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Frozen while I scan: Examining the impact of media dependencies, socioeconomic status and rumination on preparation behaviours related to Hurricane Dorian

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Abstract

Building on previous crisis and risk literature, this study investigates media dependencies, information seeking, preparation behaviours and rumination tendencies among individuals living on the Atlantic seaboard who were impacted by Hurricane Dorian in 2019. Consistent with previous work, participants continue to perceive television, a legacy media, as the most important source of information—both initially and throughout the event. This study also analysed the extent to which information seeking, preparation behaviours and rumination tendencies may be related, drawing from recent work that has suggested that rumination tendencies may help explain sex differences in information seeking. Results suggested that those with higher rumination tendencies were more likely to perceive all sources of information as very important, with the exception of television, which was heavily relied upon by most participants. Rumination tendencies did not explain the variance in any of the three preparation behaviours examined. Overall, most participants had an emergency kit and an evacuation plan in place, while socioeconomic status positively predicted home preparation.

KEYWORDS

crisis communication, emergency management, human factors, media, preparation

1 | INTRODUCTION

In September 2019, Hurricane Dorian, a Category 5 Atlantic hurricane, struck the Bahamas and the Atlantic seaboard of the United States. The economic impact reached over a billion dollars and impacted the residents of Florida, Georgia, South Carolina and North Carolina, and the storm resulted in 10 U.S. fatalities (National Centers for Environmental Information, 2019). The impact in the Bahamas was even more dire, with 74 fatalities, 245 missing persons and more than three billion dollars in damage (Associated Press, 2019; NEMA, 2020). Environmental disasters such as Hurricane Dorian continue to be an important area of research for communication scientists and emergency management researchers interested in understanding how periods of stress and uncertainty

influence information-seeking and information-related behaviours. As social media continues to grow in everyday influence, it is crucial that emergency management officials and first responders understand how individuals obtain information during an environmental disaster.

Preparation behaviours, such as having an emergency kit, an evacuation plan or making changes to a house or area of land to help reduce potential damage, often require action prior to a storm or threat. Research to date has not investigated whether reliance on particular media and preparation behaviours are correlated in a way that may facilitate the targeting of specific subgroups to increase adherence to disaster protocols. Relatedly, recent scholarship has suggested that rumination tendencies may explain widely documented differences in crisis-related information-seeking behaviour

(Gilbert et al., 2019; Spence et al., 2010). Ruminative processing patterns are those in which traumatic and high-stress events are replayed and relived in an attempt to understand them and arrive at resolution (Nolen-Hoeksema, 1987, 1990, 2000). Response Styles Theory (Nolen-Hoeksema et al., 1993) suggests that those prone to ruminating on high consequence information may be less inclined to act, as they reply the information repeatedly in order to make sense of it. It is critical for impacted individuals to be able to access clear and accurate information during an event, but as previous work has suggested, access to unlimited information may have a long-term cost in terms of mental health and behaviour. Rumination tendencies may help scholars make sense of information preferences. This study of residents directly impacted by Hurricane Dorian seeks to build on previous work related to crisis information source preferences, with exploration into the ways in which these media or interpersonal dependencies are related to preparation behaviours and rumination tendencies.

1.1 | Legacy media

Although new forms of media provide fast updated and on-demand access to information, there has long been a preference for the public to seek disaster-related information through legacy media, primarily television (Chang, 2012; Chen et al., 2018; Dudo et al., 2007). The management of information dissemination and acquisition is a critical consideration in the communication of crises. It has been well established that during a crisis the public seeks information to reduce uncertainty (Lachlan & Spence, 2010) understand what others are doing (Perse et al., 2002) and generally acquire the gratifications sought out from communication during the event. It is also the case that legacy media and interpersonal interactions work hand in hand under conditions of crisis; individuals will often learn of an event through television and retransmit it through interpersonal exchanges.

Such interactions were documented as early as the assassination of U.S. President John F. Kennedy (see Greenberg, 1964; Spitzer & Spitzer, 1965). Research after the September 11th attacks also suggests the use of television as an information-gathering tool (Lachlan et al., 2009; Spence et al., 2006), though interpersonal communication was also important as a secondary source; Greenberg et al. (2002) noted that close to half the respondents in their sample reported finding out about the attacks from an interpersonal contact, whereas a third of the sample found out from television.

