Hurricanes vs Nor'easters

The Effects of Storm Type on Perceived Severity and Protective Actions

Cara L. Cuite, Rebecca E. Morss, Julie L. Demuth, and William K. Hallman

ABSTRACT: Both hurricanes and nor'easters can be destructive and deadly. The current study investigates whether, when all other features of a storm warning message are held constant, people perceive the risks posed by nor'easters and hurricanes differently and whether these differences affect their attitudes and decisions about taking protective action. We conducted an online experiment involving 1,700 Americans residing in northeastern coastal ZIP codes to test the effects of storm type (hurricane vs nor'easter). Participants were told that their area was under an evacuation order due to either a predicted hurricane or nor'easter. Reported message comprehension and perceived relevance were similar across storm type; however, storm type had small but significant effects on other dependent measures. Those in the hurricane condition were more likely to believe the storm would be severe ($p = 0.007$). They were also more likely to say that it is important to evacuate, that they would evacuate their homes, and that they would recommend to their neighbors that they evacuate ($p < 0.001$). Additional analysis demonstrated that the effect of storm type on evacuation likelihood is mediated, at least in part, by perceived severity. These findings provide evidence that people perceive hurricanes as more severe and more likely to require taking protective action than nor'easters, even when other attributes of the storms remain the same. Forecasters, broadcast meteorologists, and emergency management professionals should consider these small but important differences in perceptions when communicating about these types of storms.

KEYWORDS: Social Science; North America; Hurricanes

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Corresponding author: Cara L. Cuite, cuite@rutgers.edu

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Although hurricanes and nor'easters are meteorologically different,¹ the two storm types can have similar impacts. Both can produce strong winds, heavy precipitation, storm surge, and strong waves in communities along the U.S. East Coast, generating major damage and destruction (e.g., Davis and Dolan 1993; State of New Jersey Office of Emergency Management 2019). Because both can cause significant coastal flooding, transportation disruption, and utility outages, coastal residents are often asked to engage in similar preparatory behavior for both types of storm (e.g., Massachusetts Emergency Management Agency 2020a,b). Although evacuation orders are more typically associated with hurricanes, they are sometimes issued for nor'easters (e.g., Held 2018; Sacks 2018). This may become more common (Skeldon 2017) as the frequency and severity of U.S. winter storms have been increasing (Melillo et al. 2014). Thus, a coastal resident facing either a hurricane or nor'easter of similar severity can be at risk for similar storm hazards and impacts and may be asked to engage in similar protective behaviors, regardless of the storm type.

Although the meteorological differences between hurricanes and nor'easters are well established, much less is known about potential differences in how the public perceives and responds to these two types of storms. Therefore, the goal of the current research is to understand if there are significant differences in how people perceive these two types of storms, and if those differences may translate into different behavioral responses to storm warning messages. In addition, we examine the particular role that perceived severity may play in explaining differences in behavioral responses to different storm types. Based on these research results, we explore implications for practitioners, from broadcast meteorologists to emergency managers, regarding how to communicate about these storms.

Public perception of and response to hurricanes and nor'easters. Nor'easters can be deadly storms with significant impacts; in fact, they often have impacts over a larger geographic area and for longer duration than hurricanes (Davis and Dolan 1993). However, while there has been a large body of research on public perceptions of and responses to hurricanes (e.g., Dash and Gladwin 2007; Huang et al. 2016; Lazo et al. 2015), this is not the case for nor'easters.

Most models of precaution adoption and protective behaviors consider both perceived likelihood of exposure to potential harm and the perceived severity of the threat as important predictors of personal protective behaviors (Slovic 2000; Weinstein 1993²). Given their demonstrated importance in influencing the adoption of protective behaviors, including hurricane evacuation (e.g., Demuth et al. 2016; Lazo et al. 2015; Meyer et al. 2014), it is likely that these are important factors in determining behavioral responses to nor'easters as well. This study is the first attempt to understand whether there are systematic differences in these perceptions and in intended behavioral responses that may be attributable to the two types of storms.

Current differences in communication about hurricanes and nor'easters. It is conceivable that members of the public would perceive the risk of hurricanes and nor'easters differently because of the dissimilar ways in which these storms

¹ A nor'easter, also called a northeaster or northeast storm, is a "cyclonic storm of the east coast of North America, so called because the winds over the coastal area are from the northeast" (American Meteorological Society 2020). In contrast to hurricanes and tropical cyclones that affect the east coast of North America, nor'easters usually develop at extratropical rather than tropical latitudes and are cold-core rather than warm-core systems (Davis and Dolan 1993). Nor'easters are most frequent between October and April, whereas the peak of Atlantic tropical cyclone season is between August and October (Davis et al. 1993; McAdie et al. 2009).

