

Article



Beyond Flood Preparedness: Effects of Experience, Trust, and Perceived Risk on Preparation Intentions and Financial Risk-Taking in China

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Abstract: Flooding, already the most damaging type of natural disaster in China, is expected to become increasingly costly around the world. However, few studies have examined residents' flood-preparedness intentions and the effect of flood experience and other variables on general financial risk-taking. This study explored the effects of Chinese residents' previous flood experiences, trust in public flood protection, and flood-risk perception on flood-preparedness intentions and attitudes towards financial risk-taking in general. Study 1 surveyed residents in a flooded area (n = 241) and a non-flooded area (n = 248); Study 2 surveyed a non-flooded area (n = 1599). The relations between the variables were tested through structural-equation modelling (SEM). Overall, the two studies found that residents' flood preparedness but also their financial risk aversion. This study highlights the importance of residents' trust in public flood protection for flood risk management and communication, especially for those who have not yet experienced flooding.

Keywords: flood; risk perception; trust; flood preparedness

1. Introduction and Literature Review

1.1. Introduction

The economic and human costs of floods have been increasing in recent years due to several factors. For example, increased urbanization has led to more runoff, less storage capacity, and a greater exposure of population and economic assets to flooding events [1]. Research suggests that economic growth, urbanization, and population increases have led to an increased exposure of individuals and assets to flooding [2]. Over a recent five-year period (2014–2018) in China, floods were responsible for an average of RMB 161 billion in economic losses and 747 deaths annually, accounting for 48% of the economic costs and 61.2% of the deaths caused by natural disasters (https://www.mem.gov.cn/gk/tjsj/, accessed on 10 October 2021). Although China is among the nations that have recently suffered the most from flooding [1], few studies have focused on Chinese people's flood-preparedness behaviors, and even less have addressed the impact of these experiences on financial risk-taking/risk-aversion. The present study addresses this gap by examining the role of past flood experiences, trust, and perceived risk on these important outcomes in China.

1.2. Literature Review

Risk perception as it pertains to flooding is the process by which individuals estimate the perceived probability and severity of flood damage in the future [3]. Risk perceptions



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Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). are thus one's evaluation of the potential for future harm or loss [4], and research shows people typically underestimate their flood risk [5]. Direct experience with flooding is one important factor that increases both risk perceptions and preparedness [6]. For example, residents who had direct experience with flooding or who had lived in neighborhoods in New Orleans that experienced flooding during Hurricane Katrina reported higher perceptions of risk than those who lived in neighborhoods that did not experience flooding or who did not have personal experience with it [7]. A study from Netherlands found previous flood experience was associated with both increased risk perceptions and increased preparedness and that people who had experienced flooding showed stronger emotions about future flooding and stronger intentions to take adaptive actions than those who had not [8]. Similarly, a survey from New Zealand found previous flood experience was associated with increased risk preparedness [9]. However, the findings on the relationship between past experience and risk perceptions are inconsistent, with some authors even suggesting that past experience can lower the perceived risk of future disaster through "gambler's fallacy" reasoning (i.e., the belief that the likelihood of an event occurring is lower after it has occurred [10]). The vast majority of studies do show a positive relationship between personal experience with natural hazards and subsequent preparedness [11,12], although these effects are often small to medium in size [5]. In addition to personal experience, the second variable found in past research to have the most substantial impact on risk perception of natural hazards is trust in public flood protection [13].

Citizens often rely on public flood protection and defenses for their protection from floods. Studies from Europe [14], Japan [15], and the US [16] show that citizens often cede responsibility to the government for their public safety from natural hazards like flooding. Research suggests that when individuals lack expertise in a topic, they rely more heavily on trust in authorities in judging risks [17]. Some studies in the European context have shown a positive relationship between trust in public flood management and preparedness [18,19]. However, other research from Europe suggests that social trust in public flood protection reduces individuals' perceptions of personal risk and their motivation to act to protect themselves (i.e., their own flood-mitigation intentions [20,21]). For example, private or public insurance and other government risk-management efforts can lead to reduced incentives to mitigate risk (i.e., moral hazard). The fundamental conflict of moral hazard as it relates to risk preparedness is "the more and better insurance is provided against some contingency, the less incentive individuals have to avoid the insured event, because the less they bear the full consequence of their actions" [22]. Flood insurance can be a major factor in some contexts, such as countries like Norway or Iceland that have mandatory flood insurance [23]. Trust in public-protection or private-insurance systems may therefore reduce intentions to prevent damage. These findings suggest that trust in public flood protection can lead people to underestimate their personal risk, which in turn reduces preparedness intentions; when citizens trust in the authorities and the public structural measures in place, they feel secure and are therefore less likely to form flood preparation intentions of their own.

