JEM

Sex differences in informational needs and media dependencies during the 2018 California wildfires

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ABSTRACT

Previous research has suggested that men and women differ in a number of crisis-related behaviors including information-seeking behavior and media dependencies. The 2018 California wildfires provided a context where demographic differences are largely unexplored, as most prior emergency communication research has focused on slower moving events such as hurricanes and storm surges. Participants were identified based on their residence in areas affected by the Camp and Woolsey fires (N = 363). Sex differences were discovered for how people found out about the fires, perceptions of medium utility, and informational needs. Implications for emergency management practitioners are discussed.

Key words: media dependency theory, crisis communication, sex differences, natural disasters

INTRODUCTION

Between November 8, 2018 and November 25, 2018, California's Camp Fire and Woolsey Fire burned more than a quarter million acres of land before being contained.[1] The Camp Fire has been declared the deadliest and most devastating fire in California's history, having killed at least 85 people and destroyed 14,000 residences.[2] In a recent community meeting about Woolsey fire in Los Angeles, residents remained frustrated by various aspects of the fire response despite reassurances from first responders that they had done "the best they could with what they had."[3]

Much of the extant literature on crisis communication has focused on slower-moving events such as hurricanes or storm surges, leaving a gap in the literature. Given the fast-moving and urgent nature of wildfires, previous emergency communication research has suggested that how an individual perceives their risk is complex and subjective.[4-6] Additionally, while not specific to wildfires, data have suggested that there are sex differences in how men and women perceive the usefulness of information coming from certain sources and information seeking behavior.[7]

Unfortunately, when developing emergency response and policy, individual actions are commonly underconsidered or ignored altogether. Typically, greater emphasis is placed on agency response, public officials, or federal level management depending on the scope of the disaster.[8] In the specific context of wildfires, risk has been well investigated and typically falls in the domain of two knowledge areas: pre-event (educating, warning, and preparing) and post-event (recovery and rebuilding). However, there exists a dearth of knowledge concerning what individuals do *during* the event, or in other words, when they choose to remove themselves and/or mitigate against a situation which may be dangerous and life-threatening. The potential impact of sex differences has also been ignored, despite documented evidence in the literature that men and women are likely to experience different preferences in how they obtain

DOI:10.5055/jem.0588

crisis news ahead of events, women may be more likely to seek information related to both affective and survival needs, and that men may channel obtained information into anger responses.[9-11]

In an initial attempt to fill this gap in the literature, the current study will attempt to understand if there are sex differences in how useful men and women found different sources of information, general information seeking behavior, and specific types of information seeking they engaged in during two California wildfires: the Camp Fire and the Woolsey Fire.

CRISIS COMMUNICATION

Disasters are nonroutine events, which require individuals to partake in protective behaviors in order to keep them safe or removed from harm. Individuals, organizations, and agencies learn to adapt and respond on the fly in order to meet the demands of the situation.[12] For example, many individuals learn to improvise in the disaster or crisis to remove themselves from harm, or in some circumstances, even perform relief and rescue behaviors individually.[13-15]

Though often very localized in nature, wildfire risk perceptions do not deviate much from the individual perceptions of other types of risk. Research on risk perception of wildfires suggests a complex and subjective understanding, which can be dominated by individual concerns, individual vulnerability, or the timeframe and chronological considerations one needs to make.[4-6]

In any natural disaster, individuals are tasked with making sense of context in a relatively time-constrained period.[16-18] Individuals gather as much current and factual information as they can, as a sense of reducing anxiety and displaying some level of control over the situation. Unfortunately, wildfires present many localized risks—to the point that one house may burn, while another across the street may be spared. Thus, individuals desire more localized information in wildfire risks than other types of natural disasters, eg, "is my home okay?," and often rely on additional platforms of information (neighbors, backchannels, etc.) to acquire the said information.[8,19,20]

Often-times fast moving threats such as these require a more dynamic and real-time approach to preparation, mitigation, or evacuation, due to the nature of how a wildfire may spread (or how an individual may not have enough warning to take precrisis action). Personal experience with a wildfire has been shown to have mixed effects in predicting risk perceptions,[6,21] and appropriate risk perceptions are necessary for an individual to take action.

