

# The Process of Rebuilding Human Resilience in the Face of the Experience of a Natural Disaster: A Multisystem Model

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<b>What is Known about this Topic</b>
Resilience refers to capacity to adjust to adversity
Ecological understandings of resilience highlight the interplay between individual developmental/adaptive process and social and environmental influences
There is limited understanding of the interconnection between multi-level influences on resilience
<b>What this Paper Adds</b>
At an individual level, resilience was characterised by <i>getting on with rebuilding</i> . The term <i>rebuilding</i> was a broad concept that went beyond physical structures to include notions of home, social networks and community.
The roles and actions of others (friends, community members, media, government, and relief agencies) can have a profound impact on an individual's experience of resilience.
The mechanisms for external factors/others to influence individual resilience included a caring attitude, effective communication, and a timely response.

**ABSTRACT:** *This paper explores the process of resilience in multiple system levels through the perspectives of people who experienced a natural disaster in Australia. By focussing on human resilience, the paper adds to the literature by taking a salutogenic approach to addressing the effects on mental health arising from living through a natural disaster. The authors analysed 19 semi-structured interviews with people who experienced the 2010/11 floods in Victoria, Australia, and 20 witness statements from people who experienced the 2009 Victorian bushfires. We used an interpretive and comparative content analysis, through the lens of Bronfenbrenner's theory, to develop an ecological model of the processes within and between systems that contributed to community resilience. Findings suggest that resilience is supported by goals to rebuild a sense of home, a network of friends and a sense of community. We conclude that enhancing community resilience required consideration of the roles and actions of others (media, government, relief agencies) as well as an individual's resources from existing and new networks. The multiple-system model of resilience describes the complex integration of individual and community resilience to guide people involved at the multiple levels of disaster management with strategies that support communities that experience adversity.*

**Key words:** *Resilience, adversity, natural disaster, social networks, Australia*

## INTRODUCTION

Disasters affect communities across the globe. In 2010 alone, there were 385 natural disasters worldwide, which killed more than 297,000 people, affected over 217 million others, and caused a damage bill of US\$123.9 billion (Guha-Sapir, Vos, Below & Ponsérre, 2011). Disasters devastate communities through immediate mortality and morbidity as a result of injuries, exacerbation of existing health problems, loss of clean water, shelter, sanitation and a disrupted health system (Keim, 2008) and also contribute to long term adverse mental health outcomes for community members

(Bonanno, Brewin, Kaniasty & La Greca, 2010). Australian studies have consistently reported elevated adverse mental health as a result of disasters (McFarlane, Clayer & Bookless, 1997; Parslow, Jorm & Christensen, 2006; Bryant et al. 2014). After the most recent Australian Black Saturday bushfires in 2009, persistent fire related post-traumatic stress disorder (15.6%), depression (12.9%) and psychological distress (9.8%) was more prevalent in communities that were highly affected.

Despite the adverse consequences associated with disaster, there is also a body of evidence that has identified unexpectedly positive outcomes. Prevalence of the absence of pathology (identified as resilience) at six months post disaster was found to be as high as 65.1 per cent in a total sample of 2,752 participants exposed to the

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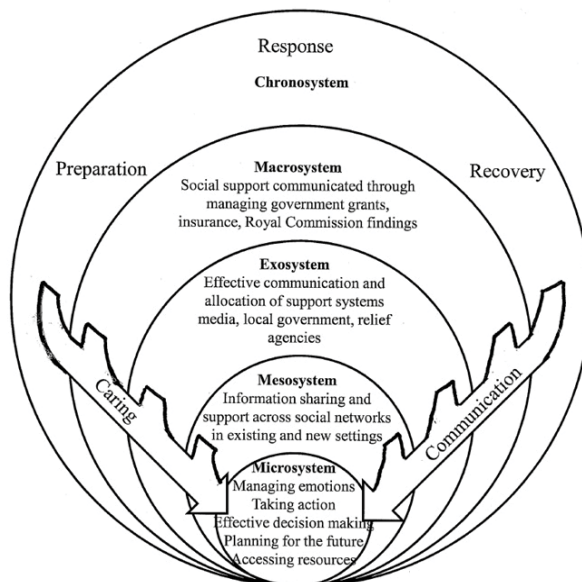
World Trade Centre terrorist attack (Bonanno, Galea, Bucciarelli & Vlahov, 2007), and 77.3% in participants exposed to the Australian Black Saturday fires (Bryant et al., 2014).

Resilience at its simplest is understood as bouncing back from adversity, but as the body of research in this area expands, it is increasingly observed to be a dynamic and complex phenomenon (Luthar, Cicchetti & Becker, 2000). Resilience is a nascent and sometimes nebulous term, because it references work based on different theoretical perspectives, and a growing body of research into different populations in different disciplines. An individual's resilience is variously understood as an outcome related to personality traits (Block & Block, 1980), or a consequence of developmental processes (Rutter, 1993), or a process of adaptation, or development of internal personal resources (Masten et al., 1999). Community resilience is conceptualised either as an aggregation of individual resilience factors or the collective behaviour of individuals (Patterson Weil & Patel, 2010). However, it has been observed that a group of resilient individuals does not always lead to a resilient community (Norris et al., 2008). The concept of community resilience is potentially useful in disaster research because it describes the characteristics of the community context, including built, natural, social, and economic environments that influence one another in complex ways to support the resilience of its members (Norris et al., 2008; Brodsky et al., 2011).

