

International Journal of Mass Emergencies and Disasters  
August 2014, Vol. 32, No. 2, pp. 317–352.

**Societal Influences on Earthquake Information Meaning-Making  
and Household Preparedness<sup>1</sup>**

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*Previous research has identified a diversity of personal and individual factors that influence household preparedness for earthquakes. However, societal influences on the preparedness process are less well studied. In particular, there is limited understanding of the impact that wider society has on people's interpretation of earthquake and preparedness information, and how this relates to people's decisions about getting prepared for earthquakes. To address this gap, a New Zealand-based project was initiated to investigate how social factors interact with individuals' meaning-making of earthquake information and how this affects subsequent earthquake preparedness behaviour. A range of social factors were identified as being influential on the meaning-making and preparedness process, including community (community participation, sense of community); leadership; responsibility (responsibility for preparing, responsibility for others); social norms; trust; and societal requirements.*

**Keywords:** Earthquakes, Preparedness, Information meaning-making, Societal influences.

## Introduction

Undertaking individual household preparedness is advocated as one way of reducing risk of death, injury and damage from large earthquakes, and aiding response and recovery. Preparedness can be undertaken prior to an earthquake by collecting survival items such as food, water and other essentials; undertaking mitigation actions such as retrofitting a building to prevent earthquake damage; creating a household emergency plan so that family members know how to respond in the event of an earthquake; learning survival skills; or participating in social preparedness activities (Kirschenbaum 2002; 2004; Lindell et al. 2009; Mulilis et al. 1990; Russell et al. 1995; Spittal et al. 2008).

Despite years of advertising campaigns advocating that householders undertake preparedness, levels of preparedness are still modest. In New Zealand, for example, less than half (49%) of residents have undertaken any single action to reduce or prevent damage from earthquakes (Earthquake Commission 2011), and only a third (32%) describe themselves as being fully prepared for any kind of disaster at home (Colmar Brunton 2012).

In order to raise levels of household preparedness, it is first necessary to understand what motivates people to prepare. Household adjustment adoption for earthquakes is a heavily studied field, and a wide range of factors have been identified as influencing preparedness, including specific perceptions about earthquake risks, perceptions about the preparedness process, other attitudes and beliefs, emotions and feelings, previous earthquake experience, coping style, resource issues, earthquake education, demographic characteristics and social influences (for more detail see review papers by Lindell and Perry 2000; Solberg et al. 2010).

Despite the range of research on household earthquake adjustment adoption, such studies have been relatively constrained in their approach. Most have focused on investigating adjustment adoption in an individual sense, looking at intra-individual cognitive processes (Solberg et al. 2010). Few studies have focussed on the influence that the wider social context has on preparedness. Consequently, while some social aspects have been highlighted as influencing preparedness, the impact that wider society has on both people's interpretation of hazard and preparedness information, and how this affects the preparedness process, has not been investigated in any depth. A project was undertaken to attempt to address this gap.

## Theoretical Background

In attempting to explain why people prepare for disasters such as earthquakes, researchers have developed and applied a number of different models (e.g., Lazarus and Folkman 1984; Folkman 1997; Hobfoll 1989; Miletic and Fitzpatrick 1992; Kaiser et al. 1996; Sattler et al. 2000; 2002; 2006; Turner et al. 1986; Dooley et al. 1992; Farley 1998). In particular, many researchers have developed models in the context of expectancy-valence (EV) theory. The Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) are two such EV models. The Theory of Reasoned Action (Fishbein and Ajzen 1975) is focused on three important aspects of behaviour including: (1) behavioural intentions; (2) attitudes toward behaviours; and (3) subjective norms. In particular, the theory maintains that attitudes toward behaviours and subjective norms will predict people's behavioural intentions. In an earthquake context, the Theory of Reasoned Action, "...posits that one's attitude toward an object (e.g. seismic hazard) is less predictive of behaviour than one's attitude toward an act (seismic hazard adjustments) relevant to that object" (Fishbein and Ajzen 1975; in Lindell et al. 2009, p. 1073). The Theory of Planned Behaviour (Ajzen 1985; 1991) is similar to TRA in that it includes the three aforementioned aspects of behaviour. However, its difference is that it also adds perceived behavioural control to the mix, whereby an individual who believes that factors exist that can facilitate behaviour will have a sense of control, and be more likely to undertake the behaviour (Breinbauer et al. 2005).

A number of natural hazard-specific models have been developed based around EV theories such as TRA and TPB. Such models include Protection Motivation Theory (PMT—Rogers 1983); Person relative to Event theory (PrE) (Duval and Mulilis 1999; Mulilis 1996; Mulilis and Duval 1995; 1997; 2003; Mulilis et al. 2000; Mulilis et al. 2003); and the Protective Action Decision Model (PADM—Lindell and Perry 1992; 2000; 2012).

