Men and women’s psychological outcomes in communities affected by bushfires

Anna Cavanagh  
School of Psychology, University of Wollongong  
Coralie J. Wilson  
Illawarra Health & Medical Research Institute, University of Wollongong  
David J. Kavanagh  
Institute of Health & Biomedical Innovation and School of Psychology & Counselling, Queensland University of Technology  
Peter Caputi  
Centre for Health Initiatives, School of Psychology, University of Wollongong

This paper aimed to identify men and women’s prevalence and predictors of psychological outcomes, as well as their coping strategies, in communities affected by the October 2013 bushfires in the Blue Mountains region of Australia. 189 participants took part in a paper-and-pencil or online survey that included closed and open-ended questions about their fire- and community-related experiences, psychological outcomes and coping strategies. Almost half of participants reported probable PTSD (45%), while 23% reported psychological distress and 16% reported heavy drinking, with men drinking significantly more than women (OR: 0.41, 95% CI: 0.18-0.91, p = .03). Psychological distress was predicted by higher level of risk during fires, property damage and lower perceived community cohesion, whereas PTSD was predicted by property damage and female gender. Participants named various coping strategies including seeking social and community support, sharing information and resources, and seeking help from professional and volunteer organisations. A few participants also observed gender differences in coping, i.e. some men were perceived to engage more in problem-solving coping, whereas women in accessing emotional-focused strategies. Findings indicate the need to further assess community resilience and how to draw on men and women’s strengths in order to rebuild and promote mental health and wellbeing post-fires.

In the last four decades, the frequency and intensity of natural disasters, such as floods and bushfires, has increased worldwide. This trend is predicted to continue due to climate change and global rise in temperatures that is slowly approaching the 2°C limit above pre-industrial levels (Confalonieri et al., 2007; Steffen & Hughes, 2013). Australia is particularly affected by these weather-related changes due to its extreme weather conditions. During the summer of 2012/2013, Australia experienced a series of extreme weather events, including record-breaking heatwaves of 7 consecutive days over 39°C (Steffen & Hughes, 2013). These extreme weather events contributed to the outbreak of a string of bushfires in the Blue Mountains Region, New South Wales, Australia, in October 2013. The October 2013 Blue Mountains bushfires led to the destruction of a total of approximately 200 properties and to the damage of a further 132 properties, affecting areas of Springwood, Winmalee, Mount Victoria, Mount Wilson and Bell (Bushfire Bulletin, 2013). It was one of the worst natural disasters in the history of the Blue Mountains region with an estimated revenue of over 100 million dollars lost as result of a decline in the local tourism industry (Donegan, 2014).

It has been well documented that the psychological costs of bushfires, resulting from the loss of human lives, injuries and destruction of properties, for the affected communities are significant. Psychological distress, depression, anxiety, post-traumatic stress disorder (PTSD) and increased alcohol consumption are most commonly reported by people who have been exposed to bushfires (Bryant et al., 2018; Forbes et al., 2015; Laugharne, Van de Watt, & Janca, 2011; Marshall, Schell, Elliott, Rayburn, & Jaycox, 2007; Raphael & Meldrum, 1993). In some
cases, these mental health impacts can be long-lasting. A study on the 1983 Ash Wednesday bushfires in Australia found that 1 year after the event, 42% of participants, and 20 months after the event 23% of participants, classified for depression, anxiety or PTSD (McFarlane, Clayer, & Bookless, 1997). In addition to assessing mental health prevalence, a growing body of research has explored factors that may impact the onset of mental health problems in the disaster context. Some of these include the extent of property damage, fear for loved ones or level of risk experienced during fires (Bryant et al., 2014; Forbes et al., 2015; Parslow, Jorm, & Christensen, 2006; Paveglio, Kooistra, Hall, & Pickering, 2016).

Although the psychological outcomes for people who witness destructive bushfires can be significant, and in some cases effects may be long-lasting, it has been recognised that most people are resilient against developing mental health problems (Bonanno, 2004; Parslow et al., 2006). Despite this recognition, there is limited research on the factors that potentially influence people’s resilience and their recovery following bushfires. Some of the factors that have been identified include social and community support but it remains unclear whether these factors may differ for different members of the community (Pooley, Cohen, & O’Connor, 2010).

