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Factors of influence on flood risk perceptions related to Hurricane Dorian: an assessment of heuristics, time dynamics, and accuracy of risk perceptions

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Supplementary information

Table S1. Coding of the dependent and independent variables

Variable	Coding
Dependent variables	
Perceived flood probability	*"What is your best estimate of how often a food will occur at your home?"* 7-point Likert scale, 1 = less often than 1/1,000 years to 7 = more often than 1/10 years
Concern flood probability	*"The probability of flooding is so low that I am not concerned about the consequences of a flood"* 5-point Likert scale, 1 = strongly agree to 5 = strongly disagree (higher numbers indicate more concern)
Worry about flooding	*"I am worried about the danger of a food at my current residence"* 5-point Likert scale, 1 = strongly disagree to 5 = strongly agree
Estimated damage	*"What would it cost to repair the damage to your home and its contents if your home did flood"* Categorical, 1 = $0-$10,000; 2 = $10,000-$30,000; 3 = $30,000-$50,000; 4 = $50,000-$70,000; 5 = $70,000-$90,000; 6 = $90,000-$150,000; 7 = $150,000-$350,000; 8 = $350,000 or more
Control variables	
Gender	*Was the respondent male of female?* Dummy variable, 1 = female,0 = male
Age	*"How old are you?"* Numeric
Education	*"What is your highest completed level of education?"* Categorical, 1 = some high school to 5 = postgraduate
Income	*"Which of the following describes your total household income for 2019 before taxes?"* Categorical, 1 = less than $10,000 to 6 = $125,000 or more
Homeowner	*"Do you rent or own your home?"* Dummy variable, 1 = homeowner, 0 = rent (or missing)
Personal beliefs and experiences	
Flood experience	*Has the participant in their current household been affected by floods caused by natural disasters?* Dummy variable, 1=yes, 0=no
Social norms[a]	*"Most people who are important to me would think that someone in my situation ought to take measures to reduce flood risk to one's home and purchase flood insurance"* 9-point Likert scale
Trust government	*"How much do you trust the ability of government officials to limit flood risk where you live, for example by maintaining levees and enforcing building codes?"* 4-point Likert scale, 1 = not at all, 2 = not much, 3 = somewhat, 4 = completely
Dorian specific	
Awareness living in Dorian impact area	*"How certain are you that you live in the area that will be affected by this storm?"* 4-point Likert scale, 1 = certainly not, 2 = no but unsure, 3 = yes but unsure, 4 = certainly yes
Perceived wind speed of Dorian	*"The last you heard, what was the category of the hurricane that's out there now?"*

	Numeric, 1 = Category 1 to 5 = Category 5
Objective indicators of risk	
Home ground floor	*"Does the part of the building you occupy include the ground floor level?"* Dummy variable, 1 = yes, 0 = no
Basement	*Home contains basement, cellar or crawlspace* Dummy variable, 1 = yes, 0 = no
FEMA flood zone	*Does the respondent live in a 1 in 100 year flood zone?* Dummy variable, 1 = yes, 0 = no
Time variables	
Time dummies	Categorical, 1_ = August 29 to 5_ = September 2 _1 = 23:00-06:00; _2 = 06:00-13:00; _3 = 13:00-17:00; _4 = 17:00-23:00.
Personal preferences	
Risk aversion	*"What number reflects how much risk you are willing to take?"* 11-point Likert scale, 0 = not at all willing to take risks, 10 = very willing to take risks
Internal locus of control	*"What number reflects how much control you have over how your life turns out?"* 11-point Likert scale, 0 = no control to 10 = complete control

[a] The results of merging two categorical variables

Table S2. Ordered logistic regression model of variables of influence on feelings of worry regarding the dangers of flooding.

