Table 1: Representativeness of Survey Participants

Demographic Categories	U.S. Adult Population* (%)	Participants (%)
Gender		
Female	51.3	51.3
Male	48.7	48.7
Age		
18 to 24	12.1	12.2
25 to 34	18.0	18.2
35 to 44	16.2	16.4
45 to 54	16.8	16.6
55 to 64	16.7	16.6
65 and up	20.2	20.0
Ethnicity		
Hispanic	16.1	16.3
Non-Hispanic	83.9	83.7
Race		
White	78.2	76.4
Black or African American	12.8	13.6
Asian	5.8	6.4
Other Race	3.2	3.5
NWS Region		
Eastern	31.7	31.9
Southern	27.0	26.7
Central	20.7	21.2
Western	20.6	20.2

*****Population estimates were obtained from the U.S. Census Annual Estimates of the Resident Population by Sex, Age, Race, and Hispanic Origin for the United States and States: April 1, 2010 to July 1, 2017 (PEPASR6H).

Table 2: Operationalization of Tornado Warning Reception

Survey Question	1	2	3	4	5
Please tell us how strongly you agree with the following statements about tornado WARNINGS:					
• **Rec_All:** I receive all tornado warnings that are issued for my area.	6.5%	15.9%	28.1%	32.4%	17.1%
• **Rec_Most:** I receive most tornado warnings that are issued for my area.	4.9%	7.5%	25.8%	42.9%	18.9%
• **Rec_Soon:** I receive tornado warnings as soon as they are issued for my area.	5.1%	12.2%	29.1%	36.9%	16.7%
Sometimes people *miss* tornado WARNINGS because they are doing something that makes it difficult to pay attention to the weather. For example, people often miss tornado warnings when they are sleeping. How confident are you that you would *receive* tornado warnings in the following situations?					
• **Rec_Sleep:** If you are sleeping?	25.7%	32.7%	21.8%	11.5%	8.3%
• **Rec_Car:** If you are in a car?	7.2%	16.4%	33.9%	27.4%	15.2%
• **Rec_Work:** If you are at work or school?	4.5%	10.8%	29.7%	34.6%	20.4%
• **Rec_Store:** If you are at a store?	7.7%	20.2%	33.5%	25.5%	13.1%
• **Rec_Sm_Group:** If you are with a small group of friends or family?	3.7%	12.1%	37.4%	31.3%	15.4%
• **Rec_Lg_Group:** If you are with a large group of friends or family?	4.2%	12.9%	32.7%	32.8%	17.3%
For some people the time of day influences tornado warning reception, understanding, and/or responsiveness. If a tornado WARNING were issued for your area tomorrow at [RANDOM TIME], how confident are you that you would receive the warning?					
• **Rec_Morning:** 1:00 AM – 9:00 AM	11.3%	16.6%	28.7%	28.2%	15.3%
• **Rec_Afternoon:** 10:00 AM – 5:00 PM	2.4%	5.2%	26.9%	38.8%	26.7%
• **Rec_Evening:** 6:00 PM – 12:00 AM	5.5%	9.0%	26.6%	36.6%	22.3%

For **Rec_All** to **Rec_Soon**, 1 – Strongly disagree, 2 – Disagree, 3 - Neither disagree nor agree, 4 – Agree, and 5 – Strongly agree; for **Rec_Sleep** to **Rec_Evening**, 1 – Not at all confident, 2 – Not very confident, 3 – Somewhat confident, 4 – Very confident, and 5 – Extremely confident.

Table 3: Operationalization of Tornado Warning Comprehension (Objective)

Survey Question	% Correct
Ocomp_WW_Difference: This alert is issued when severe thunderstorms and tornadoes are possible in and near the area. It does not mean that they will occur. It only means they are possible. [*50% of participants get this version of the question*]	
• Tornado Watch*	76.9%
• Tornado Warning	19.3%
• Don't Know	3.8%
Ocomp_Watch_Warn: This alert is used when a tornado is imminent. When this alert is issued, seek safe shelter immediately. [*50% of participants get this version of the question*]	
• Tornado Watch	13.4%
• Tornado Warning*	84.0%
• Don't Know	2.6%
Ocomp_Warn_Time: If the National Weather Service issues a tornado warning for your area, how much time do you have before the tornado arrives?	
• Less than 1 hour	55.3%
• How many ***minutes*** are there between when tornado WARNINGS are issued and when tornadoes arrive? [< 30 minutes]*	
• 1 to 24 hours	36.6%
• 1 to 3 days	5.8%
• More than 3 days	2.3%
Ocomp_Warn_Size: Approximately how large is the area included in an average tornado warning?	
• Around the size of a city*	30.2%
• Around the size of a county*	38.3%
• Around the size of multiple counties	28.0%
• Around the size of a state	2.2%
• Around the size of multiple states	1.3%
Ocomp_Watch_Time: If the National Weather Service issues a tornado watch for your area, how much time do you have before the tornado arrives?	
• Less than 1 hour	19.1%
• 1 to 24 hours*	63.7%
• How many ***hours*** are there between when tornado watches are issued and when tornadoes arrive? [1 to 3 hours]*	
• 1 to 3 days	13.1%
• More than 3 days	4.1%
Ocomp_Watch_Size: Approximately how large is the area included in an average tornado watch?	
• Around the size of a city	21.5%
• Around the size of a county	33.3%
• Around the size of multiple counties*	39.2%
• Around the size of a state*	4.2%
• Around the size of multiple states*	1.9%