However, there is evidence to suggest that this effect may be culturally dependent. The fundamental concept from the various conceptualizations of collectivism across researchers is a focus on duty and a sense of obligation to one's ingroups [24]. This could have implications for how individuals in strongly collectivistic cultures like China interpret and feel a sense of responsibility towards flood preparedness (e.g., to personally contribute towards the public good). For example, the social loafing effect is less prevalent in China as compared to Western cultures [25,26]. The collectivistic orientation in China may therefore alter the negative relationship observed in Europe between trust in public protection and intentions to personally engage in flood preparedness [3]. The present study was thus undertaken to study the relationship between trust in public flood protection and flood preparedness in China, as this relationship may differ with respect to both the overarching cultural context and the local characteristics of flooding [27].

For example, studies based from the Ganges, Brahmaputra, and Meghna River (GBM) basin provide a different cultural context as these individuals experience normal to extreme floods almost every year. A study from Bangladesh showed that farmers with past experience with flooding were resilient in responses to extreme flood events; however, multi-peak and long-duration flood events reduced their autonomous crop adaptation (ACA). This inability to engage in ACA affected their financial risk-taking ability, resulting from less income, less land to farm, and higher occupational loss [28]. Similarly, extreme floods reduced individuals' ability to manage the next flooding event [29]. This highlights the impact of past flood experience on future financial behaviors.

In addition to the effect of past flood experience on flood-related risk perceptions (e.g., as shown in strong correlations between one year's flooding and the subsequent year's crop insurance demand; [30]), past flood experience may impact financial risktaking attitudes [31]. Risk-taking attitude refers to the amount of risk individuals or communities are willing to expose themselves to [32]. There are many variables that impact financial risk-taking, including demographic variables [33], social-environmental factors like subtle physical contact [34], and even specific genes [35]. Past negative life events have been found to decrease financial risk-taking [36], and individuals tend to be more risk averse after natural disasters [31]. For example, after the Fukushima disaster, Germans considered themselves more risk averse [37]. However, the findings on the impact of disasters on risk-taking attitudes are mixed. Past research in China following two low-probability/high-consequence events (i.e., a blizzard in southern China and a major earthquake in the Sichuan Province) found those in the affected areas were both more risk-averse (i.e., selecting a sure loss rather than a risky one) and more risk-seeking (i.e., selecting a low probability gain in a lottery), which the researchers characterized as overweighting low probabilities after a disaster [38]. This suggests that flood experience may increase both the perceived likelihood of risk and financial risk-taking involving low probability gains (e.g., investing in a risky but potentially profitable business).

Financial risk-taking attitudes have real-life consequences for society at large, as more risk-tolerant people are more likely to open a new business, change jobs, and adopt new technologies [31]. Additionally, gender differences in financial risk aversion are broadly argued to explain—along with income—women's lower levels of wealth compared to men [39,40]. Although many factors impact women's relative wealth, this is a relevant concern in China, where there are significant gender differences in accumulated wealth [41]. Thus, one's financial risk-taking attitude is an important additional outcome measure to examine in the present set of studies.

2. Aims and Hypotheses

The objectives of this article are twofold. First, we examine how previous flood experiences, trust in public flood protection, and personal flood-risk perception influence flood preparedness, in order to understand the predictors of flood-preparedness intentions in China. Second, we examine the effects of the above-mentioned variables on financial risk-taking.

Figure 1 illustrates the hypothesized relations among these variables.



Figure 1. Conceptual model of predicted effects (adapted from Terpstra [3]).