Since risk factors alone do not solely predict behavior, other considerations must be investigated to better understand risk behavior around wildfires. One common occurrence is the mitigation of potential wildfire risk through protective actions. In a prefire situation—eg, homeowner lives in fire prone area, but may not be immediately at risk—many homeowners take action to protect their own properties,[5,22,23] which are influenced by a variety of factors such as proximal wildlife, effectiveness, or the efficacy of the actions. Many homeowners see these behaviors as their protective responsibility, while viewing larger organizations, officials, and agencies as the education source and/or responsible for the management of public lands.[21,24,25]

Of course, people are not born with an innate understanding of evacuation strategies, mitigation plans, or general knowledge of fast-moving risks. Media dependency theory[26,27] offers that individual media users will rely on specific sources to make sense of their world, and that these sources will become increasingly influential as they become more reliant upon them. At the level of the individual user, these dependencies are asymmetrical and may be a function not only of preference but also of information availability, message framing, and threat perception.[28] Thus, people are dependent on media, but not all media equally, and may rely on a range of sources across varying circumstances and situations.[27,29] Furthermore, when the environment becomes ambiguous, desire for information from these trusted sources is likely to increase, both for pragmatic purposes and with the aim of reducing uncertainty or as an emotional coping mechanism.[26,30]

It is not surprising then, that given the conditions surrounding crises and disasters, research has indicated that media dependencies intensify during crises, and that media may be an effective tool in

engendering audience responses under these conditions.[31,32] Members of impacted communities can be expected to engage in specific, predictable patterns of information seeking in the face of danger, seeking this information from trusted sources, and continually return to these sources for updated information throughout the duration of the crisis.[29,33] Considering media dependency and the likely need to reduce uncertainty before making rational decisions, most individuals will seek to acquire information from trusted media sources in the time leading up to, during, and immediately following a large-scale disaster.[34]

SEX DIFFERENCES AND CRISIS COMMUNICATION

While not specific to wildfires, research has suggested that men and women differ in terms of a number of crisis-related behaviors that may be applicable to understanding wildfire emergency management. In their work related to the collapse of the I-35W bridge in Minneapolis, MN, Spence et al.[7] offered evidence of notable sex differences in media preferences and subsequent emotional responses. While there were no sex differences in aggregate information seeking behaviors between men and women, women were more likely than men to seek information related to rescue efforts and the status of friends and family. Furthermore, women were found to differ from men in their perceptions related to information from different sources, such that women found the Internet to be more useful in obtaining reassurances from political leaders and found television to be a more useful tool for obtaining information about who was affected by the bridge collapse and rescue efforts and survivors.

In a follow-up study, the same research team examined responses to the 2008 campus shooting at the University of Central Arkansas and found that when compared to men, women engaged in more information-seeking behavior and experienced more stress.[35] It was further proposed that while women may seek out more information in an attempt to alleviate psychological fear and stress, the act of ruminating on the additional information may serve only to increase negative feelings rather than reducing uncertainty. This is consistent with past research, suggesting that socialization into western gender norms, such as an emphasis on emotional regulation and supporting others, may inhibit women more so than men from processing and resolving anxiety.[36-38] Regardless, the findings were consistent with previous research that how men and women experience crises has potential implications for emergency management communications.

More recently, research based on communications following a hypothetical college campus shooting supported sex differences in how much men and women learned from different sources such that men learned less overall than women.[39] Results also suggested that women were more likely to seek out information concerning the shooting event, *and* as a result of that information, they were less likely to form unfavorable opinions of the institution.[39(p99)] Previously identified medium preferences, such as women preferring media other than television, were not supported in this research study.[39] The researchers suggested this may be a result of the overwhelming drive for information canceling out medium bias.[39]

In regard to wildfire communication, previous research studies also suggest that emergency communication practitioners may need to attend to potential sex differences, as there is evidence that men may be less likely to internalize information in the immediate aftermath of a localized crisis.[39] In sum, the extant research suggests sex differences in media preferences, emotional responses, and internalization of actionable information concerning crises and emergencies. Given that the previous research on sex differences has not been applied to fast moving crises, such as wildfires, this study will examine to what extent sex differences apply in the context of the California wildfires. This may prove useful to crisis communication practitioners and emergency management officials aiming to quickly inform at-risk publics of the conditions of a threat, and motivate these publics to action while maintaining calm to the extent possible. Since crisis messages are usually processed in comparison to first alerts,[40] it is imperative that crisis communication practitioners understand who are likely to receive these messages, the extent to which this may vary by time of day or household decision-making tendencies, and the relevance of this

response context to both first alerts and subsequent information.