*Indicates correct response. Of the 55.3% of respondents who answered Ocomp_Warn_Time correct, 25.3% also correctly knew tornado warnings have an average lead time less than 30 minutes; of the 63.7% of respondents who answered Ocomp_Watch_Time correct, 27.7% also correctly knew tornado watches have an average lead time of 1 to 3 hours.

Table 4: Operationalization of Tornado Warning Comprehension (Subjective)

Survey Question	1	2	3	4	5
Scomp_WW_Difference: Now we have some questions about the National Weather Service (NWS), an agency of the United States government that issues weather forecasts and different kinds of alerts to the public about hazardous weather, including severe weather watches and warnings. In general, do you understand the difference between watches and warnings?	1.3%	4.0%	10.2%	42.6%	41.9%
Scomp_WW_Understanding: How would you rate your understanding of tornado watches and warnings?	9.8%	27.5%	31.9%	21.6%	9.3%
Scomp_Severe_Thund: How would you rate your understanding of severe thunderstorm watches and warnings?	4.8%	23.7%	35.5%	25.0%	11.0%
Scomp_Maps: Forecasters, websites, and phone applications often use maps to display tornado watches and warnings. How would you rate your understanding of maps?	5.5%	17.7%	34.0%	26.4%	16.4%
Scomp_Radar: Forecasters, websites, and phone applications also use radar images to communicate tornado risk. How would you rate your understanding of radar images?	8.2%	23.6%	32.2%	24.3%	11.6%
For some people the time of day influences tornado warning reception, understanding, and/or responsiveness. If a tornado WARNING were issued for your area tomorrow at [RANDOM TIME], how confident are you that you would understand the warning?					
• **Scomp_Morning:** 1:00 AM – 9:00 AM	4.0%	9.7%	28.7%	38.5%	19.1%
• **Scomp_Afternoon:** 10:00 AM – 5:00 PM	2.3%	4.7%	25.2%	41.7%	26.1%
• **Scomp_Evening:** 6:00 PM – 12:00 AM	3.4%	6.4%	26.0%	39.9%	24.3%

For **Scomp_WW_Difference**, 1 – Definitely no, 2 – Probably no, 3 – Not sure, 4 – Probably yes, and 5 – Definitely yes; for **Scomp_WW_Understanding** to **Scomp_Radar**, 1 – Poor, 2 – Fair, 3 – Good, 4 – Very good, and 5 – Excellent; for **Scomp_Morning** to **Scomp_Evening**, 1 – Not at all confident, 2 – Not very confident, 3 – Somewhat confident, 4 – Very confident, and 5 – Extremely confident.

Table 5: Operationalization of Tornado Warning Response

Survey Question	1	2	3	4	5
Please tell us how strongly you agree with the following statements about tornado WARNINGS. If you have never received a tornado WARNING, please tell us how you think you will respond if you receive a WARNING in the future:					
• **Resp_Always:** I always take protective action when tornado warnings are issued for my area.	3.8%	14.0%	34.2%	34.9%	13.1%
Sometimes people receive tornado WARNINGS but *do not take protective action* because they are busy or doing something that makes it difficult to respond. For example, people often decide not to take protective action in response to tornado warnings when they are sleeping. How confident are you that you would *take protective action in response* to tornado warnings in the following situations?					
• **Resp_Sleep:** If you are sleeping?	18.1%	29.9%	25.9%	16.1%	9.9%
• **Resp_Car:** If you are in a car?	5.4%	17.2%	37.6%	25.8%	14.1%
• **Resp_Work:** If you are at work or school?	3.3%	8.8%	32.0%	35.7%	20.2%
• **Resp_Store:** If you are at a store?	4.1%	15.5%	38.7%	27.4%	14.2%
• **Resp_Sm_Group:** If you are with a small group of friends or family?	2.9%	10.9%	36.8%	33.3%	16.1%
• **Resp_Lg_Group:** If you are with a large group of friends or family?	3.4%	12.2%	34.9%	33.2%	16.3%
For some people the time of day influences tornado warning reception, understanding, and/or responsiveness. If a tornado WARNING were issued for your area tomorrow at [RANDOM TIME], how confident are you that you would take protective action in response to the warning?					
• **Resp_Morning:** 1:00 AM – 9:00 AM	6.0%	13.3%	35.7%	29.5%	15.5%
• **Resp_Afternoon:** 10:00 AM – 5:00 PM	2.9%	6.9%	33.2%	36.1%	20.8%
• **Resp_Evening:** 6:00 PM – 12:00 AM	4.7%	10.0%	33.2%	32.5%	19.5%