Variable	Worry	Concern	Perceived flood probability	Estimated flood damage
Age	-0.016*	-0.012	-0.012	-0.002
	(0.007)	(0.006)	(0.008)	(0.007)
Gender	0.174	0.179	0.155	0.283
	(0.204)	(0.196)	(0.207)	(0.188)
Education				
- High school graduate	0.905	1.734	0.873	-1.220
	(0.487)	(0.910)	(0.690)	(0.746)
- Some college	0.003	1.188	0.395	-1.838*
	(0.470)	(0.887)	(0.682)	(0.758)
- College graduate	0.446	1.259	0.690	-1.116
	(0.480)	(0.890)	(0.681)	(0.717)
- Postgraduate	0.391	1.251	0.695	-1.201
	(0.513)	(0.906)	(0.686)	(0.767)
Income	-0.071	0.075	-0.063	0.163
	(0.084)	(0.076)	(0.089)	(0.0923)
Homeowner	0.085	-0.071	-0.870*	1.140**
	(0.352)	(0.376)	(0.409)	(0.393)
Experience flooding	0.854***	0.911***	1.683***	0.222
	(0.273)	(0.271)	(0.299)	(0.240)
Social norms	0.355***	0.331***	0.297***	-0.071
	(0.045)	(0.048)	(0.045)	(0.046)
Trust government	-0.135	-0.213*	-0.109	0.033
	(0.105)	(0.103)	(0.113)	(0.106)
Awareness Dorian impact area	0.291**	-0.020	-0.077	0.153
	(0.108)	(0.100)	(0.118)	(0.119)
Perceived wind speed Dorian	0.034	-0.041	0.019	-0.012
	(0.132)	(0.132)	(0.125)	(0.117)
Home ground floor	-0.393	-0.661	-0.418	0.637
	(0.396)	(0.391)	(0.458)	(0.388)
Basement	0.721**	0.288	0.006	-0.264
	(0.256)	(0.277)	(0.275)	(0.234)
FEMA flood zone	0.076	-0.126	-0.051	-0.095
	(0.212)	(0.198)	(0.215)	(0.203)
Time1_4	0.880	1.168	0.297	0.920
	(0.737)	(0.802)	(0.668)	(0.614)
Time2_1	0.919	1.945*	0.525	0.588
	(0.687)	(0.779)	(0.799)	(0.528)
Time2_3	1.652	2.066	-0.713	0.889
	(3.492)	(1.375)	(1.387)	(1.774)
Time2_4	1.318	1.479*	0.016	0.588
	(0.634)	(0.730)	(0.619)	(0.528)
Time3_1	1.900*	1.848*	0.685	0.977
	(0.719)	(0.836)	(0.732)	(0.656)
Time3_2	0.704	1.244	0.042	1.114
	(0.852)	(0.940)	(0.912)	(0.894)
Time3_3	1.937*	1.442	0.323	1.159
	(0.678)	(0.799)	(0.690)	(0.595)
Time3_4	1.090	1.411	0.171	0.432
	(0.635)	(0.760)	(0.646)	(0.540)
Time4_1	1.325	0.624	0.166	1.252
	(0.820)	(1.041)	(0.695)	(0.885)

Time4_3	1.449	1.302	0.571	-1.091
	(0.981)	(0.986)	(0.871)	(0.922)
Time4_4	1.124	1.426	0.345	0.902
	(0.676)	(0.833)	(0.723)	(0.583)
Time5_1	0.488	1.140	0.359	1.687
	(0.824)	(0.973)	(1.697)	(0.762)
Time5_3	0.485	0.830	0.749	0.072
	(0.684)	(0.811)	(0.744)	(0.614)
Risk aversion	-0.027	-0.029	0.029	0.013
	(0.034)	(0.034)	(0.039)	(0.035)
Internal locus of control	-0.052	-0.015	0.003	-0.022
	(0.036)	(0.033)	(0.037)	(0.039)
Log likelihood	-561.615	-581.744	-610.013	-726.640
Pseudo R^2	0.126	0.102	0.103	0.042
Observations	426	426	395	384

Notes: Ordered logistic regression model of variables of influence on flood risk perception dimensions including time dummy variables. Robust standard errors in parentheses. Significance levels: *p<0.05; **p<0.01; ***p<0.001.

Table S3. Logit model of variables of influence on change in flood risk perception

