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Supplement of

The determinants affecting the intention of urban residents to prepare for flood risk in China

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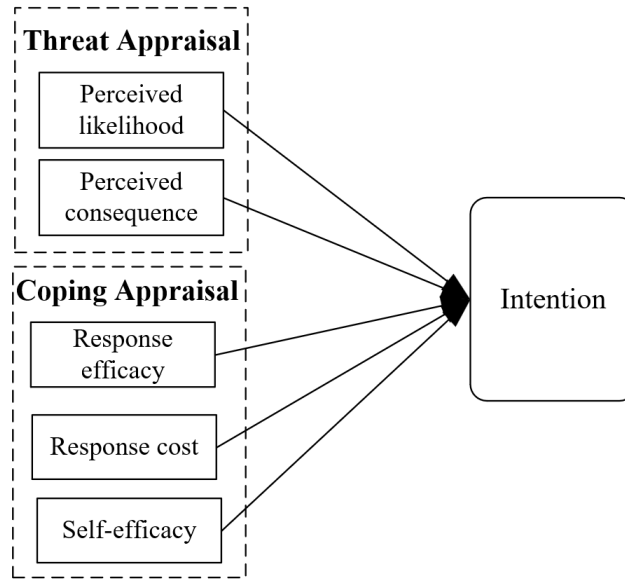
Figure S1. Basic framework of PMT model.

The Online Questionnaire

We used the Wenjuanxing website to collect the survey. For ease of understanding, a fully translated version of the questionnaire is provided below. Note, however, that not all of the questions are used in the analysis. The types of survey questions included fill in the blank, demographic questions, single choice questions, multiple choice questions, and rating scales.

Introduction

Research on Public Awareness and Mitigation Measures of Floods.

In recent years, extreme rain events have occurred frequently and flooding has caused significant losses to the country and its people. The purpose of this questionnaire is to understand the public's awareness of flooding caused by extreme rainfall and their choice of response measures. This questionnaire is anonymous, all the data you provide will be treated confidentially and will not have any adverse impact on you and your work life. In addition, the answers to this questionnaire are not right or wrong, and are for academic research purposes only. Your active cooperation is of great importance to this research work, and your support and cooperation are greatly appreciated!

Table S1

The questionnaire.

Item	Description of question	Response scale
1	Reinforcement of houses or/and construction of water retaining walls.	
2	Prepare sandbags, life jackets and other emergency supplies.	Categorical variable, respondent's willing to implement
3	Participate in emergency drills or/and learn about flooding.	measures: 1=strongly unwilling, 2=unwilling, 3=undecided,
4	Purchasing flood insurance.	4=partly willing, 5=strongly willing.
5	Move the shelter to a safe area away from flooding.	
6	The number of occurrences of very heavy rainfall has increased in 5 years.	Categorical variable, likelihood of occurrence according to the respondent: 1=never, 2=rarely, 3=sometimes, 4=often,
7	Spending to withstand damage caused by heavy rainfall has increased.	5=always.
8	How likely do you think flooding is to cause damage to infrastructure (telecommunications, electrification and transportation, etc.) in your area?	Categorical variable, likelihood of occurrence according to the
9	How likely do you think you are to be a victim (property damage or injury) in a flood?	respondent: 1=very small, 2=small, 3=medium, 4=high, 5=very high.
10	How dangerous do you think the flood is to your life?	
11	Prepare sandbags, life jackets and other emergency supplies.	
12	Participate in emergency drills or/and learn about flooding.	Categorical variable, respondent perceives the measures to
13	Reinforcement of houses or/and construction of water retaining walls.	be:1=not effective at all, 2=not effective, 3=not effective, not
14	Purchasing flood insurance	ineffective, 4=effective, 5=very effective.
15	Move the shelter to a safe area away from flooding.	
16	I think I have the ability to take the above flood protection measures.	
17	When a flood occurs, I think I will be able to keep my property safe.	Categorical variable, respondent thinks that him/herself or a member of the household is capable of taking the described
18	When the flood occurs, I think I have the ability to keep my life safe.	measures: 1=fully disagree, 2=partly disagree, 3=partly
19	When the flood occurs, I think I have the ability to help others out of danger.	disagree, partly agree, 4=partly agree, 5=fully agree.
20	Prepare sandbags, life jackets and other emergency supplies.	Categorical variable, respondent perceives the measure to be:
21	Participate in emergency drills or/and learn about flooding.	1=a very short time to implement, 2=a short time, 3= do not
22	Reinforcement of houses or/and construction of water retaining walls.	know, 4=a long time, 5=a very long time (time needed to
23	Purchasing flood insurance.	implement the measure)/1=very low-cost, 2=low-cost, 3=do

