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Anger Dimensions and Mental Health Following a Disaster: Distribution and Implications After a Major Bushfire

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Abstract

Anger is an important dimension of affect and a prominent feature of posttraumatic mental health, but it is commonly overlooked in postdisaster settings. We aimed to examine the distribution and implications of significant anger problems in the aftermath of a natural disaster, via analyses of Beyond Bushfires survey data from 736 residents of rural communities 5 years after the 2009 Black Saturday bushfires in Victoria, Australia. Assessments included the five-item Dimensions of Anger Reaction (DAR-5) scale along with measures of PTSD, depression, and significant mental illness, and indicators of life satisfaction, suicidality, hostile aggressive behavior, and violence exposure. The results indicated that approximately 10% of respondents from areas highly affected by the bushfires scored above the provisional cutoff criteria for significant anger problems on the DAR-5, which was a more than 3-fold increase, *OR* = 3.26, relative to respondents from areas of low-to-moderate bushfire impact. The rates were higher among women, younger participants, and those who were unemployed, and co-occurred commonly, although not exclusively, with other postdisaster mental health problems. Anger problems were also associated with lower life satisfaction, β = -.31, an 8-fold increase in suicidal ideation, *OR* = 8.68, and a nearly 13-fold increase in hostile aggressive behavior, *OR* = 12.98. There were associations with anger problems and violence exposure, which were reduced when controlling for covariates, including probable PTSD. The findings provide evidence indicating that anger is a significant issue for postdisaster mental health and should be considered routinely alongside other posttraumatic mental health issues.

Anger Dimensions and Mental Health Following a Disaster: Distribution and Implications After a Major Bushfire

There is growing literature from the field of postdisaster mental health (North, 2016) that illustrates the psychological sequelae of large-scale events that involve the threat of harm to large numbers of people, the impact that extend across whole geographic areas or communities, and widespread damage to both physical and social infrastructure. Although disasters can vary in type and scale, the mental health sequelae may be attributable to important dimensions of experience that can distinguish stressful and potentially traumatic events, including the magnitude of the threat to life and loss of personal, social, and material resources (Hobfoll et al., 2007). Furthermore, the immediate impact of disasters can precede accumulating stressors and resource losses that can also impact mental health, such as through declines in employment and economic circumstances as well as disrupted support networks (e.g., as survivors relocate away from disaster-affected areas; Hobfall, 2012; Palinkas, 2012). Relevant literature indicates that although most survivors do not exhibit serious mental health problems in the aftermath of such events, including natural disasters like bushfires and floods, many individuals experience impairments, and high numbers of survivors develop conditions that would benefit from intervention (Goldmann & Galea, 2014). To date, most of this literature has focused on postdisaster occurrences of posttraumatic stress disorder (PTSD) and major depression, whereas studies have also considered anxiety and substance use problems to a lesser extent (Beaglehole et al., 2018). In contrast, other dimensions of mental health have been studied rarely and there have been calls for research on a wider range of issues to inform evaluations of postdisaster functioning and improved targeting of services in recovery environments (Goldmann & Galea, 2014).

Anger is an important dimension of affect and a prominent feature of posttraumatic mental health. By way of illustration, the diagnostic criteria for PTSD include multiple references to anger or irritability, including within the trauma-related alterations in arousal and reactivity symptom cluster in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*; American Psychiatric Association [APA], 2013). Findings from studies of combat veterans have also indicated that these symptoms are commonly reported on standardized measures of PTSD (Pietrzak et al., 2010). Although standalone screening tools that may distinguish clinically significant anger problems, defined by impacts on performance, relationships, and health (Forbes et al., 2004), have been developed only recently (Forbes, Alkemade, Hopcraft, et al., 2014; Forbes, Alkemade, Mitchell, et al., 2014), preliminary studies have suggested that up to 80% of veterans engaged in treatment for PTSD exhibit such difficulties (Forbes, Alkemade, Hopcraft, et al., 2014). Comparable figures from nonclinical samples of U.S. service members and veterans have reported rates of around 17% (Adler et al., 2020). These findings are in addition to those from numerous studies of anger in veterans, which have highlighted the consequences for the course of posttraumatic mental health (Koenen et al., 2003), as well as for aggression or violent behaviors (Novaco & Chemtob, 2015), suicidality (Wilks et al., 2019), and further impacts on treatment for military-related PTSD (Forbes et al., 2008). The findings from studies of survivors of interpersonal violence also suggest that anger may be an important "victim-related" factor that can increase the risk of revictimization (Iverson et al., 2014), whereas broader literature indicates potential physical health implications, such as coronary heart disease (CHD) and poor prognoses among patients with existing cardiovascular disorders (Chida & Steptoe, 2009).

