

Differing Perceptions of Hurricanes and Nor'easters

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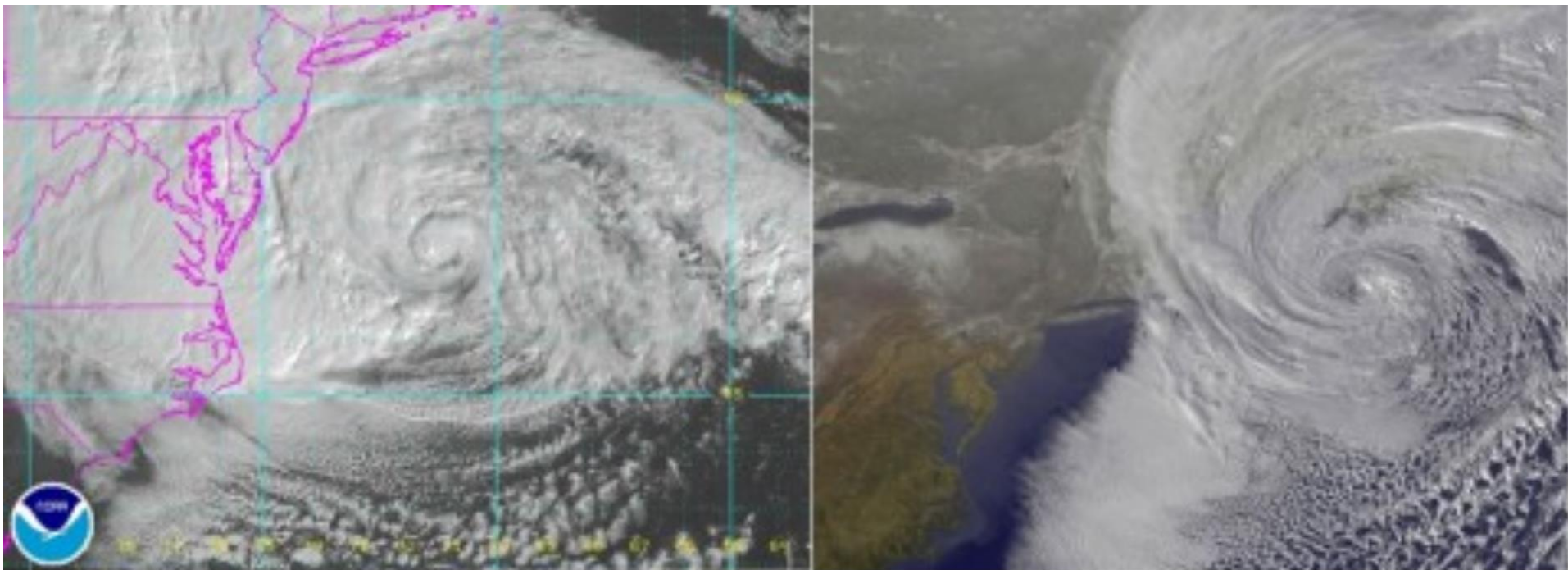
Coastal Storm Awareness Program

- Created in aftermath of Superstorm Sandy.
- \$1.8 million targeted to social science research and related technology transfer.
- Objective is to better understand the coastal storm hazards warning system, the information it conveys (what, when, how, and by whom) and the factors that affect whether recipients of this information decide to act on it.



CSAP Grant “Best Practices in Coastal Storm Risk Communication”

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- David Robinson, Department of Geography and NJ State Climatologist
- Rachael Shwom, Department of Human Ecology



Left: Hurricane Sandy, right: February 8-9, 2013 Nor'easter. Source: NOAA/NASA

Meteorological differences

	Hurricane	Nor'easter
Storm origin	Tropics	Extratropical, usually form near the coast between GA and NJ
Temperature	Warm core	Cold core
Season	June-November	Can occur anytime, most frequent October-April
Size	200-300 miles wide	Can be over 1,000 miles wide, largest in the world
Duration	Short relative to nor'easters, move more quickly	Last longer in given location, move more slowly
Wind speeds	Minimum 74 mph	Not defined by wind speed



Photo credit: Aol.com



A SUV braves the flooded W. Front Street in Keyport, N.J., on Dec. 9, 2014. A slow-moving storm churned through the Northeast early Tuesday, bringing drenching wind-blown rain to coastal areas, wet snow inland and a wintry mix to the New England states. 📷 Tanya Breen / AP

No real differences in terms of impacts

	Hurricane	Nor'easter
Precipitation	✓	✓
High winds	✓	✓
Flooding	✓	✓
Power outages	✓	✓
Evacuations	✓	✓

There are significant differences in communication by storm type.



