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Need for cognition and rumination: Alternate explanations for sex differences in disaster information seeking

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ABSTRACT

While a long history of research in crisis communication has suggested sex differences in information seeking, little has addressed the underlying reasons why this may be the case. The current study examines information seeking behaviors in the time leading up to Hurricane Dorian, and suggests that these differences may be a function of ruminative processing tendencies. Sex differences in information seeking are moderated such that they attenuate at higher levels of rumination. Implications for our understanding of audience responses and emergency management are discussed, along with differences in sex role normalization that may play a factor in the observed data.

1. Introduction

Over the past two decades, research on communication efforts concerning disasters and other large-scale crises has moved beyond simple mass-audience thinking, to consider a range of diverse audiences and differential patterns of uses and effects amongst those at risk. One demographic marker that has received ongoing attention concerns respondent sex. While empirical examination of sex differences in crisis information seeking and response have been confined largely to studies involving western cultures, they produce a consistent pattern of findings; across these studies, women tend to engage in more aggregate information seeing, and are more inclined to seek out information related to tangible tasks that can be used to mitigate against loss of life, health, and property. Yet despite the consistency of these findings, little research has attempted to examine underlying processes that may account for them, or the implication of these processes for emergency managers.

Using the natural laboratory of 2019's Hurricane Dorian in the southeastern United States, the current study aims to examine the importance of two trait processing tendencies – need for cognition and ruminative coping tendencies, as potential mechanisms driving the observed sex differences in information seeking. It also examines the relationship between information seeking and tangible mitigation behaviors, and addresses the implications of these findings for crisis communication practitioners.

1.1. Disasters and information seeking

By definition, disasters and other mass crises are non-routine events, forcing individuals to adapt their behaviors and knowledge case in order to minimize harm (Wachtendorf, 2004). A lengthy history of research in both the disaster risk reduction literature suggests that this includes finding ways to remove oneself from harm, mitigate and remain in place, or even practice individual relief and rescue efforts [19,38,39]. Perplexingly, this literature also indicates that individual actions and responses are often overlooked or completely ignored when developing emergency responses and policies. Due to time and resource demands, greater emphasis is typically placed on agency and governmental level responses, with little regard for differences within and across populations [45]. Comparatively little is known about the ways in which people use information to make sense of such an event and the pathways by which this information does or does not motivate mitigation efforts.

This corpus of research also suggests that people will actively seek information once they realize that a disaster is imminent, and will do so under some degree of time pressure [15,20,25]. In order to exert behavioral control over ambiguous and uncertain conditions, individuals will gather as much information as possible, and will continually monitor for updates to this information. We can thus expect desire for highly localized knowledge, which may drive people toward multiple information sources in order to gather information about their particular environ [7,45,48].

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Further, evidence form the Communication literature suggests that when audiences experience high degrees of ambiguity, threat, or uncertainty, they will develop especially intense dependencies on trusted media and sources [8,14,23]. It is also likely that this drive to seek information is fueled at least to some extent by a desire to reduce uncertainty (see [1,2] This is typically accomplished by seeking out information related to the condition or circumstances at hand. Past research in crisis and risk communication has found evidence for differential patterns of information seeking – both in terms of preferences and degree – across crisis events, subcultures, and demographic strata. One frequently identified difference can be found between males and females, in terms of the amount of information sought under conditions of duress.