The majority of research into resilience has considered individual and community resilience as distinct processes, focussing on either identifying individual or community factors. For example, community resilience relies on reconnecting with a sense of place (Cairns-Nagi & Bambra, 2013; Cox & Perry, 2011) or community connectedness and collective self-esteem (Zimmerman et al., 2015). Understanding the concept of resilience as a dynamic interaction between intrapersonal factors, psychological or mental health outcomes and environmental protective factors (Luthar, Cicchetti & Becker, 2000) suggests that resilience may be better understood as an ecologically dynamic process (Ungar, 2011; Brodsky et al., 2011; Zimmerman et al., 2015).

This paper advances our understanding of resilience by moving towards an ecological approach using Bronfenbrenner's ecological theory (Ungar, 2011). This approach conceptualises resilience as occurring in a set of multiple level systems. The knowledge about individual resilience factors (situated within first level of systems known as the individual's microsystem) has been nested in a number of systems that organise external factors according to their proximity to the individual (Figure 1). Factors associated with the individual's immediate social circle or network has been allocated to the mesosystem. Events occurring in the local community that had an impact on the individual, but where the individual was not an active participant, have been described as occurring in the exosystem. More distal factors have been observed to occur in the broader community (macrosystem) where overarching influences such as culture, social structures, belief systems and resources may impact on individual resilience. Bronfenbrenner's ecological theory adds the dimension of time as another system of influence (Bronfenbrenner, 2005), which is useful in studying the aftermath of disasters.

This paper adds to the literature which contains very little investigation into the processes that are important for resilience that occur within and between multiple-system levels (Masten & Obradovic, 2008). Disaster management relies on understanding the complexity of the interplay of factors in order to develop resilience-orientated interventions (O'Sullivan, Kuziemy, Toal-Sullivan & Croneil, 2013), requiring more research to understand the interplay of factors within and between multiple system levels. The purpose of this study was to use the experience of people exposed to two natural disasters to develop a deeper understanding of resilience to be used by people involved at the multiple levels of disaster management



Source: Diagram designed by first author demonstrating analysis based on Bronfenbrenner's theory (2005).

**Figure 1.** Ecological disaster resilience process: getting going with rebuilding

including, but not limited to, policy makers, disaster recovery coordinators, business, not-for-profit, political and community leaders in developing and implementing strategies. Having reviewed the literature to locate the study theoretically, the paper now describes the methodology and data collection methods before presenting the results organised by the ecological model. The paper concludes by discussing both theoretical and practical implications for policy makers, disaster recovery coordinators, business, not-for-profit, political and community leaders of using an ecological model to analyse disasters.

## METHODOLOGY

This study employed a qualitative methodology that placed the emphasis on discovery from the perspective of people who had experienced natural disasters. The methodology was appropriate because of the underpinning theory that knowledge was created and transmitted by people as social actors in a social context, and that the meaning for each individual arose from their experiences and social interactions with others (Blumer, 1969; Crotty, 1998). Consequently, data were collected from transcripts that were already available, as well as interviews conducted for this research (van Kessel, Gibbs and MacDougall in press). The processes of bearing witness, being interviewed and transcription were understood as processes of social interaction, where knowledge was constructed in the interaction between a participant and the researcher (Kvale & Brinkman, 2009).

## Setting and Time

The study was conducted in the state of Victoria, Australia. Victoria has a population of 5, 737,600 people (ABS, 2013) and a recorded history of disasters since colonisation. The 2009 bushfires and 2010/11 floods provided an opportunity use the ecological model to compare and contrast the response to different types of disasters.

Following a decade of drought, January 2009 was a very dry month in Victoria, and the final week was marked by a severe heat wave, with maximum temperatures reaching their highest levels since 1939. On the 7th of February 2009 the high temperature (47 degrees Celsius) was exacerbated by a low relative humidity and winds of 90 km/hour. These conditions led to 316 grass, scrub or forest fires. The financial impact of the bushfires was estimated to be more than \$4 billion and the human toll included the death of 173 people, and the innumerable people devastated by loss (Teague, Mcleod, & Pascoe, 2010a).

Eighteen months later, parts of Victoria experienced up to three serious flooding events between the 3rd of September 2010 and the 15th of January 2011. Two hundred Victorians evacuated after the initial floods in 2010 while the final episode in 2011 affected over 100 towns (Comrie, 2011). The financial impact of the floods was estimated to be \$1.3 billion (Comrie, 2011).

