

Chapter 2

Natural Disasters: On Wildfires and Long-Term Recovery of Community-Residing Adults

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Introduction

A wildfire is defined as a large, uncontrolled, fast-moving, and destructive fire. Various names are used to describe it such as bushfire, wildland fire, brushfire, grass fire, and forest fire. They occur throughout the world (Brotak, 2012). Examples of this can be seen recently from February 2014 through September 2014: California's King wildfire, Washington State's Carlton Complex wildfire, Spain's Costa del Sol wildfire, the Valparaíso Chile wildfire, and South Australia's Victoria wildfire.

Wildfires appear to be occurring more frequently due to a combination of factors including global climate changes (Brotak, 2012). Not only do wildfires damage or destroy structures, plants, and animals but they may also kill or injure firefighters and community residents. Economic losses can range in the billions of dollars (Brotak, 2012). Adverse health effects can also be seen, as a community's air quality is poorer after a wildfire, resulting in respiratory system problems for those residing in the area (Caamano-Isorna et al., 2011; Finlay, Moffat, Gazzard, Baker, & Murray, 2012). Psychiatric and psychological consequences of wildfire destruction have also been found (Finlay et al., 2012).

In this chapter, I examine the impact of wildfires on the long-term mental health of community-residing adults. This chapter is organized as follows. I begin with an overview of past research on short-term and long-term psychological well-being after a wildfire event. In the next section, I present select data from the 2007 northern San Diego County wildfire study. Specifically, I describe this study's assessment of the impact of demographic and psychosocial predictors on the mental well-being of community-residing adults aged 30–94 years of age. I conclude by reflecting on the implications of these findings for disaster planning and preparation for community-residing adults.

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Literature Review

The literature on short-term and long-term effects on the mental health outcomes of community-residing adults after a wildfire is limited. A review of research investigating the short-term effects of a wildfire on mental well-being includes studies on wildfires in California, one occurred in 2003 (Marshall, Schell, Elliott, Rayburn, & Jaycox, 2007) and others occurred in 2008–2009 (Afifi, Felix & Afifi, 2012), and a wildfire in Greece in 2007 (Mellon, Papanikolaou, & Prodromitis, 2009).

Mental health outcomes for community-residing adult participants were comparable for Marshall et al. (2007) who surveyed at 3 months after the wildfire and Mellon et al. (2009) who surveyed at 6 months. Both of these researchers found poorer mental health and evidence of psychopathology for those directly affected by the wildfires. On the other hand, Afifi et al. (2012), who surveyed at approximately 5 months after the wildfire with the largest number of evacuees, did not find the mental health of community-residing adults who evacuated to be significantly different from those adults who did not evacuate, although differences approached significance. One of the better predictors of psychopathology in the short term after a wildfire was damage to property or home (Marshall et al., 2007). Afifi et al. (2012) found that older adults and women reported better mental health than younger adults and men.

Although there was not a consensus in these studies, many adults, especially those who had the greatest exposure to the wildfire, exhibited poor psychological health (Afifi et al., 2012; Marshall et al., 2007; Mellon et al., 2009). Does this trend continue throughout the long term or does it increase or decrease? A review of five studies that have explored the mental health of community-residing adults for at least 1 year after a wildfire disaster provides some answers.

Three studies were conducted on the long-term effects of wildfires on the mental health of community-residing adults after various Australian bushfires. McFarlane, Clayer, and Bookless (1997) surveyed 20 months after the 1983 Ash Wednesday bushfire; Camilleri et al. (2010) investigated 3 years after the 2003 Canberra bushfires, and Bryant et al. (2014) probed 3–4 years after the 2009 Victorian Black Saturday bushfires. A fourth study by Papanikolaou, Adamis, and Kyriopoulos (2012) continued to investigate the effects of the 2007 wildfires in Greece 3 years after the wildfire. Caamano-Isorna et al. (2011) assessed respondents 1 year after the 2006 Galician Spain wildfires for the use of anxiolytic–hypnotic drugs (anxiety drugs).