Taken together, the few findings in the extant literature are inconsistent and suggest that patterns of information seeking and preference may be context specific. While the literature posits that women will seek out more information, and information about tasks related to survival and affective needs in particular, extant data concerning media dependencies relied upon to obtain this information are not consistent. Furthermore, while past studies have explored sex differences in the informational needs and responses of individuals in the vicinity of crises, they have yet to look specifically at those *directly affected by a fast moving, catastrophic event*. To that end, the following hypotheses and research questions are proposed:

H1: Women will report higher levels of information-seeking behavior.

H2: Women will report seeking out greater levels of task information.

RQ1: Did men and women differ in how they were first alerted of the fires?

RQ2: How will males and females differ in perceived usefulness of television for obtaining information about the California wildfires?

RQ3: How will males and females differ in perceived usefulness of radio for obtaining information about the California wildfires?

RQ4: How will males and females differ in perceived usefulness of the Internet for obtaining information about the California wildfires?

RQ5: How will males and females differ in perceived usefulness of social media for obtaining information about the California wildfires?

METHODS

Data were collected using an online survey distributed via the Qualtrics survey creation software by the data collection team, between January 9, 2019 and March 12, 2019. The sample consisted of 363 participants living in areas affected by the Camp and Woolsey Fires. The decision to use this sample was deemed best for this study for geographic reasons. Examination of specific, predetermined areas allowed for the impact of these natural disasters on those directly affected. Participants were compensated monetarily, receiving $2.25 for an appropriately completed survey response. Funding for this study was provided by the College of Liberal Arts and Sciences at the University of Connecticut.

PARTICIPANT ELIGIBILITY

Participants were selected based on their geographic location and were limited to counties directly affected by the fires. A total of 56 different area codes from Butte County, Malibu, Topanga, Thousand Oaks, Agoura Hills, Calabasas, Los Angeles, Ventura County, Simi Valley, Oroville, Paradise, Chico, Durham, and Marysville, CA, were included in this study (specific area codes and their associated counties are listed in Table 1). Participants were excluded from the sample if they reported they were not in one of the specific zip codes, if they reported none, or if they were uncertain of the extent of the damage to their home due to the wildfires. Responses were further excluded if the participant took less than one-third of the median screening time to complete the survey, or there was evidence of straight-lining in the closed-answer or providing gibberish in the open-answer response items. If an answer was deemed to be unacceptable due to poor response quality, it was replaced by a new participant response.

PARTICIPANT PROTECTION

Participant anonymity was established and enforced throughout the entirety of this study and the process of data collection. All identifying information about the participants was removed, and participants were assigned a randomized user response identification label, in order to ensure those collecting

Table 1. Counties examined and associated area codes	
County	**Area code**
Butte County	95969, 95914, 95916, 95917, 95973, 95928, 95926, 95930, 95938, 95941, 95942, 95948, 95954, 95966, 95968, 95974, 95978, 95927
Malibu	90263, 90264, 90265
Topanga	90265, 90290, 91364
Thousand Oaks	91319, 91358, 91360, 91362, 91320, 91359, 91361, 93012, 91377
Agoura Hills	91301, 91376
Calabasas	91302, 91372
Los Angeles	90272, 91304, 91356, 91303, 91367
Ventura County	93065, 91360,
Simi Valley	93063, 93064
Oroville	95965, 95968, 95940
Paradise	95967
Chico	95929, 95976, 95973, 95928
Durham	95958
Marysville	95901

and reviewing the data had no means of connecting respondents with their answers.

PROCEDURE

Participants were given the opportunity to complete the provided survey on their choice of internet-accessible device. Participants were provided a web link and were first directed to an information sheet detailing essential elements of the study. Continuation of the survey was detailed to be considered consent to participate in this study.