² Weinstein reviews four theories, each of which considers likelihood of exposure and perceived severity: health belief model, protection motivation theory, subjective expected utility theory, and theory of reasoned action.

are communicated by weather professionals. For instance, there is a standardized scale for measuring and communicating about the severity of hurricanes while none is currently used for nor'easters. This hurricane rating system, the Saffir–Simpson hurricane wind scale (Schott et al. 2019), rates hurricanes in terms of wind speed, placing storms in one of five categories, and it is widely used by broadcast meteorologists. Prior work has shown that this scale is familiar to the public and that people tend to associate higher Saffir–Simpson ratings with greater risk, although there are also concerns that the scale leads people to underestimate the risks associated with some types of storms (Morrow et al. 2015; Morss and Hayden 2010; Pace and Montz 2014; Zhang et al. 2007). Several scales for nor'easters and other winter storms have been proposed (e.g., Cerruti and Decker 2011; Kocin and Uccellini 2004; Zielinski 2002), and the NWS has developed an experimental product called the winter storm severity index that rates the severity of snow and ice impacts from winter storms (Kastman and Nelson 2020). However, there is not a commonly accepted scale for nor'easters currently in use.

A second important difference in communications about hurricanes and nor'easters is that NOAA uses names for individual tropical cyclones, including hurricanes, based on a list of storm names maintained and updated by the World Meteorological Organization. NOAA does not currently use a similar formal naming convention for nor'easters or other winter storms. However, in, 2012, The Weather Channel began naming U.S. winter storms that meet certain criteria (Niziol 2015). This has garnered significant disagreement among meteorologists (Samenow 2013); however, The Weather Channel argues that public perception has been largely positive (Norcross 2016; Palmer 2013). Similar winter storm naming programs have been established in the United Kingdom and central Europe (Charlton-Perez et al. 2019; Liberato et al. 2011).

Research questions. The current research uses an online experiment to test hypothetical storm scenarios and messages with a sample of the coastal population residing in the northeastern United States. The study explores the following research questions:

- RQ1: Do perceptions of the severity and likelihood of harm of nor'easters and hurricanes differ when all other storm features are held constant?
- RQ2: Are there differences in intended behavioral responses to nor'easters and hurricanes when other storm features are held constant?
- RQ3: What psychological mechanism might account for differences in intended behavioral responses to the storm messages?

Method

An online survey was conducted over four weeks in April and May 2015. The Institutional Review Board of Rutgers University approved the protocol. Key aspects of the methodology for the current study are described in this section; additional details are available elsewhere (Cuite et al. 2017; Morss et al. 2018).

Sampling. The sampling and online survey administration were conducted by GfK Custom Research. The study employed a combination of sample types, with a randomly selected sample ($n = 203$; 66.2% cooperation rate) and a convenience sample ($n = 1,513$; 8.8% cooperation rate) of adult coastal residents in Connecticut, New York, and New Jersey. All participants received financial incentives for their participation.

All participants resided in coastal areas of three northeastern U.S. states vulnerable to both hurricanes and nor'easters. ZIP codes were selected for sampling based on areas at risk for storm surge flooding, as described in Cuite et al. (2017) and shown in Fig. 1. The final sample

Fig. 1. Connecticut, New Jersey, and New York zip codes included in sample.

had 451 participants in Connecticut (27%, in 54 ZIP codes), 567 participants in New Jersey (33%, in 116 ZIP codes), and 698 in New York (41%, in 70 ZIP codes).

Survey design. The survey included a series of four between-group experiments. Each experiment involved a hypothetical scenario about a coastal storm. Results from one of the four experiments are presented here; other results from the research are published elsewhere (Cuete et al. 2017; Morss et al. 2018).

The survey began by collecting baseline data prior to the experimental scenarios, including questions about the participant's home address, demographic characteristics, and experiences during Superstorm Sandy. Each of the four experiments was then presented in a random order, one at a time. Within each experiment, participants were randomly assigned to receive a message about an approaching coastal storm (discussed further below). This message was followed by a series of questions measuring dependent variables, presented in randomized order.