1.2. Sex differences in crisis information seeking

A significant corpus of research on crisis and risk communication suggests that overall, women engage in more risk information seeking than do men; this has been replicated across a range of risk outcomes, including environmental health risks (see [43]), chronic health conditions (see [24]), terrorist attacks [11], and destructive weather events [3], and others. For example, in one study following the collapse of a highway bridge in Minneapolis, Spence, Lachlan, Nelson, and Shelton [44] offered evidence that women were more likely than men to seek information concerning the status of friends and family, and pertaining to rescue efforts. Differences in source preference also emerged between, as women reported finding greater utility in using the internet to obtain information from local leaders, and found television more useful for obtaining critical information concerning rescue efforts and those who were adversely affected. A follow-up to this study in the context of a school shooting found that women engaged in more information-seeking behavior and experienced higher degrees of stress than did men [26]. One explanation offered for this finding is that while heightened levels of psychological distress may drive female respondents to seek out more information, ruminating upon this additional information may bolster negative emotion rather than reduce uncertainty. More recently, a laboratory study examining message processing following a hypothetical campus shooting offered further evidence for sex differences, this time suggesting that women were more adept at retaining information than men [21]. Taken together, these studies suggest that sex differences in response are important considerations for emergency managers, and that further examination of the reasons *why* men and women respond differently may be of research interest. Some studies [10,26,44] have offered known sex differences in ruminative coping tendencies as an explanation, but have not actually tested this proposition empirically. Trait need for cognition may also drive information seeking, though the literature does not generally support sex differences on this variable, and there is conflicting evidence on how it would impact information seeking under duress. Given that little is known about these trait variables in the context of crisis information processing, or how they may impact sex differences in information seeking tendencies, rumination and trait need for cognition are offered as two potential explanatory mechanisms for these consistent sex differences and are elaborated upon below.

1.3. Rumination

It may be the case that repeated exposure to information concerning an impending crisis or threatening event may have considerable emotional impact, particularly if one is prone to repeatedly reprocess the information. Ruminative coping tendencies (see [28–30]) are an acute maladaptive coping style that drive individuals toward reliving trauma to make sense of it. Individuals with rumination tendencies tend to experience longer and more severe periods of depressive symptoms following a traumatic event, which, in turn, could lead to acute depressive disorders [34–36]. A lengthy history of research in social psychology has documented sex differences in rumination, as women are more inclined than men to exhibit this processing style; one meta-analysis across 59 studies and over 14,000 participants suggests that women are more inclined than men to exhibit rumination, brooding, and reflection across a variety of circumstances [18].

The research on these sex differences in ruminative tendency largely places their origins in socialization and subordinate social status. Nolen-Hoeksema, Larson, and Grayson [33] offer that women experience more negative, uncontrollable events than do men, thus motivating women to monitor uncontrollability and seek ways of controlling their environment. Further, a number of studies have argued that societal differences in expectations regarding emotional display contributes to these differences, as women are socialized to focus on emotional regulation, reinforced when expressing negative emotions, and prone to rumination when these expressions of emotion do not lead outwardly to problem-solving [16,31]. Women, more so than men, may also be socialized to hyper-monitor both their own emotions and those of others in order to maintain positive interpersonal interactions [13,17]. Nolen-Hoeksema and Jackson [32] offered empirical evidence for all three of these explanations. It follows logically that those who are more inclined to ruminate would spend more time seeking out information, as they repeatedly try to confront and resolve lingering anxieties and fears. However, the link between media dependency, rumination, and emotional distress has yet to be empirically examined in the context of a natural disaster with substantial leadup time.

1.4. Need for cognition

There may also be specific pathways and individual differences that are tied to the motivation to acquire information from media under the circumstances. Of particular interest to the current study is need for cognition, a personality characteristic that has long been tied to central information processing and the capacity to make decisions based on reasoned action [6,42]. Those high on need for cognition have also been shown to rate higher in openness to experience, which makes it seem likely that they would have a need for information related to an impending threat and act upon this information when received, even if this means engaging in non-routine behaviors [27]. At the same time, other research has indicated that those high in need for cognition may be lower in harm avoidance and display high persistence, which would suggest the opposite [9]. There is thus a lack of clarity in the relationship between need for cognition, information seeking, and response during times of crises.

Further, extant research generally does not support the notion of trait differences between men and women in their fundamental need for cognition. In a review of dozens of studies linking need for cognition to other variables, Cacioppo, Petty, Feinstein, & Jarvis [5] report that the need for cognition is consistently gender neutral. In laboratory research examining undergraduates, Sadowski (1993) found no sex differences in the means and standard deviations for over 1000 respondents; this finding has been replicated in numerous studies ([4,22,37]; Spotts, 1994; [46,47]).

While not directly tested or compared in prior research, it seems more likely that sex differences in information seeking may be accounted for by rumination than by need for cognition. Given the documented differences between the sexes in terms of both ruminative coping strategies and overall need for information during times of crises, it may be the case that trait differences in rumination may be accounting for the sex effects observed in prior research. This is, however, an empirical question, and one that has not yet been examined.