First, we hypothesized that higher flood-risk perception will positively predict residents' flood-preparedness intentions (H1_1 and H1_2) and financial risk-taking (H1_3 and H1_4). Second, we predicted that a higher level of trust in public flood protection will decrease residents' risk perception (H2_1 and H2_2) and their flood-preparedness intentions (H2_3) as well as increase their financial risk-taking (H2_4). Third, we predicted that residents' flood hazard experiences would directly increase their flood-risk perceptions (H3_1 and H3_2) and their flood-preparedness intentions (H3_3) and would directly decrease their trust in flood protection (H3_4) and their financial risk-taking (H3_5). Finally, in addition to the above direct effects, we also tested for mediated effects. Specifically, we proposed that trust in public flood protection and flood-risk perceptions would mediate the impact of flood hazard experiences on flood-preparedness intentions (H4_1) and financial risk-taking (H4_2).

The hypotheses were tested in two studies. Study 1 was conducted in two regions in the Shangdong province in China: one that recently experienced severe river flooding and one that had not. We surveyed random samples from these two populations to examine the effects of past experience (vs. no experience) on risk perceptions, trust in public protection, and financial risk-taking. Study 2 was conducted in a non-flooding coastal area, with the purpose of replicating Study 1's causal relations and to gain further insight into the function of trust in public flood protection.

3. Study 1: The Effects of Flood Hazard Experiences

3.1. Method

3.1.1. Sample and Data Collection

Our data were collected in two residential areas in county-level cities (i.e., Shougauang and Gaomi) within Shangdong province, China. In the middle of August 2018, about three months before data collection, a typhoon caused flooding in Shouguang but not in Gaomi. Sixteen people were reported dead or missing, thousands of houses were destroyed, and the area experienced approximately RMB 9.2 billion of direct economic losses. The flood and its aftermath attracted national and international media attention.

A random sample of 1500 households spread across 10 rural villages in Shouguang and Gaomi were selected to participate. Households received a letter, administered by the village government, explaining the research and inviting them to participate in our survey. The survey was conducted between November and December 2018. In total, 241 individuals who had experienced flooding in Shouguang and 248 individuals who had not experienced flooding in Gaomi voluntarily participated in the survey (response rate of 32.6%). Respondents reported an average age of M = 25.56 years (SD = 11.94, range: 16–68), and 59.1% were female.

3.1.2. Measurements

We applied the scales from Terpstra [3] to assess trust in public flood protection, floodrisk perception, and flood preparedness. To create a Chinese version of the above scales, we applied an independent translation and back-translation by two professional translators and conducted a pre-test with Chinese university students to validate the reliability of the Chinese-language version of these scales. All the questionnaire items were rated on a 5-point Likert scale ranging from 1 (not at all) to 5 (very). Trust in public flood protection was measured by three items, e.g., "How confident are you that the flood defenses in (your area) are maintained properly?" ($\alpha = 0.88$). Flood-risk perception was measured by two subscales, namely, perceived flood likelihood (one item, i.e., "How likely do you find major flooding in your area within the next 10 years?") and perceived flood consequences (four items, $\alpha = 0.91$, e.g., "Imagine there will be a flood in your area. How likely do you find the following: Substantial damage to your house or possessions?"). Flood preparedness was measured by four items ($\alpha = 0.94$, e.g., "Collect information about flood consequences, evacuation routes, and safe/high locations").

Financial risk-taking was measured by the Chinese version of the financial subscale of the Domain-Specific Risk-Taking (DOSPERT) Scale [42]. This uses a seven-point Likert scale ranging from 1 (extremely unlikely) to 7 (extremely likely) for 6 items (α = 0.78), e.g., "Indicate the likelihood that you would engage in the described activity or behavior if you were to find yourself in that situation: Investing 10% of your annual income in a new business venture."