Experimental design and message stimuli. The scenario examined in this paper included three experimental manipulations, including storm type (the focus of this paper). Table 1 presents the wording of the message stimuli used in this experiment. Regarding storm type, for approximately half the participants, the storm was presented as a "hurricane" ($n = 869$) and for the other half as a "nor'easter" ($n = 847$). No storm names were used in the messages.

Measures. This paper examines the effects of messages on multiple dependent variables, presented in Table 2. All of the measures presented here were measured on a scale from 1 ("not at all") to 7 ("extremely"). Participants were asked to rate how understandable and

Table 1. Experimental message stimuli.

Hurricane condition	Nor'easter condition
Imagine a strong hurricane ^a has been predicted for your immediate area. Two days before the storm is due to reach [participant's state inserted], the [participant's municipality inserted] Office of Emergency Management communicates with the public about the storm. They put a flyer on your front door that says the following. ^b	Imagine a strong nor'easter ^a has been predicted for your immediate area. Two days before the storm is due to reach [participant's state inserted], the [participant's municipality inserted] Office of Emergency Management communicates with the public about the storm. They put a flyer on your front door that says the following. ^b
A hurricane is predicted for [participant's state inserted]. The [participant's municipality inserted] Office of Emergency Management has issued a mandatory evacuation order for your area. ^c	A nor'easter is predicted for [participant's state inserted]. The [participant's municipality inserted] Office of Emergency Management has issued a mandatory evacuation order for your area. ^c
We expect significant damage from the storm.	We expect significant damage from the storm.

^a Approximately half of the participants were randomly assigned to see "nor'easter" and half to see "hurricane."
^b In both conditions, participants were randomly assigned to one of the following message channels: emergency text (for those with cell phones that can receive texts), social media (for those with social media accounts), phone call, flyer, or in person.
^c Participants were randomly assigned to see one of five types of evacuation messages: mandatory, voluntary, advisory, advice, recommendation.

how relevant the message was to them. There were three measures of risk perception: perceived storm severity and two measures of risk likelihood, including participants' perceived risk of themselves getting hurt by the storm and of someone in their family getting hurt by the storm.

The survey asked several questions related to intended protective behaviors. Regarding evacuation, this included a measure of evacuation intentions, participants' rating of the likelihood they would evacuate their home. It also measured the likelihood of recommending evacuation to others, and the perceived importance of evacuation for those in the affected area.

Participants were asked about the likelihood that they would engage in a number of preparatory behaviors, including moving their motor vehicle to a safe place, making sure they have a full tank of gas, making sure they have emergency supplies, withdrawing cash, putting lawn furniture and trash bins in a safe place, boarding up windows and doors or putting up shutters, and moving belongings to a higher location in their home. While the same 1 to 7 scale was used, for these items, participants could indicate when one of these responses was not applicable to them, and those responses were treated as missing in the analyses below.

Furthermore, participants were asked about their emotional responses to the scenario, for example, how fearful, worried, and prepared they felt after receiving the message.

Two additional factors were manipulated in this experimental scenario but are not analyzed here: message channel and evacuation message type. Participants were asked to imagine that a storm was predicted for their area, and that they receive a series of messages through one of five channels³ (e.g., social media). The presentation of the message content was identical in all of these conditions. These factors were fully crossed with the evacuation message type factor, which had five different levels (e.g., mandatory evacuation order). The evacuation message type results are presented elsewhere (Cuite et al. 2017). All data presented here are collapsed across channel and evacuation message type, to focus on examining the main effect of storm type.

³ Participants were asked if they had cell phones that can receive texts as well as social media accounts. To increase ecological validity, only those who did were eligible to be randomized into the text and social media conditions.

Analyses. Each of the three research questions was considered separately. For RQ1 and RQ2, we tested for the effects of storm type on multiple dependent variables, including storm perceptions and behavioral intentions. To do this, we used a series of one-way between-subjects analysis of covariance (ANCOVA). Using ANCOVA allowed us to control for the effects of demographic variables, including several that have been found to be significantly correlated

Table 2. Storm-type effects on message comprehension, severity and risk perceptions, and behavioral intentions. All variables were measured using 7-point scales. Covariates appearing in the model are gender, household income, race/ethnicity, education, and age. The term df indicates the degrees of freedom; *F* is the test statistic, *p* is the probability value for the test statistic, and η_p^2 is a measure of effect size.