To date, only three studies of which we are aware have examined anger in the aftermath of a disaster. This includes one early investigation of disaster relief workers following the September 11, 2001, terrorist attacks in the United States, which identified that elevated scores on the 57-item State-Trait Anger Expression Inventory (STAXI) predicted increased distress and disability as well as reduced occupational or social functioning (Evans et al., 2006). Further analyses of a 1-year follow-up indicated that anger was linked prospectively to increases in PTSD symptoms over time (Jayasinghe et al., 2008). More recently, a community-based study conducted after the 2015 Nepalese earthquakes found that 34% of civilians reported out-of-control anger (Kane et al., 2018). A third investigation was conducted after the 2009 Black Saturday Bushfires in Australia. This remains the deadliest bushfire event on record in Australia, having caused 173 fatalities and widespread damage, including the destruction of 2,055 houses and over 400,000 hectares of land burned. The relevant study involved analyses of baseline data from a prospective investigation of the effects of this disaster, called the Beyond Bushfires: Community, Resilience and Recovery Study (Gibbs et al., 2013). This study included a two-item measure of angry behavior, which was found to predict postdisaster mental health outcomes and explain, in part, associations with antecedent measures of bushfire exposure (Forbes et al., 2015).

There is a strong need for further research on mental health and psychosocial issues in postdisaster contexts, including studies of the distribution and implications of anger following natural disasters. In Australia, the economic costs of natural disasters, including from deaths and injuries, are estimated to exceed $3.5 billion annually, and the leading event types include severe storms, floods, cyclones, and bushfires (Handmer et al., 2018). The economic costs of bushfires in Australia have increased over time (Handmer et al., 2018) and have gained additional salience following the 2019–2020 bushfire season, which was

unprecedented in terms of duration and magnitude, with large-scale fires burning for many months across most states and territories, as well as with regard to expectations that such events will continue to increase due to the effects of climate change. As such, the general aim of the present study was to provide new evidence regarding the distribution and implications of significant anger problems in the aftermath of a disaster, based on analyses of data collected during the second wave of the Beyond Bushfires study. This wave included a psychometric measure of anger that could identify problems that were likely to be clinically significant and require intervention. The specific study objectives were to (a) examine levels of significant anger problems in the aftermath of a bushfire and investigate the distribution across levels of bushfire impact and sociodemographic risk factors, (b) explore patterns of co-occurrence with other postdisaster mental health issues, and (c) examine the implications of anger via associations with well-being, aggression, and exposure to violence.

Method

Participants and Procedure

Participants were residents of 25 rural or regional communities across 10 locations in Victoria, Australia, who participated in the second wave of the Beyond Bushfires study (Bryant et al., 2018; Gibbs et al., 2013). These communities were selected to represent diversity regarding socioeconomic status, community size, and remoteness, as well as according to levels of bushfire affectedness. The latter was defined by evidence of high impact, operationalized as multiple fatalities and significant property loss; medium impact, defined by significant property damage and up to two fatalities; and low impact, whereby there was no evidence of burning. The contact details for current residents of these communities and individuals who had relocated since the fires were obtained from the Victorian Electoral Commission, which approved one letter of invitation to the study. This