3.1.3. Statistical Analyses

The proposed relations between the variables were evaluated by using structuralequation modelling (SEM) in AMOS 21. First, we performed first-order confirmatory factor analysis (CFA) to confirm the construct validity of the scales. Second, we tested the path model of Figure 1 to test the measurement model fit. The following criteria were applied to assess the model fit: (1) Chi-square statistics (χ^2 , χ^2/df); (2) the root mean square error of approximation (RMSEA); (3) the Bentler comparative index (CFI), and (4) the Tucker–Lewis Index (TLI). Value for the CFI and TLI should be above 0.90 and preferably above 0.95; the RMSEA value should be below 0.08 and preferably 0.06 or lower [43,44].

3.2. Results

3.2.1. Descriptive Results

Latent correlations and descriptive statistics are presented in Table 1. Residents' prior flood experiences positively correlated with their flood-risk perceptions and flood-preparedness intentions and negatively correlated with their trust in public flood protection and financial risk-taking. Citizens' trust in public flood protection negatively correlated with their flood-risk perceptions but positively correlated with flood-preparedness intentions and non-significantly correlated with financial risk-taking.

Variable	1	2	3	4	5	6
1. Flood experiences	-	-0.19 ***	0.39 ***	0.18 ***	0.18 ***	-0.09
2. Trust in flood protection		-	-0.16 ***	-0.12 **	0.25 ***	0.01
3. Perceived likelihood			-	0.44 ***	0.26 ***	0.07
4. Perceived				-	0.33 ***	0.11 *
5 Flood preparedness					_	0.05
6. Financial risk-taking						-
М	-	3.76	2.43	3.07	3.28	2.22
SD	-	0.93	1.09	1.16	1.06	1.06

Table 1. Latent correlations and descriptive statistics of Study 1.

Note: * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

3.2.2. Results of the Proposed Model

Four latent variables and 17 measured items were tested in a first-order CFA. The measurement model included trust in public flood protection (three items, factor loading 0.84–0.92), perceived flood consequences (four items, factor loading 0.80–0.94), flood-preparedness intentions (four items, factor loading 0.80–0.95), and financial risk-taking (five items, factor loading 0.43–0.83). As one item on the financial risk-taking scale— "Investing 10% of your annual income in a moderate growth mutual fund"—showed poor factor loadings, we removed it in measurement model 2 and further analyses. The results indicated that the measured items loaded appropriately on the intended latent variables, with a good fit (Table 2).

Table 2. Model fit indexes of Study 1.

Model	п	χ^2	χ^2/df	RMSEA	CFI	TLI
Measurement model 1	489	442.82	3.85	0.08	0.93	0.94
Measurement model 2	489	309.26	3.09	0.07	0.96	0.95
Structural model	489	222.79	1.81	0.04	0.98	0.97

We assessed the proposed causal structural model of Figure 1. The results revealed a good fit, which are shown in Table 1 (see row 3, structural model) and Figure 2. First, the results supported the assumed effects of perceived flood likelihood (H1_1, B = 0.14, SE = 0.05, p < 0.01) and perceived consequences on flood preparedness (H1_2, B = 0.30, SE = 0.05, p < 0.001). Furthermore, the perceived likelihood (H1_3, B = 0.12, SE = 0.05, p < 0.05), but not the perceived consequences (H1_4, B = 0.07, SE = 0.05, p = 0.229), was significantly related to financial risk-taking.

Second, the AMOS results supported our prediction that trust in flood protection would be significantly negatively related to perceived likelihood (H2_1, B = -0.11, SE = 0.05, p < 0.05), but we did not find the predicted effect on perceived consequences (H2_2, B = -0.10, SE = 0.05, p = 0.132). Furthermore, there was a significantly positive direct effect of trust in public flood protection on flood-preparedness intentions (H2_3, B = 0.40, SE = 0.05, p < 0.001), and the indirect effect of trust on flood preparedness through perceived likelihood was marginally significant (B = -0.05, p = 0.075, 95% CI (-0.087, -0.003)). The direct effect of trust on financial risk-taking was not supported (H2_4, B = 0.06, SE = 0.04, p = 0.302), while the indirect effect of trust on financial risk-taking via perceived likelihood was significant (B = -0.05, 95% CI (-0.046, -0.003)).



Figure 2. Structural modeling Study 1 results. Notes: a. Variables within rectangular represent single observed variables; variables within oval represent latent variables. b. Values are standardized. c. Explained variances (R^2) are indicated in parentheses. d. Bootstrap samples = 10,000. e. * p < 0.05, ** p < 0.01, *** p < 0.001.