In three studies, the majority of respondents reported good mental health or low levels of psychological distress at the time of assessment (Bryant et al., 2014; Camilleri et al., 2010; McFarlane et al., 1997). When examining for the effect of exposure to the wildfire, Bryant et al. (2014), Caamano-Isorna et al. (2011) and Papanikolaou et al. (2012) found a trend of those respondents in the more directly affected communities to report higher levels of depression, higher levels of post-traumatic stress disorder, or poorer psychological health than those respondents in the medium or low affected areas or unaffected areas. Papanikolaou et al. (2012) found that older adults and women exhibited poorer psychological health, while

Caamano-Isorna et al. (2011) discovered that men used more anxiolytics–hypnotic drugs than women in the affected area.

Camilleri et al. (2010) also assessed the sources and types of support that those impacted by the wildfire perceived to be helpful in their recovery. These participants indicated that family, friends, and neighbors who provided emotional support such as kindness, listening, understanding, and tangible support such as offering housing, clothing, and financial aid facilitated their recovery. They also mentioned that aid from governmental and community services was important to their recovery.

From this review of short- and long-term effects of a wildfire on mental health, the reader can see that the psychological well-being of most community-residing adults appears to return after a period of time (Afifi et al., 2012; Bryant et al., 2014; Caamano-Isorna et al., 2011; Camilleri et al., 2010; Marshall et al., 2007; McFarlane et al., 1997; Mellon et al., 2009; Papanikolaou et al., 2012). There was a trend which showed that those who were most directly exposed to the wildfire in the short- and long-term period had poorer psychological health than those outside of the direct line of the wildfire (Bryant et al., 2014; Caamano-Isorna et al., 2011; Marshall et al., 2007; Papanikolaou et al., 2012). There were mixed findings for age and gender on psychological health in the short- and long-term time frame after a wildfire (Afifi et al., 2012; Caamano-Isorna et al., 2011; Papanikolaou et al., 2012).

San Diego County Wildfires

Four undergraduate research assistants and I explored similar variables in our study assessing community-residing adults 4.5 years after the 2007 northern San Diego County wildfires. Specifically, we investigated the severity of wildfire exposure, age, and gender on the mental well-being of community residents (Phillips, Cruz, Cuadra, Martinez, & Perdomo, 2013a, b).

We also examined the influence of sources of and types of social support on long-term recovery as did Camilleri et al. (2010). Past research has found that receiving social support is important for those recovering from the effects of a disaster and lessens psychological vulnerability (Acierno, Ruggiero, Kilpatrick, Resnick, & Galea, 2006; Camilleri et al., 2010).

The Disaster

On Sunday, October 21, 2007, multiple wildfires began in San Diego County during a major Santa Ana wind event. During the following days, the fires burned over 300,000 acres and destroyed or damaged approximately 1350 homes. Ten people were killed. Half a million residents were evacuated from their homes.

The targeted fire in this study, the Witch Creek fire, was the primary wildfire in northern San Diego County. This was the largest of these October wildfires and is

considered the fourth largest fire in California's history. It started to the east in the foothills and moved west towards the coast. It burned approximately 200,000 acres, destroyed 1125 residences, damaged 77 residences, and caused the deaths of two community residents. Raging uncontrolled for 10 days, this fire was finally 100% contained on October 31. Yet as widespread as this wildfire was, there were areas in northern San Diego County where community residents did not sustain loss of property or have to be evacuated.

Participants

One hundred and ninety-one community residents of northern San Diego County who ranged in age from 30 to 94 years in 2012 ($M=63.25$ years, $SD=14.59$) responded to the questionnaire. They were mostly Caucasian, non-Hispanic (88.00%), married at the time of the wildfire (77.00%) and at the time of data collection (75.40%). The majority of these adults had an annual income of \$75,001 to \$100,000+ (58.70%) and had insurance on their property and valuables (91.60%). One hundred and ten were female (57.60%). All participants were residents of northern San Diego County at the time of the 2007 wildfire and in 2012 as well. All were at least 25 years of age at the time of the wildfire.