was supplemented by various activities intended to increase awareness of the study, including mail drops, region-based phone calls, and social media activities. This recruitment strategy produced an initial (Wave 1) sample of 1,017 residents, which was equivalent to approximately 14% of eligible participants. At the completion of the initial survey, there were 966 participants who agreed to be contacted at Wave 2, and 736 ultimately took part. This comprised a 76.1% retention rate (Bryant et al., 2018) and included residents from communities that were initially classified as being from areas of high impact (n = 504), medium impact (n = 93), and low impact (n = 110); the latter two categories were combined for the present analyses (i.e., low and medium affectedness).

Previous analyses have compared characteristics of the initial sample with census data, and these indicated that Wave 1 participants were more likely to be female, older, and more educated (Bryant et al., 2014). Comparable analyses of sample characteristics at Wave 2 indicated that compared to nonresponders, these participants were also slightly older, reported higher educational attainment, were more likely to be from medium- or high-impact communities, and were more likely to report property loss during the fires. However, Wave 2 participants and nonresponders were not otherwise systematically different regarding gender, country of birth, and other dimensions of bushfire experience (e.g., bereavement following the fires; Bryant et al., 2018). Ethics approval was obtained for the original Beyond Bushfires study through the University of Melbourne Human Research Ethics Committee (HESC ID: 1034829.4). Further methodological details can be found elsewhere (Bryant et al., 2018; Gibbs et al., 2013).

Measures

Postdisaster mental health problems were assessed using brief measures, which were selected given that more burdensome assessment strategies were impracticable. This

approach is supported by studies of community-based traumatic events and disasters, which indicate that such brief assessment strategies compare favorably to in-depth clinical interviews, as indicated by similar prevalence and good overall classification rates as well as comparable patterns of association with covariates (Hobfoll et al., 2012).

Anger

The Dimensions of Anger Reactions Scale-5 (DAR-5; Forbes, Alkemade, Mitchell, et al., 2014) is a five-item self-report measure that is used to assess experiences of and problems related to anger over the past 4 weeks. Table 1 shows the content of the items, which were administered at Wave 2 only. A score of 12 or higher on the DAR-5 was used to distinguish clinically significant problems with anger. This provisional cutoff criterion was developed using STAXI-2 scores as the reference and defined the 75th percentile for scores in the validation study (Forbes, Alkemade, Mitchell, et al., 2014). The DAR-5 has shown strong psychometric properties in both Australian and international samples. High internal consistency has been reported (Cronbach's αs = .80–.90) along with expected patterns of convergent and discriminant validity involving STAXI subscales (e.g., Trait Anger, Anger Control) and other measures, including assessments of depression and alcohol misuse (Ceschi et al., 2020; Forbes, Alkemade, Hopcraft, et al., 2014; Forbes, Alkemade, Mitchel, et al., 2014; Hawthorne et al., 2006). In the present study, the Cronbach's alpha value for the DAR-5 was .85.

PTSD Symptoms

Symptoms of PTSD were assessed using a four-item version of the PTSD Checklist (PCL-4; Bliese et al., 2008), on which respondents are asked to rate their reexperiencing, avoidance, and arousal symptoms over the past 4 weeks on a scale of 1 (*not at all*) to 5 (*extremely*). Previous research has identified these as "high information" items; they have

also demonstrated equivalent accuracy when compared to the full PCL scale when using a cutoff score of 7 to identify probable PTSD (Bliese et al., 2008). In the present study, the Cronbach's alpha for the PCL-4 value was .85.

Depression

Depressive symptoms were measured using the nine-item Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001). The PHQ-9 has demonstrated high internal consistency (i.e., Cronbach's αs = .83–.92; Cameron et al., 2008; Kroenke et al. 2002), as well as convergent and discriminant validity with alternative measures of depression and anxiety (Cameron et al., 2008). Probable major depression was inferred if five of nine symptoms had been present for most days or more often in the previous 2 weeks, which is consistent with prior analyses (Bryant et al., 2018). In the present study, the Cronbach's alpha value for the PHQ-9 was .89.