Third, the AMOS results supported the assumed direct effects of flood experience on perceived likelihood (H3_1, B = 0.37, SE = 0.09, p < 0.001), perceived consequences (H3_2, B = 0.20, SE = 0.09, p < 0.001), trust in flood protection (H3_3, B = -0.16, SE = 0.10, p < 0.001), flood preparedness (H3_4, B = 0.14, SE = 0.09, p < 0.001), and financial risk-taking (H3_5, B = -0.13, SE = 0.09, p < 0.05). Moreover, the predicted indirect effects of flood experience on flood preparedness were marginally significant (H4_1, B = 0.06, p = 0.064, 95% CI (0.007, 0.107)), mediated by perceived likelihood, trust, and the combination of trust/perceived likelihood. The indirect effects of flood experience on financial risk-taking were significant (H4_2, B = 0.07, p < 0.05, 95% CI (0.030, 0.113)), mediated by the perceived likelihood.

3.3. Discussion of Study 1

The results from the SEM analysis were largely consistent with our predictions that previous flood experience would decrease trust in public flood protection and increase perceived risk perception and flood-preparedness intentions, while also directly decreasing financial risk-taking. Furthermore, the effects of flood experience on flood preparedness were mediated by the following four paths: (a) through perceived likelihood; (b) through perceived consequences; (c) through trust, and (d) via trust through perceived likelihood. Similarly, the effects of flood experience on financial risk-taking were also mediated by the following two paths: (a) through perceived likelihood and (b) via trust through perceived likelihood. Therefore, trust in public flood protection played an important role, as it had a direct effect on flood-preparedness intentions and an indirect effect on financial risk-taking, in addition to partly mediating the effects of flood experience on these outcomes. However, trust and perceived consequences did not directly predict financial risk-taking.

A second study was conducted to replicate the present findings in a separate region of China that is located on the coast. In addition to this difference in location (i.e., from a flooding-prone river area to a non-flooding coastal area), the second study was conducted to replicate the strong positive effect of trust in public flood protection on individual flood preparedness, which was in the opposite direction from previous findings conducted in Europe [3].

4. Study 2: The Effects of Trust in Flood Protection

4.1. Method

4.1.1. Sample and Data Collection

To examine whether the results from Study 1 would be replicated in a different sample from China, 1599 Chinese university students without flood experiences from Qingdao (66.1% female), a coastal city, participated in the second study. The average age was M = 18.25 years (SD = 0.73, range: 15–32). We chose college students without flood experience because we expected their responses to be less biased by their individual personal histories of flooding or natural disasters and because convenience sampling would allow us to survey a larger number of participants. Although mean levels of the perceived risk likelihood can be affected by factors like education level [45] or income [46], we did not expect the sample demographics to change the relationships between variables tested in the present analyses. The survey was conducted in November 2018. Respondents were thanked for their participation by email.

4.1.2. Measurements

All instruments were identical to the ones used in Study 1.

4.2. Results

4.2.1. Descriptive Results

Latent correlations and descriptive statistics are presented in Table 3. As in Study 1, residents' trust in public flood protection negatively correlated with their flood-risk perceptions, positively correlated with their flood-preparedness intentions, and was not related to their financial risk-taking.

Variable	1	2	3	4	5
1. Trust in flood protection	-	-0.14 ***	-0.01	0.23 ***	0
2. Perceived likelihood		-	0.31 ***	0.19 ***	0.13 ***
3. Perceived consequences			-	0.28 ***	0.13 ***
4. Flood preparedness				-	0.12 ***
5. Financial risk-taking					-
M	3.89	2.14	3.02	3.11	2.29
SD	0.97	1.05	1.12	1.11	1
	NT -	*** 0.001			

Table 3. Latent correlations and descriptive statistics of Study 2.

Note: *** *p* < 0.001.

