



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 systema-

tic 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.,

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