Recently, some studies have found that men and women may experience and respond differently to the exposure of bushfires (Eriksen, Gill, & Head, 2010; Griffiths, 2010). A review on bushfires in Australia indicated that men may be more likely to stay and fight the fires as leaving and evacuating may be regarded as ‘weak’ or ‘cowardly’, whereas women may be more prone to evacuate early with their children (Griffiths, 2010). These potential gender differences in responding to bushfires may also have an impact on how men and women cope in the aftermath of fires. Research on the psychological outcomes of the 2009 Black Saturday bushfires in Australia found, for instance, that whilst women were more likely to experience elevated rates of PTSD and general anxiety, men were more likely to report an increase in alcohol abuse and risk taking behaviours post-fires (Weiss, Zara, & Parkinson, 2013; Zara & Parkinson, 2013). This may also relate to findings on men and women’s coping strategies for stress in general as it has been well established that women are more likely to use emotion-focused and social strategies, whereas men tend to use more behavioural, problem-focused techniques to manage their stressful experiences (Kelly, Tyrka, Prince, & Carpenter, 2008; Matud, 2004; Ptacek, Smith, & Dodge, 1994). While there is acknowledgement that bushfires in the Australian context may not be gender-neutral occurrences but rather events that could influence gender and identity roles, further research is required to identify men and women’s mental health and recovery needs.

In order to further optimise communities’ resilience post-fires, we need to know more about people’s coping strategies and sources of support and whether these differ for different members of the community. Consequently, this study aimed to estimate the prevalence and predictors of psychological outcomes for men and women in communities affected by the October 2013 bushfires in the Blue Mountains region in Australia, nine months post-fires. It specifically sought to test the following hypotheses: (1) Higher level of risk experienced during the fires, larger extent of property damage, lower perceived community cohesion and not seeking support from anyone predict higher levels of psychological distress, PTSD and alcohol use and (2) Men are more likely to report higher alcohol use, whereas women are more likely to report higher levels of psychological distress and PTSD. The paper also explores the community’s perceived sources of distress and support, as well as whether potential gender differences exist in managing the aftermath of the October 2013 bushfires.

**Method**

**Participants and Procedure**

Institutional ethical approval was granted for this study by the Human...
Research Ethics Committee, University of Wollongong (HE14/253). All participants provided informed consent to undertake this research. Participants (aged > 18 years) were recruited from communities in the Blue Mountains nine months after experiencing the bushfires in October 2013. Those bushfires included: (1) The Linksview Road Fire affecting the areas of Springwood and Winmalee, (2) the Mount York Road Fires affecting the areas of Mount Victoria and (3) the State Mine Fire affecting the areas of Mount Wilson and Bell. Each area was rated as high impact (houses lost > 6), medium impact (houses lost: 1-6) and low impact (some damage, no houses lost). People from the affected areas were invited to either complete an online or a paper-and-pencil survey that took approximately 20 minutes to complete. They were informed about the study through multiple newspaper advertisements and recruitment flyers that were distributed across the communities and relevant organisations.

After providing informed consent, participants began the survey. A total of 216 participants, (male = 65, female = 151), started the survey and 189 (male = 56, female = 133; 87%) completed it. Considering the number of items, a 13% dropout was expected (Hoerger, 2010). The majority of participants were born in Australia (male = 49, female = 120) with a minority born in a different country (male = 7, female = 13) including other Anglo-Saxon, European, Asian and African countries. After completing the survey, participants were provided with debriefing information together with online links to relevant websites and local support contacts.

Survey

Data for this study were collected via Survey Monkey software and by paper-and-pencil survey (Survey Monkey, 2015). As part of the survey, participants were asked to complete items on socio-demographic characteristics, experiences of the October 2013 bushfires, community support and attachment, and psychological outcomes. The survey included items sourced from the ‘Beyond Bushfires’ project that assessed psychological outcomes following the Australian Black Saturday bushfires (Gibbs et al., 2013), to facilitate comparison with previous research.

Fire-related experiences and community cohesion

Participants were asked to rate their level of risk for their own safety or family/friends during the October 2013 bushfires on a 5-point Likert scale ranging from 1 (‘no risk’) to 5 (‘extreme risk’). Participants were also asked whether their property was damaged or destroyed as a result of the October 2013 bushfires. Answers were scored as ‘no’, ‘yes, there was minor damage’, ‘yes, there was major damage’, or ‘yes, the property was destroyed’.

Participants were also asked about sources of support using an adapted version of the General Help-Seeking Questionnaire (GHSQ) (Wilson, Dean, Ciarrochi, & Rickwood, 2005). The GHSQ assesses participants’ likelihood of seeking help from personal or professional sources including family, friends or mental health professionals or whether they did not seek any support, using a 7-point scale ranging from 1 (“extremely unlikely”) to 7 (“extremely likely”) for different problem situations. For this paper, the GHSQ was adapted to enquire whether participants sought help following the problem situation of experiencing the October 2013 bushfires.