To that end, the current study sought to use the natural laboratory of Hurricane Dorian to examine the moderating effects of both need for cognition and rumination on subsequent information seeking. Analyses first checked for sex differences in the key variables of interest – information seeking, need for cognition, and ruminative tendency. They then go on to examine the moderating effect of need for cognition and rumination both individually and simultaneously. Finally, a series of analyses links information seeking with actual mitigation behaviors. The following hypotheses and research questions are examined:

H1: Women will report more information seeking than will men.

H2: Women will report higher levels of ruminative tendency than will men.

RQ1: Will men and women differ on their need for cognition?

RQ2: Does rumination tendency moderate sex differences in information seeking?

RQ3: Does need for cognition moderate sex differences in information seeking?

RQ4: Are those who report more information seeking more likely to engage in mitigation behaviors?

2. Methods

Data were collected through Qualtrics, between the dates of September 30, 2019 and October 10, 2019. The sample consisted of 1152 participants living in areas of Florida, North Carolina, South Carolina, and Georgia affected by the Hurricane Dorian, recruited through the Qualtrics survey panel service. Participants were paid $2.25 for a fully completed and usable survey. Funding for the study was provided by the National Science Foundation, award number 1953270.

2.1. Participant eligibility

Data were collected from respondents in 337 different area codes in North and South Carolina, Georgia, and Florida (see Table 1); counties selected for inclusion in the study included those that were significantly impacted by high winds, storm surge, and flooding. Participants were excluded if they reported not residing in one of the specified zip codes, if there was evidence of straight lining, the participant took less than 1/3 of the median time to complete the survey, or if there was evidence of nonsensical responses in open-ended items. All identifying information was removed from the responses

2.2. Measurement

Instrumentation was mostly adapted from the work of Spence, Lachlan, Nelson, and Shelton [44], with the addition of scales need for cognition, ruminative coping tendencies, and specific actions taken in the time leading up to the storm. Participants were first asked basic demographic information questions regarding their age, sex, ethnicity, the state they reside in, and their zip code.

2.2.1. Information seeking

Next, participants were asked nine questions regarding what information they wanted during the duration of the threat of the storm, using a reverse-coded 5-point Likert-type scales ranging from (1) Strongly agree to (5) Strongly disagree, and one open-answer question ($\alpha = 0.89$). Examples include "I wanted information about the scope of the damage," "I wanted information about shelters," and "I wanted information about the larger impact of the hurricane." Coefficient alpha for the information seeking index was found to be $\alpha = 0.89$.

2.2.2. Ruminative coping tendencies

The Ruminative Responses Scale [49] was used to measure trait propensity toward ruminative processing tendency. The scale consists of 22 items on a four-point scalar ranging from "almost never" to "almost always." Example items pertaining to responses to negative emotion include "think about how alone you feel" and "analyze recent events to try to understand why you are depressed." Confirmatory factor analysis produced strong support for a one-factor solution with the removal of three items, CFI = 0.95, RMSEA = 0.08, $\alpha = 0.97$.

2.2.3. Need for cognition

The Need for Cognition Scale (Short Form) is drawn from Cacioppo, Petty, & Kato [6]. It asks respondents how typical a given item is characteristic of them, and is built on a five point-scalar ranging from "extremely uncharacteristic" to "extremely characteristic." Example items include "I find satisfaction in deliberating hard and for long hours," and "I prefer my life to be filled with puzzles that I must solve." Acceptable internal consistency and reliability was found after the removal of several items, CFI = 0.95, RMSEA = 0.06, $\alpha = 0.83$.

All reverse scored items were reversed again for ease of interpretation, so that increasing scores indicate an increase in magnitude for all constructed variables. Participants were also asked a series of yes/no questions concerning whether or not they had evacuated, had an evacuation plan in place, had some kind of emergency plan in place, had heard of hazard mitigation, or had engaged in actual mitigation activities around their home. Finally, participants were brought to a second series of demographic questions regarding the county they live in, their highest level of education and household income. Oneway ANOVA analyses indicated no relationship between age, income, ethnicity, or education and the variables central to the study; they were thus not included as controls in subsequent analyses.