Severe Mental Illness

Severe mental illness (SMI) was measured using the six-item Kessler Psychological Distress Scale (K6) and utilized a cutoff score of 13 or higher to identify probable SMI (Kessler et al., 2002). The K6 has demonstrated high internal consistency (i.e., Cronbach's αs = .84–.92; Kessler et al., 2002; Mewton et al., 2016), and the cutoff criterion of 13 has been proposed for the detection of an SMI, defined as any mental health diagnosis with significant functional impairment (Kessler et al., 2003). In the present study, the Cronbach's alpha value for the K6 was .89.

Well-Being and Suicidal Ideation

Indicators of well-being included a single-item measure of life satisfaction ("How satisfied are you with your life as a whole at the moment?"), which was scored on an 11-point scale ranging from 0 (*completely dissatisfied*) to 10 (*completely satisfied*). Suicidal ideation

was measured using the final item from the PHQ-9, scored as 0 for no suicidal ideation and 1 for suicidal ideation that occurred several days or more often.

Aggressive Behaviors and Violence Exposure

Aggressive behaviors and violence exposure were assessed using single-item measures. These included one item from the Anger Attacks Questionnaire (AAQ; Fava & Rosenbaum, 1999), which operationalized hostile aggressive behavior ("How often have you exploded with verbal or physical aggression because of anger?") during the past 4 weeks. This item was part of a two-item measure of angry behavior that was analyzed and reported using baseline data from the *Beyond Bushfires* study (Forbes et al., 2015). Although this item was scored using a five-point scale ranging from 0 (*none of the time*) to 4 (*all of the time*), there was limited variability among nonzero scores; thus, responses were collapsed and scored as 0 (*none of the time*) or 1 (*a little of the time or more often*).

Indicators of exposure to violence were derived from a checklist of life events and included (a) assault or violence and (b) feeling or being threatened by your partner, ex-partner, and/or another family or household member. Response options indicated any personal experiences of these events since the first survey.

Data Analysis

Data file preparation and preliminary analyses were conducted using SPSS (Version 25), and subsequent analyses were conducted using R (Version 3.5.1) and M*plus* (Version 8). A preliminary exploration of the data identified a programming error for the online survey whereby DAR-5 items were administered only when participants indicated nonzero scores on the K6, which was the preceding measure and produced missing values on the DAR-5 for 220 cases. These missing values were addressed in two ways. For the descriptive analyses, "zero-fill" techniques were used for missing values, which assumed no anger problems and thus

provided conservative estimates of frequency. Multiple imputation (MI) of missing values, across $k = 20$ data sets, was used for subsequent analyses. The MI procedures included K6 scores and other covariates in the imputation model and thus supported the plausibility of the missing-at-random (MAR) assumption (Graham, 2009). These procedures also addressed small amounts of missing data for additional measures, which ranged from 0.3% for life satisfaction to 14.3% for the PHQ-9.

Preliminary analyses considered rates of significant anger problems, which were operationalized using the provisional cutoff criterion of a score of 12 or higher on the DAR-5. The rates were considered across respondents from areas characterized by high versus low or moderate bushfire affectedness, whereas further analyses considered associations with both sociodemographic and mental health characteristics. These involved logistic regression models specifying significant anger problems (i.e., DAR-5 score of 12 or higher) as the endogenous variable, with each potential risk factor treated as exogenous in separate models, which thus estimated bivariate associations. A subsequent series of regression models were then specified to estimate associations with significant anger problems, which were treated as exogenous, and indicators of well-being (i.e., life satisfaction and suicidal ideation), hostile aggressive behavior, and violence exposure, which were each considered in separate models. Standardized regression coefficients and odds ratios (*OR*s) were produced to quantify associations in linear and logistic regression models, respectively, which were conducted using the TYPE = COMPLEX feature in M*plus* to adjust for clustering associated with sampling from fire-affected communities.