## Participants

These events provided two contrasting samples for this study. The first data set selected 20 witnesses from the 100 lay people who presented to the 2009 Victorian Bushfires Royal Commission. This Royal Commission was established to investigate the deaths associated with the fires and provide recommendations on fire preparation, response and recovery. The final report (<http://www.royalcommission.vic.gov.au/commission-reports/final-report>) records the statements from the witnesses up to 12 months after experiencing the 2009 bushfires (Teague, Mcleod, & Pascoe, 2010b). These statements were recorded as transcripts available for public access on line (<http://vol4.royalcommission.vic.gov.au/index.php?pid=137>) enabling an analysis without further increasing the burden on participants that might result from retelling their stories. It was considered important to honour the bushfire witnesses' courage and intent. For this reason, every transcript was read ( $n = 100$ ) to establish an appreciation of the breadth of issues of which the witnesses felt the Royal Commission needed to be aware. This provided an understanding of the context of the Royal Commission and the bushfire event itself. This initial process identified 50 transcripts that addressed the research question. A second reading coded each transcript to identify 20 information rich transcripts. As patterns emerged during this initial coding, transcripts were selected to ensure a diversity of location, age and gender using information from within the transcripts (van Kessel, Gibbs & MacDougall, 2014).

The second data set came from interviews conducted by the first author with 19 people who experienced the 2010/11 Victorian floods. There were no publicly available witness statements available and so a stratified purposive sampling method was used to identify potential interviewees. Sampling consisted of firstly identifying communities exposed to the 2010/11 Victorian floods (Flood Victoria n.d.), using media reports and a list of selection criteria developed from a review of the literature of factors associated with community resilience, that included previous experience with flooding, exposure (Bonanno, Brewin, Kaniasty & La Greca, 2010) and economic and social resources (Sherrieb, Norris & Galea, 2010). As a result, four communities were selected.

## Data Collection

Flood Recovery Officers for each selected flooded community were identified as key informants and interviewed to provide a guide to the cultural mores of each community (Fontana & Fey, 1994). Interview participants were recruited within the selected communities, initially through advertisements and subsequently through snowballing to gather diversity in the sample guided by factors established by the literature as predicting resilience of individuals. The consent form for the flood affected participants collected information on age, sex, education, ethnicity and employment status. The semi-structured interview captured information on personal exposure including injury, loss of life of those close to the participant, loss of property, change in personal finances, impact on the broader community, the proximity of the flooding to the participant's property and participants' subjective appraisal of risk (Bonanno, Brewin, Kaniasty & La Greca, 2010; Harville et al., 2010; Lee, Shen & Tran, 2009). In addition, the interview data included details on the participant's media exposure, previous experience of flooding and social support which have also been found to be related to resilience (Bonanno, Brewin, Kaniasty & La Greca, 2010; Fernando & Hebert, 2011).

The interviews were conducted face to face by the first author over a similar time span post disaster as the 2009 Victorian Bushfires Royal Commission hearings. This was consistent with the theoretical understanding of resilience as a trajectory of recovery within the first twelve months of a disaster (Bonanno, 2004). The semi-structured interviews began with exploring the flood affected participant's life history and allowed the person's experience to be placed into context. The interviews provided an opportunity for participants to describe their disaster experience, reflect on the meaning the experience had for them (Seidman, 1998). Serendipitously, this format closely matched the 2009 Victorian Bushfire Royal Commission witness transcripts.

The first author transcribed each interview. The interview and witness transcripts were coded and had a memo file set up before the next interview was conducted. This allowed analysis and new questions to be explored throughout the study. New issues and perspectives were allocated new codes that were recorded throughout this process. Saturation was deemed to have been reached when no new codes emerged in the later interviews.

Ethics approval was gained from the Flinders University and Southern Area Health Service Social and Behavioural Research Ethics Committee on the 9th of May 2011. Permission from the Honourable Speaker of the Legislative Assembly, Parliament of Victoria for the final quotations to be used in this publication was also sought and granted. Numbers, rather than pseudonyms, have been used to maintain confidentiality and anonymity of the flood affected participants. Numbers have also been used for the bushfire interviews to avoid possible disrespect associated with the allocation of false names to people who had chosen to go on the public record and bear witness to the bushfire event.

## Data Analysis

The interviews were recorded using a Sony stereo IC recorder and the digital mp3 files were downloaded into NVivo 9 (along with the downloaded witness transcripts). Each interview and witness statement transcript was analysed as a whole unit with a set of analytical questions. This captured the overall experience of the individual (Saldaña, 2009) and helped to keep to the fore the perspective of the flood affected participants throughout the analysis.

The coding of the transcripts broke the data into discrete parts by highlighting the exact words from the text that appeared to capture key thoughts or concepts (Hsieh & Shannon, 2005). A label was developed for each code that reflected key themes as they emerged. This phase of coding included some simultaneous coding where more than one code seemed relevant to the same data set (Saldaña, 2009). Notes were made of these occurrences to help identify initial relationships between codes, and reflections on the sensitivity of each code.

Once categories began to emerge, a series of concept maps helped to organise the data and investigate the relationships between categories. This iterative mapping eventually organised the categories into a structure (Hsieh & Shannon, 2005) which was then aligned with Bronfenbrenner's bio-ecological theory (2005) as a theoretical lens to provide further structure for the analysis. Final categories and relationships were defined and each transcript was re-read to verify the final structure with the original data.