If the participant chose to continue, they were then presented with questions asking them to provide basic demographic information. If the participant indicated they were either under 18 years of age or did not reside in the state of California, the survey was terminated, and the participant was thanked for their time. If all criteria were met, the participant was then brought through a series of questions examining damage to their home and the participant's evacuation plan. If these criteria were met, the participant was guided through items examining the information they sought and received regarding the fires.

MEASUREMENT

Instrumentation was largely adapted from the work of Spence et al.[7] and modified for the specific conditions surrounding the Camp and Woolsey fires. Participants were first asked basic demographic information questions regarding their age, sex (male, female, and other), ethnicity (White, Black, American Indian, Asian, Native Hawaiian, and other), the state they reside in, and their zip code. Participants were directed to a multiple-choice question asking how the participant first learned that wildfires might occur. Example responses include "face to face conversations with a friend or coworker," "radio," and "website or e-mail."

To address participant's perception of specific media source importance, participants were directed to a series of five questions, each with three-part multiple-choice responses consisting of "very important," "somewhat important," and "not important." Examples of these items include "How important was TV as an information source about the wildfires" and "How important was social media (Facebook, Twitter, etc.) in getting updates on the wildfires?"

Next, participants were guided to a series of nine questions using a reverse-coded 5-point Likert-type scales ranging from (1) Strongly agree to (5) Strongly disagree, and one open-answer question asking what information they wanted during the duration of the threat posed by the fire (α = .89). Example items 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 wildfires."

Participants were then asked a series of items related to emotional responses to information concerning the fire, for use in another study. Finally, participants were brought to a second series of demographic questions regarding the parish or 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, and 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, and prefer not to answer).

RESULTS

Research question one asked how California residents first learned about the wildfires. Results indicated that 25.1 percent of respondents (n = 91) first learned of the crisis through television, 14.3 percent (n = 52) through a phone call with another person, and 13.8 percent (n = 50) from an official such as a police officer or a firefighter. 18.2 percent (n = 66) of participants selected "other" for how they first learned about the wildfires, and open-ended answers included "I could see flames behind my house on the hillside," "Saw the fire crossing the freeway," and "Smelled smoke in the air," suggesting that in the case of the California wildfires, the physical manifestation of the crisis was intense. Chi-squared analyses also revealed sex differences in how respondents first found out about the fires, χ^2 (9) = 13.11, V = .19. Men (31 percent) were more likely to have found out from television than women (22.4 percent), while women were more likely than men to have found out from a face-to-face conversation (12.7 percent versus 9.5 percent), a phone call (15.1 percent versus 12.9 percent), or an official (15.5 percent versus 10.3 percent). In sum, women were more likely than men to learn through some kind of interpersonal interaction, while men were more likely to first learn about the fires through television.

Hypothesis one proposed that women would report higher levels of information-seeking behavior. This hypothesis was tested by running an independent samples t-test comparing men (n = 116) and women (n = 245) and their respective scores on the composite variable of what type of information individuals would want if the wildfire caused widespread damage (α = .89). Results indicated that there was a significant difference in overall information-seeking behavior between men (M = 1.76, SD = .72) and women (M = 1.54, SD = .60), such that women were more likely to seek out information; this variable was measured on a reverse-coded 5-point Likert-type scale from (1) Strongly agree to (5) Strongly disagree, t(359) = 3.08, p < .01.

Relatedly, hypothesis two proposed that women would seek out greater levels of task information. As the results above indicate, while men and women did differ overall in their information-seeking behavior, there were types of information that men and women did not differ on wanting. Follow-up independent samples' t-tests revealed that of the nine questions participants were asked about the types of information they wanted, men and women significantly differed on wanting information about the scope of the damage, t(359) = 2.51, p < .02, information about food and water distribution, t(359) = 2.65, p < .01, information about evacuation, t(359) = 2.81, p < .01, information about rescue operations, t(359) = 2.28, p < .03, the larger impact of the fires, t(359) = 1.99, p < .05, and information about who might be affected, t(359) = 3.25, p < .01, such that women indicated they wanted more information than men. Men and women did not significantly differ in their desire for information about the government's response, information about shelters, or information about friends and family. The second hypothesis is partially supported, as women expressed a stronger desire for information related to efficacious behaviors such as evacuation, rescue, and supplies, as well as affective needs like those affected and the larger impact of the fires.