24	Move the shelter to a safe area away from flooding.	not know, 4=expensive, 5=very expensive (cost of the measure).
25	Infrastructure is interrupted or destroyed in the area where you live.	
26	Serious damage to your personal belongings (e.g. vehicles, outdoors/residential areas).	Categorical variable, worry about flood occurrence and consequences: 1=quite don't worry, 2=don't worry, 3=do not
27	Destruction partial/total of your residence.	know, 4=worry, 5=very worry.
28	Injuries to individuals or family members.	
29	Death of an individual or family member.	
30	I don't think we can reduce the loss in the flood no matter what measures we take (fatalism).	
31	I think flood prevention is a matter for the authorities and has less to do with individuals.	Categorical variable, respondent's attitudes towards flood prevention: 1=strongly disagree, 2=partly disagree, 3=partly disagree, partly agree, 4=partly agree, 5= strongly agree.
32	I think individuals have the responsibility to protect their families from floods.	
33	How much influence does your family have on your implementation of flood prevention measures?	
34	How much influence do your neighbors or friends have on your implementation of flood protection measures?	Categorical variable, respondent's felling: 1=very small, 2=small, 3=medium, 4=high, 5=very high.
35	What is the impact of government policies on your implementation of flood prevention measures?	
36	I am confident that the flood defenses are maintained well.	Categorical variable, respondent's attitudes to the flood protect
37	I have confidence in the technological skills of flood risk managers.	projects: 1=strongly disagree, 2=partly disagree, 3=partly
38	I rely heavily on the local flood control facilities.	disagree, partly agree, 4=partly agree, 5= strongly agree.
39	Gender	Dummy variable, 1=female, 0=male.
40	Age	Age of the respondents grouped into 5 classes:1=" Under 20 years old", 2=" 20-30 years old", 3=" 31-40 years old", 4=" 41-60 years old", 5=" Over 60 years old".
41	Personal yearly income	Continuous variable of net yearly income
42	Education level	Respondents' education level grouped into 4 classes: 1=" junior high school or below", 2=" Senior high school", 3=" Associate degree or bachelor degree", 4=" Master's degree or

		PhD degree".
43	Housing	Dummy variable, 1=homeownship,0=tenancy.
44	Floor level	Dummy variable, 1=" First floor or basement", 2=" Second floor", 3=" Third or upper floors", 4=" other".

Table S2

Flood-risk precautionary behavior scale.

Constructs	Item	Description of question	Response scale (1-5)
Intention (IN)	IN1	Reinforcement of houses or / and construction of water retaining walls.	"very reluctant to"-"very glad to"
	IN2	Prepare sandbags, life jackets and other emergency supplies.	
	IN3	Participate in emergency drills or / and learn about flooding.	
	IN4	Purchasing flood insurance.	
	IN5	Move the shelter to a safe area away from flooding.	
Perceived likelihood (PL)	PL1	The number of occurrences of very heavy rainfall has increased in 5 years.	"absolutely no"-"absolutely have"
	PL2	Spending to withstand damage caused by heavy rainfall has increased.	
Perceived consequence (PC)	PC1	How likely do you think flooding is to cause damage to infrastructure (telecommunications, electrification and transportation, etc.) in your area?	"very small"-"very high"
	PC2	How likely do you think you are to be a victim (property damage or injury) in a flood?	
	PC3	How dangerous do you think the flood is to your life?	
Response efficacy (RE)	RE1	Prepare sandbags, life jackets and other emergency supplies.	"not effective at all"-"very effective"
	RE2	Participate in emergency drills or / and learn about flooding.	
	RE3	Reinforcement of houses or / and construction of water retaining walls.	
	RE4	Purchasing flood insurance.	
	RE5	Move the shelter to a safe area away from flooding.	
Self-efficacy (SE)	SE1	I think I have the ability to take the above flood protection measures.	
	SE2	When a flood occurs, I think I will be able to keep my property safe.	
	SE3	When the flood occurs, I think I have the ability to keep my life safe.	
	SE4	When the flood occurs, I think I have the ability to help others out of danger.	
Attitude (AT)	AT1	I don't think we can reduce the loss in the flood no matter what measures we take (fatalism).	"strongly disagree"-"strongly agree"
	AT2	I think flood prevention is a matter for the authorities and has less to do with individuals.	
	AT3	I think individuals have the responsibility to protect their families from floods.	
Trust in public flood protection (TR)	TR1	I am confident that the flood defenses are maintained well.	
	TR2	I have confidence in the technological skills of flood risk managers.	
	TR3	I rely heavily on the local flood control facilities.	
Response cost	RC1	Prepare sandbags, life jackets and other emergency supplies.	"very low-cost"-"very

