

The impact of bushfires on student wellbeing and student learning

Environmental scan

Centre for Education Statistics and Evaluation



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Background to this environmental scan

The catastrophic bushfires that occurred across New South Wales (NSW) in late 2019 to early 2020 have had a significant impact on school operations. In response to the fires, the NSW Premier declared a State of Emergency on three separate occasions and the bushfires received wide media coverage both in Australia and internationally. A large number of schools temporarily ceased operation during the bushfire crisis.

In February 2020, the NSW Department of Education (the department) formed a new Bushfire Relief Strategy Directorate charged with developing a strategy that provides direction for managing future bushfire seasons. The strategy outlines the department's approach to assisting schools to recover from bushfires across the short, medium and long term.

Scope and structure of this paper

This paper aims to support the strategy by bringing together the available research on the potential impact of natural disasters on student wellbeing and student learning, contextualised to school education in NSW. The first section describes the research on students' distress and mental health in the short-term and long-term stages after bushfires and other natural disasters. The second section looks at the potential impact of bushfires on student learning and considers the implications for NSW schools in relation to student learning, student assessment, and disaster education.

Sources of information

This paper is structured as an environmental scan – a form of review that synthesises information from a range of sources to inform an organisation's decision-making. Sources used in this paper include:

- research published in peer-reviewed academic journals, focusing on studies conducted after previous bushfires in Australia and, where applicable, other disasters in Australia and overseas
- 'grey literature', including policy statements, government reports, media reports and guidelines from professional associations
- qualitative information from school leaders in regions affected by the 2019-2020 bushfires. The Bushfire Relief Strategy Directorate gathered this feedback through 49 school visits and 47 online meetings (as at 1 June 2020), and collated findings into key themes relating to a) the impact of the bushfires on their schools and communities, and b) the need for a bushfire relief strategy.

Executive summary

“2019/20 was the most devastating bush fire season in NSW history, truly unparalleled in more ways than one. Over the course of the season, fires spread south from the Queensland border to the Victorian border, leaving huge numbers of people displaced.”
(NSW Rural Fire Service 2020 p. 2).

The 2019-2020 bushfires exposed many NSW students and school communities to potential trauma. When bushfires threaten homes and communities they threaten people’s physical and emotional safety and expose them to high levels of uncertainty and stress. It is normal for children and young people to be overwhelmed and experience strong physical and emotional reactions after experiencing bushfires. There is no one ‘standard’ pattern of reactions, and it is important to recognise that children and young people have different needs to those of adults and differ in how they understand, express and recover from trauma and distress.

Children and young people face additional challenges when bushfires interrupt their education. The fires may impede their physical access to school, destroy school facilities, or cause teachers to be unavailable as they deal with the crisis. Some students experience further academic and social disruption from relocating to another school in a new area. When they do return to school, students may still be experiencing stress and trauma reactions that affect their concentration and memory, potentially contributing to long-term impairments in their academic performance (Gibbs et al. 2019).

The literature highlights the central role of community support. Children and young people are members of families, peer groups, schools and other social and cultural communities that interact to either buffer or exacerbate a disaster’s impact (Peek et al. 2018). In the context of Australian bushfires, it is clear from the research and communication from principals and school leaders in bushfire-affected areas that schools play a key role in supporting their communities throughout bushfire preparation, planning, relief and recovery.

Main findings

Following are key findings from this paper in relation to the potential impact of bushfires on student wellbeing and student learning.

In relation to student wellbeing:

- Trauma is a personal experience unique to each individual. Understanding students' normal responses to bushfire events in the immediate aftermath and following months can help schools to support students in their recovery and recognise when they might need to seek extra help.
- While the majority of children and young people who experience disaster-related distress return to their normal state of wellbeing over time, a substantial minority experience more intense and persistent reactions.
- Some students are more vulnerable than others to developing problems following bushfire events. Risk factors include:
 - pre-bushfire experiences and context (for example, having prior traumatic experiences, or fewer financial or social resources, a pre-existing illness or disability, or limited family support)
 - exposure to, and interpretation of the event (for example, the extent to which students witnessed terrifying events, suffered losses, or feared for their own or a loved one's safety)
 - post-bushfire physical, social and emotional disruption (for example, relocation, family conflict or violence, separation from social networks, an undermined sense of self, or safety and security issues).
- Families affected by bushfires may be reluctant to seek professional mental health support and often have no experience in seeking or accepting help from agencies, according to fieldworkers experienced in disaster relief. It is important to take a coordinated approach to mental health service provision that is tailored to the local community context and needs.
- Schools can play an important role in supporting students' wellbeing after bushfires by restoring hope and predictable routines in a safe and stable environment.

In relation to student learning and assessment:

- Natural disasters such as bushfires can have immediate, short-term and long-term impacts on student learning. Further research is needed on the long-term impacts of bushfire events.
- The degree of disruption to student learning can be influenced by the degree to which schools have been affected by fire, although this is not always the case.
- The interaction between environmental stressors such as bushfires and high stakes examinations such as the HSC may exacerbate underlying stress for students who are already vulnerable.
- Communication with students and their parents during bushfire events is a key priority for principals, especially in relation to the HSC.
- Schools have a critical role in preparing children and young people to face natural disasters.
- The vulnerability of students is reduced through information provided via disaster education programs.

Student wellbeing

The sudden, disruptive nature of bushfires exposes children and young people to uncertainty and stress. They are unlikely to maintain strong psychological wellbeing in the immediate to short-term stages post-disaster (Australian Red Cross & Australian Psychological Society 2013). Children and young people may be more vulnerable than adults to the social and psychological harms of bushfires and other natural disasters, as they typically have less developed coping strategies and are more reliant on adults for their physical safety and emotional support (Allen et al. 2007; Peek et al. 2018).