Results from research after Hurricane Katrina indicated that television was the primary information source for the public, followed by some form of face-to-face communication with acquaintances and interpersonal communication with strangers (Spence, Lachlan, & Griffin, 2008; Spence et al., 2008). These same patterns were also found in studies of displaced persons following Hurricane Ike (Burke et al., 2010), commuters following the Minneapolis I-35 bridge collapse (Spence et al., 2010) and residents of Flint, Michigan concerning their well-documented water contamination (Day et al., 2019).

This preference for television is consistent with research from the climatology literature (Comstock & Mallonee, 2005; Hammer & Schmidlin, 2002; Spence, Lachlan, Burke, & Seeger, 2007), as those impacted by adverse weather events will prefer information with a substantial lead-up time so that preparations can be made (Hoekstra et al., 2011). There is also ample evidence that these same audiences will form trusting bonds with local television weathercasters (Sherman-Morris, 2011). Based on the previous research supporting the use of face-to-face communication and television for information seeking and acquisition, coupled with the argument that television news is still widely used, the following hypotheses are offered:

H1: Television and interpersonal communication will be the primary information resources concerning Hurricane Dorian.

1.2 | Factors impacting preparation

Acquiring information and crisis preparation are related concerns. Having information that is both accurate and reliable is an important component to effective crisis planning. Emergency managers and government officials often assume that if the public receives crisis-related information this will help create conditions that motivate individuals to take protective action. There are several problems with this assumption. Although information may be received, it may not be acted upon. Wachinger et al. (2013) add that responses to risk messages may be similarly inhibited if individuals understand the risk but choose to accept since benefits outweigh costs, if they acknowledge the risk but believe they have no agency to address it, or if they have little in the way of resources necessary to address the risk.

Thus, individuals who live in crisis-prone areas often are socialized into a disaster subculture (Helsloot & Ruitenberg, 2004; Isoda et al., 2019). What can emerge in the context of disaster subculture is a set of cultural tools to cope with or address the threat, even in the face of these cultural and perceptual obstacles. Engel et al. (2014) argue that these tools can be tangible or intangible. However, the presence of such a disaster subculture can cause these same areas or groups to ignore the realities of the threat and in a sense, avoid necessary precautions because of previous instances of dealing with the crisis (Burke et al., 2010). After Hurricane Katrina many who did not evacuate before the storm indicated a belief that their own vulnerability would be low because of previous experience (Eisenman et al., 2007). Another study completed in the aftermath of Hurricane Katrina indicated that there was a substantial minority of respondents who indicated that if another Hurricane arrived in the next month, they would not evacuate (Blendon et al., 2007). Because previous research outlines that those in crisis-prone areas are not always willing to take protective actions, the following research question is offered:

RQ1: To what extent did those in the areas affected by the hurricane mitigate against the threat?

Another problem with the outlined assumption is that members of the public may not have an equal or realistic means of implementing self-protective actions. As noted by Fothergill et al. (1999), preparedness is the stage of a crisis involving all pre-crisis preparation and efforts to mitigate in advance of an impending event. Throughout the literature, an argument is made that individuals with lower socioeconomic status may have increased crisis vulnerabilities (Phillips et al., 2005; Rufat et al., 2018; Spence et al., 2008). This may result from lack of information or lack of resources. Research has shown that individuals may choose not to evacuate because of a lack of access to adequate transportation (Rowel et al., 2012) or individuals may require special assistance that they feel are unlikely to be met if they evacuate (Spence et al., 2010). Moreover, to engage in preparation requires financial capital. Individuals that are lower in socioeconomic status must make choices each day concerning financial capital and some deal with the challenges of continued poverty. These create conditions where purchasing and stockpiling food and supplies is not possible (Berke et al., 2010; Rufat et al., 2015). Research also notes that minority and vulnerable groups decode and respond better to crisis messages that are crafted and targeted directly to them (Frisby, 2002), which often is not that case as crisis messages tend to be broadly targeted and general in content. Finally, individuals from lower economic status have also been shown to have less trust in the government, which causes a delay in response to disaster warnings and impacts preparation (Spence et al., 2008) and sometimes possess literacy levels which impact the understanding about messages provided (Hutchins et al., 2009). Therefore, due to resource and information scarcity, the following hypothesis is offered:

H2: Respondents from lower socioeconomic status will be less likely to have prepared.

