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Sharing Emergency Alerts on a College Campus: How Gender and Technology Matter

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ABSTRACT

As universities strive to make campuses safer in the face of disasters, both natural and those of human origin, how students respond to emergency alerts ultimately defines the success of these efforts. This study investigates how gender differences impact college students' responses to tornado (natural) and active shooter (human-made) emergency scenarios. Specifically, we examine perception of crisis severity, likelihood, and motivations to engage in secondary crisis communication, the most likely recipients of shared emergency alerts, and how participants respond to these alerts. Findings reveal that women are likely to take emergency alerts more seriously than men and also engage in secondary crisis communication. Whereas males tend to share emergency alerts primarily to reassure others, women inform others so that they too may protect themselves. The implications of these findings are discussed with regard to social role theory and optimism bias.

KEYWORDS

Crisis communication; emergency alerts; gender differences; secondary crisis communication; social media

Unfortunately, disasters and crisis situations, both natural and of human origin, increasingly occur on college campuses with alarming frequency. Whether they involve extreme weather, wildfires, toxic substance spillage, random acts of violence, or perhaps the most terrifying active shooter incidents, effective crisis communication is fast becoming an integral component of university administration emergency plans. To meet the challenges posed by these unforeseen events, many universities have advance warning alert systems to notify students, staff, and faculty about incipient crises and natural disasters. For instance, many schools use text messages, automated calls, and social media to alert the campus community about potential threats. Given the paramount significance of student safety and effective crisis communication on college campuses, it is indeed surprising that so little research has examined how students respond to these messages. A range of characteristics likely impact these responses, including past experiences, socioeconomic, demographic, and psychographic differences.

One such factor is the perception of risk, and previous studies on natural disasters (Donner, Rodriquez, & Diaz, 2012; Klockow, Peppler, & McPherson, 2014; Lovekamp & McMahon, 2011; Sherman-Morris, 2010) have confirmed that most people operate under an optimism bias, that is, the tendency to believe that one is less likely to experience negative events than one's peers. This can result in fatal consequences, as in the case of people who wait to see impending signs or sounds of a tornado before taking protective measures (Donner et al., 2012). Following the deadly April, 2011, tornadoes in Alabama and Mississippi, Klockow et al. (2014) conducted 71 in-depth interviews with local residents, and uncovered evidence of "weather myths" or "folk sciences" that reflected an optimism bias. For example, most residents believed that the tornado would occur somewhere else and not affect them. When paired with local myths about tornadoes not generally occurring in

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populated areas, this bias led to complacent behavior among local residents. Of relevance to the current investigation, some research suggests that the optimism bias has also been observed on college campuses.

Another factor that might influence how students respond in a crisis is gender. Prior research (e.g., McIntyre, Spence, & Lachlan, 2011; Spence, Westerman, & Lachlan, 2009) has indicated that women and men may differ in their informational needs and emotional reactions to crisis and emergency messages. Women generally tend to be more compassionate than men (Garcia-Garcia, Dominguez-Borras, SanMiguel, & Escera, 2008; Harenski, Antonenko, Shane, & Kiehl, 2008; Javela, Mercadillo, & Ramirez, 2008; Mercadillo, Diaz, Pasaye, & Barrios, 2011) and are also more likely to look to the welfare of others (Bjorklund, 2003). Mercadillo et al. (2011) found that compassion mechanisms evolved differentially in women, possibly in connection with the cultivation of desirable gender-normative social skills, including maternal preverbal communication and emotional responses to helpless children (Campbell, 2008; Lenzi et al., 2009). In addition, varying sociocultural expectations also influence female reactions and moral judgment in crisis situations. For instance, women are typically taught to be more emotionally expressive than men, who are generally encouraged to suppress or control overtly emotional displays (Saldívar-Hernández, Ramos-Lira, & Romero, 2008; Tilley, 2004). These characteristics have encouraged a pattern of perceiving women as the "keys" to prevention, since they tend to be proactive responders in natural disasters and other crisis situations (Enarson, 2000).