SAFFIR-SIMPSON HURRICANE WIND SCALE

CATEGORY	WINDS (MPH)	DAMAGE
1	74-95	SOME
2	96-110	EXTENSIVE
3	111-129	DEVASTATING
4	130-156	CATASTROPHIC
5	157+	CATASTROPHIC

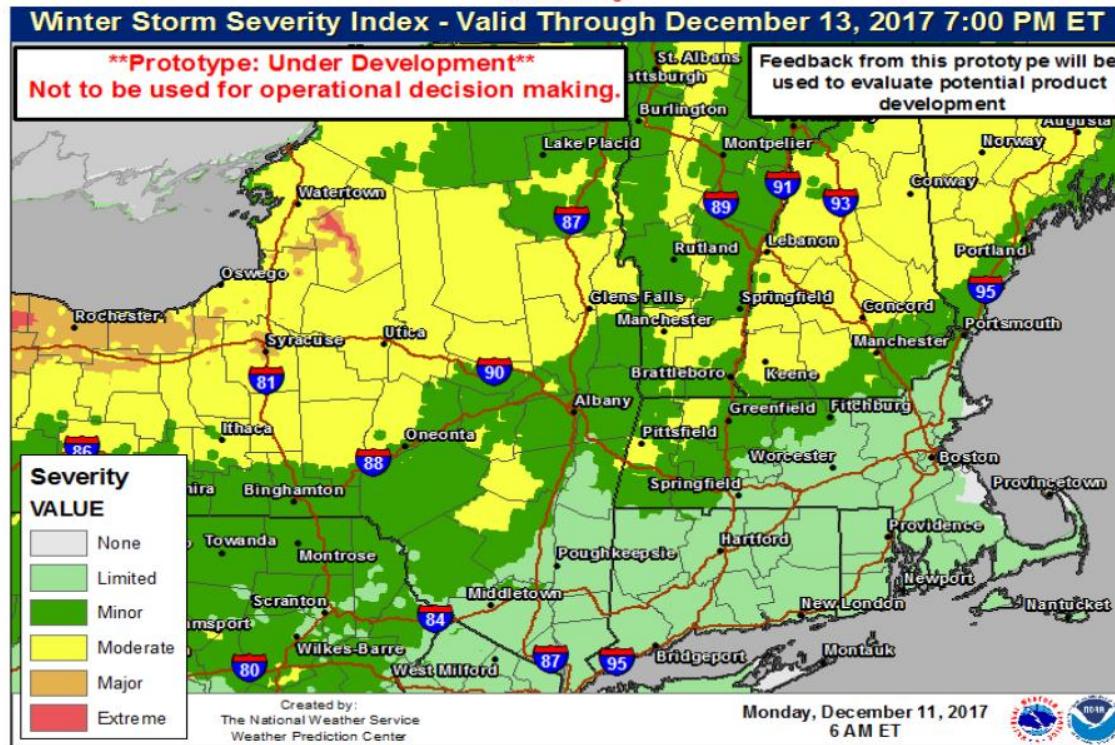
The Saffir-Simpson hurricane wind scale. (Photo: 10 Weather)

*There is no similar scale for nor'easters.
However, this may change.*

Winter Storm Severity Index - Valid Through December 13, 2017 7:00 PM ET

Last Updated: Monday December 11, 2017 06 AM ET

[Click to enlarge](#)



Severity Level None Limited Minor Moderate Major Extreme

[Click legend for a detailed description of severity levels](#)

Hurricanes are officially named by World Meteorological Organization

2018 Tropical Storm Names

Atlantic

Pacific

Alberto	Helene	Oscar
Beryl	Isaac	Patty
Chris	Joyce	Rafael
Debby	Kirk	Sara
Ernesto	Leslie	Tony
Florence	Michael	Valerie
Gordon	Nadine	William

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SOURCE: <https://www.clickorlando.com/weather/hurricane/heres-the-nhcs-full-list-of-2018-atlantic-storm-names>

Nor'easters are not “officially” named

Nor'easters are not “officially” named



Aiden	Hunter	Oliver	Violet
Benji	Inga	Polly	Wilbur
Chloe	Jaxon	Quinn	Xanto
Dylan	Kalani	Riley	Yvonne
Ethan	Liam	Skylar	Zoey
Frankie	Mateo	Toby	
Grayson	Noah	Uma	

However, they have been unofficially named by the Weather Channel since 2012.



The Weather Channel 

@weatherchannel



Winter Storm Names for the 2017-2018 season have officially been released: wxch.nl/2z12pRZ

7:58 AM - Oct 5, 2017

 349  758  1,927



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Winter storm Jaxon? Skylar? Names create blizzard of jokes

The Weather Channel continues its controversial naming of winter storms, and this year's trendy list has played soccer with your kid.

BY **GAEL FASHINGBAUER COOPER** / OCTOBER 5, 2017 2:42 PM
PDT



Weather Channel Decision to Name Winter Storms Will Increase Confusion in Delivering Critical Safety Information to Public

October 03, 2012; 11:48 AM

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Unilateral Initiative Not Supported by Science

STATE COLLEGE, PA - October 3, 2012 - A unilateral decision by The Weather Channel to name winter storms will create confusion, rather than delivering critical and important safety and planning information to the public, said

AccuWeather, Inc. AccuWeather's own examination of the issue over many years has found no benefit to users of weather forecasts by the initiative recently announced by The Weather Channel.

"In unilaterally deciding to name winter storms, The Weather Channel has confused media spin with science and public safety and is doing a disservice to the field of meteorology and public service," said Dr. Joel N. Myers, AccuWeather Founder and President. He pointed to a reported statement by The Weather Channel's spokesman that storms affecting many people would get names and that those affecting few people would not be named, highlighting the arbitrary nature of the unpublished criteria.