3. Results

A series of analyses addressed the central research questions, along with several follow-up analyses for purposes of clarification. Simple mean comparisons are used to evaluate sex differences in the focal variables, followed by a correlation matrix across the key variables. The moderating effects of need for cognition and rumination on sex differences in information seeking are then evaluated in terms of simple moderation, using the Hayes PROCESS macro for SPSS [12]. They are further probed through a model including both moderating variables, again using the PROCESS program. For correlation and regression analyses, sex was effect coded −1 for male, and 1 for female respondents.

The first analyses sought to examine simple sex differences across the variables of interest. In terms of information seeking, significant sex differences were observed as women ($M = 4.14$, $SD = 0.69$) reported more information seeking than men, ($M = 3.94$, $SD = 0.75$), $t\,(1147) = 4.68$, $p < .001$, $d = 0.28$. Women ($M = 2.07$, $SD = 0.77$) also reported higher levels of ruminative coping tendency than did men ($M = 1.96$, $SD = 0.80$), $t\,(1147) = 2.27$, $p < .02$, $d = 0.14$. Significant differences were not detected for need for cognition, $t\,(1147) = 0.02$, *n.s.* Bivariate correlations indicate that information seeking was positively related to rumination, $r = 0.08$, $p < .01$, and that rumination and need for cognition were strongly and negatively related, $r = -0.32$, $p < .001$. No relationship was detected between rumination and need for cognition. Consistent with the *t*-tests, sex significantly correlated with both information seeking and rumination, but not with need for cognition (see Table 1). In terms of the first research question, differences between men and women were not detected on need for cognition, though hypotheses one and two were supported, as these analyses indicated differences in information seeking and rumination tendency.

Table 1
Correlation matrix across key variables.

	Sex	Information Seeking	Ruminating Tendency	Need for Cognition
Sex	1.00			
Information Seeking	0.137**	1.00		
Ruminating Tendency	0.067*	0.077*	1.00	
Need for Cognition	0.000	0.044	−0.318**	1.00

** $p < .01$.
* $p < .05$.

3.1. Simple moderation analyses

In order to examine research questions two and three, simple moderation analyses were performed using PROCESS [12]. For purposes of illustration, the moderation effects were probed at the mean, and at one standard deviation above and below the mean of the moderator. In both analyses, the predictor variable was sex and the outcome variable was information seeking; the moderator for the first of these analyses was need for cognition, while for the second it was ruminative coping tendency.

The interaction between sex and need for cognition was found to be statistically significant, $b = 0.07, p < .01$, 95% CI = [0.02, 0.13]. The conditional effect of sex on information was correspondingly detected. At low moderation (need for cognition = 4.31), the effect of sex on information seeking was found to be $b = 0.04$, n.s. At middle moderation (need for cognition = 5.09), this effect was found to be $b = 0.10, p < .001$, 95% CI = [0.06, 0.14], while at high moderation (need for cognition = 5.87), it was found to be $b = 0.15, p < .001$, 95% CI = [0.10, 0.22]. An examination of the estimated levels of information seeking across different degrees of moderation by need for cognition suggests different processes for men and women as it relates to the connection between these variables (see Fig. 1). While a considerable gap exists between men and women across the entire sample, female respondents tended to engage in more information seeking when exhibiting higher levels of trait need for cognition. Curiously, this relationship runs in the opposite direction for male respondents, as a slight negative trend was detected in information seeking amongst men with high need for cognition.

This approach was taken again for the second moderation analysis. The interaction between sex and rumination was found to be statistically significant, $b = -0.08, p < .01$, 95% CI = [−0.13, −0.03]. Once again, a conditional effect of sex on information was detected. At low moderation (rumination = 1.23), the effect of sex on information seeking was found to be $b = 0.15, p < .001$, 95% CI = [0.10, 0.22]. At middle moderation (rumination = 2.02), this effect was found to be $b = 0.10, p < .001$, 95% CI = [0.05, 0.14], while at high moderation (rumination = 2.81), it was found to be $b = 0.03$, *n.s.* An examination of the estimated levels of information seeking across different degrees of moderation by rumination suggests that while women were fairly consistent in their desired information seeking across degree of rumination tendency, there existed a positive relationship between rumination tendency and information seeking amongst men (See Fig. 2). In other words, sex differences in information seeking were attenuated at higher levels of rumination.