Research questions two through five asked if men and women would differ in their perceptions of the usefulness of varying media for obtaining information about the California wildfires. An independent samples' t-test revealed that men (M = 1.58, SD = .78) and women (M = 1.35, SD = .67) did significantly differ in how useful they perceived the Internet to be as a source of information related to the wildfires, t(359) = 2.87, p < .01, as women indicated that they perceived the Internet as more useful than men. An independent samples' t-test revealed that men (M = 1.40, SD = .71) and women (M = 1.51, SD = .73) did not differ in how useful they perceived television to be as a source of information related to the wildfires, t(359) = –1.39, p = .17. Perceptions of the usefulness of radio also did not differ between men (M = 1.78, SD = .78) and women (M = 1.89, SD = .85) t(359) = –1.22, p = .22.

Research question five asked if men and women would differ in their perceived usefulness of social media for obtaining information about the California wildfires. An independent samples' t-test revealed that men (M = 1.85, SD = .76) and women (M = 1.54, SD = .75) did significantly differ in how useful they perceived social media to be as a source of information related to the wildfires, $t(359) = 3.64$, $p < .01$. Women indicated that they perceived social media as more useful than men; usefulness was measured on the same three-point Likert-type scale as detailed earlier.

DISCUSSION

What is immediately clear is that despite the pervasiveness of social media, television remains an important source of crisis information for participants. This is consistent with earlier research by Spence et al.,[41] which found that television followed by face-to-face communication with acquaintances were the two most important sources of information about Hurricane Katrina. Additionally, Sutton et al.[8] found that during the 2007 southern California wildfires, the majority of participants found out about the fires through television and mediated communication with others. For emergency management personnel, acknowledging the continued importance of traditional media and "word of mouth" communication may be an important consideration given the appeal of social media.

However, caution is necessary as research has suggested that individuals who only use television as a way to obtain crisis information reported less learning than those who viewed television and read press releases.[39] In other words, reliance on a single medium is not optimal during a crisis event. Crisis managers should emphasize a multimethod approach to informing constituents of danger.

In addition to the aggregate differences in information-seeking behavior, differences seem to continue to exist between men and women, consistent with extant literature. The nuances regarding types of information-seeking are more or less consistent with past research. Generally, women seemed to want information related to immediate next steps: food and water distribution, evacuations, and rescue operations. This is once again consistent with the notion that women may be more inclined to seek information that can be used to inform tangible mitigation behaviors and remedial steps. Women were also more inclined to inquire about the larger impact of the fires, consistent with past research suggesting that affective needs may be less salient to men under circumstances of crisis and risk,[7] and that women may be generally more comfortable in acknowledging negative emotions under conditions of high uncertainty.[42] All in all, the results for sex differences in specific information orientations are consistent, despite their examination in the context of a direct threat and among those who were directly affected by the said threat.

Finally, while men and women did not differ in how useful they perceived television and radio to be in obtaining information about the wildfires, they did differ in how useful they found the Internet. Consistent with other work,[7] women found the Internet to be more useful than men. This may be driven by the finding that women found social media to be significantly more useful than men in finding information about the wildfires. It is unclear why women found the internet and social media to be more useful than men, though it may be related to past research suggesting that interpersonal dynamics are on the whole more important to women under dire circumstances,[7] and that interpersonal communication is often used to verify or confirm high-consequence information obtained through other sources.[43]

Despite the novel, fast moving nature of the research context, the findings concerning first alerts and sex differences are fairly consistent with prior research on other types of disasters. This contributes to a larger body of recommendations for crisis communication practitioners concerning message placement and content. It may be valuable to consider household decision-making patterns in an at-risk community, along with those most likely to receive information given the time of day of a crisis event; first alerts can then be targeted in a manner that addresses the likely needs of those internalizing and acting upon the information at hand. Given who in a household is likely to respond, audience segmentation

and placement is also a consideration. While most will be reliant on television for first alerts, follow-up information may be better placed in social media or other web sources, if community response patterns suggest that female heads-of-household are likely to manage evacuation or sheltering efforts. Similarly, under such circumstances, emergency messages should consider a focus on self-efficacy and behavioral responses, since this information will likely be sought the responding audience.