Many nor'easters could have “official” names in the future.



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Ad Hoc Committee on Naming Winter Storms

4. Nor'easters Aren't Taken Seriously Enough

Due to the frequency of nor'easters, it is crucial to prepare for the ferocity of these storms. Despite this, coastal inhabitants do not heed warnings for nor'easters. Nor'easters have the potential to cause massive amounts of damage, however they are often dismissed as low risk events. Compounded by a lack of universal rating scales (such as the Saffir-Simpson Hurricane Scale), nor'easter data is rarely compiled in a way that demonstrates their ability to generate damage.

<http://www.stormsolutionsusa.com/Brochures/Noreaster%20Handout.pdf>

There is not a lot of empirical evidence for these statements.

Does the public perceive these storms differently?

When storm forecast and evacuation notices are the same:

- Are people less likely to evacuate for a nor'easter than a hurricane?
- What mechanism might account for this?
- Do people think nor'easters are less severe?

Methods

- Internet-based survey
- Data collected April and May 2015
- Mean survey duration of 15 minutes
- 1,716 coastal residents in NJ, NY, and CT
 - Primary residence
- Conducted by GfK Custom Research
 - Uses ZIP code for sampling selection



Sources of sample:

- 203 respondents from KnowledgePanel®:
Representative, randomly selected panel.
- 1,513 from non-randomly selected opt-in panels.
- Opt-in panel sample more Non-Hispanic White and higher levels of education.
- No significant differences between samples on dependent variables.

Sample Demographics

	%
<i>State</i>	
CT	26.3
NJ	33.0
NY	40.7
<i>Gender</i>	
Female	56.6
<i>Age</i>	
18-29	5.8
30-44	17.8
45-59	32.8
60+	43.7

	%
<i>Education</i>	
High School or less	11.6
Some college	28.0
Bachelors degree or higher	60.4
<i>Race/Ethnicity</i>	
White, Non-Hispanic	81.6
Black, Non-Hispanic	5.7
Other, Non-Hispanic	5.8
Hispanic	5.5
Multiple Races, Non-Hispanic	1.5

Procedures

- Each respondent viewed four hypothetical coastal storm-related scenarios.
 - Scenario order was randomized.
- Multiple message factors were tested within each scenario.
- Between subjects design: Respondents randomly assigned to one level of each message factor within each scenario.

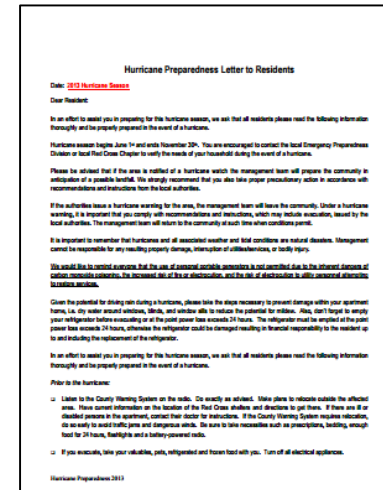
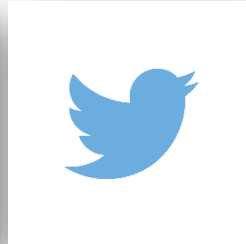
Messages to be tested

Independent variables by scenario:

- | |
|--|
| <ul style="list-style-type: none"> - <u>Describing storm as a hurricane or nor'easter</u> - Evacuation wording (mandatory, advisories, voluntary) - Message channel (emergency texts, phone calls, social media flyers, face-to-face) |
| <ul style="list-style-type: none"> - Location-based messages - Message channel (emergency texts, phone calls, social media flyers, face-to-face) |
| <ul style="list-style-type: none"> - Guilt appeals (with Turner) <ul style="list-style-type: none"> • Focus on family vs. first responders - Message channel (emergency texts, phone calls, social media flyers, face-to-face) |
| <ul style="list-style-type: none"> - Fear appeals - Storm surge information - Descriptive information about impacts of storm - Message channel (emergency texts, phone calls, social media flyers, face-to-face) |

Message Variable: Communication Channel

*We varied how the information was communicated:
emergency text, automated phone call, social media, flyer, in
person*



Message Variable: Evacuation Notice

APRIL 2017

CUIITE ET AL.

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Improving Coastal Storm Evacuation Messages

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(Manuscript received 6 July 2016, in final form 4 November 2016)

ABSTRACT

Evacuation before severe coastal storms is a critical tool for keeping coastal residents safe. Effective messaging of evacuations could help save lives, but there is little evidence-based guidance on the advantages or disadvantages of specific messaging. Ideally, evacuation messages would convince those most at risk to evacuate and those who do not need to evacuate to stay in their homes. Using an online survey of 1716 coastal residents in Connecticut, New Jersey, and New York, this study randomly assigned respondents to message conditions in each of two hypothetical storm scenarios. Results from the first scenario indicate that those who saw mandatory evacuation messages had higher evacuation intentions than those who saw advisory messages, and both of those messages resulted in slightly higher evacuation intentions than voluntary evacuation messages. However, voluntary messages resulted in lower evacuation intentions for those that did not live in evacuation zones compared to those who did live in evacuation zones, which may help reduce shadow evacuation. In the second scenario, identifying an evacuation area by the municipality name or the individual's street name resulted in similar evacuation intentions across all participants. Messages identifying an evacuation area by "flood zone" or "flood-prone area" resulted in equally high evacuation intentions for those who believe they live in a flood zone, but these messages suppressed evacuation intentions for those who do not believe they live in a flood zone. This indicates that such messages could also be an effective approach for reducing shadow evacuation. Implications for risk communication and emergency management are discussed.