The purpose of this study is to examine differences in how men and women respond to emergency alerts on college campuses. In particular, we focus on gender differences in perceptions of crisis severity since risk perception is a vital precursor to behavioral motivation and action and secondary crisis communication patterns, including immediate responses to a crisis alert. To our knowledge, there has been little investigation into specific differences between how men and women engage in secondary crisis communication. To clarify, the National Research Council of the National Academies (National Academies Press, 2011) outlined six research gaps in how publics respond to crisis warnings. One of these included message-dissemination and information-seeking behaviors, specifically, how do people respond to alerts? For instance, do they call family or friends, or search for additional information online? This is important because secondary crisis communication, that is, the willingness to forward or share an alert message with another person (Austin, Fisher Liu, & Jin, 2012) can have a significant impact on minimizing injury and/or fatalities, as well as saving lives.

Perceptions of Risk in Crisis Situations

Weick (1995) defines crises as "low probability/high consequence events that threaten the most fundamental of goals of the organization. Because of their low probability, these events defy interpretations and impose severe demands on sensemaking" (p. 305). By their very nature, crisis situations generate unpredictability, uncertainty, fear, and stress among victims. These extreme emotional reactions in turn likely impact sensemaking and communicative behaviors in important ways.

Mileti and Sorensen (1990) propose a six-stage process that describes protective actions following a warning:

(a) the warning is received;
(b) the warning content is understood;
(c) the warning is evaluated for credibility;
(d) the warning is personalized to oneself;
(e) the warning is confirmed with others; and
(f) the recipient decides how to respond and takes action.

According to the authors, all stages are necessary before a recommended action can occur. However, both sender (including the message itself and the channel used) and receiver (psychological, social, environmental) factors can influence the warning response process.

It is important to examine risk perception in crisis situations because perceptions of severity and an individual's apparent vulnerability to the risk necessarily impact behavioral motivations and subsequent responses to the crisis. Such actions can mean the difference between life and death. For example, Sherman-Morris (2010) found that university students' inclination to seek shelter in response to a tornado warning was influenced by their perception of whether or not the tornado was a serious threat, as well as whether or not they believed that there was a safe shelter on campus. Fear might also motivate protective responses. According to the appraisal-tendency framework (Han, Lerner, & Keltner, 2007), fear is associated with the tendency to perceive uncertainty or situational control in new situations. This means that fearful people are likely to perceive greater risks in new situations. Whereas little is known about how gender influences risk perception and susceptibility, a number of studies have documented gender differences in the propensity to take risks. Following a campus shooting in 2008, McIntyre et al.'s (2011) work revealed that women expressed greater anxiety and desire for information. Female students reported a higher degree of fear, confusion, and panic than did male students. Other research has suggested that women and men report different emotional reactions to disaster news (Spence et al., 2009). Spence et al. (2009) found that after viewing a news story about Hurricane Katrina's devastation to the Gulf Coast, women reported more sadness than men. Other studies (Seeger, Venette, Ulmer, & Sellnow, 2002; Spence, Lachlan, & Burke, 2008) also report women being more concerned with relational and task information, as well as issues of safety.

Based on these findings, we advance the following hypothesis:

H1: Women will likely perceive emergency alerts more seriously than men.

Secondary Crisis Communication as an Initial Reaction

Several studies (e.g., McGee & Gow, 2012; Sherman-Morris, 2010) have examined how undergraduate students living on campus might respond to an emergency alert warning sent by the university. Following a narrow tornado miss in Mississippi, Sherman-Morris (2010) found that despite being urged to seek nearby shelter immediately, almost a quarter of the students reported trying to leave campus instead. Similarly, another study conducted soon after a tornado struck Union University (Lovekamp & McMahon, 2011) found that almost half of the students went outside to look at the sky once they were alerted about the approaching tornado. These students evidently perceived low personal risk in both instances.