PMT is based on the premise that when people are exposed to a negative threat, a cognitive appraisal process is initiated, consisting of two main aspects: threat appraisal and coping appraisal. In particular people will assess the likelihood and severity of the consequences of the threatening event, self-efficacy, and the response or outcome efficacy of protective actions (Lindell and Hwang 2008). This in turn arouses protection motivation (a mediator), which then influences attitudes and intentions to adopt any protective actions (Mulilis and Lippa 1990). The PMT has been applied to earthquake preparedness in California by Mulilis and Lippa (1990).

PrE theory has been tested in a number of hazard contexts, including earthquake preparedness. It includes variables similar to those in the PMT (e.g. consideration of the likelihood and severity of the consequences, people's self-efficacy, and response or outcome efficacy) and suggests that in making decisions about whether or not to prepare, people will appraise their personal resources relative to the level of threat (Mulilis and

Duval 1995). Research undertaken in the context of PrE theory also suggests that personal responsibility for protection is an essential element to undertaking protective action and moderates the influence of appraisal processes on coping (Mulilis and Duval 1995; 1997).

The Protective Action Decision Model (PADM) is another model developed by researchers to describe human behaviour to hazard threats (Lindell and Perry 1992; 2000; 2012). It was originally developed for describing how people behave in emergencies, but is also applicable to longer-term hazard response such as preparedness. The PADM adopts aspects of expectancy-valence (EV) models, but can also be distinguished from these because it considers the wider situational context and the influence this context may have on the adoption of protective actions. The model suggests that a number of factors influence perceptions of threat and protective action. These factors include situational factors (e.g. physical cues, social behaviour, risk communication); personal characteristics (e.g. age, education, disaster experience, locus of control); and social contextual variables (e.g. family context, kin relations, community involvement). The model suggests that people take protective actions if (a) they believe that the disaster threat exists and poses significant risk; (b) taking protective actions is feasible; and (c) they have the traits (e.g. self-efficacy, locus of control), skills and access to resources to effectively implement protective actions (Dooley et al. 1992).

These three models have had some success in explaining aspects of what drives earthquake preparedness, however gaps still remain. It is apparent that the relationships between the variables in the models are complex and often non-linear, and as a consequence little is understood about how the variables interact with other individual and societal factors (Mulilis and Lippa 1990; Lindell and Prater 2000). Thus, more work is required to understand the nature of such interactions as part of the preparedness process. It is also interesting to note that the PMT, PrE and PADM models do not specifically address subjective norms (Lindell and Perry 2012), even though these are considered important by TRA and TPB. The omission of such a central concept in these models thus presents a significant gap in understanding about how attitudes toward social norms influence the preparedness process.

### **Social Influences of Preparedness Identified from Previous Studies**

In addition to model development, prior studies have identified a number of specific social aspects that influence earthquake adjustment adoption behaviour. Previous work has tended to adopt a narrow definition of the concept of 'social' and has predominantly measured the direct influence of demographics on individual preparedness (e.g., gender, income, education, length of time in neighbourhood, homeownership, marital status, family make-up, ethnic make-up). The results of these studies have been varied, with different demographics noted to influence earthquake adjustment adoption depending on

the study (e.g. Armaş 2006; Dooley et al. 1992; Edwards 1993; Endo and Nielsen 1979; Farley et al. 1993; Karanci et al. 2005; Lindell et al. 2009; Lindell and Prater 2000; Mileti and Darlington 1997; Mileti and O'Brien 1992; Ozdemir and Yilmaz 2011; Paradise 2005; 2006; Russell et al. 1995; Tanaka 2005). Such variance in the influence of demographics on the risk perception and preparedness process suggests that demographics interact differently depending on the exact social and environmental context.

In looking beyond demographic information, a number of other social influences of earthquake preparedness have been identified. Community participation, for example, has been found by many studies to be essential to the preparedness process. Participation encourages people to discuss and solve hazard-related issues, acts to give citizens a feeling of empowerment to take action and assists in building trust—all essential elements of the preparedness process (Karanci and Askit 1999; McIvor et al. 2009; Paton 2007b; 2008; Paton et al. 2008a; 2008b; 2008c; 2009; 2010a; 2010b). While individual self-efficacy has been found by many studies to be an influencer of preparedness (Cowan et al. 2002; Duval and Mulilis 1999; Lindell and Prater 2002; Lindell and Whitney 2000; McClure et al. 1999; 2001; 2007a; 2007b; Mulilis and Duval 1995; Rüstemli and Karanci 1999; Şakioroğlu and Karanci 2008), collective efficacy has also been identified as an essential element in the process, both indirectly (e.g. helping assist with empowerment and trust) and through directly motivating intentions to prepare (Paton et al. 2008a; 2009; 2010a).