Results

Table 2 presents the rates of significant anger problems (i.e., DAR-5 score of 12 or higher) when considered across levels of bushfire affectedness, as well as the corresponding

odds ratios and confidence intervals (CIs), which were derived from a logistic regression model. As shown, 10.4% of the residents from communities characterized by high bushfire affectedness scored above the provisional criterion for significant anger problems compared to 3.5% in regions exposed to low or moderate levels of bushfire impact. This reflected a more than 3-fold increase in risk, which was statistically significant.

Table 2 also displays the rates of significant anger problems compared across sociodemographic and mental health characteristics. As shown, the results indicated that anger problems were more frequent among women, relative to men; respondents aged 18–44 years, relative to 65 years of age or older; and individuals who reported their employment status as not employed or "other," relative to those who were retired or were pensioners. However, the largest associations were observed with other mental health problems. A total of 34.0% of respondents with probable PTSD also indicated significant anger problems, which was a nearly 12-fold increase in risk relative to those who screened negative for probable PTSD. This was in comparison to rates of 40.4% among respondents who screened positive for depression (i.e., a 12-fold increase in risk) and 55.6% among those whose K6 scores indicated a likely SMI (i.e., a nearly 16-fold increase). In contrast, further analyses indicated that approximately 58.6% (n = 34) of respondents with a significant anger problem also screened positive for probable PTSD, compared to 43.2% (n = 19) who screened positive for depression and 34.5% (n = 20) whose K6 scores indicated a probable SMI.

Table 3 presents the findings from the subsequent regression model that considered associations with significant anger problems and indicators of well-being (i.e., life satisfaction, suicidal ideation), hostile aggressive behaviors, and violence exposure. These were considered in separate models and included results from unadjusted analyses and models that controlled for the effects of gender, age, and employment status as well as

probable PTSD. As shown, the unadjusted models (Model A) indicated that significant anger problems were associated with lower life satisfaction and a nearly 8-fold increase in suicidal ideation. Anger problems were also linked with an almost 13-fold increase in hostile aggressive behavior and near 5-fold increases in reports of violence exposure. The results of follow-up analyses (Model B) indicated that associations with life satisfaction, suicidality, hostile aggressive behavior, and reports of being assaulted were all reduced in magnitude but remained significant after controlling for sociodemographic factors and probable PTSD. In contrast, the association between anger and being threatened by a family or household member was not significant after controlling for covariates, particularly probable PTSD.

Discussion

This study considered significant anger problems in the aftermath of a catastrophic bushfire in Australia and contributes to the literature on postdisaster mental health, which has focused mainly on the occurrence of PTSD, major depression, and, to a lesser extent, anxiety and substance use problems (Goldmann & Galea, 2014). The results indicated approximately 10% of residents from communities that suffered high bushfire affectedness scored above the provisional cutoff on the DAR-5, which was a nearly 3-fold increase relative to individuals from communities with low or moderate affectedness. In comparison, prior analyses of data from the current sample indicated that for residents from highly affected communities, the estimated rates of probable PTSD, depression, and SMI were 19%, 11%, and 6%, respectively (Bryant et al., 2018). As such, based on prevalence alone, the present results indicate that rates of significant anger problems were comparable to other posttraumatic mental health issues and are thus important to consider in postdisaster contexts.

The current study also considered risk factors for significant anger problems after a disaster and identified elevated levels among women, younger individuals, and participants

who were unemployed. To our knowledge, this is the first study to demonstrate higher rates of anger problems among women relative to men, and this finding makes a contribution to the literature on posttraumatic anger, which has focused on predominantly male samples of military personnel or veterans. However, these findings are consistent with early studies of trauma survivors sampled from family violence shelters, which indicate that symptoms of anger and irritability are commonly reported by women assessed using standardized measures of PTSD (Saunders, 1994). They also align with emerging literature on the gendered nature of disaster impacts (Parkinson et al., 2011; Spencer et al., 2018), which emphasizes the disproportionate consequences for women that may be attributed to economic vulnerabilities, caregiving roles, and increased rates of family violence that are often recorded postdisaster (Molyneaux et al., 2020; Parkinson, 2019). The findings that age and unemployment were also linked to anger problems suggest additional inequalities in the distribution of disaster impacts across sociodemographic strata as well as the potentially unique consequences for the mental health and recovery trajectories of economically and socially vulnerable groups.