1. Introduction

Evacuation is a critical emergency management tool that can reduce the loss of life in a hazardous weather event (Brunkard et al. 2008). However, it is often difficult to get people to evacuate their homes in advance of an adverse weather event such as a hurricane or coastal storm. For example, two recent studies of New Jersey (NJ) residents who reported living in mandatory evacuation areas in the days prior to Hurricane Sandy found that less than half, and perhaps as few as 28%, evacuated prior to the storm (Abramson et al. 2015; Monmouth University Polling Institute 2013).

While it can be extremely difficult to get some people who are at high risk to evacuate for a hazardous weather threat, risk managers also face the parallel problem of overresponse or "shadow evacuations" (Dash and

Gladwin 2007; Zhang et al. 2007; Lamb et al. 2012; Huang et al. 2012; Weinisch and Bruckner 2015). Shadow evacuations refer to when people at relatively low risk (i.e., because they live outside the evacuation zones) decide to evacuate. This can cause additional traffic and stress on shelters, sometimes making it more difficult for those who are at high risk to leave their homes. By choosing to leave their homes, "shadow evacuees" can also place themselves at higher risk.

Decisions to evacuate as a hurricane approaches are complex and influenced by many factors (Hasan et al. 2011; Luo et al. 2015; Lindell and Perry 2012; Morris et al. 2015; Whitehead et al. 2009). One influential factor is the information that people receive related to the approaching hurricane, including evacuation notices and other risk messages (Gladwin et al. 2001; Burnside et al. 2007; Dow and Cutter 1998; Morris and Hayden 2010). In addition, unlike many other factors that influence evacuation decisions, those issuing risk messages often have control over which messages are developed,

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Message Variables: Hazard, Impact, & Fear



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In Press, Corrected Proof



Is storm surge scary? The influence of hazard, impact, and fear-based messages and individual differences on responses to hurricane risks in the USA

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<https://doi.org/10.1016/j.ijdrr.2018.01.023> [Get rights and content](#)

Abstract

This article uses data from an online survey-based experiment to investigate how [risk communications](#) and individual differences influence people's responses to approaching [hurricane](#) risks. Survey data were collected from 1716 residents of coastal areas of the USA affected by Hurricane Sandy. Respondents were randomly assigned to receive a combination of textual messages about a hypothetical approaching hurricane, including hazard-based, impact-based, and fear-based messages. The analysis examines how the experimental messages influenced respondents' evacuation intentions, risk perceptions, efficacy beliefs, and perceptions of the information and its source. The influence of non-message factors, including respondents' actual and perceived geographical exposure to hurricane-related risks, evacuation planning, and hurricane-related experiences, is also investigated. The results indicate that the high-impact and fear messages increased evacuation intentions, risk perceptions, and response efficacy, but the effects were small. The hazard message manipulations did not significantly influence most of the dependent variables examined; in particular, neither of the two [storm surge](#) messages tested increased evacuation intentions or risk perceptions relative to the wind-only or flood message. There were also no significant differences in message effects among respondents who lived or thought they lived in areas at higher risk. Further, several individual difference variables examined influenced evacuation intentions more than the message variations. Overall, experience evacuating for Sandy was the strongest predictor of evacuation intentions. These results indicate the importance of designing and evaluating hazard risk communications in the context of the other messages people are receiving and the individual differences that influence protective [decision making](#).

Keywords

Hurricanes; Storm surge; Flooding; Risk communication; Warnings; Evacuation

Dependent variables

- DV questions repeated after each scenario.

- **Evacuation likelihood**

After hearing this message, how likely would you be to evacuate your home?

1 not at all likely

7 extremely likely

Similar questions for recommending evacuation to others, perceived importance of evacuation, perceived risk, perceived severity

Message text:

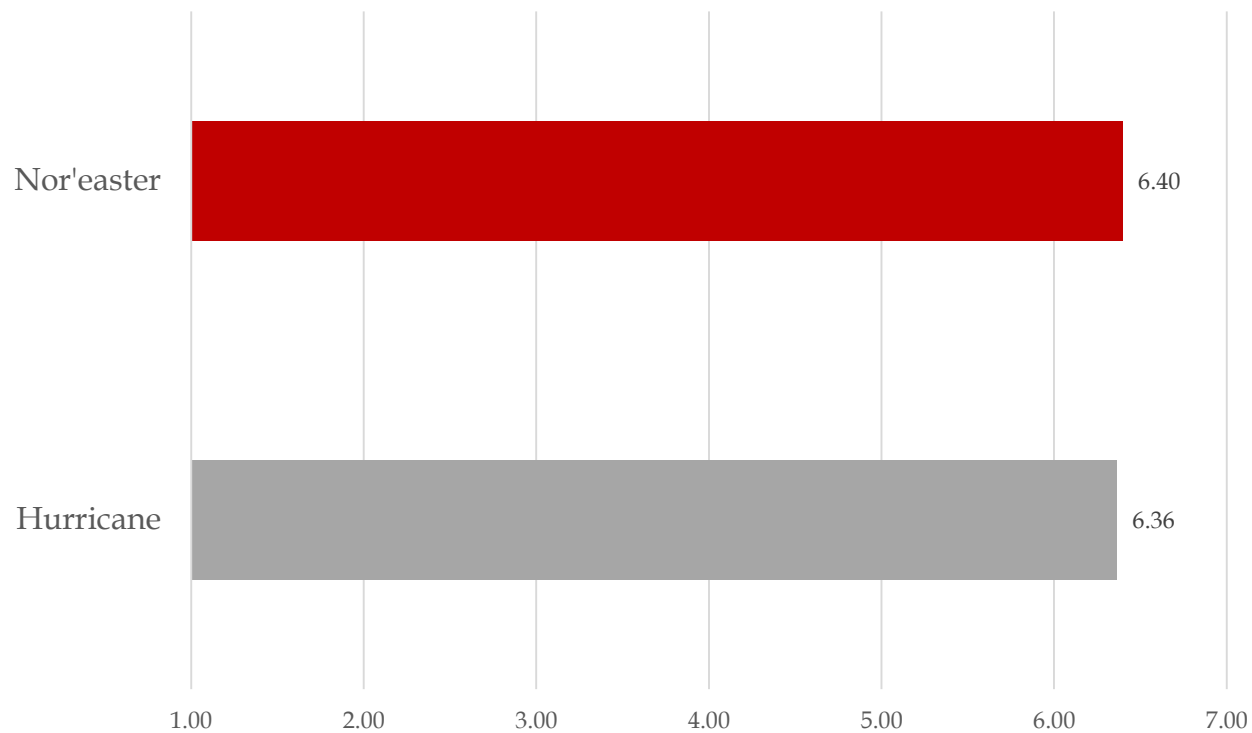
- Imagine a strong [nor'easter/hurricane] has been predicted for your immediate area. Two days before the storm is due to reach [your state], the [respondent's municipality] Office of Emergency Management communicates with the public about the storm. [An official comes to your home and tells you the following/other channels]:
 - A [nor'easter/hurricane] is predicted for [respondent's state]. The [respondent's municipality] Office of Emergency Management [advises t/recommends/has issued a voluntary evacuation order/has issued a mandatory evacuation order] for your area. We expect significant damage from the storm.

An example:



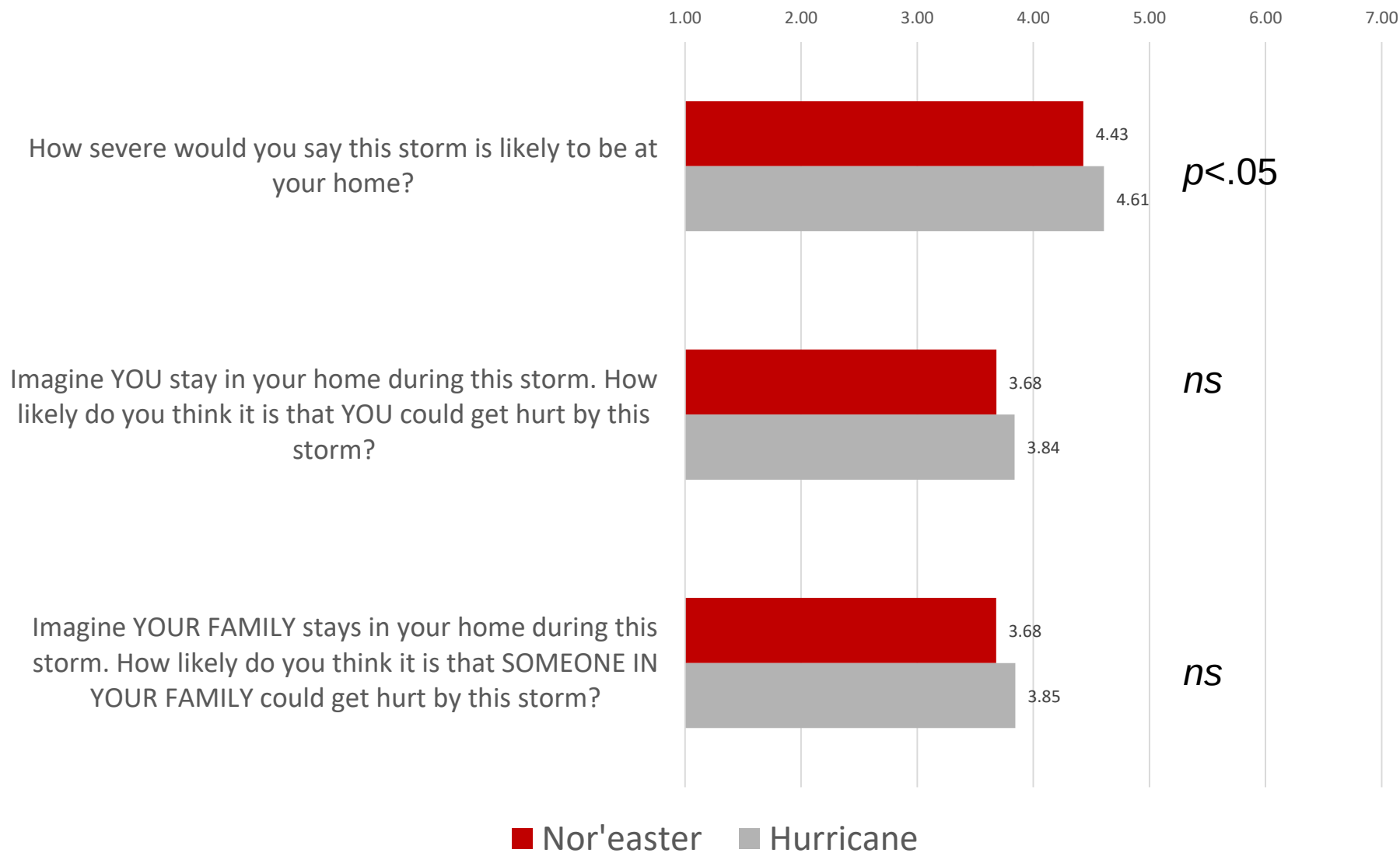
- Imagine a strong **nor'easter** has been predicted for your immediate area. Two days before the storm is due to reach New Jersey, the Highlands Office of Emergency Management communicates with the public about the storm. An official comes to your home and tells you the following:
 - A **nor'easter** is predicted for New Jersey. The Highlands Office of Emergency Management has issued a mandatory evacuation order for your area. We expect significant damage from the storm.