The concept of 'sense of community', or feelings of belonging and attachment for people and places, has mixed findings. Paton et al. (2001b; 2005) have not found any strong linkages between sense of community and the preparedness process for disasters such as earthquakes or volcanoes. However, Bishop et al. (2000) found sense of community to be a predictor of action toward salinity issues, and sense of community has also emerged as important in several bushfire studies (Paton et al. 2006a; 2012; Prior and Paton 2008). In a similar vein to the concept of 'sense of community', Russell et al. (1995) suggest that a number of demographic variables such as length of time in a community, home ownership, number of children at home and other variables may enhance a feeling of 'community bondedness' and thus encourage a desire to take responsibility for oneself and others by preparing. This is confirmed by other studies that have found adjustment adoption linked to having children or dependents in a household (Dooley et al. 1992; Edwards 1993; Russell et al. 1995; Turner et al. 1986). Feeling a sense of social responsibility to others has also been directly identified by McIvor et al. (2009) as a motivator for preparing.

Social norms are accepted ideas about appropriate behaviour, and often will restrict individuals' behaviour because people will usually conform to an acceptable norm. People may feel pressure to conform for a range of reasons including: being part of a group (no matter how small); there being agreement between several groups; the

individual identifying with those providing an opinion; the status of the person (the higher the status, the more influential a person is); feeling like they are in the public eye; and having no prior commitment to an opinion (Myers 2002). A person may conform for two major reasons: to be accepted and avoid rejection (normative influence), or to obtain important information about realities they are unsure of (informational influence). People will do the latter if they feel incompetent, if a task is perceived as difficult, and if they care about being right (Myers 2002). White, Smith, Terry, Greenslade and McKimmie (2009) outline three types of norms that have been found to contribute to normative influence in previous studies related to health and environmental behaviours:

- Social injunctive norms, whereby action is motivated based on the receipt of social rewards or punishment for engaging in a certain behaviour;
- Descriptive norms, whereby action is motivated by the perception of whether other people perform a behaviour; and
- Personal injunctive or moral norms, where by action is untaken based on a person's internal moral rules.

Previous literature discusses aspects of social norms in relation to hazards and preparedness. McIvor and Paton (2007) looked specifically at subjective norms and found that positive subjective norms had an indirect influence on intentions to prepare, mediated by outcome expectancy. Positive subjective norms also linked with having a positive attitude toward preparing. Other research on earthquake adjustment adoption addresses social norms in a more indirect fashion. For example, several researchers have found that people may be more likely to prepare if they observe or believe that others have prepared (Farley 1998; Mileti and Darlington 1997; Mileti and Fitzpatrick 1992). Other aspects known to influence preparedness, such as thinking and talking about hazards, community participation, the development of a local 'earthquake culture' (Moore 1964; Turner, Nigg and Heller-Paz 1986), and feeling responsibility for other community members, also imply that social norms must be a factor in the preparedness process. In an informational context, Solberg et al. (2010, p. 1669) suggest that when "information sources providing explicit norms for adjustment are numerous, consistent and specific", then adjustment adoption has been higher. Despite an indication that social norms play a part in earthquake adjustment adoption, this variable not been studied comprehensively. Further research is required to fully understand how social norms interact within the wider preparedness process.

While many of the aforementioned studies have highlighted a number of social influences on the preparedness process, such studies have been limited in nature. In particular it is unlikely that the full range of social influences have been identified. Additionally, it is still relatively unknown how particular social aspects interact with other cognitive, emotive, environmental and social factors relevant to the preparedness process. This study aimed to contribute to filling such gaps by identifying the range and nature of such interactions. In particular, the study draws upon social influences in the

context of people's interpretation of earthquake hazard and preparedness information, and linkages with the overall preparedness process.

### **Method**

Research was undertaken using a grounded theory approach (Strauss and Corbin 1990). With grounded theory, data is collected and theory developed from the data itself, rather than the alternative approach of the development of hypotheses followed by data collection to test those hypotheses (Charmaz 2006). Analysis of the data is undertaken by coding key themes, defining core categories and developing theory. Qualitative data tends to be most often used with grounded theory, and in the case of this research it was decided to undertake interviews with household residents about people's interpretation of earthquake information and preparedness.