In addition, participants were asked about their perceptions of community cohesion using an adapted version of the Neighbourhood Cohesion Scale (NCS) (Buckner, 1988). The NCS includes 18 items that assess the concepts of attraction-to-neighbourhood and psychological sense of community on a 5-point Likert scale ranging from 1 (‘strongly disagree’) to 5 (‘strongly agree’). For the purpose of this study, only statements relating to psychological sense of community such as “I feel like I belong to this community” were included in the survey as these were found to be most relevant for assessing community attachment and resilience following the disaster of bushfires (Gibbs et al., 2013). A previous study has found the NCS subscale of psychological
The sense of community has achieved good internal consistency with Cronbach’s α of 0.82 and 0.83 (McCulloch, 2003). In the current study, the scale achieved sufficient internal consistency (α = .73).

**Psychological outcomes**

The psychological outcomes assessed for this study included psychological distress, PTSD and alcohol use. In addition to the subsequent measures, the survey asked whether participants had experienced any mental health problems prior to the October 2013 bushfires with answers scored as ‘yes’ or ‘no’. This question was included as a control variable to account for pre-existing mental health issues in the sample.

**Psychological distress.** The 21-item Depression Anxiety and Stress Scales (DASS-21) was used to assess levels of psychological distress (Lovibond & Lovibond, 1995). The DASS-21 is a self-report measure that comprises 21 items scored from 0 (‘did not apply to me at all over the last week’) to 3 (‘applied to me most of the time’). Rather than a diagnostic tool, the DASS-21 assesses depression, anxiety and stress on a continuum of severity. Moderate to extreme severity is indicated by a sum ≥ 7 on the 7-item Depression subscale, a sum ≥ 6 on the 7-item Anxiety subscale, or a sum ≥ 10 on the 7-item Stress subscale (Lovibond & Lovibond, 1995). In the remainder of this paper, depression, anxiety and stress are indicated by moderate to extreme levels of severity on the DASS-21 for the assessment of prevalence and the overall DASS-21 sum score is used in the assessment of predictors of psychological distress. The DASS-21 has achieved good to high internal consistency for each subscale in several different community samples with Cronbach’s α ranging from 0.80 to 0.95 (Antony, Bieling, Cox, Enns, & Swinson, 1998). Within this study, each subscale achieved high internal consistency (α = .87-.93).

**Post-Traumatic Stress Disorder.** Probable PTSD was assessed using an abbreviated version of the PTSD Checklist (PCL) (Bliese et al., 2008). The PCL consists of four items that are rated on a 5-point Likert scale ranging from 1 (‘not at all’) to 5 (‘extremely’). A score ≥ 7 on the abbreviated PCL indicates probable PTSD (Bliese et al., 2008; Bryant et al., 2014; Gibbs et al., 2013). The abbreviated PCL has been found to have similar diagnostic utility in comparison to the full-length PCL and has achieved high internal consistency (Price, Szafranski, Van Stolk-Cooke, & Gros, 2016). Similarly to other studies, within this study the PCL achieved high internal consistency (α = .88).

**Alcohol use.** Alcohol use was assessed using the Alcohol Use Disorder Identification Test (AUDIT-C) (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998). The AUDIT-C is an abbreviated version of the Alcohol Use Disorder Identification Test that includes its first three items relating to alcohol consumption, scored from 0-4. The AUDIT-C has been validated to detect heavy drinking in the general population with high internal consistency and sum scores ≥ 6 for men and ≥ 5 for women (Aalto, Alho, Halme, & Seppä, 2009; Bryant et al., 2014). Internal consistency for the AUDIT-C was sufficient within the current study (α = .71).

**Open-ended Questions**

Participants were asked about their perceptions of what has been most useful to them in terms of support and coping strategies following the October 2013 bushfires, as well as what has been most distressing to them. They were asked about their perceptions of whether they had noticed any differences between men and women in the way they coped with the aftermath of the October 2013 bushfires: if they answered ‘yes’ they were asked to describe these differences. These open-ended questions were used in addition to the closed questions in order to gather more in-depth information on the community’s perceived distress and coping strategies and potential differences between genders.

**Data Analyses**

Statistical analyses were conducted using the IBM SPSS Statistics 22 software (IBM Corp., 2013). Prevalence rates for psychological outcomes were calculated...
based on recommended cut-off levels for the individual measures. Chi-square and odds ratio analyses were performed to test for differences between men and women in psychological outcomes. Significant p values, as well as effect sizes $\phi$, were used to interpret findings. Based on Cohen (1992), the following guidelines were used to interpret $\phi$ effect sizes: 0.1 referred to a small effect, 0.3 to a moderate effect and 0.5 or more to a large effect.