The severity of exposure to the wildfire differed for the community participants. For this study, primary victim status was assigned to those participants who had responded to a survey question that they had experienced structural damage (total or partial) to their residence as a result of the wildfires. They may or may not have been evacuated, depending on whether they were at home or were away from home when the wildfire occurred. Thirty-six respondents were determined to be primary victims (18.85%) with 27 reporting total loss of their home or apartment and nine reporting partial loss of their residence.

Secondary victim status was assigned to those who reported that they had evacuated from their homes, but they did not experience any structural damage to their residence. Because they were evacuated from their residence, they lived in close proximity to the path of the wildfire. There were 100 participants in this category (52.36%).

Non-victim status was assigned to those community residents who responded that they did not have to evacuate and that they had no property damage. These 54 participants (28.27%) lived in northern San Diego County but not in or near the path of the wildfire. These three categories were based on work by Bolin (1985) and Norris and Murrell (1988).

Community residents were classified into five age groups: those in their 30s ($M=5$, $F=6$), those in their 40s ($M=5$, $F=16$), those in their 50s ($M=25$, $F=26$), those in their 60s ($M=16$, $F=26$), those in their 70s ($M=15$, $F=22$), those in their 80s ($M=12$, $F=11$), and those in their 90s ($M=3$, $F=3$). Table 2.1 presents details of respondents' severity of exposure and age in decades.

Table 2.1 Age and victim status

Age in decades	Victim status		
	Primary	Secondary	Non-victim
30–39	2	4	5
40–49	3	10	8
50–59	16	19	16
60–69	7	19	16
70–79	3	26	8
80–89	5	13	4
90–94	0	6	0

Materials and Procedure

The questionnaire was composed of mostly closed-ended questions. Demographic questions pertained to age, gender, and marital status at two points in time; racial background; total household income for 2011; home or rental insurance; and property damage information and evacuation experience during the wildfire.

Received social support was measured by the *Inventory of Postdisaster Social Support* scale (Kaniasty & Norris, 2000; Norris, Murphy, Kaniasty, Perilla, & Ortis, 2001). Participants were asked to estimate how often they received different types of social support within a clearly established time frame anchored between the October wildfires (Oct 21, 2007) and around New Year’s Day 2008. This support was related to the wildfires. It was modified to include 30 items to measure three types of support: emotional (three questions), informational (three questions), and tangible (four questions). Emotional social support assessed actions such as being comforted or shown signs of affection, someone expressing concern about your well-being, and knowing that others would be around if they were needed. Informational social support measured someone suggesting some action to take, understanding a situation you were in, and being given information on how to do something. Tangible social support referred to being given/loaned/offered money, furniture tools, food, and a place to stay. Three distinct sources of support were measured: family (ten items), friends, including neighbors and coworkers (ten items), outsiders, including people outside respondent’s immediate support circle such as community leaders, voluntary organizations, and professional service providers (ten items). These questions were scored on a four-option response set ((0)=never to (3)=many times). In the current study, there was very good total internal consistency with a Cronbach alpha coefficient of 0.95. Others have found internal consistency coefficient of 0.93 with 36 total items (Kaniasty & Norris, 2000).

The *Center for Epidemiologic Studies Depression Scale* (CES-D; Radloff, 1977) was used to assess nonclinical depressive mood and symptoms and is intended for the general population. A 20-item scale was used and scored on a four-option response set ((0)=rarely or none of the time to (3)=most or all of the time). In the general population, a score of 16 or greater suggests a high level of depressive

symptoms, and a score lower than 16 reflects lower levels of symptoms (Myers & Weissman, 1980). In the current study, the Cronbach's alpha coefficient was 0.85.

Researchers included a prompt at the end of the questionnaire asking for additional comments related to participants' experiences after the wildfires. Narrative data were collected from 46 participants.