Interviews were undertaken with 48 household residents from three urban locations in New Zealand from April to June 2008. The urban locations selected for the study were Napier (16 interviews), Wanganui (14 interviews) and Timaru (18 interviews). The particular locations were selected for the research as they each had a degree of earthquake risk, were relatively similar in size (populations between 25,000 and 55,000 based on the 2001 census data), would be reasonably geographically isolated in a disaster, and had similar facilities, institutions and legislative environments.

In terms of recent events, Napier was the urban centre that had been most recently affected by a large damaging earthquake (M 7.8 Hawke's Bay earthquake in 1931), with Wanganui experiencing a slightly damaging earthquake in 1991 (M 6.5), and Timaru only experiencing small earthquakes. The 4 September 2010 Darfield earthquake (M 7.1) and 22 February 2011 Christchurch earthquake (M 6.3) occurred after data collection had taken place. Consequently, interviews were conducted in a period of relative earthquake quiescence. Other relevant disaster events that had occurred recently included a snowstorm in 2006 that had impacted Timaru (Hendrikx 2007), and a series of floods in Wanganui, with the last damaging flood event occurring in 1990.

Interviewees were self-selected volunteers that were recruited through invitations sent to known community groups and advertisements in local publications. A typical interview lasted between 30 minutes and one hour. The interviews were designed to allow people to speak as freely as possible about their thoughts on earthquake hazard and preparedness information, and actual preparedness for events such as earthquakes. Twenty-four key questions were developed by the researchers that acted as prompts for discussion about certain topics, but also allowed participants the freedom to say whatever came to mind. The questions focussed on people's understanding of earthquake hazards, exposure to different types of hazard and preparedness information, actual preparedness actions taken (e.g. collecting essential items, creating an emergency plan, undertaking emergency training, retrofitting buildings for earthquakes, engaging with other

community members on earthquake and disaster issues), interactions with others, and individuals' beliefs, feelings, and past experiences. While people's discussions did focus on earthquakes, it was apparent that they considered other hazards an important part of how they framed their perspectives as well, so as a consequence the results section refers to both earthquake and other hazards.

Interviews were digitally taped with the interviewee's permission, and transcribed into a word processing document. They were then loaded into the qualitative analysis software package *Atlas.Ti*, and an analysis was undertaken according to grounded theory methodology. The interviews were read through, and codes manually assigned to key themes. These codes were then condensed into core categories (Table 1). During the analysis a number of core categories were identified that reflected a range of influences on the earthquake information interpretation and preparedness process, many of which were related to social factors. Interactions were identified between the core categories and process diagrams were constructed for each of the 48 interviews to reflect the interactions that occur when people interpret hazard and preparedness information as part of the preparedness process. These diagrams were summarised into a model which is presented in Becker et al. (2012). This paper focuses on the core categories that were identified in relation to social influences and describes how such social factors interact with information interpretation and the overall process of getting prepared for earthquakes.

**Table 1. Core Categories and Codes Related to Social Influences  
Derived from the Interview Data.**

<b>Code Title</b>	<b>Quotation Count</b>
<b>Community: Community Participation</b>	
Community groups: belong to	200
Community group: nature: Civil Defence	83
Community: proactive in the community with respect to mitigating hazards	63
Information source: school education	54
Talking about hazards/preparedness: who: friends	51
Community groups: used to belong to	41
Community: help the community currently	40
Information source: speaker at a community group or organisational meeting	40
Information dissemination: by interviewee	37
Talking about hazards/preparedness: prompts: an event which has affected someone somewhere else	37
Talking about hazards/preparedness: who: family (general)	37
Talking about hazards/preparedness: who: community in general	32
Information: response to information: talked about it with others	30
Talking about hazards/preparedness: who: own children (grown)	30
Talking about hazards/preparedness: response: got an item or items to prepare, or made a plan	29
Talking about hazards/preparedness: who: staff at work	29