To test for predictors of psychological outcomes, separate hierarchical multiple regression analyses were conducted. The predictor variables that were tested for each outcome variable included gender, level of risk experienced, extent of damage to property, whether support was sought and community cohesion. The sum scores of the psychological outcome variables psychological distress, PTSD and alcohol use were used for the regression analyses. For each regression analysis, the predictor variable pre-existing mental health problems was entered at step 1 to assess and control for their contribution to psychological outcomes, before entering the predictor variables gender, damage to property, level of risk experienced, whether support was sought afterwards and perceived community cohesion at step 2. Linear multiple regression analysis requires approximately 2 to 10 cases per predictor for an adequate estimation of regression coefficients, standard errors and confidence intervals (Austin & Steyerberg, 2015; Green, 1991).

Open-ended questions were analysed using the text analysis function in the survey software and questionnaire tool SurveyMonkey (Survey Monkey, 2015). The text analysis function automatically highlights distinguishing and frequently used words and phrases by participants. These distinguishing and frequently used words and phrases were then categorised by the authors according to themes relating to participants’ perceived distress and coping strategies for the October 2013 bushfires. After categorising the words and phrases, the text analysis function calculated the percentages of responses for each category (Survey Monkey, 2015).

### Results

#### Participants’ socio-demographic and fire-related characteristics

A majority of participants taking part in the study were born in Australia, had post-school qualifications and employment, lived in couple households and resided in the areas of Springwood and Winmalee at the time of the October 2013 bushfires (see Table 1). Overall men and women had similar socio-demographic characteristics including age, country of origin, employment, education level or household arrangements (all ps > .05, see Table 1).

Almost half of the participants experienced high to extreme risk for their own or their family or friends’ safety during the bushfires and about 20% of participants experienced major property damage as a result of the bushfires. In comparison to men, women reported a significantly higher level of safety risk during the bushfires ($\chi^2 (1) = 4.34, p < .05$) and were more likely to seek support from a family member or mental health professional after the bushfires had taken place ($\chi^2 (1) = 16.71, p < .001$).

#### Prevalence of psychological outcomes in communities affected by bushfires

About 20% of men and women reported elevated levels of psychological distress including depression, anxiety or stress (see Table 2). In comparison to men, women were significantly more likely to report probable PTSD (OR: 0.51, 95% CI: 0.26-0.97, $p = .04$), with a medium effect size ($\phi = 0.35$). In contrast, men were significantly more likely than women to report incidences of heavy drinking with a small effect size (OR: 0.41, 95% CI: 0.18-0.91, $p = .03$, $\phi = 0.16$). About 30% of participants experienced mental health problems prior to the bushfires.

#### Predictors of psychological outcomes

To estimate the impact of gender and fire-related experiences on psychological outcomes while controlling for the confounding variable of pre-existing mental health problems, hierarchical multiple regression analyses were performed. Prior to performing multiple regression analyses, assumptions of normality for criterion
### Table 1
Participants’ socio-demographic and fire-related characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Survey total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 189</td>
<td>n = 56</td>
<td>n = 133</td>
</tr>
<tr>
<td><strong>Socio-demographic</strong></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34 years</td>
<td>41 (22)</td>
<td>6 (11)</td>
<td>35 (26)</td>
</tr>
<tr>
<td>35-44 years</td>
<td>40 (22)</td>
<td>11 (20)</td>
<td>29 (22)</td>
</tr>
<tr>
<td>45-54 years</td>
<td>41 (22)</td>
<td>13 (23)</td>
<td>28 (21)</td>
</tr>
<tr>
<td>55-64 years</td>
<td>44 (23)</td>
<td>18 (32)</td>
<td>26 (20)</td>
</tr>
<tr>
<td>65 years and older</td>
<td>23 (12)</td>
<td>8 (14)</td>
<td>15 (11)</td>
</tr>
<tr>
<td>Country of origin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia-born</td>
<td>169 (89)</td>
<td>49 (88)</td>
<td>120 (90)</td>
</tr>
<tr>
<td>Other</td>
<td>20 (11)</td>
<td>7 (12)</td>
<td>13 (10)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School qualification only</td>
<td>40 (21)</td>
<td>10 (18)</td>
<td>30 (23)</td>
</tr>
<tr>
<td>Post-school qualification</td>
<td>149 (79)</td>
<td>46 (82)</td>
<td>103 (77)</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed/Student</td>
<td>140 (74)</td>
<td>43 (77)</td>
<td>97 (73)</td>
</tr>
<tr>
<td>Unemployed/Not in the labour force (e.g. retired)</td>
<td>49 (26)</td>
<td>13 (23)</td>
<td>36 (27)</td>
</tr>
<tr>
<td>Household</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Person living alone or with children</td>
<td>35 (19)</td>
<td>11 (20)</td>
<td>24 (18)</td>
</tr>
<tr>
<td>Couples with or without children</td>
<td>140 (74)</td>
<td>41 (73)</td>
<td>99 (74)</td>
</tr>
<tr>
<td>Other</td>
<td>14 (7)</td>
<td>4 (7)</td>
<td>10 (8)</td>
</tr>
<tr>
<td>Community</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Springwood and Winmalee area(^a)</td>
<td>138 (73)</td>
<td>36 (64)</td>
<td>102 (77)</td>
</tr>
<tr>
<td>Mount Victoria area(^b)</td>
<td>24 (13)</td>
<td>5 (9)</td>
<td>19 (14)</td>
</tr>
<tr>
<td>Mount Wilson and Bell area(^c)</td>
<td>4 (2)</td>
<td>2 (4)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Other</td>
<td>13 (23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fire-related</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Member support organisation (e.g. Rural Fire Service)</td>
<td>43 (23)</td>
<td>26 (46)</td>
<td>17 (13)</td>
</tr>
<tr>
<td>Level of risk during bushfires</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low or considerable risk</td>
<td>111 (59)</td>
<td>38 (67)</td>
<td>73 (55)</td>
</tr>
<tr>
<td>High or extreme risk</td>
<td>78 (41)</td>
<td>18 (32)</td>
<td>60 (45)</td>
</tr>
<tr>
<td>Property damage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No/minor damage</td>
<td>156 (82)</td>
<td>47 (84)</td>
<td>109 (82)</td>
</tr>
<tr>
<td>Major property damage/destruction</td>
<td>33 (18)</td>
<td>9 (16)</td>
<td>24 (18)</td>
</tr>
<tr>
<td>Sought support after the fires</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not seek any</td>
<td>53 (28)</td>
<td>25 (45)</td>
<td>28 (21)</td>
</tr>
<tr>
<td>Sought support (incl. family, mental health and helpline)</td>
<td>136 (72)</td>
<td>31 (55)</td>
<td>112 (79)</td>
</tr>
</tbody>
</table>