The snowball sampling technique was used to disperse the seven-page questionnaire during the months of May through July 2012. Undergraduate research assistants and I distributed the questionnaire to adult community residents who then distributed it to other community-residing adults and so forth. An information sheet was attached to each questionnaire. This information sheet invited community-residing adults to participate in the study if they lived in the area that was involved in the 2007 northern San Diego County wildfires and if they were at least 25 years old in October 2007. These adults were told that every resident's experiences were wanted whether they experienced damage to their homes or apartments or had no damage and whether they had to evacuate or did not have to evacuate. They were told that the survey would take about 30 min to fill out and asked questions about social support encountered during and after the wildfires and about their experiences during the wildfires and in 2012.

Participants were not compensated for their time. They completed the questionnaire in their place of their choice and mailed it back to the main researcher in an attached addressed and stamped envelope. There was a response rate of 45.7%.

Results

Mental Health

The mean for all respondents for CES-D score was 8.88 (standard deviation (SD)=7.86, range=0–46) at 4.5 years after the wildfire. This mean is below the cutoff for depressive symptomology and indicates that most participants were below the clinical indicator for depressive symptoms. Demographic comparisons revealed that there was a significant effect for age in decades, $F(6, 163)=2.91$, $p=0.10$. Post hoc comparisons using the Tukey honest significant difference (HSD) test indicated that the mean CES-D score for those in their 60s ($M=10.97$, $SD=10.37$, range=0–46) was significantly different from those in their 70s ($M=5.26$, $SD=4.4$, range=0–15), $p=0.03$. No significant differences were found between the other decades, although mean CES-D scores did approach significance between those in their 70s ($M=5.26$, $SD=4.4$, range=0–15) and those in their 90s ($M=15.33$, $SD=10.29$, range=3–30), $p=0.051$. Table 2.2 provides CES-D mean and SD and age in decade data.

When victim status groups and participants' gender were compared with CES-D scores, no main effects were found, but there was an interaction, $F(2, 176)=3.93$, $p=0.02$. Specifically, women respondents' CES-D scores declined as their exposure to the wildfire declined; men's CES-D scores in-

Table 2.2 Mean CES-D and standard deviation scores and age in decades

Age in decades	Mean CES-D scores (<i>SD</i>)
30	10.64 (7.32)
40	7.40 (6.79)
50	9.37 (7.46)
60	10.97 (10.37)
70	5.27 (4.47)
80	8.32 (6.20)
90	15.33 (10.29)

CES-D center for epidemiologic studies depression scale

Table 2.3 Mean CES-D and standard deviation scores, victim status, and gender

Victim status/gender	CES-D Mean (<i>SD</i>)
Primary	
Male	5.55 (5.05)
Female	12.83 (11.81)
Secondary	
Male	6.95 (5.22)
Female	8.79 (7.77)
Non-victim	
Male	11.09 (7.58)
Female	8.48 (7.57)

CES-D center for epidemiologic studies depression scale

creased as their exposure to the wildfires declined. Table 2.3 presents CES-D mean and *SD*, gender, and victim status data.

Women ($M=9.58$, $SD=8.83$; range=0–46) of all ages showed more depressive symptomology than the men ($M=7.92$, $SD=6.21$; range=0–37); however, there was no significant effect between females and male participants, $t(181)=-1.49$, $p=0.14$ (two-tailed).

Although primary victims ($M=10.11$, $SD=10.42$, range=0–46) reported more depressive symptomology during a week in 2012 than secondary victims ($M=8.01$, $SD=6.79$, range=0–30) and non-victims ($M=9.65$, $SD=7.66$, range=0–37), analysis of the three victim status groups and their mental health at 4.5 years after the wildfire yielded no significant effect, $F(2, 163)=1.51$, $p=0.22$. After looking at these data, the large *SD* for the primary victim status group showed scores ranging from 0 to 46 with six participants' scores being 16 and above and eight participants' scores being 3 and below; therefore, it confirmed a wide range of values indicative of a large *SD*.