The present study provides further evidence of common co-occurrence and associations with significant anger problems and other postdisaster mental health issues. By way of illustration, the results indicated approximately 34% of residents with probable PTSD also indicated significant co-occurring anger problems, which was a nearly 12-fold increase relative to those who screened negative to PTSD. Conversely, approximately 59% of respondents with anger problems screened positive for PTSD. Such findings are consistent with previous literature indicating strong associations between anger and PTSD, in particular, that persist even after excluding measurement overlap (Orth & Wieland, 2006), as well as assertions that these links may reflect underlying deficits in emotional regulation that are clinical features of maladaptive reactions to trauma exposure and perceived threat (Chemtob

et al., 1997). However, the current study also indicated that in some instances, these significant anger problems were observed in the absence of probable PTSD and depression: Approximately 37% of respondents with significant anger problems (i.e., DAR-5 score of 12 or higher) screened negative for both probable PTSD and depression; thus, anger problems may occur separately from other mental health issues. Although such findings should be viewed as provisional in light of the imperfect psychometric properties of measures use in the present study, they may suggest that anger problems can sometimes comprise unique and differentiated dimensions of posttraumatic mental health. Alternatively, they may indicate that high scores on the DAR-5 do not necessarily signal emotional disturbances or mental health problems, but rather normal, although still likely maladaptive, dimensions of affect and reactions to chronic postdisaster stressors. Although speculative, such possibilities highlight the need for additional research on the heterogeneity of postdisaster anger that also considers the possibility of diverse aetiological mechanisms underlying problems, which may suggest alternative targets for intervention.

The current study demonstrated a range of potential implications of anger problems in postdisaster contexts via the associations with lower life satisfaction and an 8-fold increase in suicidal ideation, as well as a nearly 13-fold increase in hostile aggressive behavior. These results extend prior analyses of the first wave of the Beyond Bushfires study, which indicated that angry behavior was an influential predictor of postdisaster mental health (Forbes et al., 2015) through demonstration of additional associations with well-being and psychosocial consequences via the risk of harm to self and others. Although these implications were inferred from cross-sectional data that cannot distinguish across different unidirectional or bidirectional effects, the associations remained significant after controlling for covariates, including probable PTSD. These findings are consistent with the broader literature on the

implications of anger among different trauma-exposed populations. These include studies of military veterans, for example, which have also identified anger as a risk factor for suicide, with influences that are above and beyond the effects of depression and PTSD (Wilks et al., 2019) and may be attributable to adverse impacts on support networks and the erosion of social resources and protective factors (Hawkins et al., 2014). The associations between anger and aggressive behaviors were strong, and this aligns with previous literature on certain forms of aggression that are hostile, impulsive, or reactive (Ramírez & Andreu, 2006; Teten Tharp et al., 2011). Hostile aggression is presumed to be emotionally charged or driven by anger, and characterized by loss of control and perceived provocation. This can be distinguished from 'instrumental' aggression that is instead defined by the goal-oriented use of aggressive behavior (Ramírez & Andreu, 2006; Teten Tharp et al., 2011). The findings of associations between anger and both suicidal ideation and hostile aggression, in particular, reaffirm that anger is a critical dimension of posttraumatic mental health and signal the need for initiatives to identify and minimize harm from anger in postdisaster contexts.