**Table 1. Core Categories and Codes Related to Social Influences  
Derived from the Interview Data (Continued).**

Talking about hazards/preparedness: prompts: school project/activity	28
Community group: nature: neighbourhood support	27
Talking about hazards/preparedness: who: children in schools	22
Talking about hazards/preparedness: who: spouse	22
Talking about hazards/preparedness: prompts: family member experiences an event	22
Community group: nature: sports group	20
Community: volunteer/belong to voluntary organisations	20
Talking about hazards/preparedness: prompts: organised discussions as part of a community group/meeting	20
Talking about hazards/preparedness: who: Civil Defence personnel	20
Talking about hazards/preparedness: who: parents	20
Community want to/will actively participate in disaster recovery	19
Talking about hazards/preparedness: prompts: speaker at a community group/organisational group meeting	19
Community group: activities: meetings	18
Talking about hazards/preparedness: response: go home from school and talk about it with parents	18
Thinking about hazards/preparedness: prompts: working in a workplace/role that deals with hazards, preparedness or safety issues	18
Information source: meetings: street or community meetings	14
Talking about hazards/preparedness: prompts: workplace project/activity	14
Talking about hazards/preparedness: prompts: family member experiences an event	14
Community group: nature: Fire Service	13
Talking about hazards/preparedness: who: acquaintances from a community group	13
Talking about hazards/preparedness: who: neighbours	13
Talking about hazards/preparedness: prompts: community group activity/project	12
Talking about hazards/preparedness: prompts: friend experiences an event	12
Community group: we raised/donated money/resources for relief efforts internationally	11
Talking about hazards/preparedness: prompts: bring in an occupation dealing with hazards/preparedness	11
Talking about hazards/preparedness: prompts: workplace safety	11
Community group: activities: make up disaster kits for other countries	10
<b>Community: Sense of Community</b>	
Disaster/event experience: assist in responding to an event	76
Community: will/did help each other in an event	64
Community: helped the community and/or neighbours out in a past event	47
Community: know neighbours well	40
Community: helped the community out in the past (general)	20
Community: call on (phone, visit) people to check they are okay in an event	18
Community: have good neighbours/neighbourhood	15
Community: has resources they can share in a disaster/shared resources	14
Community: might need to ask for others' help in an emergency	13
Community: look after each other	13
Community: Has long term connections with the community (e.g. other family members living there, long term friends)	11

**Table 1. Core Categories and Codes Related to Social Influences  
Derived from the Interview Data (Continued).**

Community: talk/interact with neighbours regularly	11
Community: feels support is available in community	10
<b>Responsibility: Responsibility for preparing/dealing with hazards</b>	
Responsibility for dealing with hazards: personal/individual	114
Responsibility for dealing with hazards: there are different roles for different people/organisations	66
Responsibility for dealing with hazards: local government	46
Responsibility for dealing with hazards: Civil Defence	32
Responsibility for yourself	27
Responsibility for dealing with hazards: central government	24
Responsibility for dealing with hazards: personal/individual: role: do the best for themselves/look after themselves	21
Responsibility for dealing with hazards: community groups	16
Responsibility for dealing with hazards: personal/individual: role: be/get prepared	16
Responsibility for dealing with hazards: government (general)	15
Responsibility for dealing with hazards: insurance	15
Responsibility for dealing with hazards: personal/individual: role: look after selves for first 3/first few days	15
Responsibility for dealing with hazards: local government: role: mobilisation/coordination to deal with issues post-disaster	14
Responsibility for dealing with hazards: local government: role: looking after flood mitigation	13
Responsibility for dealing with hazards: up to everyone	12
Responsibility for dealing with hazards: insurance: role: fixing damage/assisting after a disaster	11
Responsibility for dealing with hazards: police	11
Responsibility for dealing with hazards: should be shared/collective	11
Responsibility for dealing with hazards: shouldn't rely on/expect other organisations or people to assist in a disaster	11
Responsibility for dealing with hazards: there is not an "army" of Civil Defence – you are on your own	10
Responsibility for dealing with hazards: personal/individual: role: help others during a disaster/event	10
Responsibility for dealing with hazards: schools	10
<b>Responsibility: Responsibility for others</b>	
Responsibility for others: children (young)	55
Responsibility for others: community (neighbours, friends, community in general)	39
Responsibility for others: family general	34
Responsibility for others: spouse	20
Responsibility for others: workmates/employees/clients	11
Responsibility for others: general	10
What might motivate people to prepare: having children (or other family to look after)	10

**Table 1. Core Categories and Codes Related to Social Influences  
Derived from the Interview Data (continued).**

<b>Social Norms</b>	
Estimation of other people's preparedness: under or not prepared	76
Estimation of other people's preparedness: prepared	67
Preparedness: should be prepared 'for life'/daily living/for everything we do	19
Estimation of other people's preparedness: don't know anyone else who has prepared	17
Estimation of other people's preparedness: don't know	15
Influenced by other people	14
Estimation of other people's preparedness: under or not prepared: who: community general	12
Preparedness: shouldn't total focus on/obsess about/worry about something that might happen	12
Preparedness: should be based on common sense/realistic expectations/is practical	12
Estimation of other people's preparedness: prepared: who: grown children	11
Estimation of other people's preparedness: under or not prepared: who: people impacted by an event	11
Preparing: can be or is 'over the top'/an over-reaction	11
Preparing: should be middle ground/lower level/minimum (rather than to the extreme)	11
Estimation of other people's preparedness: prepared: who: farmers/rural folk	10
Preparing: is a personal choice/judgement call	7
Information receipt: I've known this 'as long as I can remember'/grown up with it	7
<b>Leadership</b>	
Leadership: role in leading community groups or organisations	26
<b>Trust</b>	
Trust issues: local authority	13
<b>Societal Requirements</b>	
Preparedness: is seen as a requirement (e.g. under occupational health and safety, insurance, swimming pool regulations, etc.)	13

