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The role of prior experience in informing and motivating earthquake preparedness

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ABSTRACT

Motivating household preparedness for earthquakes can be difficult, especially given the infrequent and varying nature of major events. Past research has shown that people's experiences contribute to their beliefs about whether, and how, they should prepare for earthquakes. Direct experience of a disaster can be a strong motivator of preparedness; however, most people will not directly experience a large damaging earthquake in their lifetimes. They instead need to rely on experience of small earthquakes, experience of different disasters, adverse life experiences (e.g. accidents), or vicarious experience. This paper explores the influence of such experiences on earthquake preparedness. The research found that experience has seven different influences on the preparedness process including: prompting thinking and talking; raising awareness and knowledge; helping individuals understand the consequences of a disaster; developing beliefs; developing preparedness; influencing emotions and feelings; and prompting community interaction on disaster issues.

1. Introduction

An important component of earthquake Disaster Risk Reduction (DRR) is encouraging sustained household preparedness (e.g., collecting survival items such as food and water; undertaking mitigation actions such as retrofitting buildings; securing household items; making a household emergency plan; learning survival skills; and participating in social preparedness activities (Kirschenbaum, 2002, 2004; Lindell et al., 2009; Mulilis et al., 1990; Russell et al., 1995; Spittal et al., 2008). One area that has been recognized as influencing preparedness is experience. Experience is a complex variable. It can encompass direct personal experience of hazard events. The infrequent and diverse nature of major hazard events means that people often lack such personal experience. They will, however, have indirect experience (e.g. experience of small hazard events that did not impact them directly), vicarious experience (e.g., media reports of national or international events, accounts of prior events from relatives), and challenging life event experience (e.g., of accidents, crime etc.), all of which could play independent and interdependent roles in future preparedness decision making and actions.

There exist several reasons why experience deserves more systematic study. One reason why more systematic research into the relationship between disaster experience and preparedness is required derives from the Sendai recommendations (United Nations, 2015), particularly in relation to the Build Back Better (BBB) recommendation. The BBB concept has implications beyond the physical and can encompass using disaster experience as a catalyst for developing future DRR capabilities, such as preparedness. To pursue this, however, it is important to develop understanding of how and why experience contributes to preparedness. A need for a deeper understanding of the experience-preparedness relationship can be traced to the fact that people in hazard-prone areas will accumulate indirect and vicarious experience of hazard events and their consequences over the course of their lives.

Recognition of this fact raises several methodological and conceptual issues. For example, most work in this area has focused on direct experience and its implications. This belies the fact that actual experience is likely to be preceded and succeeded by indirect and vicarious experiences. These will interact in complex ways with direct experiences and, especially, in the post-event settings where BBB activities will be planned, could influence interpretive processes and actions. At present, to the best of the authors' knowledge, there have been no studies into how direct, indirect, vicarious and life experiences

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co-exist and influence preparedness processes and action. This paper draws upon a qualitative study in New Zealand to explore the interdependent influence of such experiences on the hazard preparedness process. First, the paper reviews work on the experience-preparedness relationship and its existence within the emergency management context in which both DRR will occur and, potentially, BBB activities will be organized.

There are several levels to Disaster Risk Reduction in New Zealand. At a national level the Ministry of Civil Defence & Emergency Management (MCDEM) administers the Civil Defence Emergency Management Act 2002, as well as the associated National Strategy. They have a responsibility for improving resilience and preparedness as outlined in the legislation. Civil Defence Emergency Management (CDEM) Groups are responsible for regional resilience and preparedness. Other agencies, such as the Earthquake Commission, also have an interest in improving earthquake resilience, and have developed their own educational strategies to target preparedness. Understanding how people's experience contributes to the preparedness process is useful for such agencies in helping them design effective BBB activities in post-event settings and DRR programmes that can incorporate experience as a motivator of preparedness.

2. Research and theory on experience and the preparedness process

Prior research has highlighted the complexities of investigating the experience-preparedness relationship. Several preparedness theories and approaches suggest that prior experience of earthquakes and other disasters has an influence on the preparedness process (e.g. Protection Motivation Theory (Rogers, 1983); Person Relative to Event theory (Mulilis et al., 2003) – also summarised in Ejeta et al. (2015); the Protective Action Decision Model (Lindell and Perry, 2011); and the mental models approach (Bostrom, 2008). However, these and other studies have also identified how complex the experience-preparedness relationship is, with different types of experience having a range of influences on the preparedness process. Such complexities are described further in Sections 2.1–2.2.

2.1. The influence of earthquake experience (and other disasters)

The first issue that arises when attempting to systematically investigate the experience-preparedness relationship concerns the fact that the definitions of direct and indirect experience differ across studies but may include experiencing injury and loss (both damage and fatalities), being disrupted by events, and helping out in an event (e.g. Palm and Hodgson, 1992; Perry and Lindell, 2008; Nguyen et al., 1996; Russell et al., 1995; Tekeli-Yeşil et al., 2010). This issue reflects researchers imposing their definition of experience on their analysis, or where a study has focused on one aspect of the multifaceted nature of experience. An alternative approach, and the one adopted in this study, involves inviting citizens (whose preparedness is being encouraged) to identify what they see as “experience” and invite them to give their accounts of how different types of experience have facilitated or constrained preparedness (individually and collectively). The importance of including the latter in a preliminary study of the experience-preparedness relationship derives from findings in previous studies that this relationship can be resolved in several ways; reducing preparedness, having no effect, and increasing preparedness.

For example, Johnston et al. (1999) and Paton et al. (2013, 2014) described how hazard experience, of the 1995 eruption at Ruapehu volcano (New Zealand), and the 2010 Darfield/2011 Christchurch (New Zealand) earthquake sequence respectively, resulted in significant reductions in post-event levels of preparedness. In the first study, this was attributed to the Normalisation Bias (Mileti and Fitzpatrick, 1992; Russell et al., 1995). The experience of relatively minor volcanic hazard consequences that had a limited impact on populations resulted in people assuming they could cope with any future event and did not need to prepare. With Normalisation Bias, people assume that they fared adequately in a previous event (i.e. in the Johnston et al. study, people believed they coped well and did not have to call on their preparedness measures) and develop the belief that they do not need to do anything different (e.g. prepare) to survive a future event.

A comparable outcome can arise from people's interpretation of experiencing relatively moderate earthquakes (e.g. magnitude 5.5, Modified Mercalli Intensity VI). This can lead people to form the opinion that they are not a problem or to think that a ‘big one’ is not likely or imminent (Simpson-Housley and Curtis, 1983). Also, interaction between experience and their magnitude calculations, can lead them to underestimate the effects of a potential future earthquake, reducing the likelihood of their preparing (Celsi et al., 2005).

In the Paton et al. (2014) study, people's experience of the 2010 Darfield earthquake, which had little impact on Christchurch participants, resulted in an example of the Gambler's Fallacy (e.g., Barron and Leider, 2010), the assumption that a future earthquake would not occur for several hundred years, resulted in some abandoning their preparedness.

Adding to the complexity, some studies have found only small or non-significant correlations between earthquake experience and preparedness (e.g. Kiecolt and Nigg, 1982; Lehman and Taylor, 1987; Mileti and Darlington, 1997; Mileti and Fitzpatrick, 1992; Tanaka, 2005), while others have found that experience can motivate preparedness (e.g. Farley, 1998; Lindell and Prater, 2002; Mulilis et al., 1990).

Whether people prepare or not appears to be dependent on the nature of the experience and how that experience has been interpreted. For example, people have undertaken additional preparedness actions depending on the number of earthquakes experienced (Russell et al., 1995); after feeling shaking (Nguyen et al., 2006); experience of damage (Davis, 1989; Palm and Hodgson, 1992; Perry and Lindell, 2008); the amount of earthquake damage and losses (Heller et al., 2005; Jackson, 1977, 1981; Russell et al., 1995); whether a person was more directly impacted (Palm and Hodgson, 1992); proximity to the epicentre (Nguyen et al., 2006; Russell et al., 1995); experience of personal loss by a family member (Turner et al., 1986); being physically, financially or emotionally injured (Nguyen et al., 2006); being evacuated (Russell et al., 1995); knowledge of and contact with recovery agencies (Russell et al., 1995); participating in rescue and solidarity activities in previous earthquakes (Tekeli-Yeşil et al., 2010); thinking about the earthquake after the event (Russell et al., 1995); hearing a prediction of a larger earthquake event (Russell et al., 1995); and experiencing an earthquake that scared an individual (Dooley et al., 1992; Russell et al., 1995). It is, however, important to consider that action following experience can result in people adopting low cost/easy to adopt measures rather than engaging in comprehensive preparedness (McGee et al., 2009; Palm and Hodgson, 1992; Paton and McClure, 2013; Russell et al., 1995).