For the **Resp_Always**, 1 – Strongly disagree, 2 – Disagree, 3 - Neither disagree nor agree, 4 – Agree, and 5 – Strongly agree; for **Resp_Sleep** to **Resp_Evening**, 1 – Not at all confident, 2 – Not very confident, 3 – Somewhat confident, 4 – Very confident, and 5 – Extremely confident.

Table 6: Tetrachoric Correlation Matrix of Objective Tornado Warning Comprehension Items

	Ocomp_WW_Difference	Ocomp_Warn_Time	Ocomp_Warn_Size	Ocomp_Watch_Time	Ocomp_Watch_Size
Ocomp_WW_Difference	-	0.28 (0.04)*	0.00 (0.03)	0.17 (0.04)*	0.22 (0.03)*
Ocomp_Warn_Time	0.28 (0.04)*	-	0.13 (0.03)*	0.31 (0.03)*	0.19 (0.03)*
Ocomp_Warn_Size	0.00 (0.03)	0.13 (0.03)*	-	0.07 (0.03)*	-0.77 (0.02)*
Ocomp_Watch_Time	0.17 (0.04)*	0.31 (0.03)*	0.07 (0.03)*	-	0.06 (0.03)*
Ocomp_Watch_Size	0.22 (0.03)*	0.19 (0.03)*	-0.77 (0.02)*	0.06 (0,03)*	-

Standard errors in parentheses; *p < 0.05.

Table 7: Parameter Estimates from Linear Regression Models

	Reception	Objective Comprehension	Subjective Comprehension	Response
Male (vs. Female)	0.04 (0.04)	0.02 (0.02)	0.26*** (0.03)	-0.004 (0.04)
Age[1]	-9.52*** (0.96)	4.06*** (0.58)	-2.31** (0.91)	-4.36*** (0.97)
Age[2]	-2.87*** (0.95)	-2.76*** (0.57)	-3.82*** (0.90)	-2.57*** (0.96)
Age[3]	3.10*** (0.95)	-2.33*** (0.57)	2.88*** (0.90)	2.69*** (0.96)
Hispanic (vs. Non-Hispanic)	0.07 (0.05)	-0.08*** (0.03)	-0.05 (0.04)	0.08* (0.05)
Black (vs. White)	0.16*** (0.05)	-0.21*** (0.03)	-0.21*** (0.05)	0.14*** (0.05)
Other Race (vs. White)	-0.17*** (0.06)	-020.*** (0.04)	-0.44*** (0.06)	-0.22*** (0.06)
Warning Count[1]	4.76*** (0.95)	4.98*** (0.58)	9.00*** (0.90)	2.49** (0.97)
Warning Count[2]	-3.21*** (0.95)	-2.12*** (0.57)	-4.91*** (0.90)	-0.89 (0.96)
Warning Count[3]	0.70 (0.95)	1.54** (0.57)	2.54** (0.90)	-0.84 (0.96)
Constant	-0.05* (0.03)	0.08*** (0.02)	-0.04 (0.03)	-0.02 (0.03)
Observations	3000	3000	3000	3000
R2	0.06	0.08	0.10	0.02
Adjusted R2	0.05	0.08	0.10	0.02
Residual Std. Error	0.95	0.57	0.90	0.96

Linear regression coefficients; standard errors in parentheses; *p<0.1; **p<0.05; ***p<0.01.