Finally, the current study identified additional implications of anger for the risk of violence exposure or victimization via associations with near 5-fold increases in reports of assault or violence and feeling threatened by a partner, family member, or household member. The analyses indicated that the association between anger and assault or violence was reduced but remained significant after adjusting for sociodemographic factors and PTSD, whereas the link between anger and feeling threatened by a household member was not significant after controlling for these covariates. Such findings are aligned with literature indicating that anger is a prominent affective reaction among victims of crime (Ignatans & Pease, 2019) and may be linked with the risk of revictimization (Iverson et al., 2014). This literature has focused mainly on violence perpetrated by intimate partners and has

demonstrated that various posttraumatic mental health problems, which may be a consequence of violence exposure, can also put victims at heightened risk of revictimization (Krause et al., 2006). Although mechanisms by which anger is associated with victimization remain unclear, it seems plausible that perpetrators may choose to target victims who exhibit visible signs of anger, while co-occurring mental health vulnerabilities can also constrain the ability of victims to leave unsafe situations or relationships. The current findings indicate that such interrelations involving anger and the risk of victimization are discernible in postdisaster settings and are important to explore in future research that also considers the conjoint influences of other mental health symptoms and environmental or perpetrator-related risk factors.

The present results should be considered in light of the study's limitations. Due to a programming error for the online survey, the DAR-5 was only administered when participants received nonzero scores on the K6, and this produced nontrivial levels of missing data for the anger scale. Multiple imputation techniques were used to manage missing values for covariate analyses, and these incorporated K6 scores in the imputation model, which supported the MAR assumption (Graham, 2009). However, zero-fill techniques, which may underestimate frequency and variability, although likely to a modest extent, were used for the descriptive analyses. The covariate analyses considered a limited number of variables and did not address other potential implications of anger, such as physical health outcomes like cardiovascular disease (Chida & Steptoe, 2009). Measures of aggressive behaviors and violence exposure comprised single items that did not capture heterogeneous forms and experiences of aggression and violence. Furthermore, these analyses were intended to provide preliminary evidence of associations using cross-sectional data. They did not examine directional or bidirectional processes that unfold over time, or control for all variables that

may explain significant links, including potential mediators or confounding factors. The measures were all administered in the second wave of a survey conducted 5 years after the bushfires, and they did not indicate experiences or behaviors situated in the immediate aftermath of the disaster. Bushfire impact was operationalized using a community-level measure of exposure, which had limited variability among individuals. Finally, the first wave of the survey involved a response rate of only 14%, and this may also limit the generalizability of the findings.

The current analyses of Beyond Bushfires data identified high levels of significant anger problems in areas of high bushfire affectedness 5 years after the disaster, which was comparable to rates of other mental health problems that have been more widely recognized in postdisaster contexts. The present results also indicated vulnerable groups and serious potential implications of anger via the risk of harm to self and others, including through hostile aggressive behavior, which strongly indicates the importance of routinely considering and addressing this dimension of affect alongside other mental health domains in the aftermath of a disaster. These implications are particularly salient given the scale and likely impacts on mental health related to the 2019–2020 bushfire season in Australia, as well as the expectation that such events will increase in frequency due to the effects of climate change.

Open Practices Statement

The analyses reported in this article were not formally preregistered. The data have not been made available on a permanent third-party archive.**References**

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Table 1

Item Content from the Five-Item Dimensions of Anger Reactions Scale

Item number	Item content
Thinking over the past 4 weeks…	
1	…I found myself getting angry at people or situations
2	…When I got angry, I got really mad
3	…When I got angry, I stayed angry
4	…When I got angry at someone, I wanted to hit them
5	…My anger prevented me from getting along with people as well as I'd have liked

Table 2

Descriptive Statistics and Analyses of Significant Anger Problems[a], Across Bushfire Affectedness, Sociodemographic Characteristics, and Mental Health Characteristics

	Descriptive statistics (N = 736)		DAR-5 ≥ 12			
			Frequencies		Regression models	
Variable	*n*	%	*n*	%	*OR*	95% CI
Bushfire affectedness						
Low/moderate	203	27.6	7	3.5	-	- -
High	504	68.5	51	10.4	3.26*	[1.26, 8.47]
Sociodemographic characteristics						