Some researchers have noted that earthquake experience can influence risk perceptions (e.g. Clark et al., 1993; Dooley et al., 1992; Karanci and Aksit, 1999; Lindell and Prater, 2000; Palm and Hodgson, 1992; Wachinger et al., 2013), but this need not translate into preparedness. The Johnston et al. (1999) study introduced above was also interesting in that the authors noted that an increase in the level of volcanic risk perception was accompanied by a reduction in preparedness. Consequently, the link between experience, risk beliefs and preparedness may be contingent on, for example, whether individuals experienced loss (Davis, 1989; Helweg-Larsen, 1999; Mileti and O'Brien, 1992; Solberg et al., 2010; Weinstein, 1989); experienced injury, or whether they knew of someone who had experienced an injury (Helweg-Larsen, 1999). An increase in perceived vulnerability may motivate people to become more prepared (Russell et al., 1995). The latter may be influenced by people's affective reaction to an event.

The experience-preparedness link could be mediated by how disaster experience influences levels of fear or anxiety (Dooley et al.,

1992; Heller et al., 2005; Karanci and Aksit, 2000; Rüstemli and Karanci, 1999; Siegel et al., 2003). Rüstemli and Karanci (1999) suggest that fear actually shapes cognitions and motivates adaptive responses. A link between fear and preparedness has also been found in a flood experience context, with (Takao et al., 2004) suggesting that "emotional response has a stronger effect on preparedness for floods than a cognitive response". Siegel et al. (2003) found a direct relationship between prior perceived 'emotional injury' and application of preparedness for the El Niño.

Conversely, Palm and Hodgson (1992) found that while experience of the Loma Prieta earthquake increased concern about future earthquakes, this did not translate into high rates of adjustment adoption for most mitigation measures. This may be possibly due to the level of concern experienced, with lower levels or too high levels of concern being less likely to motivate preparedness (Paton et al., 2005, 2003). An important issue here is whether elevated anxiety is accompanied by information about how to mitigate the source of anxiety (Paton and McClure, 2013) and whether people can act on this information. That is, the degree to which they can exercise control.

Several researchers have found that belief in personal control (associated with locus of control) has an impact on whether people prepare for subsequent events. Rüstemli and Karanci (1999) found that fear and belief in personal control were the two most important indicators of whether people would prepare for future events.

Direct experience of a disaster has an impact on memory of an event. Neisser (1996) undertook a study following the Loma Prieta earthquake and found that individuals who had direct experience of the event (as participants) had better recall of the event a year and a half later, when compared with those who had only heard about the event through the news. While unconfirmed, they suspect that this was likely due to those with direct experience talking about the event afterwards in the form of narratives. It was unclear as to whether the repetition of the narratives made the earthquake more memorable, or because it increased the distinctiveness of the experience. Lee's (1999) study with children after Hurricane Andrew found that a year and a half after the hurricane, children expressed vivid memories of their experiences, as did people questioned by Norris and Kaniasty (1992) when asked about what they remembered of their experience with Hurricane Hugo. Norris and Kaniasty (1992) suggest that people remember disastrous events because they cause great change in people's lives, and their vividness distinguishes them from other life events.

It is evident from this brief review that the (direct) experience-preparedness link is not a straightforward one. Such complexity illustrates the need for more systematic research into this relationship if experience is to be used effectively within a BBB strategy. The diversity of findings reflects how different elements have been salient in specific studies. Recognizing this diversity, the present study sought to build an understanding of the contingent influences on the experience-preparedness relationship based on the accounts of people living with hazardous circumstances. This paper also recognizes that direct and other forms of experience co-exist and, it is argued, collectively influence preparedness decisions and actions. Consequently, the paper next introduces other types of experience that could affect the experience-preparedness relationship.

2.2. Other types of experience and its influence on the preparedness process

Many people will not directly experience a disaster such as an earthquake in their lifetimes, and especially not a large one. They must rely on other types of experience in deciding whether a future earthquake is important enough to motivate them to prepare. In this case, people might either draw upon vicarious experience (i.e. the disaster experience of others, information in the media) or hazard-related 'life' experiences that are indirectly related to earthquake preparedness (e.g. traumatic life events, safety experiences). Previous research has identified vicarious and 'life' experiences as precursors of preparedness (Flynn et al., 1999; Lindell and Perry, 2011; Sjöberg, 2000).

2.2.1. Vicarious experience

In terms of vicarious experience via others, studies have reported that knowing someone who has experienced personal loss or injury, can alter risk perception or motivate an individual to get prepared (Helweg-Larsen, 1999; Turner et al., 1986). McClure et al. (2011) found changes in risk perception following vicarious experience of the 2010 Darfield earthquake in Canterbury region, New Zealand. Following the earthquake, people living in two New Zealand cities outside Canterbury (Palmerston North and Wellington) felt that an earthquake was more likely to occur somewhere in New Zealand. When asked specifically about their own cities, however, only the Palmerston North residents rated the likelihood of an earthquake in their own city as being significantly higher than before the Darfield earthquake. The difference between Palmerston North and Wellington occurred because Wellington had higher levels of risk perception before the earthquake, suggesting that vicarious experience may only be influential on risk perceptions if baseline levels of risk perception are low. In terms of vicarious experience via the media, a Turkish study following the Maramara earthquake found people's awareness of the consequences of an earthquake were raised, and people's beliefs they would have to rely on their own resources in a future event were developed (Karanci and Aksit, 2000).

2.2.2. Life experience

Paton et al. (2000) highlight that other types of hazard-related life experiences, such as crime, accidents, economic adversity or unemployment, may be more salient to community members, than natural hazards. Norris (1997) found in her study across different domains of precautionary behaviour (hazards preparedness, crime prevention, vehicular safety and health maintenance) that many people tend to take a general precautionary stance to a range of environmental threats. She states that, "'Be prepared' is a motto that many people seem to have taken to heart. In contrast to a view of the public as unconcerned with the management of risk, precautionary behaviours appear to be a common element of life" (Norris, 1997, p. 574). Her findings suggest that because people already have precautionary beliefs and behaviours across different aspects of life, a multi-hazard approach to encouraging self-protective behaviour is useful (Norris, 1997; Norris et al., 1999). Spittal et al. (2008) also found that people's propensity for risk precaution predicts earthquake preparedness, indicating that "people who take precautions about potentially adverse life events are more likely to prepare for earthquakes".

A note of caution is required however; differences do occur when comparing the uptake of different precautionary measures (for example, more people wear seatbelts than collect survival items for a disaster, which may be reflected in other motivating factors such as legislative requirements). Therefore, it is important to note that while taking a multi-hazard approach certainly has value, the mechanisms for motivating preparedness for life-related hazard experiences are unlikely to be exactly the same as for earthquake preparedness, and that specific strategies may be required to target certain aspects of earthquake adjustment adoption.

2.3. Gaps in research

The preceding discussion highlights several issues that need to be considered in researching the experience-preparedness relationship. One concerns the fact that people can bring direct, indirect, vicarious and life experiences to bear on their risk assessments and preparedness decision making. Consequently, a significant gap in the existing research has been a tendency to focus on one type. This study sought to fill this gap by exploring whether people identify their risk and preparedness beliefs and actions as being influenced by diverse types of experience. A second issue that emerged from the above review was

that the effectiveness of the experience-preparedness relationship was affected by contingent influences from several factors (e.g., memory of an event, nature and context of the experience, risk perceptions, cognitive biases, control beliefs, and anxiety, fear and concern. The present study sought to elicit clearer understanding of how experience (of different types) influences perceptions and actions based on people's accounts of their choices. This research thus aimed to improve knowledge about the roles that different types of experience can play in the earthquake preparedness process and the interactions that occur as part of that process.

3. Research outline

This research was performed using the perspective of symbolic interactionism (Blumer, 1969). Such a perspective allowed for experience-related meanings and interactions to be explored in a quest to elucidate how these relate to the earthquake preparedness process. In a practical sense, a grounded theory approach was used for data collection and analysis (Strauss and Corbin, 1990).

Data collection was qualitative, as this method is appropriate for both the symbolic interactionism perspective and grounded theory approach. Qualitative data was considered the best fit for helping define the details that are necessary to understand experience-related meaning and interactions. Consequently 48 interviews were conducted with residents from three towns in New Zealand. Interviews took place from April to June 2008.

Interview breakdowns included 18 interviews in Timaru, 16 in Napier and 14 in Wanganui. Interview locations were selected to ensure that the towns being studied had a degree of earthquake risk (with Napier subject to the greatest risk followed by Wanganui and Timaru – see Fig. 1), and were similar in terms of population size (between 25,000 and 55,000 based on the 2001 census data) (Statistics New Zealand, 2001), facilities available, institutional representation and legislative environment, and in their propensity for relative geographic isolation in a disaster. DRR activities (e.g. emergency management planning, information dissemination, etc.) for all locations were also consistent in that they aligned to legislative and guidance frameworks provided by the New Zealand Ministry of Civil Defence & Emergency Management.