Rigour was supported by ensuring each flood affected participant had the opportunity to read and verify their transcript, and through the use of memos on the coding of each transcript and emerging categories. A reflective journal was kept to record issues related to the research as an entire unit and considered difficulties, emerging insights and theoretical notes on the development of categories across the data. The iterative process of repeatedly reading transcripts from two different sources throughout the field trips was conducted

over eight months to promote credibility of the findings. Researcher triangulation with the second and third authors was used to verify coding. Negative cases were actively sought and contradictory data was discussed amongst the researchers until consensus was reached. For example, data from the interview participants who doubted their resilience was reviewed and it was observed that their data reflected the complementarity of categories identified by those who did feel resilient.

## The Study Limitations

The sample of the bushfire witness transcripts is biased towards older people and to some extent this is apparent in the flood sample recruitment also. This is not surprising given previous research has established that older people may be more resilient and so may be more likely to agree to participate in research or present at a Royal Commission (Bonanno, Galea, Bucciarelli & Vlahov, 2007) It may be that younger people chose other forums to share their experiences with the wider community. Consequently, it cannot be claimed that this research reflects their experiences.

Caution needs to be taken with generalising the results of this study to the wider community that has experienced these events, as this assumes that those who agreed to participate in either the Royal Commission or the research interviews were no different from those who chose not to engage. It is possible that flood affected participants and bushfire witnesses have a certain amount of self-efficacy and confidence in their ability to articulate and communicate their experiences not evident in the broader population.

No participant in either sample identified themselves as being an Aboriginal or Torres Strait Islander and the representation of people born overseas is below the state percentage. This suggests that the role of culture could not be adequately observed in this sample. The findings may need to be further modified for Aboriginal and Torres Strait Islanders due to the unique set of adversities they face and their attachment to land.

Finally the data collection was limited to a single point in time and so does not account for the possible change in perceptions of the flood affected participants and bushfire witnesses throughout the disaster experience.

## RESULTS

### Resilience as Rebuilding

The analysis used the ecological model to reveal that there was a consistent meaning ascribed by flood affected participants and bushfire witnesses to their resilience that was created by their personal experiences. The overarching theme of resilience, whether faced with a flood or fire, was characterised by *getting going with rebuilding*. The experience of *getting going with rebuilding* appeared within each system described in Bronfenbrenner's ecological model (2005). Resilience framed as *getting going with rebuilding* was understood at the microsystem level as taking steps as soon as possible to rebuild lives and establish a sense of normalcy with a view to the future. Participants reported their key decisions about when to return home after evacuation, whether to return to their community, and when/where/how reconstruction of their dwelling should occur. As such, *rebuilding* was strongly focused on reconstruction of housing, but importantly, in the context of re-establishing a home, rather than just shelter. This meaning of resilience as rebuilding incorporated building the individual's social network (mesosystem) and restoring communities (exosystem) and again extended beyond structural repair to include rebuilding lives and a sense of community, with recognition of macrosystem influences of funding and insurance.

[name] and I have also been involved in the [community development group], which has worked with companies like

[corporation] on establishing semi-permanent accommodation in [town] so that residents can return there and rebuild the local community. (bushfire witness #34 - female)

...we are a vibrant close-knit community, there is pride in the community and we want to build that up again. (flood affected participant #5 - female)

### Intersystem Processes

Resilience as a rebuilding occurring within a number of nested systems also appeared to rely on some key processes that connected the ecological systems depicted in Figure 1. Processes that enabled effective communication and conveyed a caring response underpinned the rebuilding processes described in this paper.

Effective communication of relevant information was identified as a dominant process both within systems but also between systems. Communication of information from macro/exo/mesosystems in the ecological model was critical for making decisions about reconstruction. It was a key process that contributed to receiving emotional support in the microsystem and maintaining community connections or expanding networks within the mesosystem as well as connecting with exosystem based organisations. Communication from the macrosystem was also recognised to be important in achieving the goals of rebuilding individual lives as well as communities.

I believe the critical issue was accessible, honest information. In this regard, I think the community meetings worked well. Due to the limitations or absence of other means of communication, we were restricted to what we could do on a face-to-face basis. That meant finding somewhere for meetings that was sheltered and where a large number of people could congregate, and then sharing what we needed to know. People have said that the meetings were also a chance to come together and to touch base with each other – certainly the conversations and catching up continued long after the formal business of the meetings concluded. (bushfire witness #20 - female)

Emotional support that conveyed a sense of being cared about by others also emerged within and across the systems. The bushfire witnesses and flood affected participants were recipients of donations, practical support as well as emotional support from meso/exo/macrosystems, all conveying sympathy and helping to manage emotions within the microsystem. However some of the flood affected participants and bushfire witnesses were also providers of community support to others extending into their mesosystem. Helping occurred during the emergency phase, with many taking time out of fighting the bushfires or floods on their own land, to assist others with defending property. Assistance was most commonly provided during recovery through home visiting, coordinating fodder distribution, contributing to recovery committee work, helping to remember those who died, advocating for the needs of others, helping others reconstruct their dwelling, helping others with their health and providing communal meals. Assisting others appeared to form part of the reconstruction activities that supported their recovery.