1.3 | Information seeking

Previous research after Hurricane Katrina found increased information-seeking concerning safety needs (Spence, Lachlan, Burke, & Seeger, 2007). An analysis of evacuation attempts before Hurricane Andrew suggests individuals of higher socioeconomic status were typically better prepared for disasters and large-scale crises (Gladwin & Peacock, 1997; Peacock, 2003; Sattler et al., 1995). Similar responses were demonstrated during Hurricane Katrina where low-income black homeowners were the most in need of information and assistance (Elliott & Pais, 2006). Additionally, because such vulnerability to loss of health, life, and property may exist throughout the crisis lifecycle, and the literature outlines previous information-seeking patterns of vulnerable populations during a crisis, the following hypothesis is offered.

H3: Respondents from lower socioeconomic status will be more likely to express a need for information related to safety needs.

Past research also indicates that social media may be an important information source during the time leading up to natural disasters (Lachlan, Spence, Lin, & Del Greco, 2014; Lachlan, Spence, Lin, & Najarian, 2014; Lachlan et al., 2016; Reuter & Kaufhold, 2018). While it may be less likely to serve as a primary information source, research evidence suggests that social media may be particularly attractive due to its ability to create parasocial bonds between reporter and audience (Lachlan, Spence, Lin, & Del Greco, 2014; Sherman-Morris et al., 2020), and the ability to locate information related to safety and shelter-seeking in real time (Stokes & Senkbeil, 2017). In the specific context of coastal storms, recent evidence suggests that social media may be relied upon for updates and real-time news, and that this content is likely to be retransmitted by users (Lachlan et al., 2019; Xu et al., 2020). As with other forms of communication information sharing and acquisition through social media during the crisis life cycle can contribute to obtaining information, informing others in general or within an individual's interpersonal networks and, therefore, promote information dissemination and acquisition (Day et al., 2019). Moreover, how social media is used and conceptualized with respects to crisis evolve rapidly. For example, social media was not designed for use in emergency coordination or crisis communication; however, the media has diffused to aid in disaster response (Westerman et al., 2014). Within the diffusion of innovations paradigm, this is process of adapting a technology to a use for which it may not have been specifically intended is known as reinvention (Rogers, 2003). This reinvention process in the diffusion of social media for crisis communication continues and requires continued examination of its use. Because people have the same goals in legacy media, face-to-face and through social media, and the use of social media for crisis communication continually adapts to meet the goals of the public, the following research question and hypothesis are offered.

RQ2: To what extent was social media important for information seeking regarding Hurricane Dorian?

H4: Those reliant upon mediated information will be more likely to prepare than those reliant on interpersonal interactions.

1.4 | Rumination

It may also 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 Nolen-Hoeksema, 1987, 1990, 2000) are an acute maladaptive coping style that drive individuals towards reliving trauma in order 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 (Martin et al., 2016; Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema et al., 1993, 1994; Wozniak et al., 2020). While it stands to reason that rumination tendencies may inhibit responses or influence information choices, the link between media dependency, rumination and emotional distress has yet to be empirically examined in the context of an environmental disaster with a substantial lead-up. To that end, the following research questions are proposed:

RQ3: Were those prone to ruminative coping reliant on different sources for information?

RQ4: Were those prone to ruminative coping less likely to engage in preparation activities?

2 | METHODS

Data were collected through Qualtrics, between the dates of 30 September 2019 and 10 October 2019. The sample consisted of 1,152 participants living in areas of Florida, North Carolina, South Carolina and Georgia affected by Hurricane Dorian. Participants were compensated monetarily, receiving \$2.25 for a fully completed and usable survey. Funding for the study was provided by the National Science Foundation, grant number 1,953,270 (data and codebook available through Open Science Framework at <https://osf.io/wuaer>). A total of 837 respondents resided in Florida (72.7%), 119 in North Carolina (10.3%), 118 in South Carolina (10.2%) and 78 (6.8%) in Georgia. In terms of respondent sex, 43.1% self-reported as male and 56.7% as female. A total of 73.2% identified as white, 18.9% as black or African American, 1.6% as Asian and 6.3% as other. For income level, 2.5% reported making less than \$30,000 a year, 48.0% between \$30,000 and \$50,000, 29.3% between \$50,000 and \$70,000, 7.9% between \$70,000 and \$100,000 and 7.0% over \$100,000, with 5.3% choosing "prefer not to answer." Average respondent age was 45.32 ($SD = 16.74$).