When children and young people experience distress and trauma from exposure to a natural disaster, there is strong evidence that most return to their normal state of wellbeing in the following weeks, particularly when it is a one-time incident and they have family support. However, a substantial minority of those affected experience more intense and/or long-lasting reactions and mental health problems (Bonanno et al. 2010; Lai et al. 2017; Australian Psychological Society 2019).

Acknowledging the growing evidence for the inextricable link between wellbeing and learning in school settings (Centre for Education Statistics and Evaluation 2018), this section of the paper summarises the research on the impacts of natural disasters on students' mental health and wellbeing. It recognises the important role schools can play to support the wellbeing and learning of students impacted by bushfires through using trauma-informed practice, a 'framework in which education systems, schools and school staff understand, recognise and respond effectively to the impact of trauma on students' (Centre for Education Statistics and Evaluation 2020 p. 4).

Findings are also considered in the context of NSW education systems and the government system's policy and initiatives to support schools in creating a planned, evidence-based approach to promote student wellbeing (for more information see Centre for Education Statistics and Evaluation 2018). Of particular relevance is the ongoing work to support professional learning in trauma-informed practice as part of the broader disability strategy (NSW Department of Education n.d; Centre for Education Statistics and Evaluation 2020).

Immediate to short-term impact

It is normal for children and young people to have strong emotional and/or physical reactions in the immediate aftermath and weeks following a bushfire disaster (Australian Red Cross & Australian Psychological Society 2013). For most people, these reactions gradually subside over time as they adapt emotionally and deal with the practical issues caused by the events. Understanding students' normal responses to bushfire events in the immediate aftermath and following months can help schools to support students in their recovery and recognise when they might need to seek extra help.

Students' perceptions of stressful events

Trauma is often associated with life-threatening events. However, trauma is a personal experience unique to each individual. People can experience the same potentially traumatic event in different ways and have different responses. The Trauma Centre of Australia therefore defines trauma as, 'a psychological wound that has occurred due to a person's perception of a stressful event' (2013). In line with this, the department's resources define a traumatic event as one that 'exceeds a person's capacity to cope with it' (Centre for Education Statistics and Evaluation 2020, p. 2).

The emphasis on the perception of stress is particularly important in the context of the effects on students. Children and young people may perceive stressful events in very different ways to adults. For example, during a bushfire, a significant stressor for parents may be the threat to their own or their child's life, while children may perceive separation from their parents as the greater threat (Kenardy et al. 2010). Other stressors may hold more significance for children than for adults, such as the loss of a pet or particular possessions (Kenardy et al. 2010).

When supporting children or young people after bushfires, an awareness of how they perceived danger during the event can help adults to better understand the child or young person's responses and how to support them in recovery (Kenardy et al. 2010).

The impact of indirect exposure

While this paper is mostly focused on supporting students who were directly affected by the bushfires, it is important to note that many students will have been indirectly exposed through the media or conversations. In NSW, the 2019-2020 bushfires spanned several months and received considerable media coverage.

There is little research on how media reporting and imagery affect students' responses to natural disasters, although the few studies that are available suggest the media can play an important role. In the Australasian context, a series of focus groups with Year 5 students in New Zealand found that media depictions of the Christchurch earthquakes often caused strong stress reactions such as crying and feeling physically sick (King & Tarrant 2013). Another study in the United States sampled students in Grades 4 to 8 who had been exposed to two hurricane disasters (Katrina and Gustav). Watching greater amounts of television coverage of the second hurricane was associated with having higher post-disaster stress symptoms, and this effect was stronger in students with pre-existing hurricane-related stress (Weems et al. 2012).

Research on television viewing more broadly suggests that children's unmonitored exposure to television is associated with heightened feelings of their personal vulnerability to threats such as natural disasters and terrorism (Comer et al. 2008). Noting that media exposure may also play a positive role by highlighting students' resilience and their achievements in the years following bushfires (Nye 2016), taken together, the limited research available suggests it is unrestricted media exposure that may exacerbate students' disaster-related stress. Expert advice on supporting children after bushfires often suggests monitoring children's access to media coverage and helping them to understand what they view (for example, Emerging Minds Australia 2018, Raising Children Network Australia 2020, NSW Department of Education 2020).

Common reactions by age group

The Australian Psychological Society (2019) emphasises that there is no single pattern of stress responses to look out for in children and young people. Instead they suggest paying attention to changes in their normal behaviour. The kinds of behaviours exhibited tend to vary across age groups. A student's ability to make sense of, and cope with, bushfires and other disasters is influenced by their physical, cognitive and emotional development (Peek 2008). Students of different ages and developmental levels also have different social and communication skills, affecting their ability to express complex emotions and seek help when they need it (Substance Abuse and Mental Health Services Administration 2018).

Common behavioural responses by age group are included in Table 1. It is not an exhaustive list, but rather summarises the behavioural changes often seen in different age groups after experiencing disasters. Not all children and young people display these reactions. They may only experience one or two, or even none, or respond differently at different times. Although these reactions can be distressing to experience and witness, they are not always problematic – sometimes they reflect students' efforts to adapt and cope with the stress of bushfire events (Stafford et al. 2009).

In addition to the behaviours in Table 1, students of all ages might express physical complaints such as headaches or nausea, or regress to earlier behaviours they had grown out of (for example, bedwetting, clinging to parents or caregivers, or competing with siblings for attention). Difficulties with school are also common in students of all age groups, often expressed as a reluctance or refusal to attend school and a decline in school performance.