		Adjusted means		Effect of storm type in ANCOVA			
		Hurricane M_{adj} (SE)	Nor'easter M_{adj} (SE)	df	<i>F</i>	<i>p</i>	η_p^2
Message understanding and relevance	How well do you understand this message?	6.36 (0.037)	6.39 (0.038)	1, 1,637	0.285	0.594	0.000
	How relevant would this message be for you?	5.42 (0.056)	5.33 (0.057)	1, 1,640	1.235	0.257	0.001
Severity perceptions	How severe would you say this storm is likely to be at your home?	4.62 (0.053)	4.42 (0.054)	1, 1,634	7.275	0.007	0.004
Risk likelihood perceptions	Imagine you stay in your home during this storm. How likely do you think it is that you could get hurt by this storm?	3.85 (0.058)	3.65 (0.60)	1, 1,632	5.737	0.017	0.004
	Imagine your family stays in your home during this storm. How likely do you think it is that someone in your family could get hurt by this storm?	3.86 (0.065)	3.65 (0.067)	1, 1,357	5.082	0.024	0.004
Evacuation intentions and attitudes	How likely would you be to evacuate your home?	4.52 (0.068)	4.10 (0.070)	1, 1,636	18.182	0.000	0.011
	How important do you think it would be for people in the affected areas to evacuate?	5.43 (0.053)	5.15 (0.054)	1, 1,636	13.303	0.000	0.008
	How likely would you be to recommend to your neighbors that they evacuate?	4.67 (0.065)	4.29 (0.067)	1, 1,638	15.851	0.000	0.010
Other precautionary behavioral intentions	How likely would you be to board up windows and doors or put up shutters?	4.40 (0.077)	3.99 (0.078)	1, 1,521	13.806	0.000	0.009
	How likely would you be to withdraw cash from the bank?	5.43 (0.069)	5.16 (0.070)	1, 1,608	7.299	0.007	0.005
	How likely would you be to move your motor vehicles to a safe location?	5.77 (0.069)	5.55 (0.071)	1, 1,435	4.816	0.028	0.003
	How likely would you be to put lawn furniture, trash bins, etc., in a secure location?	6.33 (0.053)	6.26 (0.055)	1, 1,369	0.670	0.413	0.000
	How likely would you be to make sure my vehicle has a full tank of gas?	6.40 (0.047)	6.32 (0.048)	1, 1,457	1.504	0.220	0.001
	How likely would you be to make sure you have emergency supplies?	6.30 (0.044)	6.30 (0.044)	1, 1,602	0.000	0.993	0.000

in previous studies of hurricane risk perceptions and evacuation decisions (see, e.g., reviews in Dash and Gladwin 2007; Huang et al. 2016; Lazo et al. 2015). The demographic variables included here are age, gender, education (not college graduate vs college graduate), income, and race/ethnicity (White vs not White).

To investigate RQ3, we conducted a mediation analysis (Preacher and Hayes 2004), which allows for examination of a chain relationship, that is, of an intervening variable between a predictor and dependent variable. In this analysis, we used storm type (hurricane vs nor'easter) as the predictor, and evacuation intentions as the dependent variable. We tested to see if this relationship is mediated by the intervening variable of perceived severity, i.e., if storm type influences perceived severity which in turn influences evacuation intention. We again included age, gender, education, income, and race/ethnicity as covariates. [For additional details on mediation analysis in the weather risk context, see Demuth et al. (2016).]

All analyses were conducted using SPSS 26 (IBM), and the PROCESS macro was used for the

mediation analyses (Hayes 2018). A Bonferroni correction was used to reduce the familywise error rate, which is the probability of making one or more type I errors when conducting tests of multiple hypotheses (Field 2013); because we have three research questions, we set $\alpha = 0.0167$.

Results

Demographics. Participants' mean age was 54.8 years (SD = 13.86), with a range from 18 to 86 years. Women made up more than half (56.6%) of the sample. Over half (60.4%) report having earned a bachelor's degree or higher. The majority of participants were White non-Hispanic (81.6%), and the remainder were multiracial or other (7.2%), Black non-Hispanic (5.7%), and Hispanic (5.5%).

Message understanding and relevance. As shown in Table 2, there were no significant effects of storm type in terms of perceived understanding of the messages, with an overall mean of 6.38 on a 7-point scale, indicating that respondents did not report different levels of understanding between the "hurricane" and "nor'easter" messages. There were also no differences in how personally relevant participants felt the messages were (overall $M = 5.37$). These results indicate that participants considered the messages in both conditions to be highly understandable and very relevant.