The largest and most recent earthquake disaster that had occurred in New Zealand at the time of the interviews was the major 1931 Hawke's Bay earthquake (magnitude 7.8), which devastated Napier and caused 256 deaths. Since then, Napier had experienced earthquakes of moderate size and other events such as floods. The most recent hazard event for Timaru was a large snowstorm in 2006 which caused widespread disruption but no deaths (Hendrikx, 2007). Wanganui had been most recently affected by flooding and storms, with the worst flood event occurring in 1990 causing damage to property, and several other floods since then threatening property and causing evacuations. While Timaru had not experienced any significant damaging earthquakes at the time of the study, Wanganui had experienced several, including a magnitude 7.5 earthquake in 1843 and a magnitude 6.5 earthquake in 1991 (Wanganui District Council, 2011). The 4 September 2010 Darfield earthquake (magnitude 7.1) and 22 February 2011 Christchurch earthquake (magnitude 6.3), both located in the Canterbury region north of Timaru, occurred after data collection had taken place.

Invitations to participate in the study were sent to local community groups in the areas introduced above, and advertised in local publications. As per the grounded theory approach, participants were asked to talk freely about earthquakes, other hazards, and preparedness and discuss any information they had seen on the aforementioned topics.

A series of questions to ask participants was drawn up prior to the interviews, and these questions were asked only if the participant did not freely offer the answer themselves during the interview. The two questions that specifically related to experience included: “Tell me about any past experiences you have had with hazards?” (including earthquakes and other natural or life hazards)”; and, “What types of information have you seen or heard about hazards?” (which assisted in enquiring about vicarious experience). The full set of questions can be found in Appendix A.

Interviews were taped with the interviewees’ consent and transcribed into a word processing program. The files were then loaded into the qualitative software analysis package “Atlas.Ti” and an iterative process of coding, analysis, and definition of core thematic categories undertaken according to the grounded theory approach suggested by Strauss and Corbin (Strauss and Corbin, 1990).

4. Results

Four core categories related to experience were identified, including direct disaster experience; indirect disaster experience; vicarious experience; and life experience. A number of additional core categories were also found that linked to these different types of experience. Fig. 2 depicts the core categories that were identified, a selection of individual codes that fell under each category and the number of times these codes were allocated throughout the interviews (i.e., specific numbers are indicated in Fig. 2, noting that most categories had more than 5 mentions each by participants). It is important to note that some individuals made reference to a concept several times (which was then coded several times to reflect the frequency of it being mentioned), while others may not have mentioned a concept at all (and thus no codes were ascribed for that individual).

Following the coding and definition of core categories, to promote increased rigour, credibility and trustworthiness in the analyses, process diagrams were constructed to identify linkages between types of experience, and the influence that experience had on the preparedness process. Fig. 3 shows an example of a process diagram constructed for Interview 41. This illustrates how people have had, and can draw upon direct, indirect, vicarious and life experience to inform how they, for example, interpret their risk and make their preparedness choices. This Figure also introduces a need to accommodate all types of experience in DRR planning.

Process diagrams were developed for each individual interviewee, and these were then analysed, merged and summarised to depict the overall influence of each type of experience on the preparedness process. Table 1 presents an overview of the merged process diagrams. It shows the number of interviewees who described a link between the type of experience they had (i.e. direct disaster, indirect disaster, vicarious or life experience) and how it was influential. It is evident from the table that each type of experience influenced aspects such as thinking and talking, raising awareness and knowledge, understand consequences and influencing beliefs. However, some specific types of experience were seen to be more likely to develop aspects such as preparedness, and influence emotions and feelings. The nature of this will be discussed throughout the course of the paper.

The following sections of this paper use the qualitative data to describe the types of experience identified, and the interactions and influence those types of experience had on aspects of the preparedness process. It does not seek to describe the preparedness process in full, but rather how the nature of different aspects of experience contribute to the preparedness process. For further information on understanding the preparedness process in the context of this study refer to Becker et al. (2012).

4.1. What does ‘experience’ mean?

People's accounts of their experiences (Fig. 2) provided confirmation of the fact that people's experience was sourced from:

- direct experience (i.e. physically feeling the event or being directly impacted by a disaster including experiencing injury or damage)

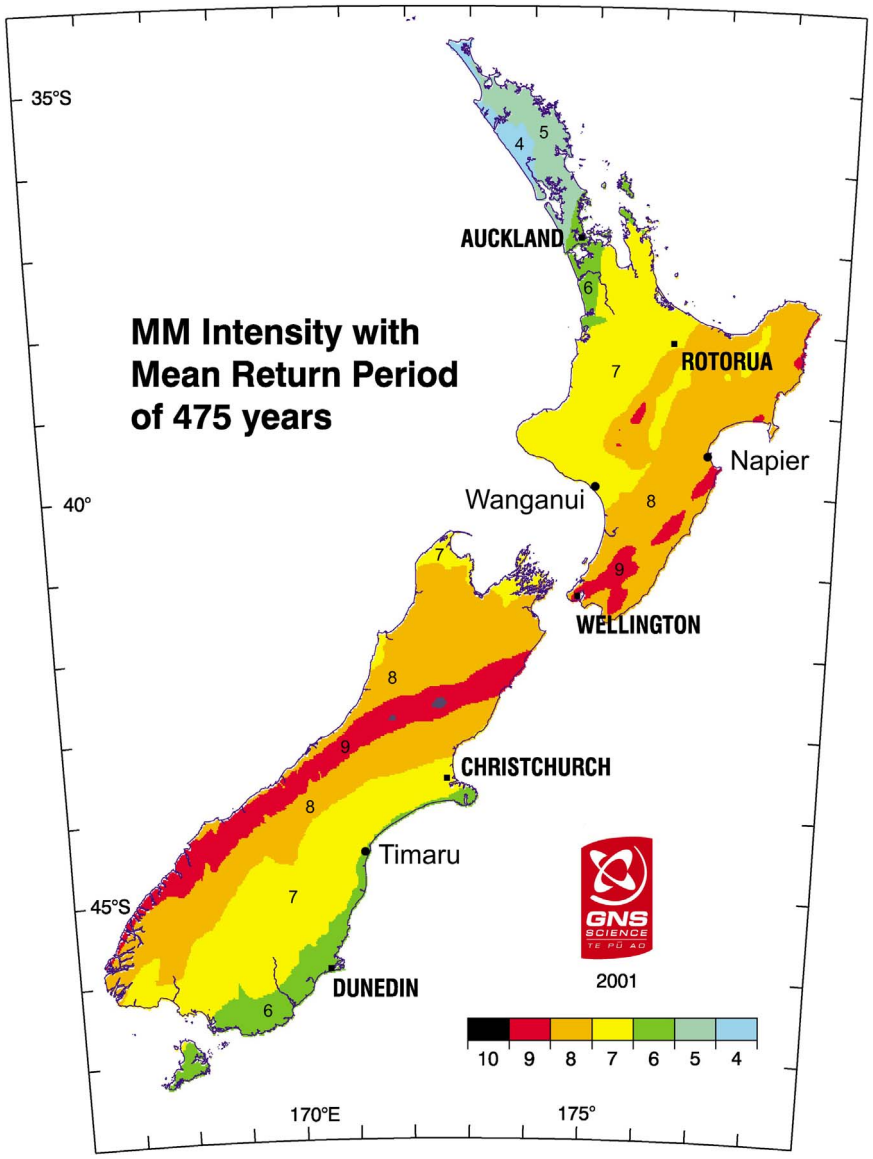

Fig. 1. The positions of the study locations relative to areas of earthquake risk, current at the time of the 2008 interviews (updates in earthquake risk have occurred since then). The map shows the distribution of Modified Mercalli (MM) shaking intensity with a current annual exceedance probability of 1/475, derived from the national probabilistic seismic hazard model. Timaru was situated within MM6 (i.e., falling items, slight damage, e.g., cracked plaster), Wanganui within MM7 (i.e., buildings cracked, bricks, and chimneys falling), and Napier within MM8 (i.e., damaged and partially or fully collapsed buildings) (personal communication, Smith, 2001); based on data from Stirling et al., 2000).

- indirect experience (i.e. being directly exposed to the real or potential impacts of a disaster, but not being personally affected. This included being indirectly impacted by an event (e.g. unable to travel to work because of transport disruptions); observing the effects of a local event but not being impacted in any way; preparing, planning or responding to an event (e.g. as a volunteer, or in an emergency management role); and assisting with relief efforts)
- vicarious experience (i.e. individuals interacting with others such as family members or friends who have had disaster experience; or tapping into experience via the media); and
- life[1] experience (i.e. applying experience of potentially adverse event or situation to a disaster context e.g. experiencing a car accident and applying experiences from that event to a disaster scenario). Life experience in this context is distinct from disaster experience.[2]

People's experiences were informed to some extent by exposure to the geographic locations they lived in and the risks they faced, but also by other events that had happened over the course of their lives.