Those sorts of things kept me very busy and that was my way of coping with everything that had happened. I wanted to use some of my skills to benefit the community rather than just my immediate family. (bushfire witness #24 - male).

### Individual Processes (Microsystem)

Resilience as rebuilding began with processes that occurred within the individual (microsystem) in the ecological model. The flood affected participants and witnesses described how strategies for managing their emotions and thoughts were linked to their ability to take action. They were able to seek and use information to make effective decisions and plans for the future. They were also able to access resources and coordinate activities from the complex array

of interventions available. The person's ability to manage their emotions, make decisions, take action, access resources and plan for their future contributed to their resilience.

### ***Emotions and Cognitions***

In both samples, it was evident that the disaster experience led to a range of emotions, which included experiencing fear, grief, anger, distress, loss, exhaustion, a sense of isolation, sense of violation, and negative cognitions. Bushfire witnesses also described their shock and guilt reactions. Many of the bushfire witnesses described a growing sense of concern during the event in response to their own observations; particularly of smoke. The focus of their fear was for the safety of themselves, their family, friends and neighbours. Fear was reduced for some, by trusting the knowledge of others, or because they had clear expectations of what the event would be like. Managing emotions, and using positive cognitions, were two of the most common personal responses evident across both samples.

Things like that happen, we have to get on with our lives, rebuild and get on with our lives and get rid of our anger and emotions. (flood affected participant #1 - male).

### ***Decisions Actions and Access to Resources***

Flood affected participants and bushfire witnesses described how they made decisions based on their assessment of risks, how they responded to those risks, and what they did to access assistance during the emergency phase. Decision-making and actions during the event were sometimes based on advice from others, but more commonly were founded on personal beliefs, values, past experience and observations of the environment. Beliefs and personal values informed decisions such as what to prioritise in terms of protecting e.g. animals, and when to stop defending and evacuate. Flood affected participants made decisions based on the history of the area, personal experience with the earlier flooding and forecasts, but they felt this left them unaware of the possible extent of the flood. The bushfire witnesses were aware of bushfire risk but again, most never expected the severity and impact of the event, and this gave most of them a false sense of personal and property safety. By contrast, the flood affected participants and bushfire witnesses, who expressed doubt that they had recovered, or were resilient, were still experiencing difficult emotions and unable to make decisions, or take actions, or were critical of the decisions and actions they had taken themselves.

I am static at the moment...it has really settled on me now, I am really angry, I wasn't before, I was just sort of trying to recover... (flood affected participant #17 - female).

### ***Future plans***

Decision making and subsequent actions also occurred during the preparation and recovery phases that constitute the timelines that inform post disaster responses. Planning included decisions on whether to take out insurance, stay and protect the property or to evacuate and when. Bushfire witnesses made decisions on how to increase the ability of the property to withstand a fire e.g. through the installation of water storage. In the recovery phase, decisions and actions centred on planning and accessing resources that would contribute to clean-up and reconstruction activities.

In hindsight, one of the best things [wife] and I did on the drive from [town] to [town] was talk about what we'd do and made the decision that we would rebuild. (bushfire witness #35 - male).

### ***Immediate Social Networks (Mesosystem)***

An ecological model of resilience drew attention to the rebuilding processes that occurred within a person's social network (mesosystem). The participants and witnesses relied on people within their network to provide information they trusted, material and instrumental support for reconstruction and importantly, emotional

support. In addition, the formation of new community groups and connections created opportunities to meet new people, so social networks were expanded. People met volunteers and staff from outside of the area as well as local and state leaders at the recovery centre and community events and this was considered important for rebuilding lives. These processes helped to maintain or create social networks and supported the resilience of flood affected participants and bushfire witnesses.

Both flood affected participants and bushfire witnesses recognised that the strengthening of existing networks contributed to rebuilding both individual lives and the community.

...everybody has built a bridge. That has been great. We have all helped each other and talked and that has been fabulous. (flood affected participant #6 - female).

Talking was seen as very important in strengthening existing networks, as it enabled existing social support networks to be recognised and used in the rebuilding process.

I learnt that the essential element of sustainable recovery is to find and engage with the strengths and networks that existed in a community before the disaster. Every community has something that works for them and that they value. It is worth taking the time to identify and connect with those networks and to build on the pre-existing strengths wherever possible. (bushfire witness #20 - female)

New networks were developed within a community through social events that encouraged sharing and facilitated emotional support, and occurred through formal events arranged to celebrate the progress of recovery.

*The party was a huge success. It was held in and around the grounds of the Council office and in the big white tent. [corporation] volunteers and other wonderful people arranged activities, entertainment and party food for the kids. (bushfire witness #20 - female).*

The work of volunteers extended support networks. This was seen before the floods through assistance with building temporary levees and sandbagging, and during both events in the relief centres where volunteers provided practical and emotional support. After the disasters volunteers contributed to cleaning up, reconstructing fencing and outbuildings such as stables and sheds, and restoring the environment through planting trees and gardening assistance.

I had the Lions club here. A man came down here on the first day to rip out the carpets and he said to me "tomorrow there will be 25 people here from [town], from the Lions club (flood affected participant #1 - male).