Table 1**Common stress-related behaviours of children and young people after disasters**

Early childhood and preschool (1-5 years)	<ul style="list-style-type: none"> – nervousness – anxiety about separation from parents – irritability, aggression and disobedience – repetitive talking about, or play related to the event – regression to earlier behaviours such as bedwetting or thumb-sucking
Primary (5-11 years)	<ul style="list-style-type: none"> – problems with memory and concentration – withdrawal from friends and family – irritability, aggression and disobedience – repetitive talking about their experiences – a reluctance to attend school and a drop in academic performance
Early secondary (11-14 years)	<ul style="list-style-type: none"> – loss of interest in social activities and hobbies – a drop in school performance – problems with memory and concentration – an increase in conflict with siblings, parents or friends – reluctance to attend school and a drop in academic performance
Later secondary (14-18 years)	<ul style="list-style-type: none"> – an increase or decrease in physical activity – antisocial behaviour (for example, stealing or vandalism) – an increase in concentration problems – substance use – a reluctance to attend school and a drop in academic performance

Adapted from Columbia University National Center for Disaster Preparedness 2018. For reviews of the supporting research, see Peek et al. 2008, Bonanno et al. 2010, Substance Abuse and Mental Health Services Administration 2018).

Medium-term to long-term impact

Prevalence of psychological distress

The developmental psychology literature agrees that stressful events may affect children and young people in different ways to adults. Children and young people have different levels of physical, emotional and cognitive development, as well as age-appropriate differences in their peer and family relationships (Dunn et al. 2017; McDermott & Palmer 2002; Peek et al. 2018). As with adults, the individual outcomes of children and young people affected by bushfires are informed by a number of factors. These are discussed further below (see 'Vulnerability and protective factors') and include demographic and other contextual factors prior to the bushfires, the nature of the bushfire experiences, and further life stress and disruption caused by the bushfires.

Studies of natural disasters and the mental health consequences for young people, outlined below, consistently convey two key messages that are equally important in the context of supporting students:

- Children and young people tend to show resilience and most do return to their normal state of mental health and wellbeing within the first few months.
- A substantial minority develop severe and ongoing psychological distress from experiencing the trauma of bushfires.

The estimated rates of people in the second group vary considerably across studies, in part because the literature covers a wide range of disasters, outcomes, and age ranges and other subgroups of the population. The majority of research on children and young people looks at symptoms of post-traumatic stress, though as the literature grows it is expanding to include other psychosocial outcomes such as symptoms of depression, anxiety, substance use and other maladaptive behavioural problems (Self-Brown et al. 2017; Rubens et al. 2018).

In relation to students affected by bushfires in Australia, studies conducted after previous disasters have found that psychological problems are relatively common, with rates of 9% to 27% of students reporting moderate to severe symptoms of psychological problems from six months to over a year after the event, as outlined below.

Six months after the 2003 Canberra bushfires, McDermott et al. (2005) followed up students in a school that had been directly affected by the fires. They found that 12% of students reported symptoms of moderate post-traumatic stress disorder (PTSD) related to the bushfire while 9% reported severe symptoms, and 23% of students reported abnormally high levels of emotional distress. Rates were particularly high in younger students and those who had been more exposed to the bushfire or perceived a higher level of threat.

Similar rates were found in students affected by the 1994 bushfire in the NSW Sutherland Shire, with 12% of students reporting moderate to severe levels of emotional distress six months after the disaster (McDermott & Palmer 2002). This study found a more complex influence of student age, with primary school students (Years 4 to 6) at greater risk for depressive symptoms while students in middle secondary (Years 8 to 10) were at greater risk for PTSD symptoms.

Another study reported even higher rates of disaster-related distress. In the 11 to 15 months following the 2005 South Australian bushfire in the Lower Eyre Peninsula, 27% of students in two directly-affected schools reported moderate to severe levels of PTSD symptoms (Yelland et al. 2010). Again, younger students reported greater symptom severity, even after adjusting for the level of exposure to the fire. Students were also more likely to report persistent symptoms where they had perceived a greater threat to their own or others' lives during the disaster, and when they had experienced ongoing loss or disruption (for example, moving home) in the following months.

Given that trauma is unique to each person, depending on factors such as prior life experiences, age and gender and the nature of the event and its aftermath (Centre for Education Statistics and Evaluation 2020), it is unclear whether mental health problems in students affected by the 2019-2020 bushfires will reflect the rates found after previous bushfire disasters. The 2019-2020 disaster is particularly unique in that it was immediately followed by the COVID-19 pandemic. In their feedback relating to the department's bushfire relief strategy, school leaders expressed their strong concern about whether the pandemic and the resulting social distancing measures could have exacerbated student distress or made it more difficult to identify students in need of further support. Further research would be needed to examine how the impacts of these two major events interacted to affect students' health and wellbeing.

Long-term trajectories

Although there is consensus that children's long-term responses to disasters are developmentally different from those of adults (Bonanno et al. 2010), there are very few studies that assess children's outcomes at multiple time points beyond the first year after the disaster. Lai et al. (2017) reviewed studies that had looked longitudinally at the trajectories of disaster-related trauma in children and young people. They identified eight studies that covered 8,306 people aged 3 to 18 years who had been exposed to a disaster. They found that all the studies showed evidence for three main post-disaster trajectories:

- **Resilience:** Persistently low post-traumatic stress symptoms over time
- **Recovery:** Initially high levels of post-traumatic stress symptoms that decline over time
- **Chronic:** Persistently high post-traumatic stress symptoms over time.