4.2.2. Results of the Proposed Model

Four latent variables and 17 measured items were tested in a first-order CFA. As in Study 1, measurement model 1 includes trust in public flood protection (three items, factor loading 0.86–0.97), perceived flood consequence (four items, factor loading 0.82–0.93), flood-preparedness intention (four items, factor loading 0.90–0.97), and financial risk-taking (five items, factor loading 0.40–0.91). Because one of the six items of financial risk-taking showed poor factor loadings as in Study 1, we removed it in measurement model 2 and further analyses. Model 2 showed a satisfactory model fit, indicating that the measured items loaded appropriately onto the intended latent variables (Table 4).

We tested the structural model presented in Figure 3. The analysis supported the predicted effects of perceived flood likelihood on preparedness (H1_1, B = 0.16, SE = 0.02, p < 0.001) and perceived consequences on flood preparedness (H1_2, B = 0.24, SE = 0.03, p < 0.001). Additionally, the effect of perceived likelihood (H1_3, B = 0.13, SE = 0.02, p < 0.001), but not the perceived consequences (H1_4, B = 0.03, SE = 0.02, p = 0.304), significantly predicted financial risk-taking.

Model	n	χ^2	χ^2/df	RMSEA	CFI	TLI
Measurement model 1	1599	1573.6	13.68	0.09	0.94	0.92
Measurement model 2	1599	1004	10	0.07	0.96	0.95
Structural model	1599	657.82	5.87	0.06	0.98	0.97

Table 4. Model fit indexes Study 2.



Figure 3. Structural modeling Study 2 results. Notes: a. Variables within rectangular represent single observed variables; variables within ovals represent latent variables. b. Values are standardized. c. Explained variances (\mathbb{R}^2) are indicated in parentheses. d. Bootstrap samples = 10,000. e. ** *p* < 0.01, *** *p* < 0.001.

The AMOS results showed that trust in public flood protection was significantly negatively related to perceived likelihood (H2_1, B = -0.15, SE = 0.03, p < 0.001) but non-significantly related to perceived consequences (H2_2, B = -0.10, SE = 0.03, p = 0.778). Furthermore, the total effects of trust on flood preparedness (B = 0.23, p < 0.001, 95% CI (0.176, 0.290)) and financial risk-taking (B = -0.09, p < 0.01, 95% CI [-0.153, -0.026]) were significant. More specifically, there was a direct positive effect of trust on flood preparedness (H2_3, B = 0.26, SE = 0.03, p < 0.001) and a direct negative effect of trust on financial risk-taking (H2_4, B = -0.07, SE = 0.02, p < 0.05). The indirect effect of trust on flood preparedness was significant (B = -0.03, p < 0.05, 95% CI (-0.049, -0.003)), mediated by perceived likelihood. The indirect effect of trust on financial risk-taking was also significant (B = -0.02, p < 0.001, 95% CI (-0.033, -0.009)), mediated by perceived likelihood.

4.3. Discussion of Study 2

This study aimed to replicate the path model from Study 1 using a large sample from a coastal region without a flood history. We confirmed the major findings from Study 1, including the positive direct relationship between trust in public flood protection and individual flood-preparedness intentions and the negative relationship with financial risk-taking, mediated by perceived likelihood.

5. General Discussion

This research investigated the effects of residents' flood experiences, trust in public flood protection, and flood-risk perception on flood-preparedness intentions and financial risk-taking in China. The results of the first study provided important evidence related to the effects of flood experience on the psychology of individuals, with past flood experience increasing the perceived likelihood of flooding, the imagined negative consequences of such an event, and individuals' preparedness intentions, while negatively predicting trust in public protection and financial risk-taking in general. The results of the second study support the results of Study 1. Among individuals without flood experience, we found a positive direct relationship between trust in public protection and individuals'

preparedness intentions and a negative relationship with financial risk-taking. Both studies found that perceived likelihood mediated the effect of past experience and trust in public protection on financial risk-taking, in support of the model previously proposed by Lindell and Hwang [46].