2.1 | Participant eligibility

The sampling frame for the study consisted of coastal adjacent counties that were directly affected by the high winds, storm surge and coastal flooding brought on by Dorian. Data were collected from individuals in a total of 337 different area codes from North and South Carolina, Georgia and Florida (see Table 1 for specific counties). Participants were excluded if they reported not residing in one of the specified zip codes. Responses were also excluded 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 the open-ended items. Excluded responses were replaced with new ones. All personally identifying information was removed from the data, and

TABLE 1 Counties included in sample

Florida	Brevard
	Broward
	Dade
	Duval
	Flagler
	India River
	Nassau
	St John's
	St. Lucie
Georgia	Palm Beach
	Volusia
	Bryan
	Camden
	Chatham
	Glynn
	Liberty
	McIntosh
	Beaufort
North Carolina	Brunswick
	Bryan
	Camden
	Carteret
	Chatham
	Craven
	Davie
	Glynn
	Charleston
South Carolina	Dorchester
	Horry
	New Hanover
	Onslow
	Pamlico
	Pasquotank

participants were assigned a randomized user response number, in order to ensure complete anonymity and separation of identity with data.

2.2 | Procedure

Participants were provided a Web link that was compatible with both personal computers and mobile devices. This link led to an information sheet detailing the nature of the study and the minimal risks involved. Consent was considered granted through continuation of the survey. If the participant continued, they were then presented basic demographic questions. If the participant indicated that they under 18 years of age, or that they did not reside in an area affected by Dorian, the survey was terminated. If the

participant passed both of these screens, they continued on to the key measures.

2.3 | Measurement

Instrumentation was mostly adapted from the work of Spence et al. (2010), Gilbert et al. (2019), with the addition of scales measuring attention, need for cognition and ruminative coping tendencies. Participants were first asked basic demographic information questions regarding their age, sex (male, female, other), ethnicity (White, Black, American Indian, Asian, Native Hawaiian, other), the state they reside in and their zip code.

2.3.1 | Damage and preparation

Participants were then directed to a multiple-choice question asking how the participant first learned of the threats posed by the hurricane. Example responses include, "face-to-face conversations with a friend or coworker," "radio" and "social media." They next answered questions addressing evacuation planning and any damage incurred by their home. The first question asked "to what extent was your home damaged by the hurricane?" and was presented in the form of a 5-point scale ranging from "no damage to destroyed" and "I don't know." Participants were then asked to respond either "yes" or "no" to the question "Were you forced to evacuate your home?" If the participant chose "no" they continued on to the items concerning evacuation (see below). Participants were then asked questions regarding their preparation and home mitigation. Both questions had simple yes/no answers concerning the presence or absence of an emergency kit or evacuation plan, and whether or not the respondent had mitigated their home against coastal storms.

2.3.2 | Source importance

To address perceptions of the importance of varying media in obtaining information about the hurricane, participants answered a series of five questions, each with three response categories of "very important," "somewhat important" and "not important." Examples include "How important was TV as an information source about Hurricane Dorian," and "How important was social media (Facebook, Twitter, etc.) in getting updates on Hurricane Dorian?"

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." Cronbach's alpha (Chronbach, 1951; McNeish, 2018) were

used to measure the reliability of continuous self-report scales. Coefficient alpha for the information-seeking index was found to be $\alpha = 0.89$.

2.3.3 | Information seeking

Participants then responded to a series of items related to their emotional responses. Participants first responded to a series of items regarding their stress level during the duration of the storm (pre-stress); $\alpha = 0.78$. These five-point Likert items ranged from "Strongly agree" to "strongly disagree," and included statements such as "I was panicked" and "I was calm." These items were later rephrased and repeated to ask the participants of their stress levels at time of data collection, approximately four weeks after the storm (post-stress) ($\alpha = 0.89$).

2.3.4 | Ruminative coping tendencies

The Ruminative Responses Scale (Treynor et al., 2003) was used to measure trait propensity towards ruminative processing tendency. The scale consists of 22 items on a four-point scale ranging from "almost never" to "almost always." Example items pertaining to responses to negative emotion include "think about how alone you feel" and "analyse recent events to try to understand why you are depressed." Strong support for a one-factor solution was detected with the removal of three items, CFI = 0.95, RMSEA = 0.08, $\alpha = 0.97$.