Only one of the interviewees had directly experienced a large damaging earthquake (the 1942 Wairarapa earthquake) and all 48 participants reported having some direct disaster experience of minor events, including storms, flooding and minor earthquakes. People's direct minor experiences were mostly related to experiencing damage to property during a disaster event. In terms of location, fourteen interviewees in Timaru mentioned they had experienced a significant snowstorm in 2006 and eight participants had been in a windstorm in the 1970s. Some mention was also made of flooding. In Wanganui, flooding was the most common type of event that participants had experienced, followed by minor earthquakes. In Napier, flooding and moderate to minor earthquakes were most commonly experienced by interviewees. Five interviewees in Napier and Wanganui also spoke

[1] Also referred to as "indirect event experience" in Becker et al. (2012).

[2] Our categories of disaster and life related-experience are developed from the (*footnote continued*) interview data, and may differ from other definitions of experience in the literature.

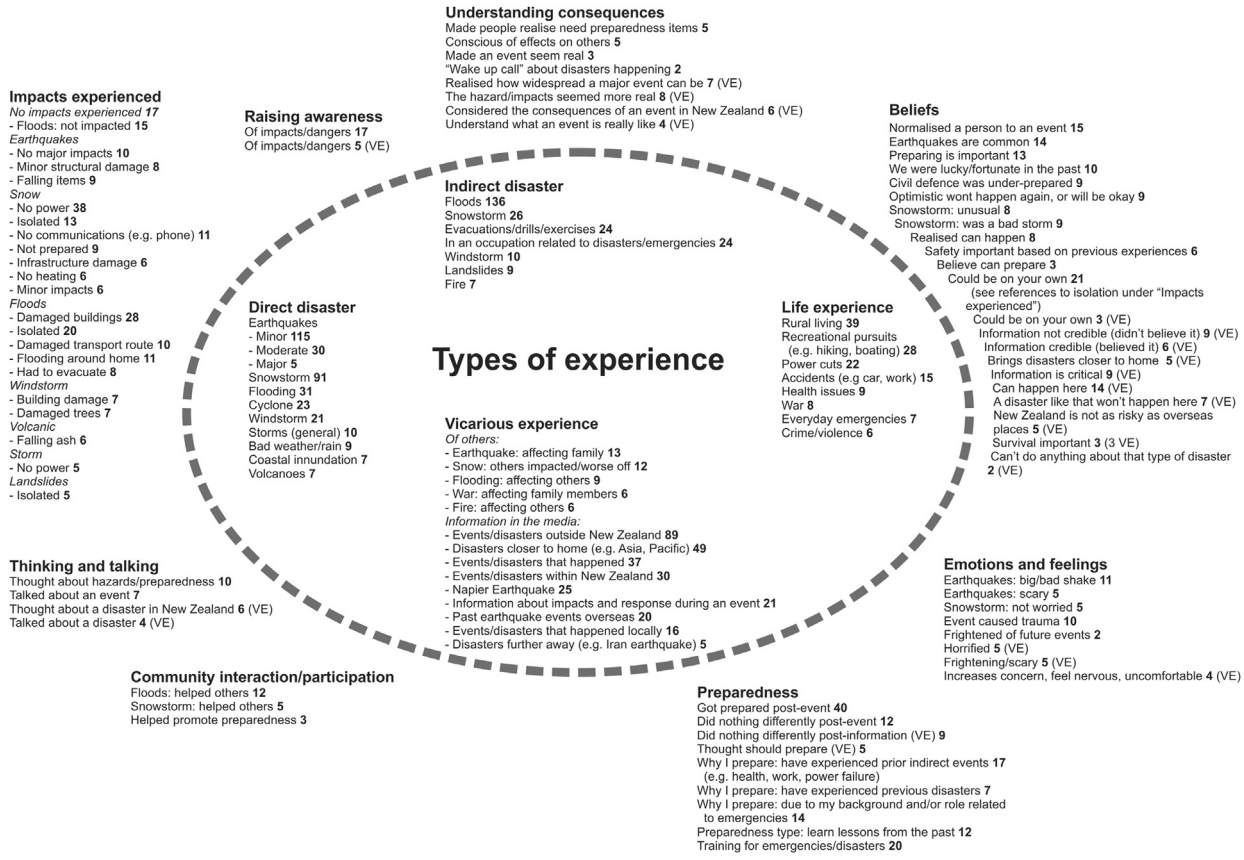

Fig. 2. Core categories and codes identified during the analysis (VE = vicarious experience). Most codes attempt to reflect people's comments as closely as possible, using similar words or concepts that they used themselves in their discussions.

about volcanic eruptions from Mt. Ruapehu and minor ash effects experienced as a result of those eruptions.

Twenty-six participants reported having indirect experience of disasters. This included, for example, their responding to an event (e.g. as a civil defence volunteer); being involved in preparing, planning or responding as part of a particular role (e.g. workplace health and safety or emergency management; being indirectly impacted by an event (e.g. unable to travel to work because of transport disruptions);

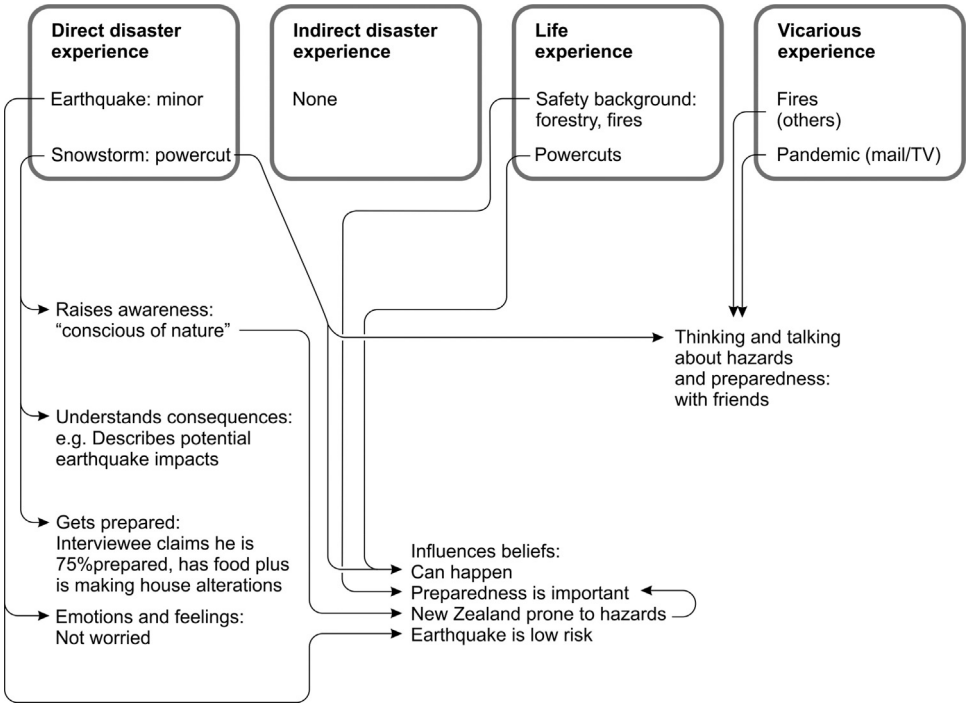

Fig. 3. Example of an experience-preparedness process diagram constructed during the analysis (for Interview 41).

Table 1
Number of people who described a link between a type of experience they had, and how it had been influential.

	Direct disaster experience (N = 48)		Indirect disaster experience (N = 26)		Vicarious experience (N = 48)		Life experience (N = 48)	
	Count	%	Count	%	Count	%	Count	%
Prompted thinking and talking about hazards and preparedness issues	19	39.6	2	7.7	22	45.8	18	37.5
Raised awareness and knowledge	12	25.0	6	23.1	11	22.9	7	14.6
Helped individuals understand the consequences of a disaster	4	8.3	2	7.7	3	6.3	2	4.2
Influenced or developed beliefs	22	45.8	11	42.3	18	37.5	18	37.5
Developed preparedness	13	27.1	1	3.8	0	0	7	14.6
Influenced emotions and feelings	22	45.8	3	11.5	3	6.3	2	4.2
Prompted community interaction	2	4.2	8[a]	30.8	2	4.2	3[b]	6.3

[a] People primarily reporting they helped out in response to a disaster (e.g. emergency response, disaster relief, etc.).
[b] People primarily getting involved in promoting preparedness.

observing the effects of a local event but not being impacted in any way; and assisting with relief efforts. Flooding was the most common type of disaster of which people had indirect experience.

Interviewees also included vicarious experiences in their accounts. Interviewees often discussed how the experience of other people influenced them, or how they had seen information about disasters through other sources. Many had also been exposed to media reports about disasters that had occurred overseas or within New Zealand, and related how this information had impacted upon them.

All 48 interviewees discussed diverse life experiences related to other adverse events. Such experiences included accidents (e.g. vehicle accidents, personal accidents), personal health events, industrial hazards, and infrastructure failure (e.g., power, telecommunications). Discussion of these events in a hazards context reflected issues that were salient to people, particularly in the absence of having experience of a significant disaster such as a damaging earthquake.

4.2. Effects of experience

Results from this research confirm that disaster experience was used to inform people's understandings and actions. That is, it represented a form of 'information.' People's experiences of disaster and other hazardous events had several influences on the preparedness process for disasters (see Table 1).