**Note.**

\(^a\) High-impact (houses lost > 6).
\(^b\) Medium-impact (houses lost: 1-6).
\(^c\) Low-impact (some damage, no houses lost).
variables and absence of multicollinearity were checked. Results of assumption testing indicated that the criterion variables were skewed and not normally distributed. Multicollinearity testing showed that predictor variables did not correlate highly (all variance inflation factors < 1 and Mahalanobis Distance values < 16) (Field, 2005).

Table 3 presents the results of the multiple regression analyses, including unstandardized (B) and standardised (β) beta coefficients, as well as squared semi-partial correlations (sr2) for variables associated with psychological distress, PTSD and alcohol use. For psychological distress, results show that after controlling for the impact of pre-existing mental health problems at step 1, the final model at step 2 explained 25% of the variance and was a significant predictor of psychological distress, adjusted R2 = 0.254, F (6, 180) = 11.58, p = .000, indicating a moderate effect (Cohen, 1988). When mental health problems were controlled for, the model with the remaining predictor variables accounted for an additional 19% of variance of psychological distress, (R2 change = 0.192).

As can be seen in Table 3, the variables that significantly predicted psychological distress included level of risk during the fires, property damage and perceived community cohesion. Note that the beta coefficients for the predictor variable community cohesion were minus, indicating that the higher the levels of perceived community cohesion, the lower the levels of psychological distress.

For PTSD, results indicate that while controlling for pre-existing mental health problems, the final model at step 2 was a significant predictor of PTSD, F (6, 180) = 15.51, p = .000, accounting for 34% of the variance, adjusted R2 = 0.341, indicating a moderate effect (Cohen, 1988). When mental health problems were controlled for, the model with the remaining predictor variables accounted for an additional 30% of variance of PTSD (R2 change = 0.295). As shown in Table 3, the variables female gender and property damage significantly predicted whether participants experienced PTSD symptoms (see Table 3). After controlling for the effect of pre-existing mental health problems, the final model for alcohol use was not significant, F (6, 180) = 2.18, p = 0.47. The only significant predictor was male.
Table 3
Impact of gender, pre-existing mental health problems and fire-related characteristics on psychological outcomes

<table>
<thead>
<tr>
<th>Variables</th>
<th>Psychological distress&lt;sup&gt;a&lt;/sup&gt;</th>
<th>PTSD&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Alcohol use&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>β</td>
<td>sr²</td>
</tr>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mental health problems prior to fires</td>
<td>7.31</td>
<td>0.29&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.086</td>
</tr>
<tr>
<td>Gender</td>
<td>-2.43</td>
<td>-0.10</td>
<td></td>
</tr>
<tr>
<td>Level of risk experienced</td>
<td>3.46</td>
<td>0.15&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0.021</td>
</tr>
<tr>
<td>Property damage</td>
<td>9.45</td>
<td>0.31&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.095</td>
</tr>
<tr>
<td>Whether support was sought after the fires</td>
<td>0.62</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Community cohesion</td>
<td>-0.69</td>
<td>-0.23&lt;sup&gt;**&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Note.
<sup>a</sup> Relates to DASS-21 sum score.
<sup>b</sup> Relates to PCL sum score.
<sup>c</sup> Relates to AUDIT-C sum score.
<sup>*</sup> p < .05.
<sup>**</sup> p < .01.
<sup>***</sup> p < .001.

gender, explaining 47% of variability in alcohol use, adjusted R² = 0.037 (see Table 3). When mental health problems were controlled for, the model with the remaining predictor variables accounted for an additional 7% of variance of alcohol use, (R² change = 0.067).