All reverse-scored items were reversed again for ease of interpretation, so that increasing scores indicate an increase in magnitude for all constructed variables. Finally, participants were brought to a second series of demographic questions regarding the county they live in, their highest level of education (less than high school, high school graduate, Bachelor's degree, Master's degree, Advanced graduate degree, prefer not to answer) and household income (less than \$30,000, \$30,000–\$50,000, \$50,000–\$70,000, \$70,000–\$90,000, over \$100,000, prefer not to answer).

3 | RESULTS

The first hypothesis sought to test whether television would emerge as the primary source of information concerning Hurricane Dorian. An analysis of simple descriptive statistics suggests that the answer is yes. In terms of how people found out about the impending threat, 63.6% first learned from television, with a webpage (12.2%) and face-to-face interaction with a friend (10.0%) coming in a distant second and third, and with no other category accounting for more than 2% of the cases. In terms of general importance for obtaining information about the storm, 77.6% of the respondents indicated that they found television to be "very important." Similarly, 65.1% of respondents indicated that websites were very important for continuing updates about the storm. By way of comparison, only

31.3% considered radio very important, as did 34.3% who considered face-to-face conversations with others very important. The results for the second research question suggest that social media was relatively unimportant—over one-third of the sample reported social media use as “not important” in monitoring developments related to the storm (see Table 2).

The first research question sought to examine the extent to which the public were prepared for Hurricane Dorian. The results suggest a contrast between low and high investment preparations. In terms of household preparations and evacuation, 84.9% of the respondents had some sort of emergency kit in place, while 71.9% had a concrete evacuation plan. However, only 18.6% had physically mitigated their house against storm damage. Of the 214 respondents reporting that their house was mitigated, 26.6% reported having done so in the last six months, while another 30.4% reported having done so at least three years prior to the administration of the survey.

Perhaps, a socioeconomic explanation can be applied to these findings, given the results for the second hypothesis; this hypothesis suggested that those from lower socioeconomic standing would be less likely to prepare. The results fail to suggest socioeconomic differences in likelihood of having a kit or evacuation plan in place but do support the notion that income played a role in mitigation. Chi-squared analyses failed to reveal significant differences across socioeconomic strata for whether or not respondents had an emergency kit in place or for whether they had a pre-existing evacuation plan. However, a significant difference was detected for household mitigation, $\chi^2(4) = 44.29$, $p < .001$, $V = 0.20$. Those earnings less than \$70,000 per year were unlikely to have mitigated their house, as 10.3% of those reporting incomes under \$30,000, 13.4% of those reporting between \$30,000 and \$50,000, and 21.4% of those making between \$50,000 and \$70,000 reported having mitigated. Among the \$70,000 to \$100,000 stratum, 40.7% reported having mitigated their home. Interestingly, this ratio drops off at higher levels of income, as only 25.9% of those making over \$100,000 per year reported having mitigated their house (see Table 3). In summation, those in the \$70,000 to \$100,000 income range were most likely to mitigate, while those both above and below this bracket were less likely to do so.

Given the challenges presented by having fewer preparation resources, hypothesis three proposed that those from lower socioeconomic strata would be more likely to express a need for

TABLE 2 Respondent perceptions of source importance

	Not important (%)	Somewhat important (%)	Very important (%)
Television	5.8	16.6	77.6
Web	7.9	27.0	65.1
Interpersonal	18.9	46.8	34.1
Social media	36.3	30.4	33.3
Radio	34.5	34.2	31.3
(N = 1,152)			

TABLE 3 Household mitigation by income

	Mitigated (%)	Not mitigated (%)
<\$30,000	10.3	89.7
\$30–50,000	13.4	86.6
\$50–70,000	21.4	78.6
\$70–100,000	40.7	59.3
\$100,000+	25.9	74.1
Prefer not to answer	11.5	88.5
$\chi^2(4) = 44.29$, $p < .001$, $V = 0.20$. (N = 1,152)		

information related to safety needs. To test this hypothesis, a series of one-way ANOVA analyses compared the mean scores for the perceived importance of varying types of information across economic strata. The results fail to indicate differences in the perceived importance of these outcomes. Significant differences across economic strata were not detected for information about the scope of the storm, government response, food and water, evacuation efforts, shelters, rescue efforts, the larger impact of the storm who was adversely affected or the whereabouts of friends and family.