McGee and Gow (2012) conducted focus groups to examine how undergraduate students living on campus might respond to an emergency alert warning sent by the university to their cellphone. Participants revealed that they were more likely to confirm warning messages with fellow students, friends, faculty, and staff than with their own family members.

Gender differences have also been observed in how men and women communicate about disasters and their outcomes. Morioka (2015) examined gender differences in the perception of radiation risk in the aftermath of the 2011 Fukushima nuclear disaster in Japan. Whereas women openly expressed concerns about the potential consequences, men appeared to be uninterested and less inclined to discuss the negative health effects of radiation exposure. These differences may be rooted in gendered cultural differences stemming from socialization.

In the absence of prior research that has specifically examined gender differences in secondary crisis communication, and based on the previous studies confirming that women tend to exhibit protective and compassionate behaviors in response to crises, we hypothesize:

H2: Compared to men, women will be more likely to share emergency alerts with others.

Finally, little if any research has examined who exactly college students are likely to contact in the event of a campus crisis situation. Sheldon (2017) found that regardless of whether the disaster was natural or of human origin (e.g., a mass shooting), the first person that a student was likely to notify was someone sitting nearby. In an experiment that analyzed media use during crises, Austin et al. (2012) found that face-to-face communication was the most important form of crisis communication. It bears mentioning that face-to-face is also the richest communication medium (Daft & Lengel, 1986), making it most preferable in times of uncertainty (Trevino, Daft, & Lengel, 1990). According to Daft and Lengel (1986), media richness encompasses a range of characteristics including:

(a) the ability to handle multiple information cues simultaneously;
(b) ability to facilitate rapid feedback;
(c) ability to establish a personal focus; and
(d) ability to use natural language.

While face-to-face communication is generally considered to be the richest medium, Walther (2011) points out that computer-mediated communication increasingly provides these advantages as well. Public officials have used social networking services, including Facebook, to warn citizens during natural disasters, especially those at immediate or maximum risk (Sutton et al., 2014).

This study aims to determine how gender differences influence who a student is most likely to contact in the event of a crisis situation, as well as identify themes in the content of this communication. We are particularly interested in the use of technological platforms, specifically social media messages and text messages to convey emergency alerts in natural disaster versus active shooter crisis situations. Given the lapse in scholarship that systematically interrogates this topic, we pose the following research question:

RQ1: What gender differences, if any, are apparent in secondary crisis communication, in particular, the first person contacted immediately after receiving an emergency alert?

In line with our exploration of how students share crisis information, we are additionally interested in immediate cognitions about a crisis, as well as motivations to engage in secondary crisis communication. We therefore include three research questions:

RQ2: What gender-based themes characterize initial responses to social media versus text message tornado emergency alerts?

RQ3: What gender-based themes characterize initial responses to social media versus text message active shooter emergency alerts?

RQ4: What specific motivations do female versus male participants report with regard to engaging in secondary crisis communication?

Methods

Participants

Two hundred and twenty-seven students (106 men and 121 women) participated in a 2 by 2 within-subject experiment. Participants ranged in age from 18 to 55 (mean age = 23.6 years; *SD* = 5.61), and

were recruited through various classes offered at a southern public university. Students did not receive any incentives or compensation.

In terms of ethnicity, 57.7% of participants identified as Caucasian, 18.1% as African Americans, 4% as Asian Americans, 0.4% as Hispanics, 1.3% as Native American, and 15.9% as none of these categories.

Stimuli

Participants read four different versions of two hypothetical (one natural and the other of human origin) crisis situations on a college campus: a social media alert about an active shooter, a text message alert about an active shooter, a social media tornado alert, and a text message tornado alert). Scenarios were presented as screenshots that resembled actual tornado and shooting emergency warnings issued by the university. Following each crisis scenario, participants completed a questionnaire logging their initial reaction to the alert, and measuring their perception of the severity of the event, and their secondary crisis communication. Each participant was exposed to all four crisis alerts, although the viewing order was randomized to control for an order effect.