Overall, children were more likely to show the 'resilience' trajectory than either the 'recovery' or 'chronic' trajectories, although the actual proportions in each group varied widely between studies. Studies of adults typically find a fourth trajectory, in which post-traumatic stress symptoms are delayed until six months after the disaster, or fluctuate over time (Bonanno et al. 2010, Saksuma et al. 2020). However, Lai et al. (2017), found only limited evidence for a delayed or fluctuating trajectory of post-traumatic stress among children.

One of very few studies on students' long-term outcomes in the context of Australian bushfires followed up students who experienced the 1983 Ash Wednesday bushfires. Twenty years after the fires, those who had been exposed to the bushfires had slightly higher rates of anxiety and depression symptoms compared with a matched control group who had not been exposed (McFarlane & Van Hooff 2009).

A more recent study examined the academic outcomes of students four years after the 2009 Black Saturday bushfires in Victoria (Gibbs et al. 2019). The researchers make the point that while the direct impact of disaster-related distress subsides over time for most students, it is also important to consider any secondary effects that may persist over longer periods. In particular, there is evidence that exposure to bushfires may have negative effects on students' academic outcomes in the following years - an issue that is discussed further in the second half of this paper.

Vulnerability and protective factors

Some children and young people are more vulnerable than others to experiencing more intense or long-lasting psychological consequences. Individual differences in children and young people's mental health and wellbeing after exposure to natural disasters are informed by a combination of risk factors and protective factors. These include social, psychological and environmental factors, which the evidence suggests are intersectional and additive (Bonanno et al. 2010). Below is a summary of risk and protective factors related to: 1) the pre-bushfire context, 2) exposure and perceived threat during the bushfire, and 3) changes and disruption after the bushfire.

Pre-bushfire contextual factors

Children and young people's contextual factors influence how they experience and cope with disaster events. These may include age and gender, socioeconomic status, disability, and experience of prior trauma.

The evidence suggests that age and gender may be associated with differential risk for psychosocial consequences of bushfires in Australia. Younger children tend to report higher levels of depression symptoms and PTSD symptoms (McDermott & Palmer 2002; Yelland et al. 2010). There are mixed findings in relation to gender differences, with some studies suggesting girls are more likely than boys to report post-disaster psychological distress (for example, McDermott et al. 2005), and other studies finding no significant gender differences (for example, McDermott and Palmer 2002; Yelland et al. 2010). One explanation is that gender tends to be strongly associated with the level of perceived threat during the disaster, so gender differences are not significant in models that adjust for subjective exposure (Goenjian et al. 2001; Bonanno et al. 2010).

Socioeconomic disadvantage is another important contextual factor. People who are already facing disadvantage are more likely to be hit harder and longer by disasters such as bushfires (Victorian Council of Social Service 2014). Families with a lower socioeconomic status have fewer economic resources to prepare for disasters and recover afterwards, and are more likely to reside in some regional and rural areas, which are at higher risk for natural disasters (Australian Council of Social Service 2012).

Pre-existing physical and mental health problems also put some children and young people at higher risk of adverse post-disaster outcomes. Students with disabilities may experience additional difficulties with educational disruption, interruptions to their healthcare needs, and mobility issues (Berger et al. 2018).

Prior exposure to trauma is another risk factor commonly found in the disaster research. It is also supported by evidence in the wider trauma literature that shows the effects of traumatic events tend to accumulate throughout a person's life. For example, McFarlane et al. (2009) conducted a twenty year follow-up of a cohort who had been exposed to the 1983 Ash Wednesday bushfires as children. They found that the bushfire-affected participants had greater risk of PTSD symptoms in the twenty year follow-up if they had reported experiencing another traumatic event.

Bushfire exposure and experiences

The losses and perceived threat experienced during disasters are consistent significant predictors of children and young people developing post-traumatic stress symptoms after natural disasters (Goenjian et al. 2005; Bonanno et al. 2010; Terasaka et al. 2015). The disaster and trauma literature distinguishes between objective threat (for example, property destruction) and perceived threat (for example, believing a loved one might die). For children and young people exposed to bushfires, perceived threat to life during a natural disaster is one of the most critical factors associated with post-disaster PTSD symptoms (Yelland et al. 2010; McDermott et al. 2005).

Bushfires can also cause bereavement. Children and young people who suffered losses, such as a loved one, home, pet or valued possessions, may experience grief in addition to other disaster-related trauma. Koplewicz et al. (2006) note that children and young people can also go through 'secondary losses' from bereavement caused by disasters. These may include their sense of security, sense of faith and purpose, and sense of identity.

The post-bushfire environment

Disasters can cause major disruption to families' lifestyles such as relocation, homelessness, changing school or separation from friends and family. These substantial changes may further interrupt children and young people's routines, cause additional stress and exacerbate trauma reactions (Koplewicz et al. 2006).

Social support networks are consistently found to be a protective factor (Lai et al. 2017), and may mitigate some of the stress caused by disruption. For example, when families relocate to be closer to their support network, relocation may be a protective factor rather than a stress factor (Gibbs et al. 2015).

Another set of complex risk factors in the post-bushfire environment is related to family violence. Two separate studies with communities affected by the 2009 Black Saturday bushfires found women had an increased risk of experiencing family violence after the disaster (Parkinson & Zara 2016; Molyneaux et al. 2020). The broader literature suggests a number of possible explanations for increased family violence following natural disasters, including intensified stress reactions in certain conditions caused by the disaster, such as job loss and financial hardship; or temporary living arrangements (which may be quite cramped) due to property loss (see Parkinson & Zara 2016: and Molyneaux et al. 2020 for more detailed reviews).

When to seek help

Because of the wide variation in children and young people's post-disaster reactions, it can be difficult to recognise when someone may be in need of professional mental health support. Further investigation should be considered when a student's reactions are more intense or persistent compared to their peers or are impairing their everyday functioning (Koplewicz et al. 2006).