Received Social Support

Overall, the mean total social support given to these respondents between the 2007 wildfire and New Year's Day 2008 was 24.26 ($SD=19.87$). No significant differences were found between depressive symptomology and total social support, but the total social support given to primary victims ($M=49.9$, $SD=19.22$) was significantly different from that given to secondary victims ($M=19.68$, $SD=15.45$) and non-victims ($M=15.87$, $SD=12.94$),

$F(2,168)=54.17, p=.00$. The total social support given to secondary victims did not differ significantly from that given to non-victims.

Types of received social support. There were three different types of received social support: informational, emotional, and tangible, and each was analyzed with the three-victim statuses—primary, secondary and non-victim.

Informational social support. The effect of victim status and received informational social support was significant, $F(2, 85.44)=37.65, p=0.00$; range=0–27 with primary victims ($M=14.87, SD=7.25$) receiving informational social support significantly more than secondary victims ($M=4.93, SD=5.69$) and non-victims ($M=4.18, SD=4.85$). One primary victim mentioned in the narrative data that United Policyholders, a nonprofit organization, gave invaluable information on filing insurance claims.

Emotional social support. There was a significant effect of victim status on received emotional social support, $F(2, 152.3)=29.95, p=0.00$; range=0–27. Primary victims ($M=20.28, SD=5.31$) received more emotional social support than secondary victims ($M=11.04, SD=8.12$) and non-victims ($M=8.85, SD=7.50$). One primary victim mentioned in the narrative data that it took a lot of work to “suck it up” and keep going, but her strong marriage and deep faith definitely helped in recovering from the fire.

Secondary victims did not receive significantly more emotional social support than non-victims did, but respondents from both groups reported in the narrative data that they did receive emotional support. A secondary victim wrote that supportive family and friends were important, and a non-victim wrote that many people called to ask about them.

Tangible social support. The effect of victim status and received tangible social support was significant, $F(2, 46.3)=65.63, p=0.00$, range=0–36. Primary victims ($M=16.81, SD=8.6$) received more tangible social support than secondary victims ($M=4.10, SD=4.47$) and non-victims ($M=1.98, SD=2.52$). In the narrative data, one non-victim respondent wrote that because he did not experience any personal property loss, he donated furniture and money to those who had lost their homes. Another non-victim respondent stated that he took a truckload of replacement items such as clothing and a TV to a friend who lost a home.

A secondary victim who had lost her home in the 2003 Cedar Fire in San Diego wrote of providing tangible social support by working at the donation center as a “personal shopper” where she was matched with an individual/family to assess their needs and to help gather necessary goods. She also helped give out a Fire Survivors Handbook, “a how-to and what-to-do guide that was assembled from our collective experiences from 2003 and the months that followed.”

In this analysis, secondary victims received significantly more tangible social support than non-victims did. One secondary victim wrote in the narrative data that as she was evacuated she fell and hurt her back. A neighbor took her to the hospital.

Sources of social support. There were three types of sources of social support in this study: family, friends, and others. Each was analyzed with the three-victim statuses—primary, secondary, and non-victim. Scores ranged from 0 to 30.

Social support from family. A significant effect of victim status was found for family social support, $F(2, 80.2)=20.91$, $p=0.00$ with primary victims ($M=16.75$, $SD=8.56$) receiving more social support from family members than secondary victims ($M=8.00$, $SD=6.44$) and non-victims ($M=7.26$, $SD=5.66$). One primary victim mentioned in the narrative data that without the support of family, recovery would have been more difficult.

Secondary victims did not receive significantly more support from family members than did non-victims, but through the narrative data, secondary victims and non-victims wrote of the support that family provided. For example, one secondary victim mentioned “supportive family.”