Measures

The perception of the severity of an alert message was measured by asking participants "How serious would you consider this message to be?" Responses ranged from "extremely serious" (5) to "not at all serious" (1). Table 1 provides the means and standard deviations across all four scenarios.

To measure *secondary crisis communication*, participants were asked how likely they would be to share the message with:

(a) anyone sitting near them,
(b) parents, and
(c) friends using a five-point scale, ranging from "very unlikely" (1) to "very likely" (5).

The overall likelihood to share the message was calculated by averaging participant responses to each scenario (see Table 2).

In addition, participants indicated the *first people* with whom they would likely share the message, as well as their preferred medium to share the message with their immediate family (options included a phone call, text message, Facebook post, or e-mail). Considering that the hypothetical scenarios were premised on the fact that students would receive the alert on campus, face-to-face communication was not included as an option.

Two open-ended items were included within each scenario: first, to examine initial responses to the crisis alert ("What is your first thought?" appeared directly below the simulated alert message); and second, to ascertain motivations for engaging in secondary crisis communication ("Explain your likelihood to share the received information").

Table 1. Gender Differences in the Perceived Seriousness of a Crisis Alert (ANOVA).

Alert Type	Gender	*M*	*SD*	*F*	*p*	Partial η^2
Tornado	Male	3.78	1.00	.69	.41	.00
Text Message	Female	3.68	.91			
Shooting	Male	4.70	.82	3.33	.07	.02
Text Message	Female	4.85	.40			
Tornado	Male	3.24	1.58	.17	.68	.00
Social Media	Female	3.32	1.24			
Shooting	Male	3.91	1.72	3.80	.05	.02
Social Media	Female	4.31	1.28			

Table 2. Gender Differences in the Likelihood to Share the Message with Other People (ANOVA).

Alert Type	Gender	*M*	*SD*	*F* (ANOVA)	*p*	Partial η^2
Tornado	Male	**3.68**	1.16	3.81	**.05**	.02
Text Message	Female	**3.94**	.96			
Shooting	Male	**4.27**	1.01	18.26	**.00**	.07
Text Message	Female	**4.74**	.62			
Tornado	Male	**3.19**	1.67	5.84	**.03**	.03
Social Media	Female	**3.70**	1.41			
Shooting	Male	3.68	1.62	16.35	.00	.07
Social Media	Female	4.42	1.09			

Statistical and Thematic Analysis

Univariate analysis of variance (ANOVA) and t-tests were used to test for gender differences in the perceived severity of a crisis situation (H1) and likelihood to engage in secondary crisis communication (H2). Cross-tabulation and a chi-square test were used to determine if gender differences influenced the person with whom an emergency alert was first shared (RQ1).

The open-ended responses (RQ2-RQ4) were analyzed using WordStat (Ver. 6.1.10), a content analysis software package. Every participant responded to at least one of the four crisis scenario prompts, with the majority providing responses to each alert and only a handful (less than 15%) leaving some response fields blank. On average, responses ranged between eight to ten words in length. An inductive analysis for emergent themes within these responses yielded a list of words that appeared five times or more (an acceptable indication of emphasis and prominence within a textual dataset of this size) in female versus male participants' responses to each crisis scenario. For instance, the word "shelter" registered the highest frequencies across initial responses to both the text message (male = 6.1%[1], female = 2.6%) and social media (male = 8.5%, female = 4.5%) tornado crisis scenarios. Correspondingly, the word "lock" logged highest frequencies across initial responses to the active shooter text message alert (male = 4.4%, female = 4.2%) only, but not the social media messages. The identification of these high-frequency words in turn allowed us to closely examine them in context within female versus male initial responses to each crisis situation. Following this, cluster extraction was performed to yield commonly occurring phrases within each scenario based on gender. For example, the most common initial reaction to the tornado text alert among male respondents was "Am I in a good/safe location?" followed by "Get to shelter." The results are now discussed.