4.2.1. Thinking and talking

Participants' experiences promoted more thinking and talking about hazards and preparedness. Being either directly or indirectly involved in a disaster or some other kind of event would commonly trigger thoughts and act as a catalyst for conversations (about hazards and preparedness). For example, Interviewee 41 directly noted that for conversations to begin, the "conversation needs to be stimulated by something [such as] an event…" Another example highlighted additional issues raised in interviews: Interviewee 29 from Timaru described how experiencing an event can trigger conversations, "… after things like the snow or the floods - yes, you are talking, that's your conversation all the time. How prepared were you? How did you manage?" Both interviewees 41 and 29 made reference to the snowstorm event which they had experienced; however, people did not necessarily have to have experience of a disaster per se for conversation to occur. This finding has significant implications for preparedness. Critical Awareness theory (Paton and McClure, 2013; Paton et al., 2005) has identified direct links between thinking and discussing hazard issues and preparedness. Thinking and talking linked to experience could be more effective if it helps people personalize their preparedness circumstances and needs (Paton and McClure, 2013).

Hazard-related discussions could also be stimulated by life or vicarious experiences. For example, interviewees commonly discussed how they would talk about experiences such as vehicle accidents or personal accidents. With respect to vicarious experience, even though Napier interviewees had not directly experienced the Hawke's Bay earthquake, they often mentioned that they would ask other family members or friends to discuss their experiences in the 1931 Hawke's Bay earthquake with them. With the vicarious experience of others, people most often talked about what happened in the event and what they had gone through. However, this did not always culminate in the topic of preparedness for disasters being included in conversations. Vicarious experience via the media appeared to prompt conversations about hazards, including preparedness, as part of regular social conversations. This is consistent with the findings introduced above regarding critical awareness (Paton and McClure, 2013).

4.2.2. Awareness and knowledge

Interviewees who had directly or indirectly experienced disasters, or had some type of adverse life experience, often felt that the experience had raised their awareness and knowledge. The types of awareness raised included both awareness of hazards and awareness of preparedness. Interviewee 26 summed up how experience can raise awareness by saying, "The way I see it, if… when people have experienced something, have experienced some disruption, then they are likely to be aware of what can happen and what they can do about it beforehand for themselves. You think afterwards, well, I should have done this, that and the other thing". Vicarious experience also raised awareness, but was more likely to be related to awareness about the hazard itself, rather than preparedness. Four people whose knowledge and awareness was raised by various direct and vicarious experiences, choose to explicitly seek further information to verify what they had seen or heard, or find out more about hazards or preparedness. The importance of this finding derives from providing people with opportunities to personalize their awareness and knowledge, with personalization being an important precursor to sustained preparedness (Lindell and Perry, 2011).

4.2.3. Understanding consequences

Disaster experiences were linked to increasing the likelihood of people understanding the consequences that hazardous events could generate. People suggested that an experience of a past disaster can make a future event seem more "real". Taken together, these outcomes further support people's ability to personalize their knowledge and make future events more salient. In particular, the development of knowledge of consequences and their (local) causes and implications plays a role in people developing (local) risk beliefs and preparedness needs (Paton and McClure, 2013). Those that had direct or indirect disaster experience spoke of the disaster or event leading them to the realisation that disasters can actually happen, the impact disasters can have, and the preparedness that needs to be undertaken to counter the

impacts of those disasters.

People also described experiencing a disaster event as a "wake-up call". Such an understanding of the consequences prompted a number of people to get more prepared. This was most evident in participants from Timaru who had experienced the 2006 snowfall event. A major issue during the event was that electricity went off, so following the event many interviewees went out and purchased items (e.g. transistor radio, batteries, candles, gas cookers, a phone that doesn't run off power, a generator) to ensure they could deal with future electricity outages. Interviewee 29 described the experience of the snowstorm, how it assisted people's understanding of consequences, and how it became a prompt for preparedness:

> "…after the snow situation here […] – there was no power, we didn't have power for what was it – 5 days, we didn't have telephone, so there was just no power. Some of the homes had it longer than that – I think it was a couple of weeks with no power. So it really brought it home to people how prepared they should be …"

Life experience also helped with understanding the consequences of something adverse happening, but in a more generic way, as the nature of the experience was usually different to that experienced during a disaster. Life experience assisted with understanding the impacts of an adverse event in general, and helped individuals understand how being prepared for adverse events might make one's life easier or lessen the impact. For example, individuals discussed how being prepared for accidents or adverse health events by having a first aid kit or first aid training could lessen the impact of such an event. Interviewee 3 described how experience of vehicle accidents has helped him become more conscious of hazards in general, understand the consequences of having an accident, and alter his behaviour to ensure his safety:

> "Riding a motorbike you tend to be quite conscious of hazards. A truck going around the corner spilling some shingle – on a motorbike it would be like ball-bearings and you would be flying. When it is wet, and diesel spills and things like that. My speed goes down by 20–30% when I'm riding in the wet, because of that – I don't like it. I have come off a few times and yeah, you are conscious of that then."

The vicarious experience of others also helped with understanding the consequences of disasters. However, because these experiences did not happen to the individual themselves, they tended to be less personalized and did not necessarily lead to reports of direct behaviour change. Interviewees described how their understanding of certain elements of disasters increased after talking with family or friends about experiences they had been exposed to. For example, after the 2006 snowstorm, Interviewee 35 from Napier spoke with friends in Canterbury who explained to her that access to electricity was a significant problem following the event. Interviewee 28 spoke to friends living in rural Wanganui, and during this conversation became aware of the isolation and problems that floods could cause:

> "During the last flood in Wanganui I had friends calling me up that knew [my husband] was with the emergency services, asking if [my husband] could please get someone out to them. They had babies, had no food, they had no milk, they couldn't get out, the water was up to their front door, sort of thing. So even they weren't always prepared."

Vicarious experience via the media helped with understanding the consequences of event. Visual information, such as camera footage seen on television had a greater impact than written or verbal information alone. The impact and influence of visual media such as television has been noted in other studies (e.g. Turner et al., 1986). A number of interviewees stated that they couldn't imagine what an event might be like, because they had never experienced one, and visual information helped with that "imagination". Understanding the actual consequences of an event helped people understand what an event might mean to them, and helped with motivation in getting prepared. As interviewee 46 stated:

> "…if you go back to that big tsunami event that happened in Bali, around in those islands […] within two days you've got photographs taken by these people […] that were there standing on the balcony of a hotel, and you could actually see a wave come in, hit – knock over things and go zooming back. Now, the only way that you ever could talk to anybody about it was to say, "Oh, it's like a big wave, it will come in and it might come further up the shore". Now, you could only, you could verbalise that but it's not until you actually see visually what its impact is and how in actual fact it's so destructive as it comes back. In fact you have an understanding of what a tsunami is really like."

Having a true understanding of the consequences (i.e. a realisation of what the impacts would be, a reflection on their own vulnerability, and a realisation "why" individuals needed to prepare) helped develop and cement beliefs about hazards and preparedness. For example, some people had never thought about the impacts and consequences of disasters before an event, and this was the first time they developed beliefs based on what they had experienced. Others had heard key messages through information sources, but had not really taken these messages on board until the experience had "brought it home" or made it seem "real". One of the examples that emerged was that related to an understanding of "being on your own". New Zealand Ministry of Civil Defence & Emergency Management information has in the past promoted the idea that people might be on their own in the "Get Ready, Get Thru" campaign. The "Emergency Services" television advertisement running at the time of the interviews, for example, stated that it is necessary to prepare because, "…you and your family will be on your own for up to three days or more…" (Ministry of Civil Defence & Emergency Management, 2011).

While several interviewees were aware of the message promoted in the MCDEM advertising, it wasn't often until people had actually experienced a hazard event in some way that they really understood why the message was important, and began to cement it as a belief worthy of attention. Interviewee 48 summed up how experience can bring home such messages, "… we had floods here - as a lot of people did in – in 2004, about February, but people were cut off. […] You know, and it really brought it home that people can be isolated". The aforementioned findings by Karanci and Aksit (2000) support the concept that disaster experience helps people understand that they need to rely on their own resources in a disaster.

4.2.4. Formation of beliefs

From the analysis, a relationship was observed between the type of experience a person had encountered and the kinds of beliefs that were formed. These beliefs could facilitate or hinder preparedness. Both direct and indirect disaster experiences were valuable for forming beliefs. After directly or indirectly experiencing a disaster, people were more likely to believe that a disaster "Can happen anytime", that "You could be on your own" in an event, and that "Preparing is important". This "personalizing" outcome can be important in stimulating preparedness (Lindell and Perry, 2011).

People also developed more comprehensive views about the risk posed by natural hazards. Some of these views could be accurate; for example, people in Wanganui had a good understanding of the potential impacts of flooding (i.e. the damage it could cause to property and the impact it could have on people) from the direct and indirect experiences they had been through.