3.2. Multiple moderation analysis

To further explore these research questions, the data was modeled in PROCESS using both moderators simultaneously (Model 2). When modeled simultaneously, an interaction effect for sex by rumination was detected, but not for sex by need for cognition. In the final model, main effects were detected for both need for cognition, $b = 0.07, p < .02$, 95% CI = [0.01, 0.03], and for rumination, $b = 0.09, p < .002$, 95% CI = [0.03, 0.15]. An interaction effect between rumination effect was also detected, $b = -0.07, p < .02$, 95% CI = [−0.13, −0.02]. An examination of the means at varying levels of the moderators suggests that the observed sex differences attenuate at higher levels of rumination, while need for cognition generally drives information seeking for women (see Fig. 3). At low levels of need for cognition and high levels of rumination, men and women were almost identical in level of information seeking. Notably, in addition to not detecting a sex by need for cognition interaction, the multiple moderation analysis also reveals no main effects on information seeking, $b = 0.01$, *n.s.* Taken together, it may thus be the case that differences between men and women observed in both the current data and prior research may be attributable to higher degrees of rumination tendency found amongst female respondents.

Finally, research question four was examined through a series of simple analyses linking information seeking and mitigation behaviors. Those who evacuated exhibited more information seeking ($M = 4.16$, $SD = 0.74$) than those who did not, ($M = 4.03, SD = 0.72$), $t(1150) = 2.49, p < .02, d = 0.18$. Similarly, those who had an emergency kit in place ($M = 4.10, SD = 0.70$) sought more information than those who did not ($M = 3.87, SD = 0.71$), $t(1147) = 3.75, p < .001, d = 0.37$, while those having heard of hazard mitigation also indicated higher levels ($M = 4.14, SD = 0.67$) of information seeking than those who had not ($M = 4.03, SD = 0.74$), $t(1147) = 2.43, p < .04, d = 0.16$. Interestingly, information seeking did not differ significantly across those who had or had not physically mitigated their home, $t(1147) = 1.44$, *n.s.* With the exception of physically mitigating a house, these outcomes all seem somewhat tied to information seeking, further underscoring the need crisis and risk messaging to persuade audiences to seek information.

4. Discussion

These analyses of data from residents impacted by Hurricane Dorian both support and extend the results of previous research. While a long history of research in both the Communication and disaster management literatures has suggested sex differences in the information sought before and