New resident groups were reported more frequently in the bushfire data, with a number of bushfire witnesses describing their roles as founding members of the recovery committee, or setting up information sharing groups and a support network for "weekenders". One witness organised speakers and holidays for community members, while another described the breakfasts she ran as new community events.

### ***Local Community Processes (Exosystem)***

An individual's resilience was characterised by an ecological approach as influenced by distal events that did not require their active participation (exosystem). In addition to expanding personal networks and receiving direct support from new acquaintances, flood affected participants and bushfire witnesses also discussed activities occurring in the broader community that influenced their rebuilding efforts. These external activities demonstrated how the actions of others could have a personal impact. Effective communication from media, government and council bodies and appropriate allocation of assistance by agencies contributed to peoples' experience of resilience.

## **Effective communication**

Flood affected participants and bushfire witnesses had expectations that were not met regarding being able to access up-to-date information during the event from the exosystem via the media. Instead, most reported that their knowledge came from the micro/mesosystem through personal observation or from other community members.

Local government organisations were expected to provide leadership through effective communication and action. Bushfire witnesses expected leadership in relation to managing environmental risks while flood affected participants expected local government (Shire) staff would step in with a rapid response to recovery. Where these expectations were not met there was an interpretation of lack of care.

*There wasn't a lot of Shire presence and that took a few days before Shire presence started to be felt so there is still a bit of resentment in the town because of a lack of empathy, a lack of care and response (flood affected participant #7 - male).*

## **Responsive Resource Allocation**

In addition to the direct volunteer assistance from within individuals' support networks, indirect assistance was provided from the exosystem in the form of donations of practical materials that could be used to sustain immediate needs and contribute to reconstruction, such as household items (e.g. mattresses, blankets, oven, cook top and dishwasher, fridges), food shopping vouchers, clothes, building materials (plaster, carpet, kitchen, white ant inspections) and cars. There were also more personal donations, which were intended to provide emotional support; including holidays, gifts (such as chocolates, flowers and wine), personal items (fresh pillows and toilet paper), entertainment and garden plants. The bushfire donations also constituted significant amounts of materials that contributed to the reconstruction of farming livelihoods including fodder, agistment and fencing material. The donations of material goods were perceived as both empowering and disempowering, and this depended on how they were allocated. Donations gave people a sense of self-efficacy to purchase what they needed but also required energy to sort and store and dispose of unnecessary goods.

Existing groups such as the Country Fire Association (CFA), Rotary, Lions, the Australian Red Cross, the Salvation Army, Apex, and the Country Women's Association were able to provide support that provided practical assistance. The local knowledge of staff allowed them to be prompt in providing donations, unlike the burdensome paperwork required for government grants. These services and staff were effective because they were able to coordinate volunteer help and donations as well as provide emotional support activities.

When you haven't lost any family members or your pets but you have lost your house, it is practical assistance that you need most. I think the assistance provided by the CFA is why our community is so far ahead compared to other communities that are rebuilding. (bushfire witness #23 - female)

The responsiveness of local government in planning, preparation and response (e.g. making sandbags available, managing road side fuel load and road access) was also attributed by flood affected participants and bushfire witnesses as external events that influenced their capacity to protect their home and consequently influenced their recovery and resilience.

## **Broader Community Processes (Macrosystem)**

The ecological model of resilience highlighted some distal processes within the culture, social structures, and resources that enabled rebuilding (macrosystem). There were fewer descriptions provided by the flood affected participants and bushfire witnesses of these more distal influences. Some of the most important were the federal and state government funding schemes, global climate,

cultural attitudes to land and water management, and the Royal Commission.

## **Funding support**

Both flood affected participants and bushfire witnesses were dependent on broader policy decisions and systems. The provision of financial support was influenced by leadership and decisions made at the macrosystem level. Actions by insurance companies, the Australian government and international sources, were associated with the opportunity to realise the goal of rebuilding lives.

If we get good news [to a funding proposal], we will at least have a chance to start rebuilding our lives. (bushfire witness #24 - male)

Conversely, some of the flood affected participants described how they were not eligible for government grants and how this negatively affected them. Some flood affected participants also found the Centrelink and tax consequences confusing.

One of the people down the road, [town] didn't get flooded but they gave her money and that was what I am saying they handed it out willy-nilly and they gave her flood recovery money. She came up here and said here you have my share because you deserve it more. (flood affected participant #18 - male)

## **The Influence of the Context Of Time (Chronosystem)**

Finally Bronfenbrenner's theory drew attention to the dimension of time as an important system of influence (chronosystem). The importance of timing appeared across the data, to support the notion that resilience was about *getting going* with rebuilding as soon as possible.

*You have got to bounce up and get going and we had our moments, we certainly did but you do you keep plodding on and I guess we are pretty positive people ... (flood affected participant #12 - female)*

Resilience as a process was observed to be reliant on the actions of others as well as the individual concerned and consequently the timing of actions by others had an impact on resilience. Actions that were appropriately timed, coordinated and delivered in a flexible, collaborative manner conveyed a sense of caring, recognition of plight and empowerment. Conversely, delays had an adverse effect on reconstruction, whether individual or community. It was felt by most flood affected participant and bushfire witnesses that the response should be swift and immediate, to avoid people giving up on the reconstruction project. Delays in providing financial support had a particular influence on delaying reconstruction.