The Australian Child and Adolescent Trauma, Loss and Grief Network described potential indicators of more serious problems in an evidence-based guide they produced for schools affected by the 2009 Black Saturday bushfires in Victoria (Kenardy 2010). These are reproduced below in Box 1. It is important to note that students who present any of these indicators do not necessarily have a serious mental health problem. Rather, indicators should be used as a starting point for gathering more information and/or referring the student for further assessment.

This advice aligns with the trauma-informed practice resources developed by the department and the guidance to teachers and school staff on recognising student behaviours related to trauma (Centre for Education Statistics and Evaluation 2020, p. 4).

Box 1**Indicators that a child or young person affected by bushfires may benefit from further assessment or intervention****Further assessment or intervention may be indicated if:**

- symptoms persist or worsen over time
- the young person shows a significant decline in concentration, academic performance or classroom participation that interferes with their daily functioning or causes significant distress
- the young person shows ongoing or worsening difficulties regulating emotions (for example, difficulty controlling emotions such as crying, anger)
- the young person shows significant and lasting changes in social functioning (for example, withdrawing from friends, fighting, interpersonal difficulties, physical and verbal aggression) that cause problems for them or others
- the young person shows behaviours that disrupt others and the classroom environment on a regular basis
- the young person shows difficulties that cause the child or others significant distress or concern (including the family)
- the young person shows behaviours or difficulties that prevent them from engaging in age-appropriate tasks or developing appropriately (for example, advancing academically, advancing socially, maturing appropriately, interruptions to developmental milestones such as speech, language)
- the young person returns to a behaviour typical of a younger child (for example, difficulties toileting, using 'baby talk')
- the young person shows evidence that the problems exist outside of school as well. For example, the problem occurs in multiple settings (at home, with friends, at school)
- parents or caregivers have concerns about the child's/family's functioning, request assistance, or are distressed by the situation
- there is evidence of ongoing stressors outside of school which may exacerbate difficulties (for example, financial difficulties, housing issues, parental separation, death of a family member).

Source: Kenardy et al. 2010. How children and young people experience and react to traumatic events. Booklet produced for the Victorian Bushfire Support and Training for Affected Schools Project. The Australian National University, Canberra p. 18.

It is important to recognise that families affected by bushfires may be reluctant to seek professional mental health support and often have no experience in seeking or accepting help from agencies (Australian Psychological Society 2014). The Australian Psychological Society notes the importance of taking a coordinated approach to mental health service provision with an understanding of the local context: 'it is vital that psychological support is integrated with formal coordinated recovery efforts and provided with an understanding of the devastating impact that disasters have on the social cohesion of communities' (Australian Psychological Society 2014, p. 1).

Supporting student wellbeing after bushfires

Due to the ethical and practical challenges of conducting research in the aftermath of disasters, there is little direct evidence for the efficacy of any specific intervention models to improve post-disaster wellbeing. To address this gap, a panel of psychiatry experts analysed the stress and trauma literature and identified five empirically supported principles that should guide and inform psychosocial support and intervention at the early to mid-term stages post-disaster (Hobfoll et al. 2007). The five principles are:

1. Promote a sense of safety.
2. Promote calming.
3. Promote a sense of self- and collective efficacy.
4. Promote connectedness.
5. Promote hope.

These principles underpin a best practice guide for supporting people affected by disasters in the Australian context. Produced by the Australian Psychological Society and the Australian Red Cross (2013), it provides guidance for delivering 'psychological first aid' to people affected by a disaster in the immediate aftermath and following weeks. It is designed to be used with children and young people as well as adults, and is informed by the evidence for community-based delivery (as opposed to delivery through healthcare settings) of psychosocial support in emergencies (van Ommeran et al. 2005).

Gibbs et al. (2014a and 2014b) took a similar principles-based approach in their research on community-based interventions to support children and young people affected by disasters. They propose a conceptual framework encompassing the domains of mental health, wellbeing and social inclusion, based on the universal principles listed above (Hobfoll et al. 2007), analysis of the disaster literature and their extensive research on the community impacts of the 2009 Black Saturday bushfires in Victoria (Gibbs et al. 2016). When applied to services and initiatives delivered to children and young people following Black Saturday, findings highlighted the important role schools can play in supporting children and young people affected by bushfires and community-based initiatives that focus on restoring safety and stability (Gibbs et al. 2014b).

Gibbs et al. (2015) sought to better understand the needs of children and young people after bushfires by conducting participant-guided research with children and young people affected by Black Saturday. Their findings indicated the importance of physical, psychological, emotional and social safety and stability for children and young people who had been exposed to bushfires: restoring safety and security where its lack is a source of stress, and improving it to promote recovery and wellbeing (Gibbs et al. 2015).

The literature on bushfires in Australia and the broader disaster literature supports the department's advice to assist parents, teachers and students in the wake of the 2019-2020 bushfires (NSW DoE n.d). It aligns with the department's broader approach to supporting trauma-informed practice in educational settings. This work suggests the following interrelated strategies for schools and teachers to use to support the wellbeing and learning of students impacted by trauma (Centre for Education Statistics and Evaluation 2020, p. 5).

- Physical and emotional safety for students and staff.
- Respect for diversity, including different cultures, historical backgrounds and genders.
- Positive relationships, particularly focused on trustworthiness, consistency and predictability.
- Empowerment of students, including taking a strengths-based approach.