Gender							
Male	283	38.5	18	6.5	-	-	-
Female	453	61.5	44	10.0	1.66*		[1.06, 2.58]
Age (years)							
18–44	118	16.0	21	17.8	4.30***		[2.15, 8.60]
45–54	135	18.3	14	10.5	2.26		[0.98, 5.19]
55–64	231	31.4	13	5.8	1.34		[0.72, 2.49]
≥ 65	202	27.4	9	4.6	-	-	-
Educational attainment							
High school or less	226	30.7	14	6.4	-	-	-
Trade/technical	215	29.2	20	9.5	1.45		[0.69, 3.06]
Tertiary	280	38.0	27	9.8	1.70		[0.93, 3.13]
Employment status							
Employed full-/part-time	385	52.3	37	9.8	1.81		[0.95, 3.47]
Retired/pensioner	276	37.5	15	5.6	-	-	-
Not employed/other	70	9.5	10	14.5	2.63*		[1.20, 5.78]
Relationship status							
Married/cohabitating	576	78.3	51	9.0	-	-	-
Single/other	156	21.2	11	7.4	0.80		[0.41, 1.55]
Country of birth							
Australia	614	83.4	53	8.8	-	-	-
Outside Australia	122	16.6	9	7.4	0.92		[0.45, 1.89]
Mental health variables							

PTSD							
PCL-4 score < 7	614	83.4	24	4.0	-	-	-
PCL-4 score ≥ 7	106	14.4	34	34.0	11.82***	[7.24, 19.31]	
Depression[b]							
PHQ-9 score < 5	583	79.2	25	4.3	-	-	-
PHQ-9 score ≥ 5	48	6.5	19	40.4	12.09***	[6.81, 21.48]	
Severe mental illness							
K6 score < 13	674	91.6	38	5.7	-	-	-
K6 score ≥ 13	36	4.9	20	55.6	15.84***	[9.26, 27.10]	

Note. Reference categories for categorical predictors in regression models are indicated by "-." DAR-5 = five-item Dimensions of Anger Reaction Scale; *OR* = odds ratio; PTSD = posttraumatic stress disorder; PCL-4 = PTSD Checklist for *DSM-IV*; PHQ-9 = nine-item Patient Health Questionnaire; K6 = six-item Kessler Psychological Distress Scale.

[a]Defined as a DAR-5 score of 12 or higher. [b]Probable major depression inferred if five of nine symptoms had been present with a frequency rating of "most days" or more often.

*p < .05. **p < .01. ***p < .001.

Table 3

Descriptive Statistics and Results from Logistic Regression Models Specifying Significant Anger Problems as a Predictor of Well-Being Indicators, Hostile Aggressive Behaviors, and Violence Exposure, Including Both Unadjusted (Model A) and Adjusted Models (Model B)

Variable	Total sample ($N = 736$)			Regression models					
				Model A			Model B[a]		
	M	*SD*	*n*	%	β	*OR*	95% CI	β	*OR*	95% CI
Well-being										
Life satisfaction	6.25	2.1			-.31**		[-.38, -.24]	-.18**		[-.25, -.11]
Suicidal ideation			45	6.1		8.68***	[4.34, 17.38]		4.18**	[1.73, 10.09]
Hostile aggressive behavior			190	25.8		12.98***	[8.07, 20.90]		9.41***	[5.32, 16.66]
Violence exposure										
Assault or violence			32	4.3		5.02***	[2.53, 9.96]		2.29*	[1.18, 4.41]
Threatened			37	5.0			[2.91,		2.13	[0.84,

by partner/former partner/family or household member	4.87***	8.16]	5.39]

Note. OR = odds ratio.

[a]Adjusted for gender, age, employment status, and probable posttraumatic stress disorder.

*$p < .05$. **$p < .01$. ***$p < .001$.