Open-ended questions about community’s perceived distress and coping strategies
Several themes emerged from participants’ responses regarding perceptions of their most distressing experiences as a result of the October 2013 bushfires (see Table 4). The most prominent theme related to participants’ direct fire and evacuation experiences (33%). Participants reported that it was highly distressing to witness the actual fire and its damage, as well as being fearful and concerned for loved ones. Damage to property and loss of material and sentimental possessions was also reported as highly distressing (26%). This included, for instance, the loss of childhood memories and dearly loved pets, as well as dealing with the rebuilding process. Another frequent theme included emotions and reflections after the bushfires took place (14%). Participants mentioned worries about experiencing future fires, concerns about their children’s mental health and feeling anxious when being reminded of the fires, e.g. when seeing or smelling smoke. Witnessing other people in the community losing their homes (12%), as well as mismanagement by services (9%) and negative media reporting (6%) were also described as sources of distress for some participants.

Despite the distressing experiences resulting from the October 2013 bushfires, participants named multiple sources of support and strategies of coping. These included most predominantly the perceived strength of the community members to come together and support each other (48%). Participants detailed the many efforts of
family, friends and neighbours to listen to each other in times of distress, to organise community events and to rebuild and repair damaged houses together. In addition, some participants praised the work of local and professional organisations, such as the work of the fire brigades, Salvation Army, Red Cross and numerous evacuation and mental health workers and other services (22%). Although not all participants made use of offered services, many stated “just knowing they were there” was sufficient. Another source of support that participants perceived as helpful included donations and the offering of temporary accommodation to people who had lost their homes (15%). A few participants also appreciated information sessions and materials on how to manage stress and mental health issues and how to best prepare for future fires (9%).

Several themes about perceived potential differences between men and women’s coping strategies emerged from the data. The most frequent theme was perceived gender differences in verbal and emotional
expression (40%), see Table 5. Some participants suggested that men were generally less likely to talk about their feelings and experiences than women. Another theme related to help seeking and accessing support (19%). Some participants were of the opinion that men were less likely to seek professional or personal support in comparison to women. A few participants also perceived differences between men and women in problem solving and behavioural activation (17%). Some participants felt that men responded in more active and practical ways in response to the October 2013 bushfires, while other participants saw women as more assertive in rebuilding. Several participants noted that some men had struggled with the loss of their traditional role in protecting and providing for the family after the bushfires took place. However, others reported that there were no differences between men and women in coping with the October 2013 bushfires, or that differences were due to individual circumstances rather than gender (13%).

Discussion

This study aimed to identify men and women’s prevalence and predictors of psychological outcomes and their coping strategies in communities affected by the October 2013 bushfires in the Blue Mountains region. About 20% of participants experienced elevated rates of psychological distress and 16% reported heavy alcohol use following the exposure of the bushfires. These rates correspond to other studies that found increased alcohol consumption and psychological problems 1 year post-disaster (Boscarino, Adams, & Galea, 2006). Almost half of the participants in the current study classified for probable PTSD. Although direct comparisons are difficult to achieve because of differences in sampling methods and assessment tools, the prevalence of PTSD in the current study appears to be comparable or higher to PTSD rates reported in other Australian studies on bushfires (Bryant et al., 2014; McFarlane et al., 1997). PTSD might have been particularly prevalent in the sample of this study as most participants who took part were from areas that suffered a high impact of
The prevalence of PTSD and other mental health symptoms is likely to further reduce as time progresses. Previous research has found that psychological problems significantly improve by 2 years and 5 years post-disaster (Bryant et al., 2018; Norris, Friedman, & Watson, 2002). When examining the prevalence of psychological outcomes, it needs to be taken into account that about 30% of participants in the current study experienced mental health problems prior to the bushfires. Prevalence rates in this sample may therefore not be entirely due to the exposure of bushfires but likely due to an array of other factors, some of them not fire-related.

After controlling for the impact of pre-existing mental health problems, results of the regression analyses showed that people’s level of psychological distress was predicted by their level of risk experienced during the fires, the extent of property damage and their perception of community cohesion. This was partly to be expected as previous research has shown that factors that reflect the degree of the impact of bushfires, such as severity of property damage and risk to life, can significantly influence people’s mental health outcomes (Laugharne et al., 2011; Marshall et al., 2007).