Results

H1 predicted that women would perceive emergency alerts more seriously than men. Results of the ANOVA revealed that this hypothesis was partially supported (Table 1). Only in the case of the active shooter alert that was broadcast through social media did women perceive the alert to be more serious than men. As evident in Table 1, there were no gender differences in the perceived severity of the tornado alerts.

H2 predicted that women would be more likely to share emergency alerts with others, compared to men. This hypothesis was supported, as shown in Table 2. This was true for all four crisis scenarios. Furthermore, Table 3 displays gender differences in the inclination to share or forward an emergency alert with a range of individuals based on varying degrees of familiarity and intimacy. In most cases, women are more likely to share emergency alerts with parents and friends, compared to men.

RQ1 examined gender differences, if any, in the first person that students were likely to contact immediately after receiving an emergency alert. Overall, men and women were both likely to first notify someone in close physical proximity. Chi-square test results (Table 4) revealed gender differences in only two emergency alert scenarios: the tornado text message alert and the active shooter text message alert. In both these instances, women reported that they would be more likely

Table 3. Gender Differences in the Likelihood to Share the Message with Different Individuals (t-test).

Alert Type	Person	Gender	*M*	*SD*	*t*	*p*
Tornado Text Message	Anyone	Male	4.15	1.18	−.27	.79
		Female	4.19	1.12		
	Parents	Male	**3.35**	1.50	−2.36	**.02**
		Female	**3.79**	1.33		
	Friends	Male	3.55	1.42	−1.65	.10
		Female	3.84	1.26		
Shooting Text Message	Anyone	Male	4.80	.76	−1.57	.12
		Female	4.93	.50		
	Parents	Male	**3.80**	1.55	−4.22	**.00**
		Female	**4.54**	1.07		
	Friends	Male	**4.22**	1.29	−3.91	**.00**
		Female	**4.74**	.69		
Tornado Social Media	Anyone	Male	3.59	1.83	−1.72	.09
		Female	3.98	1.51		
	Parents	Male	**2.92**	1.81	−2.53	**.01**
		Female	**3.50**	1.60		
	Friends	Male	**3.07**	1.81	−2.46	**.02**
		Female	**3.63**	1.55		
Shooting Social Media	Anyone	Male	**4.18**	1.71	−2.54	**.01**
		Female	**4.67**	1.10		
	Parents	Male	**3.18**	1.80	−4.05	**.00**
		Female	**4.09**	1.51		
	Friends	Male	3.67	1.80	−4.20	.00
		Female	4.51	1.09		

Table 4. Gender Differences in First Person Being Notified About the Crisis (%).

		First Person Notified			
Alert Type	Gender	Parents	Friends	Someone Nearby	χ^2
Tornado Text Message	Male	14.3	18.4	67.3	5.82*
	Female	26.9	20.4	52.8	
Shooting Text Message	Male	12.6	14.6	72.8	4.77
	Female	24.1	12.1	63.8	
Tornado Social Media	Male	19.5	22	58.5	2.85
	Female	29.4	15.7	54.9	
Shooting Social Media	Male	6.9	23	70.1	7.32*
	Female	16	11.3	72.6	

Note: $p < .01$*, $p < .05$**

to notify their parents first. Men, however, were still more likely to notify someone sitting nearby, or a friend.

RQ2 focused on gender-based differences among initial responses to the tornado (i.e., natural disaster) scenario. The word "shelter" registered the highest frequency among responses to both the text message (male = 6.1%, female = 2.6%) and social media (male = 8.5%, female = 4.5%) tornado emergency alerts. In response to the text message alert, other high-frequency words included "check" (male = 1.8%, female = 1.6%), "weather" (male = 1.6% and female = 1.6%), and "tornado" (male = 1.2%, female = 1.3%). Responses to the Facebook alert were similar: "check" (male = 2.4%, female = 1.5%), "safe" (male = 1.7% and female = 1.3%), and "weather" (male = 1.7%, female = 1.3%).