Social support from friends. The effect of victim status and friends’ social support was significant, $F(2, 178)=56.78$, $p=0.00$. Primary victims ($M=18.75$, $SD=6.90$) received social support from friends, neighbors, and coworkers more often than did secondary victims ($M=7.69$, $SD=5.95$) and non-victims ($M=5.25$, $SD=4.97$). There were many comments in the narrative data from primary victims related to received social support from friends, neighbors, and coworkers. For example, one primary victim wrote that she and her husband were blessed to have had great friends to help them. She went on to say that this “taught my husband and me what matters” (see Chap. 21, this volume, for related discussion).

Secondary victims received significantly more social support from friends, work colleagues, and neighbors than non-victims did. One secondary victim wrote that her neighbors helped to take care of her for three weeks as she had hurt her back when evacuating and was unable to stand and walk for those weeks.

Social support from others. A significant effect of victim status was found for others’ social support, $F(2, 58.76)=59.21$, $p=0.00$ with primary victims ($M=16.53$, $SD=7.92$) receiving more social support from outsiders such as community leaders, voluntary organizations, and professional service providers than secondary victims ($M=4.36$, $SD=4.8$) and non-victims ($M=2.94$, $SD=3.73$). Another primary victim stated that there was a group called Fired Up Sisters (FUS) that was created to support women whose homes were destroyed or damaged and that this support system helped her tremendously. She stated, “we cried, we solved problems, we moved forward. After a couple of months, friends and families didn’t want to hear about our constant problems so with our FUS group, we found a ‘new’ normal” (see Chap. 12, this volume, for a related discussion). Another primary victim mentioned the biggest encouragement was the outpouring of concerns and help from those outside her immediate circle.

Secondary victims did not receive significantly more social support from outsiders such as community leaders, voluntary organizations, and professional service providers than did non-victims. A secondary victim mentioned in the narrative data “the kindness of strangers was completely overwhelming.”

Conclusions

In summary, these community-residing adults who responded to the questionnaire in 2012 on the 2007 northern San Diego County wildfire showed good psychological health. Our findings were similar to those of Bryant et al. (2014), Camilleri et al. (2010), and McFarlane et al. (1997). While Bryant et al. (2014), Caamano-Isorna et al. (2011), and Papanikolaou et al. (2012) found that respondents in the more directly affected communities or primary victims showed poorer psychological health than those adults in the medium or low affected areas or unaffected areas, this result was not replicated in our study (Phillips et al., 2013a, b). Although the mean score for depressive symptoms was higher in the primary victim group, there were no significant differences among the scores of the three exposure groups on the depressive symptomology measure.

There was agreement between our study and Papanikolaou et al.'s (2012) which showed that older adults exhibited poorer psychological health; specifically, though it was those in their 60s who showed more depressive symptoms than those in their seventies in our study. This exception noted that there were no other differences among the seven age groups here. Unlike Caamano-Isorna et al. (2011) or Papanikolaos et al. (2012), we did not find any gender differences. We did find an interaction between gender and victim status. Women in the primary victim group had higher mean depressive symptoms than those women in the secondary and non-victim groups, but men showed the opposite pattern.

Although there was no significance in total social support and depressive symptomology, our findings agreed in kind with Camilleri et al. (2010). Primary victims were helped significantly more than the other two victim groups by family, friends, and outside sources, and they were provided three types of social support: informational, emotional, and tangible social support.

Camilleri et al. (2010) mentioned that after the wildfire in Canberra, Australia, residents formed new groups to help with recovery. This was seen in this study with the formation of the Fired Up Sisters (FUS) organization. This support group began in November 2007 for those women who were primary victims of the 2007 northern San Diego County wildfire. It was foremost an emotional support group for these women, but it also provided discounts from local merchants and solicited donations of tangible goods and services to help primary victim families (Rossi, 2010). In the narrative data, this organization was mentioned several times, including a primary victim who wrote that she had amazing friendship and support from all "my Fired Up Sisters."

Implications

While wildfires, as do all natural disasters, have an immediate impact on the mental health of those affected individuals, the findings from the 2007 northern San Diego wildfire study continue to provide promise for long-term recovery and

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