How well do you understand this message?

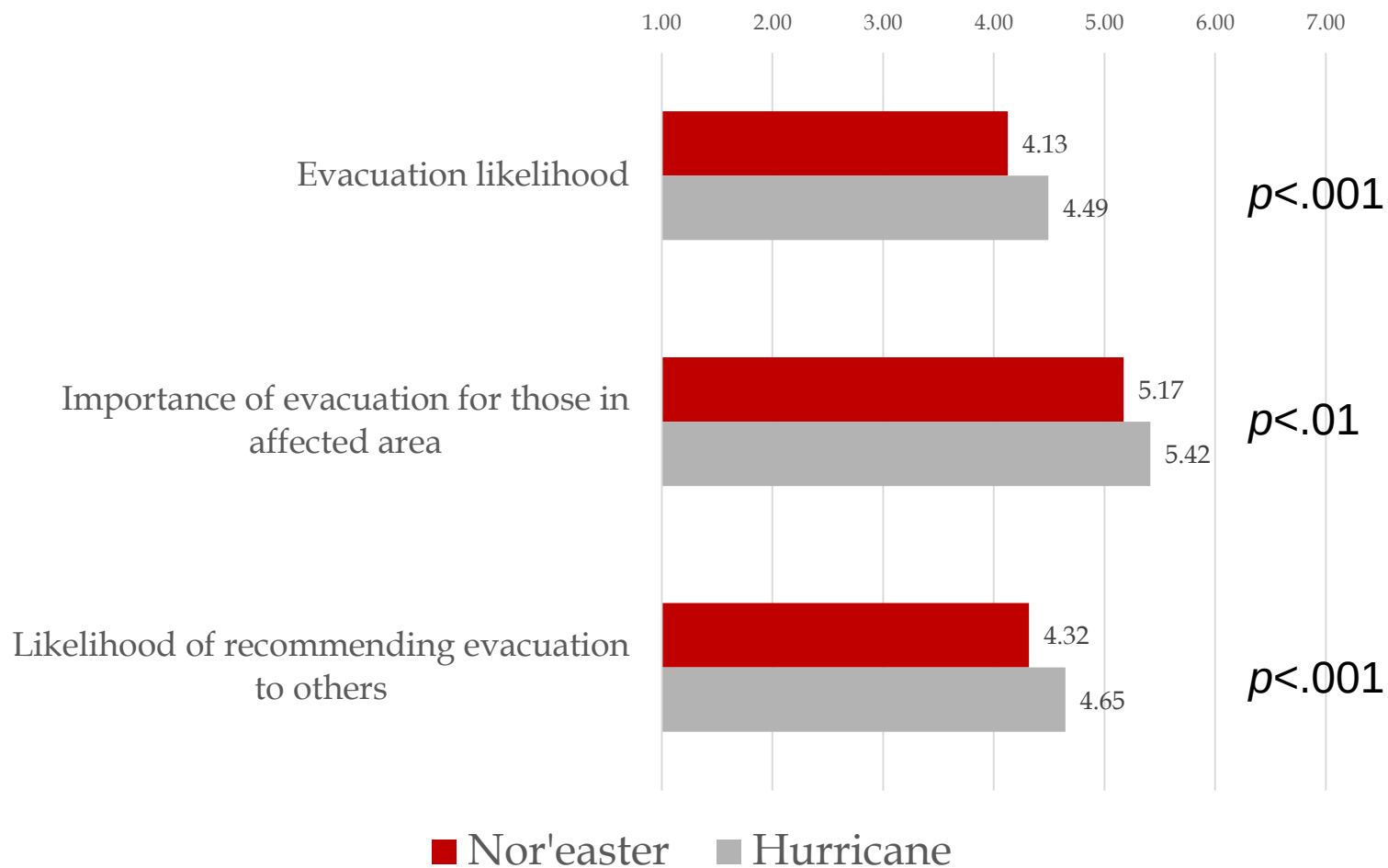


ns

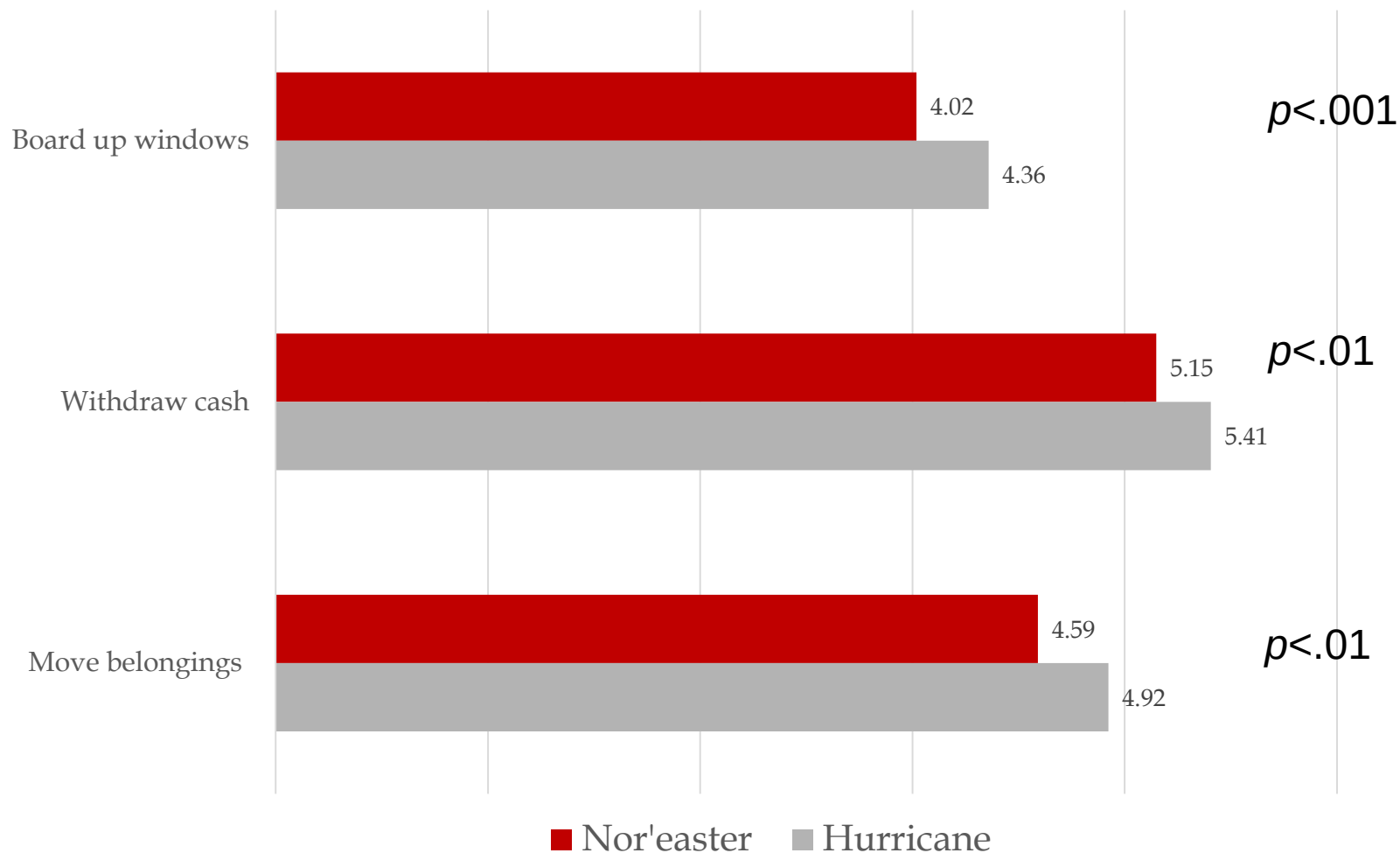
Perceived Severity and Risk



Evacuation Intentions



Preparatory Behaviors



No statistically significant differences on:

- Move motor vehicle to a safe place
- Make sure I have emergency supplies
- Put lawn furniture and trash bins in a safe place