Student learning and assessment

Another significant concern during and after bushfire events, alongside student wellbeing, is the potential impact of bushfire events on student learning. This section of the paper examines the potential impact of bushfire events on student learning and assessment. It draws on research conducted in Australia and international contexts about the academic performance of students in disaster-affected regions, and the experiences of teachers and school leaders whose practices have been affected by natural disasters. Three key areas are addressed – learning, student assessment, and disaster education.

Student learning

Natural disasters such as bushfires can have immediate, short-term and long-term impacts on student learning.

In the midst of a bushfire event, teaching and learning may be interrupted or suspended while school staff apply emergency procedures such as placing the school in lockdown and accurately accounting for the attendance of staff, students and visitors on the school site. Ensuring that students and parents are informed about emerging threats is paramount and may take precedence over teaching and learning activities. Disruptions to power supplies may mean that schools need to rely on mobile devices for information and communication (McArthur 2019).

Once the immediate threat of danger passes, short-term impacts may include a suspension, or reconfiguration of teaching and learning as access to the school site is re-established and buildings are assessed for safety.

Research on the long-term impacts of bushfire events on student learning is limited and further research is needed in this area. However, learning is likely to be impacted by teachers' need to balance a return to learning with the provision of practical and pastoral care to address ongoing wellbeing issues with their students (Mutch 2014a). Student learning is also likely to be impacted if physical damage to the site is significant and learning spaces need to be adapted or re-constructed, or if teaching and learning resources have been damaged or destroyed by the fire. In a comparative analysis of four schools affected by fires in NSW and the ACT, for example, Nye (2016) found that in one instance, a school that had been in operation for 26 years lost all resources, sports and circus equipment, and personal property in one night when the school was almost entirely destroyed by fire. The impact of such losses is particularly severe in practical subjects, where specialist equipment and materials are needed for learning to take place.

Research also shows that the degree of disruption to student learning may be influenced by the degree to which schools have been affected by fire. Gibbs and a team of 10 co-researchers conducted a study that examined the academic performance of more than 24,000 primary students from schools located outside metropolitan areas in Victoria, following the Black Saturday bushfires of 2009 (Gibbs et al. 2019). The schools were classified into three levels of bushfire affectedness: high, moderate and low¹. The authors analysed the level of improvement in student NAPLAN (National Assessment Program – Literacy and Numeracy) test scores from Year 3 (2011) to Year 5 (2013), across the three levels of bushfire affectedness, adjusting for demographic factors collected one year before the bushfires. The results showed that the expected gains for scores in reading and numeracy were reduced with higher levels of bushfire impact, while the expected gains for scores for writing, spelling, and grammar were unaffected by the level of bushfire impact. In numeracy, while academic growth levels were similar for students in areas of ‘high’ and ‘moderate’ bushfire-affectedness, results for students in both of those categories were considerably lower than the results of students in the ‘low’ areas.

Gibbs and her co-researchers note that while it is positive to find no negative impact on academic gains in the early years after the bushfire event for some NAPLAN domains, the risk is that later impacts on academic performance will be overlooked and, ‘without targeted interventions, children’s future academic trajectories and life opportunities may be compromised’ (Gibbs et al. 2019 p. 1410). They note that evidence is emerging that the early neurodevelopmental impacts of trauma might only appear at later stages of development such as adolescence, when key abilities, such as the development of executive skills like planning and problem solving, are due to emerge.

Other studies have focussed on the impact of fires on student achievement in different school subjects. A study of a discotheque fire in Göteborg, Sweden found that the most negative impact on schoolwork as a result of fire disaster was reported for subjects that require high degrees of concentration, such as mathematics, physics and grammar (Broberg, Dyregrov & Lilled 2005). Subjects such as religion, psychology and arts were reported to have become more interesting, easier or more important. Gibbs et al. (2019) hypothesise that this

“ may reflect a shift in student priorities and social and emotional responses to subject content following their loss and trauma experiences. Another explanation is that difficulties with certain subjects are mediated through the disruption of neuro-maturational processes that underlie the development of cognitive, social, and emotional building blocks necessary for academic achievement.”
(Gibbs et al. 2019, p. 1408).

¹ A designation of ‘high’ was given based on the extent of loss of lives and properties in the area; ‘moderate’ was given if schools were located in a catchment zone adjacent to a high impact locality; and ‘low’ was given if very limited or no damage occurred and there was no loss of lives.

Assessment

Vulnerability of students undertaking school-based, and external assessment

Natural disasters such as bushfires have the potential to disrupt assessment for all students, but students preparing for, and undertaking Higher School Certificate (HSC) examinations may be particularly vulnerable. In addition to the anxiety induced by examinations (see Robinson, Alexander & Gradisar 2009), HSC students often undergo heightened levels of distress during their final year of school due to personal, social and developmental changes as they prepare to transition out of school (Hodge, McCormick & Elliott 1997). The interaction between environmental stressors such as bushfires and high stakes examinations such as the HSC may exacerbate underlying stress for students who are already vulnerable (Wuthrich, Jagiello & Azzi 2020).

Some studies have found that test anxiety can be associated with poorer student performance because test-anxious students are more susceptible to distraction and interference (Keogh et al. 2004). While research relating to distraction is broad, a number of international case studies on natural disasters have pointed to the high levels of interference caused by natural disasters such as floods and earthquakes with student examination preparation (Beaton & Ledgard 2013), and the conduct of examinations resulting from school evacuations and closures (Bangay 2013; Zhong 2013).