RQ1: Are there differences in perceptions of the types of storms? Regarding RQ1, Table 2 shows that there were significant differences in perceived severity of the storm, with the hurricane perceived as slightly more severe than the nor'easter. There were no statistically significant differences in the two measures of perceived likelihood of being harmed, that is, the likelihood that the participants themselves or their families would be harmed if they stayed in their homes during the storm.

There were no differences across storm type in terms of any of the emotional responses measured, including fear, happiness, worry, preparedness, sadness, guilt, or confidence (results not shown).

RQ2: Are there differences in behavioral responses to the two types of storms? Storm type resulted in significant differences on some but not all measures related to protective behaviors, as illustrated in Table 2. The most consistent findings were related to evacuation. Participants who saw the hurricane scenario reported significantly higher evacuation intentions, gave significantly higher ratings of importance for people in the affected areas to evacuate, and reported a significantly higher likelihood of recommending evacuation to their neighbors.

Participants who saw the hurricane scenario also reported significantly higher likelihoods of withdrawing cash from the bank and of boarding up windows and doors or putting up shutters. There were no statistically significant differences on any of the other behavioral responses we measured.

RQ3: What psychological mechanism might account for these behavioral differences between hurricanes and nor'easters? Because storm type had statistically significant effects on severity but not on the two likelihood variables, we tested severity as a mediator of the relationship between storm type and behavioral responses, specifically evacuation intentions. As mentioned above, when controlling for demographic covariates, participants who saw the "hurricane" message were 0.2 units higher on the perceived severity scale than those who saw "nor'easter." This is shown in Table 2, and in the mediation analysis as the weight for path a in Fig. 2 (with storm type coded as nor'easter = 0 and hurricane = 1).

The mediation analysis also shows that higher perceived severity was related to higher evacuation intentions (path $b = 0.87$), and that storm type indirectly affected evacuation intentions

through its effects on increasing perceived severity (path $a \times b$; point estimate = 0.18; 95% bootstrap confidence interval: 0.05–0.31). After accounting for this indirect effect, there was still a statistically significant direct effect of storm type on evacuation intentions (direct effect = 0.23; bootstrap confidence interval: 0.09–0.38), suggesting that storm type also influences evacuation intentions through other mechanisms.

Fig. 2. Mediation analysis. One asterisk means $p < 0.05$, two asterisks means $p < 0.01$, and three asterisks mean $p < 0.001$. Storm-type coding: nor'easter = 0 and hurricane = 1.

Overall, these results show that coastal residents say they would be less likely to evacuate for a nor'easter than they would if they received a similar evacuation notice for a hurricane. This mediation analysis indicates that, when all else is equal about the risk message, coastal residents view hurricanes as more severe than nor'easters, and this difference in perception partially explains why they say they would be more likely to evacuate for a hurricane.

Discussion

These findings provide evidence that people perceive hurricanes as more severe and more likely to require protective action than nor'easters, even when all other aspects of a warning message about an approaching storm are exactly the same. These results are consistent across multiple protective actions, especially those related to evacuation. Furthermore, our mediation analysis indicates that these increased severity perceptions can explain, at least in part, why people are more likely to say they will evacuate for a hurricane compared with a nor'easter. Although the magnitude of the statistical effects are not large, there can be tremendous practical implications stemming from peoples' failure to understand the risks that nor'easters can pose and to take actions to protect themselves accordingly.

Participants in the hurricane condition were more likely to say they would evacuate and tell neighbors to evacuate, and they rated evacuation as having higher importance than those who were told the storm was a nor'easter. In addition to evacuation, those who saw "hurricane" were more likely to say that they would board up their homes and get cash out of the bank, both of which would be likely precursors to evacuating. Evacuation and boarding up one's home are among the more burdensome protective behaviors one can undertake in the face of an incoming storm. In contrast, most of the other behavioral intentions are relatively easy to carry out: participants in both conditions reported being likely to do them, with means for all of the nonsignificant behavioral intentions in both storm scenarios being 5.5 or higher on a 7-point scale, each with very small standard errors (<0.07). Thus, it appears that a ceiling effect for those behaviors may have prevented the finding of any significant differences across conditions.