It is also noteworthy that despite the high consequences and fast-moving nature of the fire, the explanation offered by Lachlan and colleagues[39] that high consequences may "wash out" media preferences, which did not hold in the current study. While the 2018 study was based primarily on those finding out about a campus shooting second hand, the current data were drawn from individuals who tangibly stood to lose their homes or suffer the loss of friends or family as a consequence of the fire. As a result, the need for trustworthy information may have produced stronger dependencies than those elicited by a vicarious association, and this may explain the variation in media preferences.

At the same time, it should be cautioned that despite the statistical significance of these differences, their relative magnitude and the pattern of means suggest that they were rather modest. In fact, the descriptive statistics suggest that while women and men differ in their media preferences and informational goals, across the entire sample respondents were reliant on a variety of sources and were more or less interested to some extent in all of the information outcomes examined. For example, in the gender analyses, the "lowest" mean reported for desire for information is 1.94, on a five-point, reverse scored scalar (Table 2). If there is a "wash out" effect to document, it may be the case that those in the middle of an extremely equivocal, high-consequence event may be interested in *any information they can get*. This would also be consistent with uncertainty reduction theory arguments, which purport that high levels of uncertainty will naturally drive more intense desires to acquire information in order to resolve the said uncertainty.[33,44,45]

Table 2. Sex differences in informational needs

	Men	Women	p
Scope of damage	1.63 (.20)	1.40 (.73)	<.02
Government response	1.81 (.93)	1.67 (.95)	n.s.
Food and water distribution	1.86 (.97)	1.59 (.87)	<.01
Evacuation	1.54 (.87)	1.30 (.89)	<.01
Shelters	1.94 (.99)	1.74 (1.02)	n.s.
Rescue operations	1.84 (.94)	1.62 (.84)	<.03
Larger impact of fires	1.80 (.91)	1.60 (.91)	<.05
Who else affected	1.83 (.97)	1.51 (.83)	<.01
Friends and family	1.60 (.90)	1.44 (.80)	n.s.

Note: Items reverse scored; lower value = greater need for info means and p values. Standard deviations are in parentheses.

LIMITATIONS

This research is limited in scope because of collecting data after the wildfires occurred which may result in memory loss. Data collection began as soon as possible, but for participants, the immediate threat to their area from the wildfire may have occurred weeks before they took the survey. Past research suggests that under conditions of high psychological stress, verbatim memory may dissipate quickly by way of comparison to more general, or "gist" memory.[46] Additionally, the data were analyzed as a whole rather than separated into data from those impacted by the Camp Fire and those impacted by the Woolsey Fire. There may be unique circumstances related to each fire that are not accurately captured by the data as they currently stand, and it may be useful to further examine the data in a comparative sense; the physical surroundings, access to mitigation

resources, and sociodemographic differences between the regions may impact the media dependencies and informational needs of those affected.

CONCLUSION

Even the most conservative climate change models suggest that wildfires will continue to get worse over time.[47] The 2018 wildfires in California were some of the most devastating to date, but unfortunately, they are likely not the last of their kind. The current findings suggest that there are meaningful nuances in how individuals impacted by wildfires obtain and consider information about the crisis, particularly when evaluating differences between men and women in their responses and needs. Television and mediated interpersonal communication remain the most common method of finding out about the threat initially. But men and women continue to differ in the types of information they want and the mediums through which they would prefer to receive this information. For emergency managers and first responders, understanding the unique needs of individuals impacted by the wildfires can be crucial. A careful consideration of the information needs and media use patterns of varying audiences may help government officials and emergency management agencies provide information that is timely, relevant, and helps individuals make good decisions under high-consequence conditions. Understanding the demographic makeup of those affected, and the means in which those affected use information to relieve stress and gather lifesaving information, may help these groups design targeted and effective emergency messages.

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