However, a novel finding of this study was the effect of participants’ perceptions of community cohesion on levels of psychological distress. Specifically, results indicated that participants who scored higher on community cohesion, measured for this study as participants’ attachment and sense of belonging to their community, had lower levels of psychological distress. This indicates the possibly protective function of a strong sense of community against developing severe psychological distress post-disaster.

In contrast to psychological distress, PTSD was predicted by female gender and property damage but not by people’s level of risk during the fires, their perception of community cohesion or whether they sought support after the fires. While the exact reasons underlying this finding are unclear, it may be that people’s level of risk experienced during the fires were felt more acutely, whereas property damage may present a more chronic reminder of the bushfires, and thus might be more likely to contribute to PTSD symptoms. Surprisingly, results indicated that alcohol use was not predicted by any of the fire-related variables or by people’s perception of community cohesion or support systems but by male gender. This shows that alcohol consumption reported in the current study may not be related to the exposure to bushfires but may potentially be of an ongoing, chronic nature.

Furthermore, the gender differences in PTSD and alcohol use reported in this study correlate with data from the general population, which indicate that alcohol misuse is more commonly reported in men and PTSD is more commonly reported in women (Slade, Johnston, Oakley Browne, Andrews, & Whiteford, 2009). Although the underlying reasons for these gender differences remain unclear, it has previously been suggested that men and women use different strategies to regulate their emotions (Forbes et al., 2015; Nolen-Hoeksema, 2012). Men have been reported to use distracting and avoidance behaviours, such as increased alcohol use, whereas women have been found to be more prone to ruminating when feeling distressed, possibly leading to higher psychopathology (Nolen-Hoeksema, 2012). Differing social roles and gender norms are likely to influence these responses to psychological distress and the use of emotion regulation strategies (Addis, 2008). For instance, it may be more socially acceptable and consistent with masculine gender norms for men to express their psychological distress through externalising and avoidant behaviours, whereas women might be more prone to focus on and discuss the distressing event in order to process it, which is more consistent with feminine gender norms. These existing gender differences in the general context may have been amplified in the context of bushfires.
which encourages risk taking behaviours (Griffiths, 2010).

The inclusion of open-ended questions gave participants space to provide more detail about their lived experiences and perceptions. Consistent with the quantitative results of this study, findings of the open-ended questions indicated that participants perceived damage to property and loss of belongings as highly distressing. In particular, some participants mentioned that losing their pet was incredibly painful to them. The uncertainty and concerns for loved ones during the fires and evacuation was described by many participants as very distressing, as well as the reflections about one’s decisions on the day and strong emotions felt afterwards. Similarly to previous research, connectedness to community, termed ‘community spirit’ by some participants, and social support was defined as most helpful in coping with the aftermath of the bushfires (Pooley et al., 2010). This shows the importance of intervention programs to be community-centred and to facilitate community processes that respond to recovery needs. According to Gordon (2004), fire-affected communities undergo significant changes to their social and physical environment that may lead to fractions within different groups in the community. Dynamic interventions that acknowledge pre-disaster social support systems, in combination with introducing new communication channels that allow space for change, are therefore likely to be most effective in responding to recovery needs (Gordon, 2004). This corresponds partially to what participants reported in this study as many highlighted the invaluable support of professional and fire-specific organisations such as the work of the fire brigades, a bushfire recovery centre, numerous volunteer organisations and charities that facilitated the sharing of information, resources and stories and allowed for the formation of a community identity post-fires.

In order to facilitate adaptive recovery processes in fire-affected communities, it may also be necessary to further explore whether recovery needs may differ for different members of the community. For instance, some participants perceived differences in men and women’s use of coping strategies following bushfires. Some participants reported that in their opinion men were generally less likely than women to talk about their feelings and experiences and were more likely to use problem-solving strategies, whereas women were reported to more readily talk about their experiences and seek personal and professional support. These perceived gender differences in coping and seeking help respond to previous literature that reports some men may be less likely to seek support when distressed (Galdas, Cheater, & Marshall, 2005; Möller-Leimkühler, 2002) and may be less likely to employ emotion-focused styles in comparison to women (Matud, 2004; Nolen-Hoeksema, 2012). Other participants noted that the impact of bushfires might influence men and women’s identity and roles in different ways. For instance, some believed that men who identify with the traditional role as protector and provider for the family may find it particularly difficult to cope with the destructive aftermath of bushfires. This shows that as much as a natural disaster is a physical event, it may also be perceived as a social and psychological phenomenon for some people that can impact and shift some community member’s identity and roles.