Other risk perception beliefs could reduce the likelihood of people considering alternatives to their past experiences. For example, this hindsight bias was evident in several people suggesting that the hazards they were most at risk from were the same as those experienced in the past, rather than undertaking a rational assessment of all the risks posed by hazards in the local area. When Interviewee 11 was asked why she

chose wind as the event most likely to affect her in future she said, "Because that's what has affected us [in the past]."

As disaster experience often involved physically dealing with the impacts of an event, individuals could develop useful skills that they could apply in future both with respect to responding to a future event and preparing. The practice gained during this experience helped develop people's self-efficacy beliefs that they would be able to do something to respond to a future event, or that they could do something to prepare.

Life experience appeared to promote a slightly different set of beliefs in individuals. As with disaster experience, life experiences inspired a belief in many individuals that preparing was important. However, it was more likely to encourage beliefs related to general safety issues. For example, this type of experience led people to believe that "Safety is important", "Survival is important", and that "Preparedness should be a 'way of life'" rather than a one-off activity (see also Becker et al., 2013). The development of such beliefs, particularly those that lead people to internalise preparedness (as a "way of life"), increased the likelihood of people asking questions about their needs and what they need to do (Lindell and Perry, 2011; Paton and McClure, 2013). For example, Interviewee 14 stated, "I have got one leg […] – when I was aged 29 I had bone cancer which probably shook me out of my comfort zone. That I wasn't bullet proof, and probably I have thought about personal safety because of that a little more than others probably would". While Interviewee 25 said, "I've had a lot of personal life disasters which probably prepare you for the next event all the time, you know, serious car crash and those sorts of things. And heart attacks and all those sorts of things. But, you know, I mean, you know, you become a bit wiser by events". Interviewee 6 described how life experience from being in the army helped develop some of her core beliefs around survival and safety which she also applied in a disaster context, "…we were both in the army so we kind of have a little bit of a survival background too. […] I think once you've done that sort of thing the seeds are well sown, it's about keeping yourself safe and knowing where to get help".

While vicarious experience did have some influence on beliefs (such as forming beliefs that people will be on their own, or thinking a disaster could happen locally), this type of experience did not appear to cement beliefs as profoundly as other direct and indirect experiences did. This may be due to the fact that the experience did not happen to the individual themselves, and thus was not personalized (see above regarding the importance of personalization) by the individual. With regard to media sources of vicarious experience, one particular set of beliefs that was found related to fatalism. Several participants suggested that many reported disasters were so big that they felt they couldn't do anything about a similar disaster if it were to happen locally. Research by McClure et al. (2001, 2007a, 2007b) note that many initial media reports of disasters are exaggerated and 'instance based', focusing on damage and destruction and thus contributing to the formation of fatalistic beliefs.

All types of experience had an influence on trust-related beliefs, in both positive and negative ways, depending on the nature of the experience. For example, in a negative context, experience of a disaster where a civil defence emergency management response did not go well lead some people to believe that "civil defence was underprepared" and a consequent lack of trust in civil defence. Life and vicarious experiences (e.g. dissatisfying interactions with police with respect to crime; conflicting newspaper information about flood protection) could also lead a lack of trust in agencies. Becker et al. (2012) discusses the influences of experience on trust in more detail.

People's varied experiences were also found to prompt several biases. First, some experiences were found to contribute to Normalisation Bias (Johnston et al., 1999; Becker et al., 2013; Mileti and O'Brien, 1992; Russell et al., 1995). This was seen particularly in the context of earthquakes, where people who had experienced many smaller earthquakes had become blasé and not concerned about an earthquake occurring. This engendered a lack of motivation to prepare. In the context of a large earthquake, Interviewee 6 described how her grandmother and father fell subject to Normalisation Bias following their experience of the Hawke's Bay earthquake. She stated, "… they were never ***too*** concerned with earthquakes. They thought about them and they'd lived through them and figured that they'd managed to get through one, they'd probably get through the next one (laughter)."

Evidence of Unrealistic Optimism Bias and the Gambler's Fallacy could also be discerned in people's accounts of the relationship between experience and (non) preparedness. Participants accounts provided evidence of Unrealistic Optimism bias (Helweg-Larsen, 1999; Becker et al., 2013; Burger and Palmer, 1992; Spittal et al., 2005), with participants stating that they would not be affected in future, that a future event would not strike them directly, or that their current state of preparedness would see them through. Evidence of the Gambler's fallacy was also present in people's accounts. For example, people discussed how the fact that now an earthquake had occurred, it wouldn't happen again or it would not happen the same way again, not happen for many years to come (e.g., based on their interpretation of return periods for events in their area), or that any future event would be as benign as its predecessor. Interviewee 35 described how despite her experience, she believed another event wouldn't occur in future, and thus she did not prepare:

> "When we lived in Opotiki in the Bay of Plenty, that whole township flooded when we lived there… but I didn't learn a lesson from it, if you know what I mean, coming to live here."
> *So why do you think it didn't stick with you?*
> "Because you think it's not going to happen again, sort of thing."

A variation on the above was evident in some people describing the disaster events they had experienced as "unusual". For example, the majority of interviewees from Timaru thought that the 2006 snowstorm was an unusual event and, as such, was unlikely to occur again in future.

4.2.5. Developing preparedness, including skills

Direct and indirect disaster experience and life experience also assisted with motivating some people to get directly prepared for a future disaster (see Table 1). This preparedness related to gathering together physical preparedness items and developing plans, as well as developing skills to get ready for and respond to a disaster. Life experience in particular was seen to be useful for developing personal skills on how to prepare and respond, leading to the development of self-efficacy beliefs in these areas. For example, Interviewee 47 described how growing up in a place with a lot of crime taught her skills about how to think laterally about how to deal with adverse situations, "I grew up in South Africa. We're from South Africa and I think that teaches you to, just because of the criminal climate and the way things are there, it teaches you to look broader, or, "How else can I?"

4.2.6. Emotions and feelings

Experience had a strong influence on people's emotions and feelings. In particular, direct or indirect disaster experience often made people think an event was "frightening", "scary" or "horrific". They might then transfer this emotion to future potential disasters, thinking about the risks that may be posed by those events, how they might feel, and what they might need to do to avert any adverse feelings. For example, Interviewee 35 was "frightened by heavy rain now" after her experience of having her house flooded, and acted to prepare by ensuring her gutters were clear to avert such a disaster happening again. Interviewee 25 discussed how his indirect disaster experience of responding to a flood in Invercargill filled him with horror, and prompted him to think about and check his own preparedness.

"[The] Invercargill flood was a very dirty flood because, if you

compare it with a sink, where someone's put a plug in the sink and filled it up with water over say a period of 24 h, and while it was there it was like a lake filling and all the debris and rubbish and sewage and everything was all - it was horrible […] I rang my wife halfway through the week, and I said to her, tomorrow please ring the insurance company and double our contents policy. When I got home, I mean I found that we already had enough, but it just stunned me…"

Those with direct disaster experience were more likely to use words like "scary" to describe the event, or say that it was a "bad event". Emotions such as excitement, concern, nervousness and unease were often conveyed if an individual had indirect disaster experience.

Emotions such as an event being "scary" were not connected as strongly with life experience (e.g. personal health issues, accidents). As with life experience, the vicarious experience of others did not appear to produce the same depth of emotion in an individual as disaster experience did; however, it still did have some impact. In terms of the vicarious experience of other people, while an experience was vicarious for the interviewee; it was still direct to the other person who had experienced it. This caused the other person to be persuasive about their experience and have an influence on the interviewee. For example, Interviewee 10 said that his wife's experience of Cyclone Tracey had made him more sensitive to windstorms, "My wife is petrified of strong winds. She was in Darwin when a cyclone hit in 1974 I think it was – and that gave her one hell of a fright. So whenever we get strong winds she is petrified. That has made me a lot more sensitive to them. Now that she has experienced the destructive nature of a tropical cyclone".

In terms of vicarious experience via the media, one strong emotion that was frequently triggered on seeing overseas or local disasters was concern or anxiety. Interviewees reported being uncomfortable watching or hearing some media information (e.g. death and destruction in the wake of earthquake or tsunamis), and in some cases this anxiety was enough to cause denial, whereby people would "switch off" from the information or not want to hear about it anymore.

4.2.7. Community interaction

Finally, all types of experience were seen to prompt community interaction or participation with respect to disaster issues. For example, some individuals who had been directly involved in a disaster reported interacting with other community members during the disaster response and recovery process. The Timaru snowstorm provided the best examples of this, with people checking on family, friends and neighbours during the event to see if they were okay, and offering to help out where possible (e.g. clear snow, deliver essential items such as food and medication).