Note: The "code title" refers to the title of the code (organised under each core category heading) while quotation count refers to the number of times that the theme was mentioned within the interviews. Only relevant codes with seven or more occurrences are reported in this table

## Results

Key social influences identified in the analysis of the interviews included the community (community participation, sense of community), responsibility (responsibility for preparing, responsibility for others), social norms, leadership, trust and societal requirements. The nature of these influences is described under the following sub-headings.

## Community

Communities are often considered to be a social network of interacting individuals, located within a specific geographic area (Johnston et al. 1994). However, the term ‘community’ can also refer to groupings of people who share common interests, such as religion, family ties, culture or social activities. A community essentially exists if there is a social network present whereby people interact with one another in some way. It is argued that some neighbourhood-based communities today are less socially networked than in the past and are less effective in operating as a unit, while groupings that consist of people from widespread geographic locations may in some cases be stronger.

Given that communities can be geographically place-oriented or based on shared interests, people may belong to a number of different communities. The interviewees suggested during their conversations that this was the case. Common communities mentioned included neighbourhoods, wider urban areas (i.e. the whole town or city), workplaces, schools, and community groups (e.g., hobby or interest groups, sports groups, community service groups, and religious groups). The different communities all had varying influences on participants, but neighbourhoods, workplaces, schools, hobby or interest groups, and community service groups proved particularly influential with respect to hazards and preparedness issues.

A number of overall community influences were evident. The first relates to participation in the community with respect to hazard and preparedness issues. If people participated in the wider community, they were more likely to think and talk about hazard issues, have a raised awareness of hazards and preparedness, understand the consequences of a potential event better, have developed some skills they could use for preparedness and response, be empowered, have trust in organisations involved with hazard issues, and be more likely to be motivated to prepare. A variety of levels and types of participation were noted. At the most basic level, people participated with informal networks to discuss hazards and preparedness issues (e.g., conversations with friends and family about what people have seen in the media). Other types of participation included listening to a speaker talking about hazards and preparedness, attendance at meetings, and involvement in community activities (e.g., school activities, workplace activities and community group activities). In general, the more interactive, structured, and frequent the participation was, the more likely it was to lead to some type of preparedness action.

Some participants were directly involved in activities focused on hazards and preparedness (e.g., they belonged to a volunteer civil defence group) while others participated in the community in a more general sense (e.g., they belonged to a service group such as Rotary). Those that participated in non-hazard related groups sometimes brought hazards and preparedness into their regular discussions and activities. Interviewee 35 from Napier talked about how she brought the topic of hazards and

preparedness to a community dinner she was running and notes the influence it had on those participating:

I'm the hostess of the Hawke's Bay Dinner Club. I have been for five years. [...] I always have three topics of discussion to talk about when people arrive for pre-dinner drinks before the dinners. [...] One of my topics was, "Are You Prepared for a Disaster? Did You See Kerre Woodham's Programme?" Well, nobody was prepared at that dinner. And then the next dinner I said, "What have you done in the last month to prepare for something like that?" Well a lot of people had done a lot of things. So I felt, oh well it was just a little thing that I'd done but at least I'd done my bit to make all those dinner guests aware.

Other types of disaster activities that hazard and non-hazard related groups participated in included engaging in voluntary disaster response activities (both at home and overseas), co-ordinating local and overseas post-disaster relief efforts, and putting together preparedness/response kits for people overseas. Several of the Napier interviewees belonged to Rotary groups and discussed how the Rotary was involved with putting together disaster relief kits to send to international disaster sites. However, Interviewee 34 admitted that Rotary had not done this for their own community in a preparedness sense, and that he "[hadn't] really thought about the contradiction" until his conversation with the researcher. Interviewee 37 suggested a reason that preparedness kits were not made for their own community is that funding is available to undertake group activities such as responding to overseas disasters, whereas "putting food in your own cupboard is your own responsibility."

Individuals often participated in community activities to help others (both locally and internationally) as they perceived that other people were more vulnerable and needed their assistance. This was also reflected in people believing that other people had experienced worse impacts in a previous event, or other people would be worse off if a future disaster were to strike. Such beliefs link with the concept of optimistic bias, whereby previous studies have found that often people don't prepare because they perceive themselves to be less vulnerable or better prepared than the rest of the population (Burger and Palmer 1992; Helweg-Larsen 1999; Spittal et al. 2005). Therefore while participation in the community may be positive depending on its nature, it can also serve to uphold unhelpful existing beliefs related to vulnerability.