We had hypothesized that flood experience would indirectly increase financial risktaking—mediated by perceived likelihood—because past research suggests that people tend to overestimate low-probability events after a disaster [38]. In line with this reasoning, Study 1 showed that flood experience positively predicted perceived likelihood, which positively predicted financial risk-taking. Consistent with previous research [8], this suggests that past experience acts as a motivating force to increase individuals' preparedness for future disasters. This is in line with the argument that direct experience is more impactful than indirect experience, resulting in stronger and more persistent attitudes towards future events [47]. Study 2 further confirmed this positive relationship between perceived likelihood and financial risk-taking. In both studies, whereas perceived likelihood predicted financial risk-taking, the perceived severity of the consequences did not support the "Psychological Typhoon Eye" effect suggested by Li et al. [38], which predicts that people closer to the center of the risk event would become more risk-seeking.

A second major contribution of the present studies are the findings, in both Study 1 and Study 2, that trust in public flood protection was positively related to flood-preparedness intentions in our Chinese sample—a result that conflicts with past results reported in the Netherlands [3]. We suggest that this may represent another way that highly collectivistic societies' focus on duty and one's obligation to one's ingroups may alter patterns and relationships found in Western, educated, industrialized, rich, and democratic (WEIRD) [48] populations that are overrepresented in psychological research. Secondly, the relationship between trust in public flood protection and preparedness intentions in our sample could reflect the effect of individuals' trust in the warnings provided by the government on the decision to act on those warnings (e.g., [49]). China ranked first in the "2020 Edelman Trust Barometer 2020" trust index among the major 28 economies in the world (including over 34,000 respondents). Confucianism in China promotes preparation for future adversity and emphasizes the importance of long-term thinking, and these cultural concepts may promote local citizens following the government's example to prepare in line with their perception of the government's actions [49], rather than leading them to socially loaf as might be expected in Western cultures [25,26]. In this way, Chinese citizens' responses about the quality of public flood protection may reflect their perception of a flood-protection norm to be followed.

Our results provide new evidence on the effects of trust in public protection and past flood experience on flood-risk perception and financial risk-taking. The current findings demonstrate an alternative path between risk perception and risk management, as trust in public protection may be a crucial factor in the context of flood management with regards to preparedness intentions, as well as flood-risk perception [50]. In our Chinese samples, one's sense of responsibility for taking protective measures was positively related to one's belief in the effectiveness of public protective means. As suggested by Wachinger et al. [13], negative emotions related to previous experiences with flood undermine trust in public protection, which can explain the observed negative relationship between past flood experience and trust in public protection. According to Bradford et al. [6], perceived flood likelihood is essential in determining the best way to communicate flood risk information. Building on this, the present findings suggest that trust in public protection is as essential as risk perception in determining individuals' flood-preparedness intentions, and trust in public protection is more necessary when individuals' knowledge of flooding is limited [13,50]. This highlights the importance of building public trust in governmental agencies and flood risk-management authorities. A summation of these potential solutions are highlighted in Figure 4.





One limitation of the present research is the cross-sectional nature of the data. Collecting data at a single time point in cross-sectional research may create a common method variance (CMV) bias, which can preclude causal conclusions [51,52].

6. Conclusions

This study investigated the effects of flood experience, trust in public flood protection, and perceived risk on flood preparation intentions and financial risk-taking, by conducting one study in a river area where participants had or had not experienced a flood (Study 1) and another survey in a coastal area where participants did not have flood experience. The

current study highlights the importance of both residents' past flood experience and their trust in public flood protection, as these variables affect both flood-preparedness intentions and financial risk-taking. In line with past research, we found that past experience increases the perceived risk likelihood and that perceived flood risk likelihood predicts financial risk-taking. Unlike some research conducted in European settings, we found a positive relationship between trust in public flood measures and preparedness intentions, and we found that the effect of trust becomes even more important among individuals with limited experience with flooding. We recommend future research to replicate this novel finding in other collectivist cultures. Despite its limitations, the present study provides important insights into the relationships between flood experience, trust in public protection, risk perceptions in terms of perceived likelihood and consequences of flooding, and individuals' flood-preparedness intentions and financial risk-taking behavior.

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Data Availability Statement: The data and the survey questionnaire that support the findings of this study are openly available in "OSF" at https://osf.io/46nqm/?view_only=d64ec45308a948d9a4 d3739afc9e31ab (accessed on 15 November 2021).

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