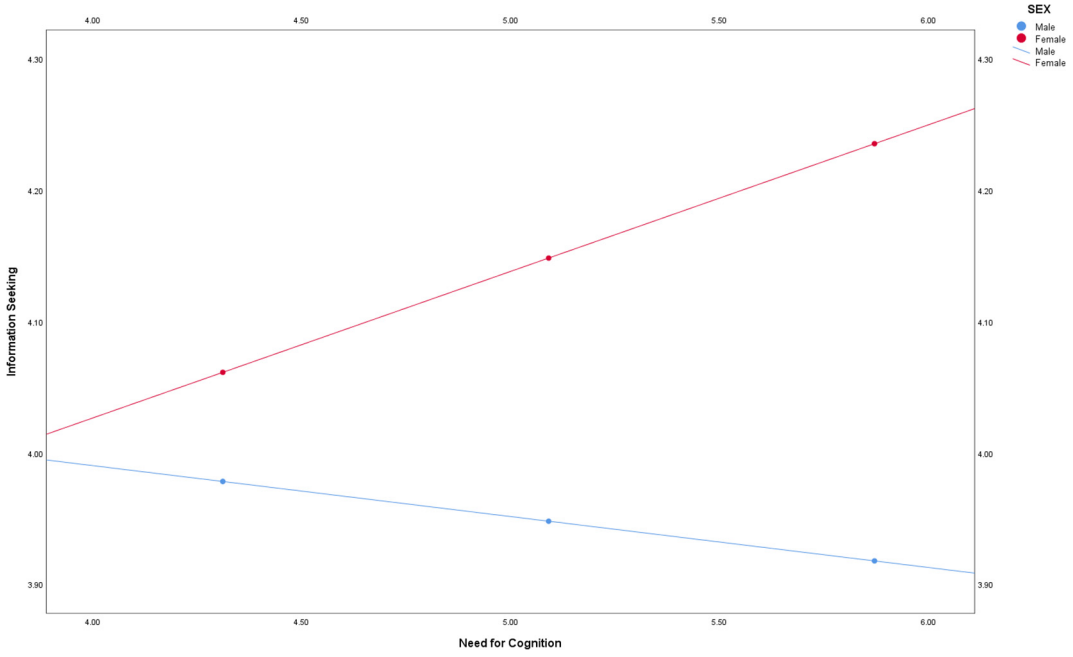

Fig. 1. Moderation effect of need for cognition on sex differences in information seeking.

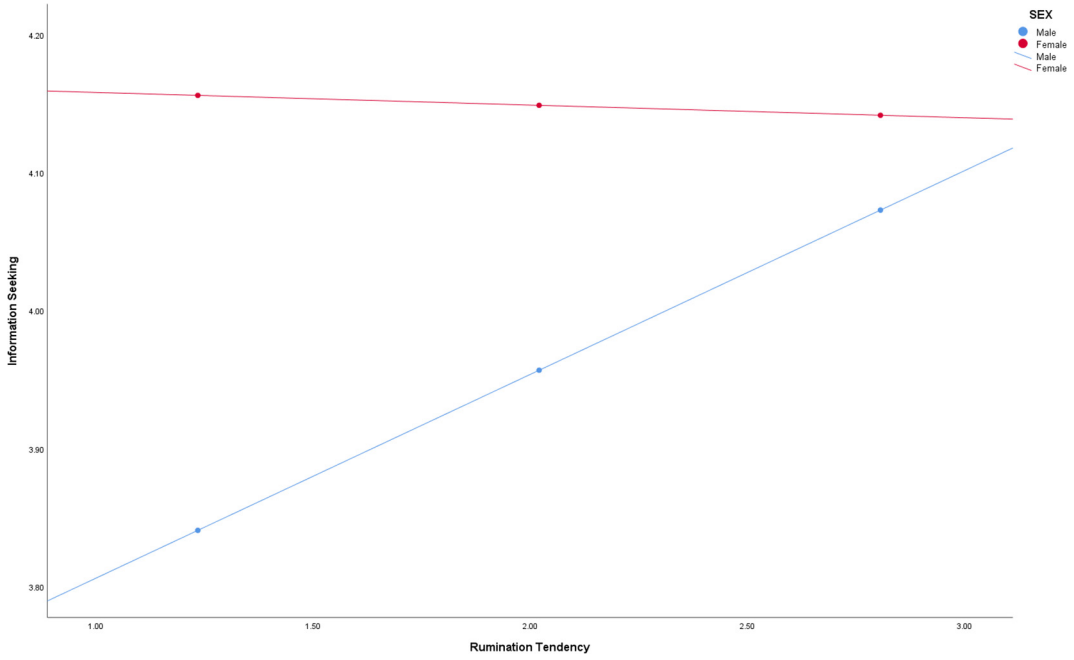

Fig. 2. Moderation effect of rumination tendency on sex differences in information seeking.