A closer examination of these terms in context revealed that although the first priority was to get to a safe location (e.g., basement or a room with no windows), there was considerable skepticism about the alert. Several individuals claimed that they would turn to another source (e.g., weather app or website) to verify the information and determine the exact location of the tornado. Importantly, at least three women erroneously assumed that a tornado warning was "nothing to worry about" and "nothing serious." Among male respondents, the most common initial reaction to the tornado text alert was "Am I in a good/safe location?" followed by "Get to shelter/safety." And the most common response to the social media tornado

alert was "Get to a safe place" and "Find shelter." These statements indicate an immediate preoccupation with personal safety. However, among female participants, the most common initial response to the tornado text alert was "Where should I go?" followed by "I should go home." And the most common responses to the social media tornado alert were "Where exactly is the tornado" and "Get to a safe place." In general, these responses reveal confusion regarding appropriate and recommended safety behaviors for tornadoes, as well as insufficient knowledge about designated emergency shelters on campus. Therefore, while male participants were mostly preoccupied with assessing and securing their personal safety, female participants seemed less certain of where exactly to seek safe shelter during this natural disaster.

RQ3 focused on gender-based differences in the initial response to the active shooter (i.e., human-origin crisis) scenario. The word "lock" registered the highest frequency within initial responses to the text message (male = 4.4%, female = 4.2%), followed by "door" (male = 3.5%, female = 2.8%). Among males, other high-frequency words included "campus" (1.7%), "room" (1.5%), and "safe" (1.5%). Among females, corresponding high-frequency words were "hide" (1.6%), "room" (1.6%), and "doors" (1.5%). Responses to the Facebook alert about this crisis showed additional gender differences. The same high-frequency keywords were apparent among males "campus" (1.6%), "room" (1.6%), "safe" (1.6%), and "lock" (1.4%). However, female responses emphasized "hide" (1.5%), "lock" (1.4%), "friends" (1.1%) and "campus" (1.0%).

Examining these keywords in context, male participants implied that they were most likely to remain where they were and barricade the room. However, at least six individuals claimed that they would "run" or "try to leave campus." Interestingly, although female participants were also likely to lock themselves in a room to stay safe, several women stated that they would immediately text their roommates and friends to share the news and make sure that they too were safe.

Among male respondents, the most common initial reaction to the active shooter text alert was "Get to a safe place" followed by "Run." And the most common response to the social media shooter alert was "Oh, shit!" followed by "Get to a safe place." Among female participants, the most common initial response to the shooter text alert was "Go to the nearest room and lock the door" followed by "Where exactly is the shooter?" And the most common responses to the social media shooter alert were "To go and hide" and "Oh crap." Therefore, both male and female responses to the active shooter scenario reveal an emphasis on finding a safe location and locking the door, although some males displayed an inclination to flee the scene.

Finally, RQ4 examined gender differences in specific motivations to share crisis alerts, i.e., to engage in secondary crisis communication. Cluster extraction revealed no predominant motivations among male participants to engage in secondary crisis communication about the tornado alert. Most participants claimed that the frequency of tornado alerts on their campus made it difficult to take them seriously, and so they did not want to alarm others about yet another tornado warning. By contrast, women claimed that they would forward the information to others to "let them know for their safety." An interesting pattern emerged, as males stated that they were more likely to forward or inform others about an active shooter alert so that they "don't worry and know I am safe." A secondary motivation was to "let them know to keep a look out." Female participants, however, claimed that they would forward an alert because others "needed to know."

These results therefore indicate that while male participants primarily sought to reassure others or gauge the severity of an emergency alert before forwarding it or notifying others, female participants were more immediately concerned with i ensuring that others had all necessary details to keep themselves safe, as well.