The fourth hypothesis sought to test whether those dependent on mediated information would be more likely to mitigate than those reliant on interpersonal interactions. To address this hypothesis, a series of chi-squared analyses first examined whether having an emergency kit in place was related to the perceived importance of radio, television, websites, conversations with others and social media. This analytic plan was then repeated for whether there was a pre-existing evacuation plan, and whether the respondent's house was mitigated (see Table 4).

In terms of emergency kits, the results suggest differences based on the perceived importance of radio, $\chi^2(2) = 7.21$, $p < .03$, $V = 0.08$, television, $\chi^2(2) = 17.10$, $p < .001$, $V = 0.12$ and websites, $\chi^2(2) = 8.47$, $p < .02$, $V = 0.09$ but not for interpersonal interactions or social media. A total of 43.1% of those without an emergency kit rated radio as unimportant, with 27.6% rating it somewhat important and 29.3% rating it very important. Regarding television, 12.1% of those without a kit in place rated television as not important, compared to 19.5% somewhat and 68.4% very. For websites, 13.2% of those without a kit in place claimed websites were not important, compared to 27.6% somewhat and 59.2% very important. All in all, those without a kit in place expressed reliance on television and websites, but not radio.

A somewhat similar pattern was detected for evacuation plans, though in this case, the importance of social media was evident. Results suggested differences across the perceived importance of radio, $\chi^2(2) = 13.05$, $p < .001$, $V = 0.11$, television, $\chi^2(2) = 23.53$, $p < .001$, $V = 0.14$, websites, $\chi^2(2) = 15.92$, $p < .001$, $V = 0.12$ and social media, $\chi^2(2) = 80.53$, $p < .02$, $V = 0.09$, but not for interpersonal interactions. Within evacuation plan status, 42% of those without a plan also considered radio unimportant, as opposed to 33.3%

TABLE 4 Perceptions of source importance by preparation

	Kit (%)		Evacuation plan (%)		Household mitigation (%)	
	Yes	No	Yes	No	Yes	No
Television						
Very important	79.2	68.4	80.9	69.1	78.0	77.5
Somewhat important	16.1	19.5	15.0	20.7	16.4	16.6
Not important	4.7	12.1	4.1	10.2	5.6	5.9
Web						
Very important	66.2	59.2	68.6	56.2	63.6	65.5
Somewhat important	26.9	27.6	24.2	34.3	30.8	26.1
Not important	7.0	13.2	7.2	9.6	5.6	8.4
Interpersonal						
Very important	33.4	39.1	34.9	32.7	39.3	33.2
Somewhat important	47.8	41.4	47.7	44.4	41.1	48.1
Not important	18.8	19.5	17.4	22.8	19.6	18.8
Social media						
Very important	32.5	37.9	34.7	29.9	35.5	32.8
Somewhat important	31.7	23.0	31.6	27.2	25.7	31.4
Not important	35.8	39.1	33.7	42.9	38.8	35.7
Radio						
Very important	31.6	29.3	33.8	24.7	38.3	29.6
Somewhat important	35.4	27.6	34.5	33.3	31.8	34.8
Not important	33.0	43.1	31.6	42.0	29.9	35.6

somewhat and 24.7% very. Among those with no evacuation plan, the pattern reversed for television, as 10.2% saw television as unimportant, 20.37% somewhat and 69.1% very important. For social media, 33.3% of those without an evacuation plan saw social media as unimportant, as opposed to 27.2% who saw it as somewhat and 29.9% who saw it as very important. Those without an evacuation plan were reporting less reliance on radio and social media, but more reliance on television.

For mitigating one's house, differences were only detected across the importance of radio, $\chi^2(2) = 6.29, p < .05, V = 0.07$. Of those who had not mitigated their home against hurricanes and related threats, 35.6% saw radio as unimportant and 34.8% saw it as somewhat important, as opposed to 29.6% who rated radio as very important. Once again those not preparing, in this case through household mitigation, were less reliant on radio.

Research question four then went on to ask whether those prone to ruminative coping would be reliant on different sources for information. To examine this research question, a series of one-way ANOVA analyses examined the levels of rumination reported across those who rated each of the five sources as not important, somewhat important or very important. The results suggest significant differences for mean rumination tendency within radio, $F(2, 1,149) = 8.50, p < .001, \eta^2 = 0.01$, websites, $F(2, 1,149) = 7.63, p < .001, \eta^2 = 0.01$, conversations with others, $F(2, 1,149) = 7.41, p < .001, \eta^2 = 0.02$ and social media, $F(2, 1,149) = 43.56, p < .001, \eta^2 = 0.07$. Only within television did differences fail to emerge. Those

who rated radio, websites, interpersonal conversations and social media as "very important" consistently indicated higher levels of ruminative tendency (see Table 5).