We spent five months just hanging around. Because of the delay, some of the business people who were initially interested in being involved in the project gave up on [town] and set themselves up somewhere else. I have also observed that the morale of the remaining business community has been dented by the delay and the constant disappointments it has caused. (bushfire witness #25 - male)

They could have deployed a lot more, a lot sooner and minimised, I suppose pain and suffering, not necessarily in an emotional sense but in a monetary sense that will help the community recover and come out quicker. (flood affected participant #4 - male)

On the other hand, some interventions were ceased too early, and did not allow people impacted by the disaster time to seek assistance at their own pace. People affected by both events perceived that recovery occurs at an individual pace, so interventions need to be flexible in their timing and not withdrawn too quickly.

We worked fairly closely with the DPI [Department of Primary Industry] – they had imposed a four week time limit on the emergency assistance but we kept it going for another couple of weeks because, in many cases, it was days and weeks before people began to emerge to seek assistance. (bushfire witness #27 - female).



Flood affected participants also discussed the timing of their own recovery, and their expectations of what was normal. In addition they identified that outsiders had expectations of an appropriate time by which to recover.

I reckon around August/September there was a real dip ... I remember talking to the Flood Recovery Officer. I think, we were all starting to think, we should be over it and that probably made us feel worse. (flood affected participant #9 - female).

## DISCUSSION AND CONCLUSION

This study explored resilience within the context of natural disasters following bushfire and flood events in Victoria, Australia through the multiple system levels of Bronfenbrenner's ecological theory (microsystem, mesosystem, exosystem, macrosystem and chronosystem) that was discussed in the previous section. This section draws out the significance of using an ecological model to analyse data. The use of an ecological model demonstrates how proximal individual factors contributing to resilience might be connected by increasingly distal community factors in the first 12 months post disaster, and identified the importance of a caring response and effective communication across multiple system levels. These connections are demonstrated in a conceptual model of nested processes within and between system levels (Figure 1) to guide people involved in policy development, disaster planning and response.

We identified a central unifying theme of the chronosphere across the levels of the model, of *Getting going with rebuilding*. The first part of this theme, *Getting going* implies that the experience of resilience from the overarching recovery process is based on a dimension of time. Resilience appeared to be strongly influenced by the timely availability of support services and resources and the capacity to operationalise those supports when the individual is ready for action. This notion of resilience incorporating the dimension of time supports previous work describing resilience as one of a number of different recovery trajectories (Bonanno, 2004; Norris, Tracy & Galea, 2009). This view of resilience emphasises the importance of using timelines in pre-disaster planning that are based on a resilience trajectory, to minimise the delay of the implementation of post disaster strategies, and optimise effectiveness.

The second part of the central theme acknowledges the concept, so important in disaster literature, of *rebuilding*, is a term often used to refer to the reconstruction of physical infrastructure. Application of Bronfenbrenner's ecological model, however, reveals a much broader meaning across the four levels (Bronfenbrenner, 2005). The meaning attributed by the flood affected participants and the bushfire witnesses to rebuilding focussed on the restoration of their lives towards a sense of normality. This required making plans and working towards a positive future through the restoration of hope. Hope, in the broader literature has been observed to influence resilience in the disaster context through the actions of others such as home visiting or acts of leadership that assisted others to set positive goals (Karairmak, 2010; Hobfoll et al., 2007). Our findings suggest that promoting individuals to take out adequate insurance and develop evacuation plans are as important as consultation processes led by people in the local and broader community to develop visions for a new future.

Our conceptual model captured some of the resilience processes that occurred within the individual (depicted as the microsystem in Figure 1). At this level *rebuilding* requires a degree of agency from the person who has experienced a disaster, in order to restore a sense of safety (through rebuilding home as a symbolic extension of self), rebuilding personal identity or re-establishing a sense of place (Cox & Perry, 2011). The flood affected participants and the bushfire witnesses utilised their ability to manage emotions and

cognitions, and their capacity to solve problems, as fundamental adaptive systems for human resilience (Masten & Obradovic, 2008). Managing emotions and cognitions have been demonstrated to enhance resilience through actions such as a willingness to change thoughts and behaviour, being optimistic and not seeing themselves as a victim or confined to one role (Beiser, Wiwa & Adebajo, 2010; Fox, White, Rooney & Cahill, 2010; Karairmak, 2010; Greenhill, King, Lane & MacDougall, 2009; Rajkumar, Premkumar & Tharyan, 2008).

However, our model demonstrates how resilience requires more than an individual's self-agency, it also relies on the actions within a person's immediate social network (within an individual's mesosystem) (Fernando & Hebert, 2011; Fox, White, Rooney & Cahill, 2010; Lawson, 2010; Glandon, Muller & Almedom, 2008; Rajkumar, Premkumar & Tharyan, 2008). The flood affected participants and bushfire witnesses explained the importance of the care and emotional support provided by their existing networks friends and family. Evidence that the actions by others providing emotional support (Wyche et al., 2011; Beiser, Wiwa & Adebajo, 2010; Boscarino & Adams, 2009; Hobfoll et al., 2008; Bonanno, Galea, Bucciarelli & Vlahov, 2007) confirms the importance of relationships to resilience (Masten & Obradovic, 2008).