	Worry		Concern		Probability		Estimated damage	
	Negative change	Positive change	Negative change	Positive change	Negative change	Positive change	Negative change	Positive change
Age	-0.002	<0.001	0.005	0.012	-0.014	-0.014	0.009	0.009
	(0.013)	(0.012)	(0.012)	(0.012)	(0.014)	(0.014)	(0.012)	(0.013)
Gender	-0.311	-0.066	0.180	0.668	-0.151	-0.350	-0.194	-0.357
	(0.404)	(0.429)	(0.404)	(0.409)	(0.416)	(0.447)	(0.412)	(0.467)
Education	-0.106	-0.253	-0.581**	-0.356	-0.088	0.112	-0.068	-0.012
	(0.206)	(0.198)	(0.246)	(0.262)	(0.209)	(0.219)	(0.199)	(0.234)
Income	0.032	-0.208	0.266	0.260	-0.110	-0.195	-0.114	-0.028
	(0.183)	(0.158)	(0.170)	(0.177)	(0.183)	(0.188)	(0.175)	(0.187)
Homeowner	0.798	0.612	-0.213	-0.296	-0.152	0.295	-0.147	0.591
	(0.741)	(0.721)	(0.771)	(0.791)	(0.783)	(0.896)	(0.921)	(1.530)
Flood experience	1.486*	0.373	1.564*	0.323	0.744	0.546	-0.907	-0.415
	(0.636)	(0.769)	(0.755)	(0.715)	(0.639)	(0.725)	(0.595)	(0.619)
Home ground floor	-0.104	1.548	-1.441	-0.146	0.325	0.765	0.131	1.131
	(0.662)	(1.156)	(1.060)	(1.143)	(0.923)	(0.971)	(0.878)	(1.408)
Basement	0.014	-1.595	0.259	-0.130	-0.600	-0.764	1.113	1.431
	(0.584)	(0.817)	(0.633)	(0.680)	(0.580)	(0.723)	(0.882)	(0.768)
FEMA flood zone	-0.571	0.407	-0.183	-0.185	-0.151	-0.441	-0.059	0.553
	(0.413)	(0.490)	(0.452)	(0.489)	(0.462)	(0.503)	(0.462)	(0.493)
Constant	0.323	-0.480	2.438	-0.146	2.046	0.741	0.769	-2.021
	(1.290)	(1.560)	(1.759)	(1.723)	(1.739)	(1.566)	(1.498)	(1.656)
Pseudo R2	0.055	0.075	0.105	0.047	0.031	0.042	0.032	0.071
Observations	133	115	126	115	117	94	104	105

Notes: Logit regression estimates of change (negative and positive) versus stability for four indicators of flood risk. Robust standard errors in parentheses. Significance levels: *p<0.05; **p<0.01; ***p<0.001

Table S4. Logit model of variables of influence of flood risk misperception

	Probability		Hurricane category		Damage	
	Under-estimate	Over-estimate	Under-estimate	Over-estimate	Under-estimate	Over-estimate
Age	0.004	<0.001	-0.004	-0.011	-0.008	-0.006
	(0.011)	(0.008)	(0.009)	(0.010)	(0.012)	(0.009)
Gender	0.327	0.250	-0.014	0.227	-0.621	-0.170
	(0.340)	(0.226)	(0.261)	(0.301)	(0.344)	(0.263)
Education	-0.096	-0.232	-0.081	-0.033	-0.025	-0.052
	(0.184)	(0.120)	(0.135)	(0.154)	(0.176)	(0.145)
Income	0.003	-0.010	-0.146	-0.153	0.175	0.007
	(0.150)	(0.098)	(0.113)	(0.118)	(0.131)	(0.128)
Homeowner	-0.394	0.116	-0.131	1.341	0.974	0.278
	(0.555)	(0.396)	(0.446)	(0.639)	(0.636)	(0.491)
Flood experience	-0.778	0.143	-0.230	-0.410	0.421	0.602
	(0.632)	(0.288)	(0.378)	(0.455)	(0.496)	(0.373)
Social norms	-0.029	0.050	-0.030	0.017	0.018	-0.037
	(0.077)	(0.056)	(0.065)	(0.073)	(0.085)	(0.063)
Trust government	-0.089	0.070	0.075	-0.300	0.241	0.206
	(0.173)	(0.119)	(0.155)	(0.167)	(0.185)	(0.144)
Home ground floor	1.257	1.113*	0.484	-0.374	0.106	0.267
	(0.770)	(0.521)	(0.512)	(0.486)	(0.660)	(0.543)
Basement	-0.017	-0.333	0.079	0.075	-0.408	-0.422
	(0.566)	(0.334)	(0.391)	(0.445)	(0.508)	(0.364)
Risk aversion	0.087	0.023	-0.087	-0.088	0.100	0.104*
	(0.056)	(0.039)	(0.045)	(0.056)	(0.059)	(0.043)
Internal locus of control	0.034	0.022	-0.001	0.029	-0.061	-0.017
	(0.068)	(0.041)	(0.053)	(0.066)	(0.066)	(0.049)
Worry flooding	-0.167	-0.118	-0.004	-0.188	0.097	0.145
	(0.146)	(0.096)	(0.119)	(0.141)	(0.150)	(0.112)
Concern flood probability	-0.510***	0.113	0.151	0.117	-0.343*	-0.095
	(0.157)	(0.091)	(0.120)	(0.134)	(0.153)	(0.110)
Constant	-0.950	-1.917	-0.544	-0.240	-0.915	0.306
	(1.378)	(0.977)	(1.092)	(1.351)	(1.672)	(1.055)
Pseudo R2	0.139	0.032	0.027	0.048	0.094	0.041
Observations	315	387	377	359	175	304

Notes: Logit regression estimates of misperception (over- and under-) versus correct estimation for three indicators of flood risk. Robust standard errors in parentheses. Significance levels: *p<0.05; **p<0.01; ***p<0.001