No statistically significant differences in emotional responses to storm types

Guilty

Fearful

Happy

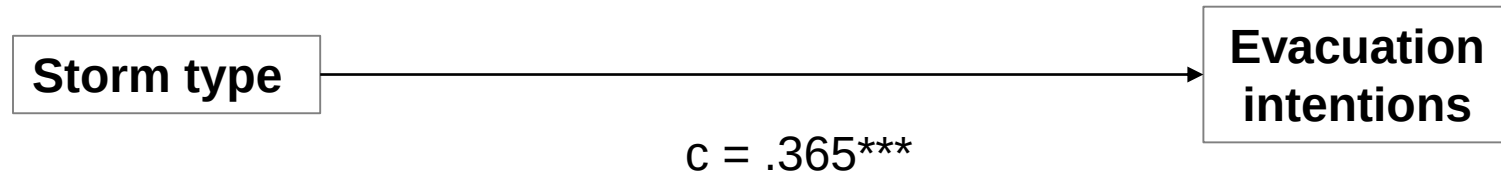
Worried

Prepared

Sad

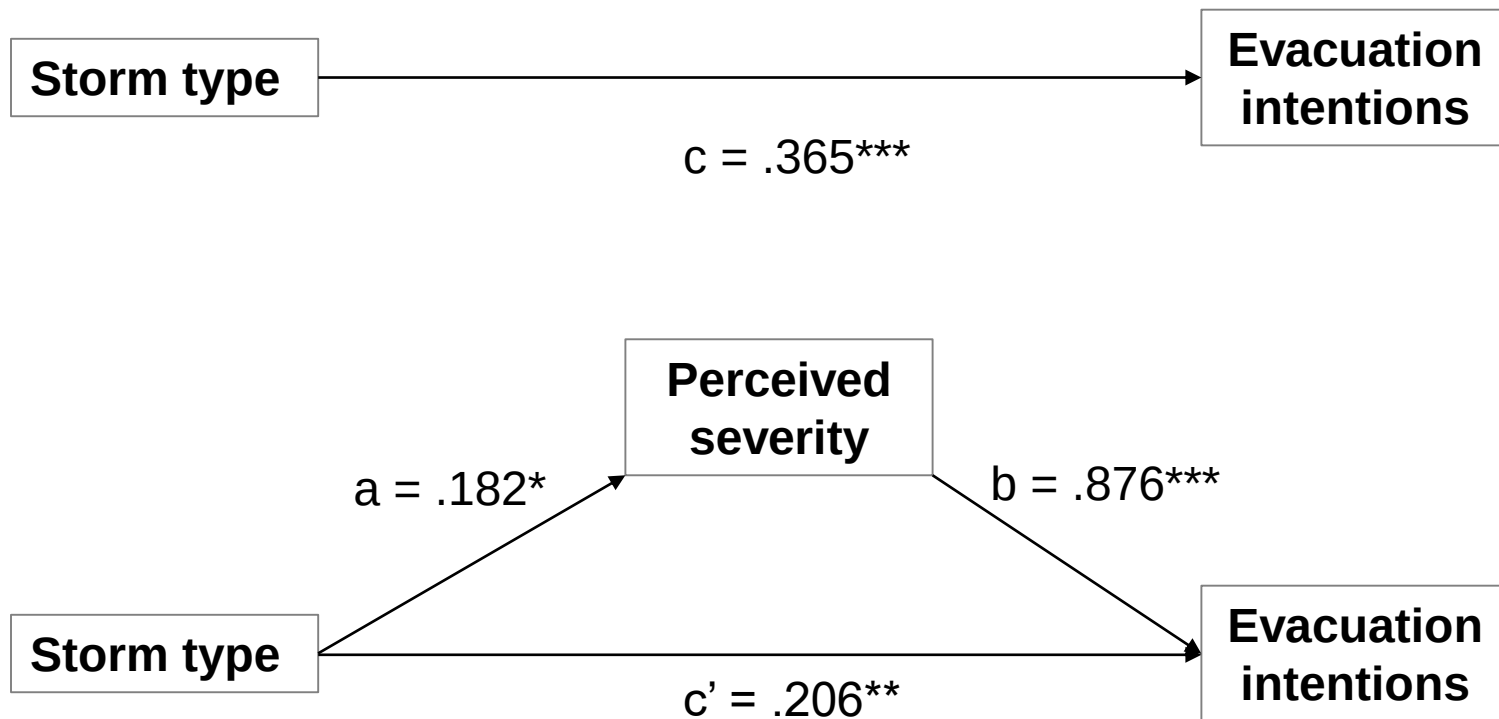
Confident

Mediation



* $p < .05$; ** $p < .01$; *** $p < .001$

Mediation



* $p < .05$; ** $p < .01$; *** $p < .001$

Conclusions

- Coastal residents may be less likely to evacuate for a nor'easter than they would during a similar evacuation notice for a hurricane.
- When all else is equal, coastal residents view nor'easters as less severe than hurricanes, and this at least partially explains why they would be less likely to evacuate.

Conclusions, continued

- The findings have significant implications for communicating with the public about nor'easters.
 - When a significant nor'easter is approaching and evacuation is advised, stressing the severity of the storm may be a successful approach to increasing evacuations.
 - Findings may be useful for those deciding whether to name nor'easters and developing a standardized severity scales.
- Focusing on impacts of storms rather than storm type or other features may be another important tool to increasing evacuation.
- These effects are not big, but even small improvements in increasing appropriate evacuations can save lives.

Where do we go from here?

It would be interesting to redo the current study:

- with differing and/or more detailed forecasts.
- in other parts of the US.

More research is needed on direct impact of having a named vs. un-named storm.

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