Another prominent concept that emerged from the interviews was 'sense of community'. Many individuals who had prepared felt a sense of community. Such individuals felt that if they were prepared for a disaster then they would be better placed to help out other community members as needed. They anticipated that this preparedness would be reciprocal, and that other community members would also prepare, so they

could help out too if someone was in need. Interviewee 23 described how he wants to make sure he has “done his share”, by ensuring he is prepared so he can look after himself and other community members, and they can do likewise if he needs help. Interviewee 47 summed up the idea of having preparedness across a community:

If I'm prepared in my house and the neighbour's prepared in their house and we're at home and it goes wrong, we can support each other, or, you know, a quick grab and go. Or if something happens in my house and the neighbour is prepared as well, you've got further sustainability, you know, while you're waiting for assistance. You might be prepared for a day or two, they're prepared for a day or two, between the two of you—you can either, you know, work something out together kind of thing.

Hazard events in Timaru and Wanganui demonstrated how sense of community can make a difference in a disaster. People often described how during the 2006 snowstorm in Timaru and floods in Wanganui that people shared their resources amongst community members in an attempt to negate the effects of the events. For example, there was pooling of generators to run electricity, particularly on farms where cows required milking. People would also assist by sharing home comforts such as food, showers and accommodation.

Other evidence of the importance of community was seen in people's beliefs that having a good community network was important to be able to respond adequately to a disaster; feeling that support was available in their community if something adverse occurred; feeling like they knew neighbours or community members well; and feeling that they were living in a good community.

Many of the interviewees held community as an important aspect; however, this was most likely influenced by the selection of the sample, as many interviewees received invitations through community groups. Those that were less community-minded did give some alternative opinions on the role of community. Some did not prepare because they felt that others in the community had prepared already, and that they could rely on these people if a disaster strikes. Thus they saw a role for sharing of resources during an event, but lacked the sense of moral obligation that others had to “do their share”. In this instance, they transferred their responsibility onto other community members, as they assumed that other people would help them out in a disaster. For example, Interviewee 32 from Wanganui suggested that other farmers didn't prepare for Y2K because they thought that they could share other people's community resources during an event. In addition, Interviewee 17 from Timaru had spoken to people who said that they were not prepared, but that they would come to his place in a disaster because they knew he had prepared.

## Responsibility

Leading on from the discussion about sense of community, comes personal responsibility. As seen in the comments above, responsibility for preparing is not-clear cut. The interviews revealed that many individuals feel a personal responsibility for preparing at a household level, and as a consequence this belief is more likely to motivate preparedness. Those that thought they had no personal responsibility for preparing were unlikely to prepare. They had a tendency to transfer this activity to others, and hope that others—such as other community members, government agencies, or other organisations—were taking care of the problem.

However while individual responsibility appears to be a key driver for household preparedness, people still hold beliefs that preparing is actually a shared responsibility. So a person might think that they have a responsibility for preparing, and also think that other agencies or organisations also have a responsibility. As discussed above, communities are perceived to play a role in preparedness, particularly through ensuring each community member is prepared and thus able to share resources and provide mutual assistance during an event. Also, agencies and organisations are perceived to play a role in preparedness. The public expects that each organisation has particular activities that they must undertake to ensure they are prepared and can respond effectively during a disaster. For example, people expect that local government should educate, undertake physical mitigation works, run an adequate civil defence unit, be prepared for a disaster and be able to respond to local issues effectively. It is expected that service providers, such as power or telephone companies, be prepared for and be able to respond to disasters effectively, with the anticipation that services are up and running quickly. Interviewee 24 directly stated this by saying, “So, yeah, there’s an individual responsibility and a collective responsibility.” Interviewee 34 suggested that while we have devolved some tasks to organisations, it does not completely absolve us of personal responsibility (e.g., just because you pay taxes for hospital care it does not mean you should not take good care of your personal health), again emphasising the need for shared responsibility across individuals, communities and agencies.