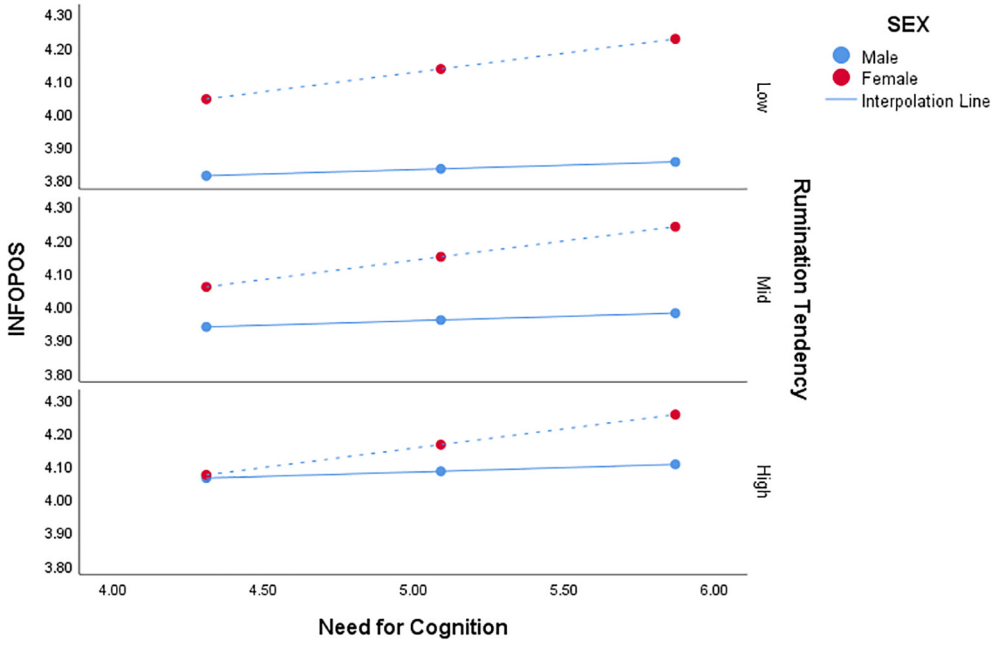

Fig. 3. Combined moderation effects of need for cognition and rumination tendency.

during crises, far less has attempted to examine the underlying psychological processes that may account for these differences. While limited to a specific type of event and location (a coastal storm in the southeastern United States), the results from the current study both reinforce previous findings and offer new insights and implications for disaster management and crisis communication practitioners. A discussion of the results and their implications follows.

The simple analyses for sex differences across key variables are entirely consistent with prior research in the area. Women reported higher levels of information seeking, consistent with recent research in crisis and risk communication. Women also reported higher levels of rumination tendency, consistent with a long history of research in cognitive psychology suggesting such sex differences [16,31,32]. Of further note is the small but significant positive correlation between rumination and information seeking. This supports the argument that those prone to rumination may be more inclined to continually seek information from their environment in order to resolve ongoing anxiety, as it is processed and reprocessed. Regardless of differences between men and women, this finding is consistent with the

notion that a desire to attain resolution will drive individuals to continually scan for additional information. It is also consistent with the basic tenets of Uncertainty Reduction Theory [1]. Further, while not measured in this study, it may be the case that those with ruminative tendencies may be more prone to symptoms of clinical depression, as they experience repeated trauma in their attempt to obtain information and arrive at resolution [34,35]. Future research in audience responses to information concerning disasters and widespread crises should investigate the connection between rumination, information seeking, desire to reduce uncertainty, and measurable depressive symptomologies.

The absence of sex differences in need for cognition are also consistent with prior research (e.g. [5]). As expected, differences were not found between men and women in terms of trait need for cognition, though the current findings add to this body of knowledge by testing these differences in a field setting. Further, they may have implications for our understanding of dual process models (ELM, HSM, etc.) in crisis and risk scenarios. While dual process theories tend to suggest differences in the persuasive power of messaging depending on the nature of the message and subsequent processing type, we have at least one data point from the field now suggesting that there is no need to anticipate sex differences in trait need for cognition. The desire or motivation to process centrally may be more likely an individual level variable. It may also be the case that under conditions of high risk and uncertainty, individuals engage in a large amount of central processing despite their trait tendencies; high levels of involvement are likely to lead to high levels of central processing, which can be leveraged for persuasive purposes (see [40,41]). These are, however, empirical questions for future examination in field contexts; caution should be taking in generalizing beyond the parameters of the current data, and replication and extension is necessary with different types of disasters and different populations.

The absence of sex differences renders need for cognition an unlikely explanation for the observed sex differences in information seeking. The simple moderation analyses suggest this to be the case. However, there also exists an unanticipated pattern in the data when considering the dynamic between sex, information seeking, and need for cognition. Consistent with work from Mussell [27], women higher in need for cognition were more likely to seek out information than were women lower in need for cognition. However, a slight trend was detected in the opposite direction for men, whereby men with high levels of need for cognition were *less* likely to seek out information than men with low levels of need for cognition. This finding is consistent with previous research by Fleischhauer et al. [9], which found that those high in need for cognition would be lower in harm avoidance and continue to maintain routine patterns of behavior. Given that there continues to be disagreement in the field regarding the impacts of need for cognition on behavior during an emergency event, future research should attempt to replicate, and if necessary disentangle the underlying causes of this difference between men and women.