Although disruption from natural disasters may directly affect the administration of examinations and expose students susceptible to anxiety to more stress, poor examination performance cannot always be attributed to the impact of natural disasters. In a study of the impact of the Canterbury earthquakes in New Zealand conducted using longitudinal data from 2009 to 2013, Beaglehole and his co-researchers found that although there may have been negative effects for a sub-population of students exposed to the disaster, a range of post-disaster responses may have helped to mitigate adverse effects on the performance of other adolescent students (Beaglehole et al. 2017). The development of resilience as a result of post-traumatic growth, and proactive measures such as programs to increase community cohesiveness, are examples of health-promoting mechanisms put in place by government agencies in New Zealand that may have minimised poor student performance in assessment (Beaglehole et al. 2017). Further research is needed to better understand how best to mitigate against the potentially negative impact of natural disasters on student performance in assessments.

Applications of special examination provision in the event of a natural disaster

Education systems vary in their provisions for students who are undertaking examinations and who have been affected by natural disasters.

In the case of a wide-scale flooding emergency in the United Kingdom in 2007, Beaton and Ledgard found that examination boards were unable to grant flexibility to examination provisions beyond cases of individual students (Beaton & Ledgard 2013).

In NSW, the HSC examination illness and misadventure procedure provides an avenue for students to apply for special consideration in the case of unforeseen circumstances that may impact their performance in an examination. Statistical data from the NSW Education Standards Authority (NESA) indicates that an average of 6% of HSC students lodge illness/misadventure applications each year (NSW Education Standards Authority 2019a). The procedure is not applicable to a large cohort, however, as it relates to specific instances and individual cases, and an application is usually lodged once the examination period has commenced or alternatively, an appeal can be lodged after the examination. In the case of the NSW 2019-2020 bushfires, NESA indicated that individual students were eligible to lodge an illness/misadventure appeal if they were unable to attend an examination (NESA 2019b).

A variation to this procedure, however, was implemented in NSW recently in response to the COVID-19 pandemic. NESA made adjustments to the HSC examination procedures that affected both school-based assessment and HSC examinations. In some courses, a decision was made to cancel examinations (NSW Education Standards Authority 2020a), while in others such as visual arts, submission dates were extended for the examination of the body of work. The changes were intended to account for the exceptional circumstances induced by the 2020 COVID-19 pandemic and in this instance, use of the illness/misadventure procedure was not considered an appropriate instrument to deal with the widespread nature of the disruption to courses of study.

In New Zealand, where there are exceptional circumstances, a system of Derived Grades has been developed that acts as an alternative to the usual procedure for establishing students' final school grades. Students who are prevented from sitting an external examination, or whose preparation for, or performance in an external examination is seriously impaired through temporary illness, trauma or misadventure, can apply for a grade derived from pre-existing evidence. This system also applies to cases of unexpected events and schools can apply for emergency grades for a whole group of candidates who are affected in the same way by a common event (New Zealand Qualifications Authority nd), as was the case following the Christchurch earthquakes of 2011 (Beaglehole n.d. 2017; Connolly 2013). It also applied following the Kaikoura earthquake in 2016, when 89 schools applied for emergency grades on behalf of more than 20,000 students (Dougan 2017).

Communication during bushfires and conveying information about assessment

In May 2020, personnel from the Bushfire Relief Strategy Directorate conducted consultation meetings with principals of schools affected by the 2019-2020 NSW bushfires and the Directors, Educational Leadership (DELs) responsible for those schools. Participants raised the topics of communication and student assessment as areas of particular importance and requested that assessment be included in the department's Bushfire Relief Strategy.

In the consultation meetings, participants reported that students, parents and members of the community often seek advice from their school in the event of a bushfire - a view supported by research pointing to the significant role of schools as sources of authority and stability in a community during a crisis (Mutch 2014b; Seyle, Widyatmoko & Silver 2013). Participants in the meetings also reported that it was often challenging to navigate information from multiple sources, including a number of government agencies, in order to provide accurate advice to their communities both during the event and in the period following. For example, as the 2019-2020 bushfire season progressed, procedures for HSC examinations were updated frequently in line with the rapidly changing bushfire situation across NSW. Advice was provided by both the Minister for Education and Early Childhood Learning, and NESA, and was delivered via a range of sources, including the local media, formal media releases and NESA's Schools Online site. It included vital information such as what students should do on examination day if access to their school was cut off. Principals played a crucial role in monitoring the provision of information from multiple sources and conveying it to students, as well as acting on it themselves.

Communication was also a central theme in a New Zealand study looking at how school principals supported students and their learning during and after the Christchurch earthquakes. Fletcher and Nicholas (2016) found that communication with students and their parents was a key priority for principals and that prior planning concerning modes of communication was essential, because traditional modes of communication became less accessible as the technology infrastructure for schools became overloaded during the crisis. Modes of communication that could be accessed quickly via mobile devices became essential features of successful communication strategies as power was cut, staff were displaced from their homes, and access to charging facilities was limited in emergency shelters.

Unconventional modes of communication have also been found to be effective in research emanating from Australia. Studies conducted in NSW and the Australian Capital Territory (ACT), concerning the recovery of schools that suffered loss and damage resulting from fires, found that although HSC students are considered the most vulnerable of a student cohort, senior students make crucial contributions to the dissemination of accurate information to other students through social media networks (Nye 2016). While social media use by students assists schools to ensure information is received about changes as they unfold, pre-emptive measures are also useful. Schools involved in a pilot exercise between the Catholic Schools NSW and Winmalee Fire Brigade included bushfire emergency information in student diaries, school newsletters and handbooks, in addition to publishing information on school websites (McArthur 2019).

Pre-emptive communication strategies are also highly applicable to policy contexts. In Western Australia, principals are supported with guidelines for bushfire emergency management that include advice for prevention, preparedness, response and recovery (Department of Education 2014/2018). As part of the guidelines, all schools in Western Australia are required to develop Stand-Alone Bushfire Plans, and are provided with detail for communication plans, together with sample text for communication from principals to staff, parents and the community.