The mediation analysis also indicates that it is the perception that nor'easters are less severe than hurricanes that explains, at least in part, the finding that people say they are less likely to evacuate during a nor'easter than a hurricane. Other variables, such as perceived likelihood, have been found to predict evacuation (e.g., Demuth et al. 2016) and could be hypothesized to play a mediating role in this relationship. Although we did not find that the difference in

the perceived likelihood of being harmed by the storm was significant in this study, these additional risk perception variables should be explored in future research.

In sum, our data indicate that coastal residents believe that hurricanes are more severe than nor'easters, leading them to be more likely to engage in more burdensome protective behaviors, including evacuation. For some other, less-burdensome protective behaviors, participants had very high intentions across both types of coastal storms. Upon further exploration through a mediation analysis, we found that this greater severity perception is, in part, what makes people say they are more likely to evacuate from a hurricane.

Although the effects of storm type are small, risk communicators are often looking for any way to increase protective behaviors as storms loom. It is often difficult to persuade people to engage in these protective behaviors, particularly evacuation. Therefore, any knowledge that risk communicators can use to help people understand the risks they face and to increase appropriate evacuations prior to an actual storm threat can be beneficial.

Limitations. One limitation of the study is its hypothetical nature and cross-sectional design, which limits its ecological validity. Due to the study's hypothetical nature, the dependent variables included measures of behavioral intentions, which previous work has shown is similar but not perfectly related to actual behavior (Kang et al. 2007; Gudishala and Wilmot 2010). In addition, the study design also necessarily limited the amount of information provided about the storm. Although the messages were personalized to the recipient's state and municipality of residence to enhance message relevance, during an actual storm, more information is provided, the stakes are higher, and the severity of the storm threat is more realistically experienced, which could yield differences in the results observed. In addition, the largely convenience sampling approach limits sample representativeness.

Another limitation is that the analyses presented do not fully explore the effects of individual differences on responses to different types of storms, such as past experience with storm type (Demuth et al. 2016) and location of respondents' home relative to the coast and their risk of flooding with storm type (Lamb et al. 2012).

Implications. Ultimately, the goal of coastal storm risk communication is to encourage individuals to respond to the specific hazards they face and to follow official guidance, not to use the type of storm as a heuristic to determine their response. Therefore, this study has important implications for forecasters, broadcast meteorologists, and emergency management professionals who communicate with the public during both hurricanes and nor'easters, as well as for future research. Our results suggest that people have preexisting understandings of different types of meteorological events, and that these frame their interpretations of warning messages. Risk communicators should be aware of this and provide more specific information about hazards and impacts of storms whenever possible, particularly in the case of nor'easters.

In addition, more research to test messages is needed, employing different study designs in different contexts. Testing messages about other types of storms (e.g., tropical storms as well as hurricanes), with other at-risk coastal populations, and with samples with different demographic characteristics would further extend understanding of people's response to different types of storms. In addition, future studies should test not only whether messages influence outcome variables like evacuation behaviors, but also what pathways (i.e., mediating variables) these messages operate through and how, as we have done here. Such work is important because it can help better understand the levers that risk communicators can use to motivate evacuation and other protective behaviors, and how these levers might vary with the message recipient. Together, our team's set of analyses from this survey illustrate the value of hypothetical studies with embedded experimental designs (Cuite et al. 2017; Morss et al. 2018), especially given the challenges of collecting and analyzing data in real time

about how people are responding to real-world weather risk messaging (Spence et al. 2016; Demuth et al. 2018; Senkbeil et al. 2019). Despite these challenges, extending the hypothetical study conducted here to investigate people's responses to different types of real-world storms can provide important additional insights.

Additional research could also explore why hurricanes are perceived as more severe than nor'easters to determine whether, how, and to what extent factors such as personal experience, community experience, and media coverage of each type of storm are driving the effects described here.

Finally, while we did not directly test the potential effectiveness of NOAA officially naming nor'easters nor the concept of a severity scale for nor'easters, this study may be relevant for both. If naming a storm does not increase perceived severity, as recent research conducted with undergraduates has found (Raine et al. 2017; Lin et al. 2018), our analysis indicates that it may not increase evacuation behaviors either. However, more research is needed on the topic of naming, using both experimental and real-world scenarios. Additional research could also test if the proposed severity index for nor'easters and winter storms could increase perceived severity and in turn spur appropriate protective actions, including evacuation.

Key to effective risk communication is to understand the starting points of the audience. This study suggests that those starting points are different with respect to the perceived severity of nor'easters and hurricanes.

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