The simple moderation analysis for rumination strikes at the central finding of the current study – that observed differences between men and women in aggregate information seeking may be attributable to underlying differences in rumination tendency. The moderating effect of rumination suggests that differences between men and women attenuate at higher levels of ruminative tendency; since the data also suggest that women are (expectedly) higher on ruminative tendency, this may at least partially explain the difference.

The combined impact of need for cognition and rumination on differences in information seeking are further illuminated by the dual moderation model (Fig. 3). The impact of need for cognition and rumination on information seeking is clear for women, as both positively impact information seeking. For men, the gap between their degree of information seeking and that of female respondents closes as ruminative tendency increases. At the specific interaction of high rumination and low need for cognition, the difference between the sexes is essentially nonexistent. By way of comparison, the starkest difference between men and women can be found amongst those low in rumination and high in need for cognition. While this is only one study, conducted in the context of a natural disaster with highly specified parameters, it suggests the need for further investigation into the role played by these trait variables in the amount and type of information being sought.

Finally, the analyses indicate that information seeking matters. Across all respondents, those higher in information seeking were more likely to evacuate, more likely to have an emergency kit in place, and were more aware of tangible mitigation behavior. Those who engaged in more information seeking were not more likely to actually mitigate their homes; while not directly examined in the current data, it may be the case that resource availability and socioeconomic factors play a more important role in whether or not someone mitigates. These findings should be tempered by the caveat that they are correlational in nature- it could very well be the case that those predisposed to crisis awareness would be inclined to seek information under the circumstances. Nonetheless, they offer some degree of evidence that information seeking is related to actual behaviors that may mitigate against loss of life, health, or property.

4.1. Implications for emergency managers

While the results are theoretically interesting and suggest the need for future research, they may also be informative to emergency managers and crisis communication practitioners in considering the manner in which messages are crafted. While this is only one study, conducted in highly specific circumstances, the impact of rumination suggests that emergency managers should continue to develop messages that engender some degree of self-efficacy; if rumination translates to information seeking, it may be critical to encourage people to engage in remedial actions and to let them know that these actions will make a tangible difference in their health and safety. It is also the case that these messages may be tailored specifically to information concerning mitigation and remedial responses, since this and prior research indicates that those seeking out more information will also likely seek out information related to these specific outcomes.

Further, emergency management agencies should consider the parameters surrounding a given crises and the relative likelihood of rumination. The current study only represents one particular natural disaster with a highly specified set of circumstances; hurricanes, by their very nature, have long leadup times and unfold over a matter of days. Addressing issues related to rumination may be more relevant in this context than in a fast-moving event, such as a wildfire or tornado. There is some initial evidence to suggest that the speed of a given crisis may impact informational needs and source reliance [10]. It may be the case that the parameters surrounding crises of different speeds impact the relevance of rumination as well.

4.2. Conclusion

Information seeking remains a crucial piece of understanding individual responses to crises; in terms of previously identified sex differences, this study finds data to support one potential underlying mechanism – rumination tendencies. Women, regardless of level of rumination tendencies, appear to exhibit high levels of information seeking behavior. Men with high levels of rumination tendencies are much more similar to women at all levels of rumination in comparison to men with low or middle levels of rumination. Previous findings related to sex differences in information seeking may be reflective of underlying rumination tendencies, rather than attributable to some innate difference between men and women. Further, given the origins of rumination differences identified by the seminal research in the area [31–33], it may be the case that differential socialization and societal expectations of men and women are translating into tangible differences in how people respond to information concerning crises and emergencies. Given the arguments in the rumination literature, it may be the case that societal expectations that women hyper-monitor their emotions, engage in higher levels of emotional regulation than men, and scan their environments to counter negative interactions (c.f. [32]) are driving differences in information processing associated with high consequence events. Future research should further explore these underlying processes and their consequences, and emergency managers should consider the potential role played by rumination

in crisis and disasters of varying magnitudes and with varying timelines, along with the extent to which this processing tendency facilitates or inhibits mitigation and protective action.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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