Interviewees who had indirect disaster experience were also often involved in the community in some way. For example, some participants spoke of being involved in the community as part of a civil defence response team during an event. Both types of vicarious experience could also lead to community interaction on hazard and preparedness issues. This could be seen in the form of a desire by community members to provide disaster assistance either before (i.e. in collating preparedness items) or after a disaster event had occurred (e.g. raising money for disaster relief). The importance of this finding derives from recognition that, particularly when dealing with uncertain future circumstances, people's view about risk and what they can do to manage their risk is socially constructed. For example, Community Engagement Theory (Paton, 2008; Paton and McClure, 2013) discusses how community characteristics and processes, such as levels of active participation in everyday community activities and the development of processes such as collective efficacy derived from experience of collaborating on meaningful community activities, stimulates preparedness.

Having either direct or indirect experience of an event can produce empathy in people, which prompts a desire to assist others in a hazards and preparedness context (Sattler et al., 1995). Interviewee 13 suggested that seeing the impacts on her elderly mother isolated by the 2006 Timaru snowstorm has meant that she will make sure she gets to know her neighbours so she can help them in a future event. Interviewee 2's indirect experience of past flooding has meant he was able to empathise with the flood victims, and was keen to help the community in future events:

"Back in 1990 we were called out to the floods and we were helping people move out - move all their belongings out - this was on Anzac Parade over there – we were wading in water up to here (points to thigh height) and it was absolutely – it was a real experience but it was just heart-wrenching for those people. And after that we have had some big ones since then and gone out and helped people get their stuff out."

5. Discussion

5.1. The role of experience in the preparedness process

While previous research has focused on specific aspects of experience and its implications, it is clear from the present study that people do not compartmentalize experience. In making judgments about, for example, risk and preparedness, they draw on all aspects of their hazardous experiences including direct disaster experience, indirect disaster experience, vicarious experience (in relation to the experience of other people, and the media), and life experience. The importance of these categories or types of experience and the need to pay more attention to experience derives from the fact that they emerged from people's own accounts of the kinds of experiences that informed their preparedness thinking and decision making. While more work is required to test this, the findings presented here identify a need to include all aspects of experience in DRR planning and adopt a holistic planning and intervention process which accommodates all aspects of experience. That is, when developing a BBB program to enhance preparedness within social recovery and reconstruction planning, it may be necessary to develop community engagement strategies that include people's indirect, vicarious and life experience in the process of mobilizing future DRR activities.

The data discussed here were obtained during a period of hazard quiescence. Participants readily called on all types of experience to discuss preparedness in this context. Currently, DRR preparedness strategies do not generally include experience, and they certainly do not include all the types of experience that community members called on (direct, indirect, vicarious and lived) when asked to discuss preparedness. The findings discussed here identify a need for "experience" to be included as a core component in community-based DRR strategies.

This study found that the various types of disaster experience have seven predominant influences on the process of information interpretation and preparedness:

1. Prompts thinking and talking about hazard and preparedness issues;
2. Prompts community interaction on disaster issues.

   These first two outcomes provide the social context in which other preparedness-related activities occur, and these include:
3. Raises awareness and knowledge;
4. Helps individuals understand the consequences of a disaster;
5. Influences or develops beliefs (including helpful and unhelpful beliefs and biases);
6. Develops preparedness, including personal skills;
7. Influences emotions and feelings.

This list introduces another significant finding that can be discerned in the work discussed here. That is, how community members describe

how experience manifests not in specific competencies (e.g., risk perception) but in the development of the community processes and structured interactions (e.g., thinking and talking about hazards and preparedness, community interaction). Such processes and interactions represent the crucible in which key risk and preparedness capabilities can be forged through structured engagement with community members.

This paper has identified several issues that inform understanding of the relationship between people's direct, indirect, vicarious and life experiences during a period of earthquake quiescence and the earthquake and general disaster preparedness process, and builds on and extends previous recent research (Becker et al., 2012, 2013, 2014). The interview data has confirmed that people's experiences act as a form of information for them, and depending on the nature of the experience, exert influence in various ways on decision making for earthquake preparedness. These findings support the 'experiential learning' process whereby "knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). Strategies in DRR programmes have to be developed and delivered to people who have either not experienced an earthquake or who have not experienced the range of magnitudes and durations that could occur. Experiential learning would fit well in a contemporary DRR context because it is concerned with understanding continuous adaptation arising from interactions between an individual and the environment (Kolb, 1984). It is also argued in this paper that experience should be considered by those working in the DDR sector as an important form of information itself and can be given the term 'experiential information'.

While it remains tentative until subject to additional research, the analyses identified potential differences in the relationship between type of experience and DRR outcomes. Direct disaster experience is known to be more powerful and vivid, which leads to better recall of information that people can use to inform future decisions (Lee, 1999; Neisser et al., 1996; Norris and Kaniasty, 1992; Sattler et al., 1995; Weinstein, 1989), improve people's estimation of impacts in a future disaster (Sattler et al., 1995), increase the likelihood of people personalizing hazards and their consequences (Lindell and Perry, 2011; Weinstein, 1989), and help people develop skills related to preparing and responding (e.g., enhanced self-efficacy) (Mulilis et al., 2003). The present study showed that people recalled their direct experiences well, and were often motivated to prepare based on their experience. In general, the more direct an experience was, the more likely people were to relate to the experience, have raised awareness and knowledge, engage in thought and discussion, understand the consequences of disasters, think about their experience in the context of future disasters, form or cement relevant beliefs, have relevant emotions and feelings, and have a motivation to prepare. Adaptive beliefs formed from disaster experience included: a disaster "Can happen anytime", "You could be on your own", "Preparing is important" and beliefs about the level and nature of risk (Becker et al., 2013).

Indirect disaster and life-related experience, was less powerful a driver of preparedness than its direct counterpart, but it was still found to contribute to the preparedness process. Indirect disaster and life experience could prompt people to engage in thought and discussion, raise awareness and knowledge, help people understand the consequences of disasters, think about their experience in the context of future disasters, form relevant beliefs about hazards and preparing, stimulate emotions and feelings, and provide motivation to prepare.

While less effective than direct experience, indirect disaster experience contributed to developing beliefs regarding specific aspects of preparedness (e.g., while less potent than direct experience, it encouraged levels of thinking and talking that facilitated preparedness outcomes). Life experience, on the other hand, formed more general beliefs related to safety issues, such as "Safety is important", "Survival is important" and "Preparedness is a way of life" (see also Becker et al., 2013). Previously, researchers have speculated upon whether life experiences are helpful or not to disaster preparedness (Norris, 1997; Weinstein, 1989). The present research has confirmed that life experiences do help inform people's interpretations and decisions about hazards and preparedness. To make hazards relevant to the general public, DRR practitioners could consider reinforcing the idea that "Preparedness is a way of life" in general, and that this philosophy can be applied to a disaster context, including leveraging on recent events to maximise messaging impact.

The interview data illustrated how direct and indirect disaster experience can contribute to the formation of cognitive biases (Becker et al., 2013). Prominent here were Normalisation Bias (Johnston et al., 1999; Mileti and O'Brien, 1992; Russell et al., 1995), Optimistic Bias (Helweg-Larsen, 1999; Burger and Palmer, 1992) and the Gambler's Fallacy (Paton and McClure, 2013). This finding reinforces the importance of utilizing experience as a driver of preparedness within community-based DRR programmes. Active engagement with people and community groups is essential for education programme's attempts to address these biases (Dooley et al., 1992; Karanci and Aksit, 2000; McGee et al., 2009; Paton and McClure, 2013; Pennebaker and Harber, 1993; Russell et al., 1995; Sattler et al., 2000; Tanaka, 2005).

The vicarious experience of other citizens and the media, while not often a direct motivator of preparedness, does play an important role in people's interpretation of information about hazards and preparedness and in people's decisions about whether to prepare or not. Vicarious experience can trigger an increased willingness to pay attention to hazard-related issues, including thinking and talking about hazard issues, assisting with understanding the consequences of future events, and helping with the formation and cementation of beliefs about hazards and preparing.

The downside is, however, that there are limitations with respect to vicarious experience. First, in their thoughts and conversations, vicarious experience was more likely than its direct and indirect counterparts to result in people talking about what happened during an event, rather than issues related to future preparedness or response, limiting their undertaking of problem-solving actions designed to advance preparedness. Vicarious experience also limited opportunities for personalizing hazard experience, reducing the capacity of this source of information to facilitate individuals' understanding of the consequences of disasters or developing the kinds of risk beliefs that motivate preparedness (Jackson and Mukerjee, 1974; Lindell and Perry, 2011; Tierney et al., 2001; Weinstein, 1989). Vicariously-sourced information was also more likely to manifest as Unrealistic Optimism Bias and fatalism, both of which hinder preparedness (Paton and McClure, 2013).

Finally, the vicarious experience of others appeared to have less influence than direct and indirect experience on emotions, which is one key to the preparedness process (Dooley et al., 1992; Heller et al., 2005; Rüstemli and Karanci, 1999; Siegel et al., 2003). Given these findings, education programmes should ensure that messaging about hazard issues are directed first to include discussions about the experience itself. This initial focus may then help to capitalise on getting people's attention and be leveraged in various ways. This could include countering various biases (e.g., Normalisation, Optimistic Biases), promoting personalization, amplifying emotional impacts while simultaneously providing information and specific guidance on what can be done to mitigate the adverse effects of future hazard experiences. This could then result in turning anxiety into a source of preparedness motivation (Demuth et al., 2016; Paton et al., 2005; Siegrist and Gutscher, 2008).