Some flood affected participants and bushfire witnesses described an increase in community involvement, social sharing and a broadening of their social network. Elsewhere, public meetings and other social gatherings have been observed to provide emotional support by allowing communities to connect, grieve and celebrate as required (Ng, Wilson & Veitch, 2015; Boon, 2014; Rajkumar, Premkumar & Tharyan, 2008).

By contrast, there were some descriptions of community gatherings marked by significant community anger and conflict. Initial community cohesion and subsequent community disharmony has been observed as a common post disaster pattern (Bonanno, Brewin, Kaniasty & La Greca, 2010; Gordon, 2004). We encourage business and community leaders to arrange events that celebrate progress and enable members of communities to maintain and build connections with each other. Disaster recovery coordinators can also play an important role in identifying the different needs and difficulties of groups within the community and facilitating the building of new relationships (Gordon, 2004).

Our findings also highlight the impact on resilience from the actions of others in settings outside of the individual's immediate network. Our interpretation of ecological model depicts the importance of effective external agencies in the exosystem (Figure 1). The ability to access resources from outside the immediate social network was perceived by the flood affected participants and bushfire witnesses to influence their capacity to reconstruct their dwelling (self-efficacy), this in turn has been shown to influence the ability to recover (Fernando & Hebert, 2011). The importance of material help through donations for resilience has been identified in other disaster contexts (Bonanno, Brewin, Kaniasty & La Greca, 2010), Rajkumar, Premkumar & Tharyan, 2008). Our findings indicate that disaster recovery coordinators can play a vital role in linking individuals to the assistance they perceive they need from outside of their immediate network by establishing effective communication systems.

We argue that resilience should not just be considered at the individual or community level. Our model reflects how some of the distal actions and decisions made at a societal level can influence the resilience of the individual (see the macrosystem in Figure 1). The flood affected participants and bushfire witnesses emphasised the influence that state and federal government policies and procedures had on their outcomes. As has been reported elsewhere, communication was used by some flood affected participants and bushfire witnesses during the response phase to raise financial,

material and instrumental support from distal sources (e.g. relief efforts, donations, volunteers) using the efficiency of media as a communication channel (Kodrich & Laituri, 2005).

While previous research has identified the influence of a number of macrosystem features such as race/ethnicity (Harville et al., 2010; Boscarino & Adams, 2009; Lee, Shen & Tran, 2009; Glandon, Muller & Almedom, 2008; Hobfoll et al., 2008; Palmieri et al., 2008; Bonnano, Galea, Bucciarelli & Vlahov, 2007; Bonnano et al., 2006), employment/population ratio, median household income, occupation type, income equity, education level and net business gain/loss rate (Sherrieb, Norris & Galea, 2010), and access to schools and services (Hegney et al., 2008) none of these were evident in our data. Some of the flood affected participants considered climate change as a distal influence when they reflected on previous natural disasters. The importance of the physical environment and the management of water infrastructure and bushfire hazards had an influence on resilience also noted in socioeconomically deprived communities in the north east of England (Cairns-Nagi & Bamba, 2013, Pearson, Pearce & Kingham, 2013). This suggests that policy makers who aspire to enhance resilience need to incorporate broad socioeconomic goals.

Our analysis of the results adds to previous ecological concepts of resilience by identifying that Bronfenbrenner's nested systems rely on intersystem processes to enable connections from more distal systems to effectively impact the individual. Communication was relevant *within* each level distal to the individual, but appeared to be equally important *between* system levels. Similarly, the data from the flood affected participants and bushfire witnesses highlighted how the actions that expressed care and concern from each level were connected to the individual's resilience. The model indicates that the role of influential leaders in the local community should not be underestimated. The perceived inaction of these others can be interpreted as a lack of caring and be detrimental to the resilience of the population. We suggest that distal sources of support from the federal level need to be clearly communicated to every level within the model to ensure that recovery resources are both efficiently and effectively allocated. Furthermore, policies that maintain or build social networks and communication are important and could include training and support for staff and volunteers in the provision of a caring response

This exploratory study has used an understanding of participants' experiences following bushfire and flood events in Victoria, Australia to expand an ecological understanding of resilience. We have detailed a number of processes within and between systems that may inform policy and practice. Our model exposes the importance not only of the actions of the individual, but the actions of others in contributing to resilience post disaster. In particular, we argue that consideration should be given to both proximal and distal influences on resilience. We suggest people involved at all phases of disaster management develop strategies to promote communication within and between each level. We highlight the important effect on resilience that result from expressions of care and support enacted by connecting the individual with resources beyond their immediate settings. We urge attention be given to the timing of implementing recovery activities as this may be crucial to resilience outcomes. Our model adds to previous research by describing a multiple system approach that promotes integration across levels of resilience and looks more broadly to the role of strategies that address issues such as climate change, natural disaster hazard management and socioeconomic equality as well as interventions that encourage members of communities to maintain and build connections.

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