Disaster education

Programs that increase student knowledge of safety procedures in natural disaster events such as bushfires are often seen as a key strategy for risk mitigation. Boon and Pagliano (2014) found that schools have a critical role in preparing children and young people to face disasters, and further, that vulnerability is reduced when information is provided through disaster risk reduction programs. Drawing on knowledge in the field of child psychology and expertise in disaster management, some researchers suggest that disaster recovery for children and young people takes time, and that schools are significant in directly and indirectly influencing trajectories for such recovery (Gibbs et al. 2014). More broadly, given the central role of schools during natural disasters such as bushfires, they fulfil vital functions in building social resilience by which communities 'resist, recover and learn from a natural disaster' (Dufty 2009, p. 13).

Programs that aim to increase student knowledge about natural disasters and hazards can be structured in a general manner, as part of the curriculum, or as a specialist intervention program following a bushfire event. Although broadly related by subject matter, these program types serve different purposes and require teachers to sensitively apply different forms of pedagogical knowledge related to the context in which the program is taught.

In their scan of Australian curricula, Kriewaldt et al. (2003) found that education systems across Australia include opportunities for students to learn about natural hazards as part of the geography curriculum (Kriewaldt et al. 2003 as cited in Dufty 2009). In NSW, there is opportunity for teaching and learning about natural hazards to occur in geography and science syllabuses for both primary and secondary students. For example, in the NSW Geography K–10 syllabus, Stage 3 students identify a contemporary bushfire hazard in Australia and examine how people can prevent and minimise the effects of a bushfire (NESA 2015/2020b, pp. 56–57). In Stage 6, students studying earth and environmental science develop skills in working scientifically to identify technologies that enable the prediction of natural disasters and consider how the effect of events such as bushfires on the biosphere can be minimised (NSW Education Standards Authority 2017, p. 52).

In intervention programs, resources related to disaster education are wide-ranging, from guides to support school leaders and teachers to facilitate strategies for wellbeing during trauma recovery, to resources for educating students about emergency procedures (see, for example, The Australian National University 2020; PreventionWeb 2019a).

Resources that are facilitated by organisations such as the United Nations Office for Disaster Risk Reduction, aim to increase knowledge about disaster risk and management for education leaders and policymakers by detailing policies and practices used in different countries and regions related to an extensive number of hazards. They build a knowledge base for policymakers and reduce the burden of resource development by providing collaborative knowledge platforms that increase access to statistical data, policy plans and advice, as well as education materials including those developed for use in schools (see PreventionWeb 2019b).

Wellbeing of principals and teachers implementing post-disaster education programs, following bushfire events

Reporting the findings of their study of the experiences and responses of principals following earthquakes in Christchurch, New Zealand, Fletcher and Nicholas (2016) found that the turbulent effects of crises such as natural disasters have profound effects on schools and their communities, and in particular, on teacher wellbeing.

A number of studies identify the issue of teacher wellbeing during post-disaster education programs. For example, in her research concerning the role of teachers as first responders during the New Zealand earthquakes, Mutch (2014a) reports that teachers are key figures in supporting emotional wellbeing by providing students with opportunities to process experiences that result from trauma. At the same time, her research found that teachers are also working in adverse conditions, often living in the same community, and also require support themselves (Mutch 2014a pp. 81–82). Beabout's (2010) investigation with principals following the aftermath of Hurricane Katrina in New Orleans found that ongoing recovery activities implemented by teachers caused emotional strain and took a costly toll on teaching and learning in other curriculum areas.

Conclusion

Bushfires have the potential to impact student wellbeing and student learning in a range of ways. This environmental scan has sought to identify and analyse recent research and other literature related to the impact of natural disasters on student wellbeing and learning, together with the experiences of principals and school communities impacted by the most recent bushfire events over the summer of 2019-2020 in NSW. The research, literature, and experiences of school leaders and their communities indicate that:

In relation to student wellbeing:

- Trauma is a personal experience unique to each individual. Understanding students' normal responses to bushfire events in the immediate aftermath and following months can help schools to support students in their recovery and recognise when they might need to seek extra help.
- While the majority of children and young people who experience disaster-related distress return to their normal state of wellbeing over time, a substantial minority experience more intense and persistent reactions.
- Some students are more vulnerable than others to developing problems following bushfire events. Risk factors include:
 - pre-bushfire experiences and context (for example, having prior traumatic experiences, or fewer financial or social resources, a pre-existing illness or disability, or limited family support)
 - exposure to, and interpretation of the event (for example, the extent to which students witnessed terrifying events, suffered losses, or feared for their own or a loved one's safety)
 - post-bushfire physical, social and emotional disruption (for example, relocation, family conflict or violence, separation from social networks, an undermined sense of self, or safety and security issues).

- Families affected by bushfires may be reluctant to seek professional mental health support and often have no experience in seeking or accepting help from agencies, according to fieldworkers experienced in disaster relief. It is important to take a coordinated approach to mental health service provision that is tailored to the local community context and needs.
- Schools can play an important role in supporting students' wellbeing after bushfires by restoring hope and predictable routines in a safe and stable environment.

In relation to student learning and assessment:

- Natural disasters such as bushfires can have immediate, short-term and long-term impacts on student learning. Further research is needed on the long-term impacts of bushfire events.
- The degree of disruption to student learning can be influenced by the degree to which schools have been affected by fire, although this is not always the case.
- The interaction between environmental stressors such as bushfires and high stakes examinations such as the HSC may exacerbate underlying stress for students who are already vulnerable.
- Communication with students and their parents during bushfire events is a key priority for principals, especially in relation to the HSC.

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