(RC)	RC2	Participate in emergency drills or / and learn about flooding.	expensive"
	RC3	Reinforcement of houses or / and construction of water retaining walls.	
	RC4	Purchasing flood insurance.	
	RC5	Move the shelter to a safe area away from flooding.	
Social norm (SN)	SN1	What influence does your family have on your implementation of flood protection measures?	"very small"-"very high"
	SN2	What influence do your neighbors, friends or relatives have on your implementation of flood protection measures?	
	SN3	What is the impact of government policies on your implementation of flood prevention measures?	
Worry (W)	W1	Infrastructure is interrupted or destroyed in the area where you live.	"quite don't worry"- "very worry"
	W2	Serious damage to your personal belongings.	
	W3	Destruction partial / total of your residence.	
	W4	Injuries to individuals or family members.	
	W5	Death of an individual or family member.	

Note: The items of red were deleted according to factor loading below 0.5.

Table S3

Results of validation factor analysis.

Construct	Item	Factor loading	Cronbach's alpha	CR	AVE
IN	IN1	0.727	0.746	0.841	0.569
	IN2	0.833			
	IN3	0.706			
	IN4	0.747			
PL	PL1	1.000	1.000	1.000	1.000
PC	PC1	0.809	0.778	0.871	0.693
	PC2	0.861			
	PC3	0.825			
RE	RE1	0.699	0.766	0.798	0.506
	RE2	0.801			
	RE3	0.704			
	RE4	0.608			
SE	SE1	0.810	0.819	0.878	0.643
	SE2	0.831			
	SE3	0.784			
	SE4	0.781			
AT	AT1	0.728	0.746	0.717	0.594
	AT2	0.921			
W	W1	0.792	0.850	0.899	0.690
	W2	0.865			
	W3	0.825			
	W4	0.838			
SN	SN1	0.854	0.732	0.849	0.653
	SN2	0.821			
	SN3	0.745			
TR	TR1	0.918	0.769	0.896	0.811
	TR2	0.883			

Note: IN: Intention; PL: Perceived likelihood; PC: Perceived consequence; RE: Response efficacy; SE: Self-efficacy; AT: Attitude; W: Worry; SN: Social norm; TR: Trust in public flood protection. CR: Composite reliability; AVE: Average variance extracted.

Table S4

The result of Fornell-Larcker criterion.

Construct	IN	PL	PC	RE	SE	RC	AT	W	SN	TR
IN	0.755									
PL	0.208	1.000								
PC	0.302	0.524	0.832							
RE	0.502	0.036	0.134	0.711						
SE	0.280	0.019	-0.098	0.249	0.802					
RC	0.131	0.129	0.102	0.088	0.155	0.775				
AT	-0.131	0.069	-0.025	-0.166	0.078	0.208	0.771			
W	0.302	0.197	0.381	0.230	-0.048	0.161	-0.074	0.831		
SN	0.301	0.159	0.210	0.262	0.195	0.140	-0.021	0.216	0.808	
TR	0.105	-0.134	-0.140	0.135	0.190	0.035	-0.068	-0.065	0.169	0.900

Note: The number on the diagonal is the square root of the latent variable AVE, and the number below the diagonal is the correlation coefficient between the latent variables. IN: Intention; PL: Perceived likelihood; PC: Perceived consequence; RE: Response efficacy; SE: Self-efficacy; RC: Response cost; AT: Attitude; W: Worry; SN: Social norm; TR: Trust in public flood protection.

Table S5

The result of HTMT.

Construct	IN	PL	PC	RE	SE	RC	AT	W	SN	TR
IN										
PL	0.238									
PC	0.393	0.595								
RE	0.714	0.061	0.184							
SE	0.343	0.026	0.131	0.329						
RC	0.242	0.182	0.155	0.249	0.251					
AT	0.149	0.120	0.097	0.240	0.090	0.493				
W	0.379	0.214	0.468	0.305	0.099	0.240	0.149			
SN	0.407	0.185	0.277	0.379	0.245	0.254	0.121	0.273		
TR	0.144	0.148	0.177	0.198	0.233	0.067	0.068	0.079	0.229	

Note: IN: Intention; PL: Perceived likelihood; PC: Perceived consequence; RE: Response efficacy; SE: Self-efficacy; RC: Response cost; AT: Attitude; W: Worry; SN: Social norm; TR: Trust in public flood protection.