The final research question sought to examine whether ruminative tendencies would impact preparation behaviour. To explore this research question, a series of logistic regression analyses regressed rumination tendency onto the binary outcomes of whether or not the respondent had an emergency kit, whether or not they had an evacuation plan in place, and whether or not their home was mitigated ahead of time. The results indicate that rumination was not related to any of these three outcomes. Significant models were not detected for emergency kits, evacuation plans or household mitigation.

TABLE 5 Rumination tendency by source importance

	Not important	Somewhat important	Very important	<i>p</i>
Radio	1.91 (0.77)	2.00 (0.74)	2.15 (0.83)	.001
Web	1.75 (0.72)	1.97 (0.71)	2.07 (0.81)	.001
Interpersonal	1.89 (0.76)	1.96 (0.73)	2.17 (0.84)	.001
Social media	1.76 (0.68)	2.08 (0.74)	2.25 (0.84)	.001
TV	2.03 (0.76)	2.06 (0.75)	2.01 (0.80)	n.s.

Note: Rumination measured on 4-point scale. Means reported with standard deviations in parentheses.

4 | DISCUSSION

This research study, drawing from previous work (Gilbert et al., 2019; Spence et al., 2010) investigates how perceptions of source importance, preparation behaviours, socioeconomic status and rumination tendencies were related in the aftermath of Hurricane Dorian. Results indicate that media and source preferences continue to exist, and that rumination tendencies were related to all sources of information, with the exception of television. Perceived importance of media sources was also shown to be related to having an emergency kit, a concrete evacuation plan and home mitigation. Socioeconomic status, while not a predictor of likelihood to have an emergency kit or concrete evacuation plan, was significantly related to home mitigation behaviour, such that those at the bottom (below \$70,000) and top (above \$100,000) of the economic strata were less likely to have mitigated. Finally, rumination tendencies were not related to the presence of an emergency kit, a concrete evacuation plan or mitigation.

Overall, the results of this study support the continued investigation of source preferences. Despite the continued daily reliance on social media for news and information, the data suggest that television remains the most important source of information during a hurricane. Most participants were both first alerted to Hurricane Dorian through television and found television to be very important as an overall information source. The role of television in environmental disasters, particularly those storms that have the potential to impact very localized areas, is well established in the extant literature (Gilbert et al., 2019; Demuth et al., 2011; Hutter et al., 2020; Lazo et al., 2009).

The second most important information source for ongoing information during Hurricane Dorian was found to be websites. Previous work has identified sex differences in how useful males and females found Internet information to be during crises, suggesting that women may find social media to be a more attractive resource for information (Gilbert et al., 2019; Spence et al., 2010; Spence et al., 2006); however, the current data suggest that the Internet plays an important role in providing information for all respondents. While the current data did not examine specific websites, past research during coastal storms has indicated that those affected may be especially reliant on websites associated with the National Hurricane Center and National Weather Service (Sherman-Morris et al., 2020).

Both radio and interpersonal communication were rated as very important for gathering information during the crisis by a third of the participants, suggesting that while a majority of participants did not find these sources critical, there remains a nonsignificant portion of the population focussed on these sources. The limited role of social media during environmental disasters continues to be of interest. As suggested by previous work (Gilbert et al., 2019), it may be that the local nature of hurricanes or wildfires mandates individuals to rely on information sources that are inherently local—local television or local media websites. Residents may feel that there is simply not enough time to narrow down social media posts to their community,

neighbourhood or even street. Whether social media will play a larger role in the future as social network sites such as Nextdoor become more widely adopted, will be important to track.