Limitations
This study has several limitations. First, the sample size is small, implying the sample may not be representative of each affected community. Recruiting from communities affected by bushfires was difficult, as some community members had relocated after the bushfires had taken place and were not easily reached. Consequently, certain members of the community might have been more likely to participate in the research than others, leading to selection bias. There might have also been research exhaustion present in the affected communities, as several different organisations had already undertaken research in the areas in the past. Importantly, fewer men than women participated in the study. The smaller sample
size of men implies that results may not be representative of the overall male community in the Blue Mountains region. Furthermore, unequal sample sizes of men and women may have led to either an under- or over-presentation of gender differences in psychological outcomes. Including more men in future studies will reduce the existing gender bias and lead to more accurate and representative results of men’s and women’s psychological outcomes. It is known that men are generally more difficult to engage in research participation than women (Patel, Doku, & Tennakoon, 2003). One way of overcoming this may be to specifically target men in order to increase their research participation. Also, it is important to note that almost half of the men who participated in the study (compared to only 13% women) were involved in a support organisation, such as the Rural Fire Service, which most likely influenced people’s responses to the bushfires and how they coped. Regardless of gender, members of the Rural Fire Service may generally be more inclined to use pragmatic, problem-solving coping strategies, in comparison to non-members who are less familiar with bushfires. The membership of a support organisation such as the Rural Fire Service might have therefore potentially biased results and led to an over-estimation of perceived gender differences in the sample. 

In regards to the statistical analyses, there are several limitations that are noteworthy. Some of the predictor analysis of the multiple regression analyses were categorical in nature (e.g. gender and whether support was sought). Although they were re-coded as dummy variables, the use of categorical variables in multiple regression analyses is potentially problematic. The criterion variables were skewed and not normally distributed, which could have biased results of the multiple regression analyses.

Finally, it needs to be emphasised that results from the open questions are not actual observed differences but rather relate to people’s perceptions of what happened and their lived experiences. Thus, the data from the open-ended questions is limited in constituting an absolute truth and rather should be viewed as a reflection of people’s beliefs about the course of events.

Conclusions

The current study shows that although a considerable percentage of participants reported psychological distress and PTSD symptoms nine months after experiencing bushfires, participants’ sense of community belonging and cohesion helped to mitigate their psychological distress. The study also provided evidence that certain community subgroups, including community members with pre-existing mental health problems, as well as members who experienced high levels of risk during the fires and extent of property damage, were particularly vulnerable to psychological distress and PTSD. Systematic screening to identify these high risk sub-groups post-fires may be useful so that support can be offered early and psychological problems may be prevented from escalating.

The finding that women were more likely to report PTSD symptoms and men were more likely to report heavy drinking and use different more pragmatic coping strategies may also suggest that it may be useful to specifically tailor current intervention programs to meet both men’s and women’s needs post-fires. This might, for instance, include the use of gender-sensitive language and behavioural interventions to particularly engage men with support services, as well as providing safe spaces for women where they feel emotionally supported. Finally, there is a need for future research to further assess community resilience and how to draw on men’s and women’s strengths in order to rebuild and promote mental health and wellbeing in fire-affected communities.

References


Acknowledgements
The content of this review is informed by a larger PhD research program being led by the first author and supervised by the second, third and fourth author. The work for this manuscript was supported by an Australian Postgraduate Award provided by the University of Wollongong to the first author. The authors wish to thank Dr Rob Gordon for his advice and consultation in regard to this project. They would also like to thank David Jones, Tony Jarrett, Andrew Kaye and Kathleen Oakes from the Rural Fire Service and psychologist Mary Karlson for their endorsement and support with promoting the project across fire-affected communities.
Many thanks also to Anne Crestani and Eleanor Mann from Gateway Family Services for her advice and consultation regarding survey development and community recruitment.

Address for Correspondence
Anna Cavanagh
School of Psychology
University of Wollongong, Wollongong, Australia.
Email: ac316@uowmail.edu.au

Author Biographies
Dr Anna Cavanagh is a clinical psychologist and researcher at Centre for Addiction Medicine, Cumberland Hospital, and School of Psychology, University of Wollongong. Anna is passionate about improving community’s access to treatment and bettering mental health outcomes for people impacted by trauma and substance use issues.

Dr Coralie Wilson is the Head of Personal and Professional Development for the School of Medicine, University of Wollongong & affiliated researcher with the Illawarra Health and Medical Research Institute, Wollongong, NSW.

Professor David Kavanagh is a clinical psychology researcher at the Centre for Children’s Health Research, Institute of Health & Biomedical Innovation and School of Psychology & Counselling at Queensland University of Technology. His current research is primarily on digital mental health and on imagery-based motivational interventions, including ones for substance misuse.

Professor Peter Caputi is currently Head, School of Psychology. His research interests are in applied health psychology and occupational psychology. Currently, his research focus is on mental health in the workplace.