Table S6

Results of structural model.

	Hypothesis	Path coefficient	T-statistic value	P-value
H1a:	PL → IN	0.072	3.340^{**}	0.001
H1b:	PC → IN	0.171	7.003^{***}	0.000
H1c:	PL → W → IN	0.000	0.125^{ns}	0.901
H1d:	PC → W → IN	0.047	4.547^{***}	0.000
H2a:	RE → IN	0.358	13.570^{***}	0.000
H2b:	SE → IN	0.190	8.431^{***}	0.000
H2c:	RC → IN	-0.067	2.359^{*}	0.014
H3:	AT → IN	-0.079	3.436^{**}	0.001
H4:	SN → IN	0.084	3.694^{***}	0.000
H5a:	TR → AT	-0.068	2.488^{*}	0.013
H5b:	TR → PL	-0.134	5.031^{***}	0.000
H5c:	TR → PC	-0.140	5.532^{***}	0.000
H5d:	TR → IN	0.007	0.216^{ns}	0.829

Note: $^{***} p < 0.001, ^{**} p < 0.01, ^{*} p < 0.05, ^{ns} p > 0.05$. IN: Intention; PL: Perceived likelihood; PC: Perceived consequence; RE: Response efficacy; SE: Self-efficacy; RC: Response cost; AT: Attitude; W: Worry; SN: Social norm; TR: Trust in public flood protection.

Table S7

Direct, indirect and total effects of antecedents to intention.

Path	Total effects ($c + a * b$)	Direct effects (c)	Indirect path	Indirect effects (a*b)
AT → IN	-0.079^{**}	-0.079^{**}		
PC → IN	0.218^{***}	0.171^{***}	PC → W → IN	0.047^{***}
PC → W	0.383^{***}	0.383^{***}		
PL → IN	0.072^{**}	0.072^{**}	PL → W → IN	0.000^{ns}
PL → W	-0.003^{ns}	-0.003^{ns}		
RC → IN	-0.067^{*}	-0.067^{*}		
RE → IN	0.358^{***}	0.358^{***}		
SE → IN	0.190^{***}	0.190^{***}		
SN → IN	0.084^{***}	0.084^{***}		
TR → AT	-0.068^{*}	-0.068^{*}		
TR → IN	-0.036^{ns}	0.007^{ns}	TR → PL → IN	-0.007^{ns}
			TR → PL → W → IN	0.000^{ns}
			TR → PC → IN	-0.031^{**}
			TR → PC → W → IN	-0.009^{**}
			TR → AT → IN	0.004^{ns}
TR → PC	-0.140^{***}	-0.140^{***}		
TR → PL	-0.134^{***}	-0.134^{***}		
W → IN	0.124^{***}	0.124^{***}		

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, ^{ns} $p > 0.05$. IN: Intention; PL: Perceived likelihood; PC: Perceived consequence; RE: Response efficacy; SE: Self-efficacy; RC: Response cost; AT: Attitude; W: Worry; SN: Social norm; TR: Trust in public flood protection.

Table S8

Means and standard deviations of all measurement items.

Items	M	SD	Items	M	SD	Items	M	SD
PL1	2.667	1.124	SE1	3.404	1.022	AT1	2.424	1.098
PC1	3.498	1.183	SE2	3.114	1.049	AT2	1.848	1.074
PC2	3.109	1.165	SE3	3.489	1.036	AT3	4.225	0.831
PC3	3.385	1.294	SE4	3.039	1.002	SN1	3.509	1.047
IN1	3.358	1.304	RC1	3.742	0.889	SN2	3.205	1.059
IN2	3.835	1.216	RC2	2.648	0.996	SN3	3.958	0.933
IN3	4.201	0.921	RC3	2.09	1.011	TR1	3.51	0.903
IN4	3.51	1.138	RC4	3.329	0.917	TR2	3.653	0.811
IN5	2.988	1.299	RC5	4.333	0.912	TR3	3.705	0.939
RE1	3.924	0.895	W1	3.743	1.055			
RE2	4.27	0.839	W2	3.855	1.068			
RE3	4.275	0.808	W3	3.662	1.191			
RE4	3.744	0.941	W4	4.168	1.112			
RE5	3.825	1.101	W5	4.054	1.302			

Note: IN: Intention; PL: Perceived likelihood; PC: Perceived consequence; RE: Response efficacy; SE: Self-efficacy; RC: Response cost; AT: Attitude; W: Worry; SN: Social norm; TR: Trust in public flood protection.