Discussion

The purpose of this research was to probe gender differences in reactions to emergency alerts, both natural and human-made crisis situations, on college campuses, as well as the inclination to engage in secondary crisis communication by forwarding or sharing an emergency alert. We examined students' perceptions of crisis severity, their immediate responses to these alerts, and also their

intention to share the alert with parents and friends. First, the results indicate gender differences in both the perceived seriousness of a warning message, as well as the intention to forward this alert. In terms of perceived seriousness (H1), gender differences emerged in both emergency alert formats for the active shooter scenarios, with women rating them as more serious than men. This confirms the evolutionary instinct propounded by prior research claiming that women instinctively tend to take fewer risks than men to protect their loved ones (Harris & Jenkins, 2006). Women also tend to perceive greater risks in uncertain situations, whereas men are more inclined to take risks because they have access to increased social power and economic resources for crisis recovery (Enarson, 2000). Considering the frequency with which tornadoes occur in the vicinity of this particular campus, the tornado threat was not considered to be serious by men and women alike. This complacent behavior reflects the "optimism bias."

However, gender differences in the perception of crisis severity in the shooting scenarios were correlated with the likelihood to share this alert with other individuals (H2). Women reported being more likely to forward both the tornado and shooting alerts to others. This finding corroborates research that suggests that women tend to be more compassionate than men, especially with regard to suffering (Garcia-Garcia et al., 2008; Harenski et al., 2008; Javela et al., 2008; Mercadillo et al., 2011), and possess a nurturing instinct (Bjorklund, 2003). Socialization patterns typically encourage women to be more expressive and disclose more information (Saldívar-Hernández et al., 2008; Tilley, 2004), so it is not surprising that female participants stated that they would forward these emergency alerts.

Gender differences were also observed in the recipient of secondary crisis communication. Women were significantly more likely to share warning messages with parents, regardless of the crisis scenario or communication medium (social media versus text message). They were also more likely to forward the crisis alert to friends in both scenarios, except for the tornado text message alert. When asked about individual motivations to engage in secondary crisis communication, women indicated a social obligation to ensure that others knew about the emergency so that they could in turn protect themselves. Social role theory may account for these behaviors (Eagly & Crowley, 1986) since men and women are likely to behave differently based on socialization patterns and prevailing gender norms. Men are typically expected to be dominant, independent, and self-confident, whereas a woman's communal role encourages the display of nurturing, helpful, and kind behaviors (Eagly, Wood, & Diekman, 2000). There is clear evidence of this communal imperative in female responses to both crisis situations, including making sure that roommates and friends were safe and informed. This may also explain why some female participants responded to the tornado text alert by stating that they should go home, possibly stemming from a desire to be near loved ones. For male participants, however, secondary crisis communication served primarily to reassure others that they were safe, which in turn reveals an individualist emphasis on personal safety rather than disseminating crisis information to safeguard others.

This study also confirms the presence of optimism bias, particularly in the case of the tornado alert, among both genders. There was a palpable sense of apathy toward the tornado warning, with many individuals ignoring or unaware of the distinction in severity between a tornado watch versus a tornado warning (the latter being significantly more serious). To a large extent, the frequency of this particular natural disaster in this region may explain the complacency. For instance, the predominant response among men and women alike was to verify the information elsewhere, rather than heed the alert and seek immediate shelter. Of particular concern, female responses to tornado alerts betrayed a lack of knowledge about the exact location of designated tornado shelters, despite the frequency of regional tornado alerts. This is indeed a troubling finding, with serious implications for individual safety. Even more alarming, results indicated risky immediate response behaviors in response to both the tornado (e.g., leaving campus to go home) and active shooter (e.g., running away or trying to attack the shooter) scenarios. For instance, the most common initial reaction to the active shooter text alert among males was "Get to a safe place" followed by "Run." Past scholarship may help explain these puzzling responses.