Perhaps, due to the routine nature of hurricanes for those that live in the states impacted by Hurricane Dorian, results indicated that 89% of participants had an emergency kit prepared and 72% had a specific evacuation plan. However, only 18.6% of participants indicated that they had mitigated their homes. Socioeconomic status here was shown to play an important role. Those making less than \$70,000 a year were significantly less likely to have mitigated their homes. This may also be related to whether individuals rented or owned their place of residency. Regardless, the socioeconomic factor is important to consider in the lead-up to next year's hurricane season. It is also important to understand the extent to which people are unable to pay for mitigation practices (i.e. boarding up windows, cutting down dead trees or tree limbs) or are unaware of mitigation behaviours (i.e. lower retractable awnings). Local and community officials may need to focus both on informing residents of best practices and providing low-cost mitigation assistance. Also, of note is the finding that those making more than \$100,000 a year were also less likely to have mitigated their homes. While these individuals may feel that mitigation is less important because of their ability to cover larger expenses or afford insurance, hurricane damage can be caused by flying debris from any individual's home. A community of mitigated homes is safer than one where only some homes are prepared for hurricane season.

Socioeconomic status was not found to be a significant predictor of whether certain types of information would be of more interest than others. Regardless of socioeconomic status, individuals were interested in information related to evacuation efforts, the larger impact of the storm, and government response, among others. This may be reflective of the fact that during an environmental disaster, any information is better than no information.

This study also investigated, for the first time, whether perceived importance of mediated information sources (as opposed to interpersonal interactions) impacted preparation behaviours. The results did suggest that differences existed for having an emergency kit, having an evacuation plan and mitigating their home, based on information source preferences *but*, in total, these differences appear to be more reflective of underlying media dependencies. For example, for those who did not have emergency kits, most participants noted that they perceived the radio as unimportant; this finding was the same for participants who lacked an evacuation plan and had not mitigated their home. As noted previously, most participants indicated that they did not find the radio to be a very important source for information during Hurricane Dorian. Similarly, for television, for those without an emergency kit or an evacuation plan, the majority indicated that they perceived television as very important; there were no differences found for home preparation behaviour. Television was indicated as very important for both initially finding out about Hurricane Dorian and for continuing to stay informed.

Finally, results suggested that the tendency to ruminate was related to information source preferences. Individuals who found

radio, websites, conversations with others and social media very important, were significantly more likely to ruminate than those individuals who found those same sources not important or somewhat important. There were no rumination differences for television information reliance. As this is the first study to investigate the connection between crisis information preferences and rumination tendencies, the conclusions are preliminary. It appears that the more reliant an individual is on a medium, the more likely they are to ruminate. Rather than this indicating that individuals who are more likely to ruminate gravitate towards a certain source, it might suggest that those who are more likely to ruminate find any source of information important. Individuals who indicate that all sources are very important may be connected by their underlying drive for continuous information. Future inquiry should examine potential links between rumination, information seeking and motivation to take action.

5 | LIMITATIONS AND FUTURE DIRECTIONS

The results of this study are limited by the very nature of the crisis itself—Hurricane Dorian was a unique event, involving specific circumstances related to geography, affected populations and destructive potential. While responses to future hurricanes may utilize the findings of this study, caution should be used in generalizing given that all storms are singular events. The results of this study are also correlational in nature—variables presented as predictor and outcome variables may not be casually connected. As with most crisis and risk research, the amount of time between participants living through Hurricane Dorian and data collection may have resulted in individuals misremembering information and, therefore, impacting the validity of the study.

6 | CONCLUSION

During a crisis event, information is a critical resource. Regardless of the type of crisis event, up to date and accurate information can be the difference between life and death. The results of this study, focussed on Hurricane Dorian, found that information source preferences continue to exist and that these media preferences may be related to rumination tendencies and preventative behaviours. Importantly, television, often regarded as a form of legacy media, played a significant role in how those affected were initially alerted to a storm as well as a favoured source for ongoing information. The localized nature of hurricanes seems to drive individuals to information sources of similar focus.

This study also suggested that while most residents had an emergency kit prepared and a specific evacuation plan, home mitigation rates were below 20%. While socioeconomic status partially explained this low number, ensuring individuals have low-cost opportunities to take steps to board up their windows or to bring in

outside furniture may help protect potentially affected communities—a mitigated neighbourhood is a safer neighbourhood during a hurricane.

Finally, results suggest that information preferences are related, in some way, to rumination tendencies. Access to information is a useful tool for any impacted individual, but understanding the potential for rumination may help keep residents healthy after the immediate danger of a hurricane has passed. No connection was found between rumination tendencies and preparation behaviours signifying that while rumination may play a role in understanding information-seeking behaviour during a hurricane, rumination may or may not be tied to preparation and action, and this process should be examined further in future research.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available through Open Science Framework at <https://osf.io/wuaer>.

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