

(2) Efforts should be made to improve the way domestic and external media, as well as those stationed abroad cover the pandemic. The proper principle for media to cover COVID-19 development in Wuhan or other regions in China should be that the coverage should not be entirely irrelevant to the pandemic, nor should it be solely about the pandemic. In other words, apart from the pandemic, what should also be covered are things around COVID-19, such as business activities, public living, security arrangement, and other events. Therefore, residents in other parts of China can come to develop a full picture of Wuhan as its locals do and foreigners can be informed of the real situation in China. All these efforts aim to prevent residents in China from smearing Wuhan city or Hubei province and avoid foreigners' overreaction to and bias against the pandemic in China.

(3) Standardized format of information release about public health emergencies should be established so that local governments can adopt a scientific approach to information release. When covering the latest development of the pandemic, the media shall properly represent relevant figures and proportions. For example, a report about Influenza A virus subtype H1N1, titled Ministry of Health Releases 4 Deaths Caused by the Inoculation of Vaccine on December 1, draws people's attention mainly to "four deaths" and accordingly arouses people's skepticism, worry, and even panic about vaccine inoculation. It turns out that the vaccination mortality rate of 28.91 million people in total vaccinated against Influenza A virus subtype H1N1 stands at only about 1/7 200 000 (probability of occurrence). When the media report the data about confirmed cases and deaths, they shall add incidence, pathogenicity rate, and fatality rate, as well as the pathogenicity rate and fatality rate caused by other contagious diseases so that the public can make a rational perception of COVID-19. In this way, the public will not play down risks, neither will they overpanic. The basic principles in information release of public health emergencies are as follows: The proper way to report confirmation rate and mortality rate is to show figures attached with population base instead of

sheer figures; the proper way to release positive news of recovery figure and hospital discharge figure is to publish figures without adding population base. Graphics coupled with text should be employed to report the core information of public health emergencies.

(4) It is suggested that the platform improve the algorithm for news releases during the pandemic and give a high weight to sources with high credibility. The frequent spread of false news (rumors) may be one of the reasons why people are worried and anxious about the pandemic. Therefore, news release platforms (such as Sina) should establish credible databases of news sources (such as microblog accounts). During the pandemic, the platform shall give a high weight to the source credibility in the algorithm of releasing messages. Priority should be given to news with high source credibility, and the source credibility should be scored along with the release of information.

Acknowledgements

We are indebted to Lin Ang, Ji Lijun, Zhang Yiran, Zhang Airong, Xu Wei, Zhang Shuwei, Cai Huajian, Wang Yiwen, Xu Lan, Chen Lingyan, You Yue, Zhao Zongmin, Gong Zheng, Shen Wei, Dong Xiuping, et al. for helping to push questionnaires abroad through WeChat, and all the participants for completing this online survey free of charge.

References

1 Slovic P. Trust, emotion, sex, politics, and science: Surveying the risk-assessment battlefield. Risk Analysis, 1999, 19 (4): 689–701.
2 Slovic P. Perception of risk. Science, 1987, 236 (4799): 280–285.
3 Li S, Rao L L, Ren X P, et al. Psychological typhoon eye in the 2008 Wenchuan earthquake. PLo S One, 2009, 4 (3): e4964.
4 Xie J Q, Xie X F, Gan Y Q. Psychological Typhoon Eye Effect in the Wenchuan Earthquake. Acta Scientiarum Naturalium Universitatis Pekinensis, 47 (5): 944–952 (in Chinese).
5 Li S, Rao L L, Bai X W, et al. Progression of the "psychological typhoon eye" and variations since the Wenchuan earthquake. PLOS One, 2010, 5 (3): e9727.
6 Li S, Liu H, Bai X W, et al. Psychological typhoon eye in 2008 Wenchuan Earthquake of May 12. Science & Technology Review, 27 (3): 87–89 (in Chinese).
7 Midden C J H, Daamen D D L, Verplanken B. De Beleving van Energierisico's. Petten: Energie Studie Centrum, 1983.
8 Tilt B. Perceptions of risk from industrial pollution in China: A comparison of occupational groups. Human Organization, 2006, 65 (2): 115–127.
9 Zheng R, Rao L L, Zheng X L, et al. The more involved in lead-zinc mining risk the less frightened: A psychological typhoon eye perspective. Journal of Environmental Psychology, 2015, 44: 126–134.
10 Maderthaner R, Guttmann G, Swaton E, et al. Effect of distance upon risk perception. Journal of Applied Psychology, 1978, 63 (3): 380.
11 Bishara A J, Pleskac T J, Fridberg D J, et al. Similar processes despite divergent behavior in two commonly used measures of risky decision making. Journal of Behavioral Decision Making, 2009, 22 (4): 435–454.
12 Camilleri A R, Newell B R. When and why rare events are underweighted: A direct comparison of the sampling, partial feedback, full feedback and description choice paradigms. Psychonomic Bulletin & Review, 2011: 1–8.
13 Hau R, Pleskac T J, Kiefer J, et al. The description-experience gap in risky choice: The role of sample size and experienced probabilities. Journal of Behavioral Decision Making, 2008, 21 (5): 493–518.
14 Hertwig R, Barron G, Weber E U, et al. Decisions from experience and the effect of rare events in risky choice. Psychological Science, 2004, 15 (8): 534.
15 Hertwig R, Pleskac T J. Decisions from experience: Why small samples? Cognition, 2010, 115 (2): 225–237.

(Translated by WEN JX)

XU Mingxing, Post-doctoral Fellow in CAS Key Laboratory of Behavioral Science, Institute of Psychology, Chinese Academy of Sciences (CAS), and Associate Professor of Fujian University of Technology. He received his PhD in Management from Fuzhou University. His research focuses on risk perception, supply chain risk, and behavioral supply chain. E-mail: xumx@psych.ac.cn; xumx@fjut.edu.cn

LI Shu, Chair of Academic Committee of Institute of Psychology, Chinese Academy of Sciences (CAS) & Department of Psychology, University of Chinese Academy of Sciences, Editor-in-Chief of Acta Psychologica Sinica, Founding President of Committee of Psychology in Decision Making, Chinese Psychological Society, and Chair of Scientific Committee of International Congress of Applied Psychology (ICAP) 2022. His research has been funded by several prestigious foundations such as National Basic Research Program of China (973 Program) and the Major Projects of the National Social Science Foundation of China. He published his research both in Chinese and English which has appeared in over five-dozen of journals such as Psychological Science, Journal of Experimental Psychology: General, and Acta Psychologica Sinica. He is the author of the academic book An Equate-to-Differentiate Way of Decision-Making. His research featured in major media outlets such as ScienceNet, Sina, Sohu, Hexun, and The Washington Post. E-mail: lishu@psych.ac.cn; s.li@UNSWalumni.com