Byrnes, Miller, and Schafer's (1999) meta-analysis of over 150 studies on gender differences in risk perception concluded that men are more willing to take risks than women. Harris and Jenkins (2006) proffer an explanation for why women take fewer risks than men, citing the evolutionary instinct. Men are more inclined to take risks (e.g., financial, health/safety, ethical, and recreational) in an effort to increase their perceived attractiveness to prospective mates (Buss, 2003). Women, on the other hand, are more attuned to avoid risks in order to protect and keep children and families safe. This instinct may extend beyond gender, and Enarson (2000) argues that women along with other subordinated groups who are generally deprived of social power, physical ability, and economic resources must typically depend on external factors in order to endure and survive disasters and crises. They are thus more likely to obey evacuation orders issued by authorities and heed warnings from friends or relatives in the event of a disaster (West & Orr, 2007). For example, women are more likely to seek shelter in response to a tornado warning than men (Sherman-Morris, 2010). The optimism bias, in tandem with socially cultivated gender norms, can therefore prompt dangerous and life-threatening responses to crisis situations.

In summary, our findings underscore the importance of effective training on campuses to dispel disaster myths, cultivate knowledge and awareness, and promote safety behaviors in emergency situations.

Limitations and Future Research

This study relied on hypothetical scenarios, which are an obvious limitation since participants might react differently during a real crisis. In addition, data collection protocol pose some setbacks since subjects should ideally have been given more time between treatments in order to ensure that prior responses did not influence later responses to each scenario. Additionally, since most participants grew up in the vicinity of the university campus, they are likely accustomed to frequent tornado alerts. It must be acknowledged that tornado alerts must always be taken seriously, since the inherent unpredictability of this particular natural phenomenon makes it especially dangerous to victims. Yet this limitation implies that our results might not be representative of how university students in other regions might respond to tornado alerts. Future research should further explore gender differences to other crisis situations, both natural and human-made. Additional qualitative methodologies such as interviews and focus groups might yield further rich information about gender differences in crisis perception, crisis response, and secondary crisis communication. Additionally, surveys could examine how social and psychological attributes impact crisis response, as pointed out by Mileti and Sorensen's (1990) six-stage model of protective action, specifically the receiver's network (friends and community) and psychological attributes (e.g., cognition and stress).

Cultural anxieties about nuclear brinksmanship increasingly permeate public discourse. A spate of unpredictable natural disasters have also occurred just within the past year, including catastrophic hurricanes in the South, calamitous and unprecedented wildfires in the West, followed by devastating mudslides. A botched emergency alert in January, 2018, about an impending nuclear attack generated mass panic in Hawaii, including on college campuses (Ewan, 2018). Many California colleges were forced to cancel classes right before final exams in December, 2017, as the state was ravaged by wildfires. Yet UCLA students complained about delays in the emergency-alert system notifying them about canceled classes (Adams, 2017). A 30-minute delay between the actual time of a stabbing on the University of Texas-Austin campus and the emergency alert that was broadcast to students spawned a host of rumors and misinformation (Mangan, 2017). These recent incidents demonstrate that campus emergency alerts are integral to everyday safety, as students and college personnel alike increasingly depend on them for minute-by-minute updates in crisis situations. Yet they also indicate how alert broadcasting errors can contribute to a dangerous sense of complacency, skepticism, and irritation. The merit of effective and reliable emergency alert systems, combined with cultivating appropriate emergency response behaviors, on college campuses cannot be understated.

This research confirms that college women tend to take emergency warnings more seriously than do their male counterparts. It is therefore essential that young adults and men in particular be made more aware and educated about the real dangers of both tornadoes and campus shootings. This can be accomplished through traditional media, interpersonal training sessions, and new media formats. For example, visual platforms such as Instagram, Pinterest, and Tumblr might be used to teach students about the seriousness of natural disasters, including what happens when alerts are ignored. Several recent studies (Donner et al., 2012; Klockow et al., 2014; Lovekamp & McMahon, 2011; Sherman-Morris, 2010) have also confirmed the unfortunate outcomes when individuals operating under an optimism bias do not take protective actions until a disaster actually occurs, which is often far too late. Effective audience-centered crisis training can help prevent serious injury and loss of life by addressing complacency and the optimism bias, while enhancing self-efficacy.

Note

1. Percentages reflect the frequency of a given word within all gender-segregated responses to this crisis scenario, for example, among all male responses to the tornado text alert.

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