Table A1: Item and Test Information Functions and Distributions

Item	Item Information	Information on the Negative Side of the Function	Information on the Positive Side of the Function
Rec_All: I receive all tornado warnings that are issued for my area.	4.04	2.36 (58.38%)	1.68 (41.62%)
Rec_Most: I receive most tornado warnings that are issued for my area.	2.86	1.77 (61.72%)	1.1 (38.28%)
Rec_Soon: I receive tornado warnings as soon as they are issued for my area.	4.32	2.59 (59.97%)	1.73 (40.03%)
Rec_Sleep: If you are sleeping?	3.87	1.5 (38.75%)	2.37 (61.25%)
Rec_Car: If you are in a car?	6.10	3.44 (56.42%)	2.66 (43.58%)
Rec_Work: If you are at work or school?	6.36	3.98 (62.6%)	2.38 (37.4%)
Rec_Store: If you are at a store?	7.91	4.35 (55.02%)	3.56 (44.98%)
Rec_Sm_Group: If you are with a small group of friends or family?	11.79	7.13 (60.53%)	4.65 (39.47%)
Rec_Lg_Group: If you are with a large group of friends or family?	9.28	5.69 (61.25%)	3.6 (38.75%)
Rec_Morning: 1:00 AM – 9:00 AM	3.67	1.95 (53.06%)	1.72 (46.94%)
Rec_Afternoon: 10:00 AM – 5:00 PM	4.74	3.22 (67.94%)	1.52 (32.06%)
Rec_Evening: 6:00 PM – 12:00 AM	3.78	2.38 (62.9%)	1.4 (37.1%)
TORNADO WARNING RECEPTION TEST (TOTAL), Alpha = 0.90	**68.72**	**40.35 (58.72%)**	**28.36 (41.28%)**
Ocomp_WW_Difference: Watch vs. warning	1.23	1.05 (83.66%)	0.18 (16.34%)
Ocomp_Warn_Time: Warning time	1.07	0.22 (18.00%)	0.85 (82.00%)
Ocomp_Warn_Size: Warning size	-	-	-
Ocomp_Watch_Time: Watch time	0.77	0.34 (25.99%)	0.43 (74.01%)
Ocomp_Watch_Size: Watch size	0.61	0.28 (45.44%)	0.33 (54.56%)
OBJECTIVE TORNADO COMPREHENSION TEST (TOTAL), Alpha = 0.51*	**3.69**	**1.9 (40.23%)**	**1.8 (59.77%)**
Scomp_WW_Difference: […] do you understand the difference between watches and warnings?	4.44	3.42 (77.12%)	1.02 (22.88%)
Scomp_WW_Understanding: […] understanding of tornado watches and warnings?	10.24	4.97 (48.5%)	5.27 (51.5%)
Scomp_Severe_Thund: […] understanding of severe thunderstorm watches and warnings?	11.35	6.09 (53.65%)	5.26 (46.35%)
Scomp_Maps: […] understanding of maps?	7.53	4.27 (56.75%)	3.26 (43.25%)
Scomp_Radar: […] understanding of radar images?	8.66	4.5 (52.03%)	4.15 (47.97%)
Scomp_Morning: 1:00 AM – 9:00 AM	5.43	3.36 (61.89%)	2.07 (38.11%)
Scomp_Afternoon: 10:00 AM – 5:00 PM	5.70	3.87 (67.84%)	1.83 (32.16%)
Scomp_Evening: 6:00 PM – 12:00 AM	5.27	3.48 (66.06%)	1.79 (33.94%)
SUBJECTIVE TORNADO COMPREHENSION TEST (TOTAL), Alpha = 0.90	**58.63**	**33.97 (57.95%)**	**24.65 (42.05%)**
Resp_Always: I always take protective action when tornado warnings are issued for my area.	3.68	2.15 (58.5%)	1.53 (41.5%)
Resp_Sleep: If you are sleeping?	4.05	1.81 (44.78%)	2.24 (55.22%)
Resp_Car: If you are in a car?	6.48	3.66 (56.41%)	2.83 (43.59%)
Resp_Work: If you are at work or school?	7.86	5.0 (63.55%)	2.87 (36.45%)
Resp_Store: If you are at a store?	9.69	5.6 (57.77%)	4.09 (42.23%)
Resp_Sm_Group: If you are with a small group of friends or family?	14.56	9.08 (62.41%)	5.47 (37.59%)
Resp_Lg_Group: If you are with a large group of friends or family?	12.46	7.71 (61.9%)	4.75 (38.1%)
Resp_Morning: 1:00 AM – 9:00 AM	5.37	3.07 (57.24%)	2.3 (42.76%)
Resp_Afternoon: 10:00 AM – 5:00 PM	6.52	4.2 (64.5%)	2.31 (35.5%)
Resp_Evening: 6:00 PM – 12:00 AM	5.66	3.53 (62.35%)	2.13 (37.65%)
TORNADO WARNING RESPONSE TEST (TOTAL), Alpha = 0.91	**76.32**	**45.82 (60.03%)**	**30.51 (39.97%)**

*Calculated using the tetrachoric correlation matrix in Table 6.