Because those with indirect disaster or life experience used less emotive terms, such as "excitement", "concern", "nervousness" and "unease," to describe their experience, a similar strategy of mobilizing emotions may be required to optimise the value of indirect experience as a motivator of preparedness. Where direct experience (which produced the most profound emotions, with people using terms such as "frightening", "scary" or "horrific,") can be called upon, there may be less need to mobilize emotions, so more attention should be directed to providing advice and guidance required to mitigate anxiety and

mobilizing preparedness (Paton and McClure, 2013).

Different experiences and emotional reactions, leading to different influences in the preparedness process is consistent with the literature. For example, Sjöberg (1998) suggests that natural disasters are linked to strong sensory experiences and may be more likely to cause the formation of perceptions related to emotional risk, while more everyday events are more likely to influence cognitive risk. Emotional risk is more likely to create anxiety about perceived threat, which may then become a motivator of preparedness.

It is important to appreciate that it is not the emotional reactions per se that motivate preparedness. The levels of stress and anxiety triggered by experiencing the consequence of a disaster have long been recognized as being able to adversely affect people's performance. For example, high arousal can lead to less efficient information processing and recall, or lead to people having trouble with tasks, particularly complex ones (Tiegan, 1994). The magnitude of these effects corresponds to the immediacy of the emotional experience; it is greater for direct experience and less so for indirect disaster experience. Direct experience generates higher levels of arousal and potential memory and performance impairments, with indirect and neutral (vicarious) experience having lower arousal and better recollection of central details (Dutton and Carroll, 2001). However, high levels of arousal can be managed more effectively, depending on the context of the experience (Hanoch and Vitouch, 2004). For example, restricting information during states of high arousal can lead to an improvement in performance. In a practical earthquake education sense, this could entail focusing on essential or goal-relevant information to assist with directing individuals to appropriate actions. Relatedly, planning and practice can help people modulate emotional arousal through increases in flexible problem-focused coping abilities, enhanced self-efficacy and actual practice of emotional modulation (Ronan and Towers, 2014).

Finally, people's experience of disasters or events often provides a prompt for interaction with the community, a known, and important, predictor of increased preparedness behaviour (e.g., Becker et al., 2012, 2014; Paton, 2008; Paton and Irons, 2016; Wood et al., 2012). During the interviews, this was most often seen in terms of directly helping out other community members during an event, or though contributing to relief efforts. Disaster experience makes hazards and preparedness more salient to people, and more willing to engage in a participatory fashion. Consequently, better use could be made of people's willingness to engage after disasters. Earthquake education programmes should make provision to use the 'window of opportunity' post-event to engage communities in participatory risk reduction activities for future events.

In summary, earthquake educators should be aware that experience does have an influence on the way people interpret hazard and preparedness issues with respect to making decisions about preparedness. Therefore, it should be considered a relevant and valuable source of information for the general public. DRR practitioners should ensure that the aforementioned aspects discussed in this paper are tailored for inclusion in future earthquake education programmes.

5.2. Challenges for earthquake education

Understanding experience and the many forms that it comes in has several implications for DRR. While the potential for experience to fall into one of several categories has been acknowledged in the preparedness literature, studies of the relationship between experience and preparedness has generally focused on only one type of experience at a time rather than recognizing that different types of experience co-exist. This study has provided confirmation that not only do different types of experience (direct, indirect, vicarious and life experience) co-exist, but people may draw on all of them to interpret their hazardous circumstances and make preparedness decisions. So, from a practical perspective, this study identifies a need for DRR strategies to make better use of experience as a predictor of preparedness than has hitherto been the case and to adopt a comprehensive approach, one that accommodates all (relevant) types of experience in DRR strategies. The findings discussed here also have other practical implications.

Studies of the experience-preparedness relationship have tended to focus on the content of experience. That is, their research has explored whether constructs, such as cognitive biases, self-efficacy etc., known to predict preparedness, have emerged from experience. By developing an inventory of "experience" based on people's own accounts, the work discussed in this paper has drawn attention to the need to understand how experience creates social contexts through its ability to encourage people to talk about hazard and preparedness issues and its capacity to act as a catalyst for community interaction and how these contexts represent the contexts in which DRR activities can be undertaken. While more work is needed to explore this in detail, this opens opportunities for using community-based DRR activities to capitalise on people's experience. In the aftermath of a disaster, this could complement a BBB strategy. If a BBB strategy is extended to the social domain and used to develop preparedness, it is essential that the nature of people's experience is understood and that such understanding is used to inform the development of DRR strategies.

While direct disaster experience appears to have the greatest influence on behaviour, difficulties arise in that few members of the public are exposed to direct experience. Perry and Lindell (2008) note the fact that emergency managers cannot recreate direct experience for people and that other ways of delivering this experience must be found. They issue a challenge for identifying how we can better use vicarious experience (both from the media and via other individuals) to more closely mirror direct experience, and assist with adjustment adoption. It has been suggested that information could be released well before a disaster occurs that vividly describes the experiences of a past event. This would assist people who experienced a disaster to remember what happened in the past, and to inform those who have not experienced a disaster what a future event might be like (Sattler et al., 1995, 2000).

Other challenges in making use of experiential information include the evolution of experience. This study was undertaken in a period of relative earthquake quiescence, and thus people's reported experiences reflect a snapshot in time. Since data collection took place, several significant damaging earthquakes have occurred in New Zealand (i.e. Darfield, 2010; Christchurch, 2011; Kaikoura, 2016), altering the landscape of direct, indirect and vicarious experience for people. This may have changed the way in which people interact with and use experiential information, and potentially may affect behavioural outcomes. For example, McClure et al. (2011) reported that risk perceptions about the likelihood of an earthquake in New Zealand were raised by the Canterbury earthquakes. In terms of actual preparedness, Russell et al. (1995) found that in comparing preparedness before and after the Sylmar, California earthquake, different predictors of preparedness were found. In their study pre-earthquake, socio-economic factors tended to be dominant drivers of preparedness, while in the post-impact period, socio-economic, psychological and situational variables tended to be key influences. Differences between pre-and post-earthquake motivators have been found by other researchers (Heller et al., 2005; Paton et al., 2015). Future research should focus on following individuals' experiences over time to ascertain how experience evolves and the influence this has on interactions between cognitive, emotive, social and environmental factors, and the overall preparedness process.

This research has several noted limitations. Interview participants were self-selected volunteers and as a consequence there may be some bias present in the sample. In particular, there is an over-representation of older people in the sample (i.e. over half the sample were 60 years or over) and an over-representation of 'community-minded people' (as the majority of invitations were sent to community groups). People who were more interested in the topics of earthquake hazards and preparedness were also more likely to have answered the request to participate. As the research data was collected via interviews it also may be prone to desirability biases and interviewer demand effects. Finally, these findings are from one study using one small group of interviewees

and one methodology.

The findings presented here are informative, but should be regarded as tentative. The findings provide a foundation for developing research questions and hypotheses that could inform future comprehensive, systematic, longitudinal studies of the experience-preparedness relationship.

Appendix A. Interview questions asked by the researcher to prompt discussion

- On a scale of 1–10 how important do you think it is that people should prepare for natural hazards/disasters (with 1 the least, and 10 the most important)?
- What can you tell me about natural hazards in New Zealand?
  1. In your town/city?
- How do you think people should go about dealing with hazards?
- What can you tell me about earthquakes?
- How do you think people should go about dealing with earthquakes?
- What types of information have you seen or heard about hazards?
  1. (If none, you do intend to "seek" any? Why? Where from?)
- Where did you see/hear this information?
- What did you think about this information?
  1. (e.g., Liked/disliked, understood/did not understand it, clear/unclear, trusted/not trusted, useful/not useful, etc.).
- What do you think people should do with this type of information? Why?
- What did you do with this information? Why?
- How do you think people can practically make use of this type of information?
- What have you done to prepare for hazards?
  1. For earthquakes?
- Why would you prepare/not prepare for hazards?
- Are there any benefits/negatives of preparing? Why do you say this?
- What do you think the outcome will be if you prepare? Why?
- Who do you talk to about hazards?
- What do you talk about with respect to hazards?
  1. What kind of things do you ask/talk about?
  2. What kind of things do other people say/talk about?
- Why do you talk/not talk about hazards?
- Why do you talk about hazards with the people/organizations you identified?
- How do you feel about hazards? About earthquakes? Why?
- When do you think a hazard event might occur next?
  1. An earthquake?
- What would you do if there was an earthquake today, in your current situation
  1. (During the earthquake? After the earthquake?).
- Tell me about any past experiences you have had with hazards?
  1. (e.g., Hazards general and earthquakes)
- Whose responsibility is it to look after/deal with hazards (or the impact of hazards)? Why did you say those people are responsible?

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