While considering that others are more vulnerable than you can lead to optimistic bias, in some cases it can be a motivator of preparedness. If individuals perceive others to be vulnerable, and also feel a sense of responsibility for these people, this can motivate preparedness. Interviewees who stated that they felt a responsibility for others such as children, a spouse, parents, other family members, work colleagues, community members and animals, often were more prepared. Interviewee 6 from Napier suggested that: “I think you think about it more when you’ve got a family. If there’s just the two of you as adults, well, you think that you’ll get on, have access to water and, you know, basic stuff. But when you’ve got children you perhaps think about it a little bit more deeply because you’ve got that responsibility.” For many, feeling a responsibility for others increased

people's worry and anxiety about them being impacted by a disaster, and preparing alleviated this concern. Likewise, the previous discussion on sense of community also highlights that people do feel responsible for wider community members (not just family), and will prepare to ensure that the wider community can assist one another in a disaster. Interviewee 32 from Wanganui also discussed his sense of responsibility for the livestock on his farm in motivating him to prepare for anticipated power failures during Y2K.

*You were talking about Y2K before. What made you do something for Y2K and what was the difference for you?*

I had 150 female [cows] depending on me, didn't I! That would actually make you do something. That was my major focus because that was New Year so the cows would be milking at quite a reasonable rate and they couldn't say how long the power would be off. And the losses by not milking the cows for 48 hours would be quite a lot. It would have taken them probably a fortnight to come back to the same amount of milk again, if they did. And you could get diseases—mastitis and all those sort of funny things. So it was worthwhile.

## **Leadership**

It was evident that individuals who showed leadership in the community were highly influential on preparedness for disasters. Those who showed leadership were more likely to be proactive in promoting preparedness amongst family, friends and their communities in general. Some took leadership upon themselves, while others were thrust into leadership roles and became advocates of preparedness because of the role they were in. For example, Interviewee 17 took it upon himself to make sure that the community of Timaru was prepared for a future disaster. Within his own local neighbourhood he strongly advocated being prepared. He would bring the subject up at Neighbourhood Watch meetings, deliver information to letterboxes and generally talk to other people about how they should get prepared. In a work context, he was also an advocate of preparedness and emergency planning, and would take his concerns to the highest level (e.g., the mayor) if he didn't think that he was making progress. In terms of leadership being undertaken as a necessity rather than a choice, Interviewee 11 talked about how her daughter had to look after preparedness and emergency management specifically for her role in the workplace. It was not her choice to be an advocate but rather a side-role expected of her by her employers.

Interviewees discussed how trying to convince people to prepare was a difficult task. They described how they would become frustrated when no-one would take their advice.

Interviewee 11 said of her daughter, “she said people aren’t the least bit co-operative when it comes to preparations for things. She used to get quite frustrated.” Interviewee 2 said in relation to her frustration, “There is only so much that you can tell people or suggest to people that you do, but if they don’t want to do it, can’t be bothered to do it...well there’s no way they are going to do it.” Frustration that people weren’t taking their advice could cause a sense of helplessness for those trying to advocate preparedness, and could lead to them giving up their efforts. Thus, leaders who start out being proactive and passionate about getting prepared can over time be beaten down, and their efforts start to wane. Ensuring support is available for such people would provide validation of their efforts, and hopefully allow them to retain their energy for such pursuits.

### **Preparedness as a Social Norm**

This research project explored a diversity of views about social norms in relation to hazards and preparedness. While many interviewees thought having a degree of preparedness was a good thing, actual specific preparedness for disasters such as earthquakes was not necessarily considered a ‘normal’ activity amongst the wider population. In fact the predominant social norm tended to be a blasé attitude toward natural hazards and preparing.

Interviewee 34 from Napier directly stated that preparedness was not considered a social norm in his conversation with the researcher. Other interviewees made indirect references to the fact that preparing for disasters is not considered a norm by way of the views they expressed. A number of references were made to the fact that people considered preparing for disasters to be “over the top” or that it can become an “obsession”. For example, Interviewee 22, when asked if he had talked about preparedness with anyone said, “Only with [my niece] about the pandemic and I thought she was a bit over the top there with her preparations.” Other evidence that supports preparedness not being a social norm was shown by Interviewee 4, who suggested that people laugh at safety regulations and call them ridiculous.

Even those that are well-prepared are conscious that their actions do not constitute the social norm. Well-prepared interviewees often admitted that they were unusual in undertaking preparedness, or that it was not normal to think or act the way they did. People used words such as “paranoid” or “crazy” in describing how others perceive them. Interviewee 17 summed up what others thought of him by saying, “People think I’m a nutter you see, so I don’t talk about it very much now, [...] but I used to try and encourage everyone and I had lots of people, lots of friends who did start putting food in a locker, getting some water in, and feeling happier that they had done it.” As Interviewee 17 pointed out, negative reactions from others due to social norms serve to stop prepared people talking about and advocating preparedness widely.

Another barrier to advocating preparedness is the belief that getting prepared is a “personal judgement call.” This links with the focus of many information campaigns that promote preparedness as a personal responsibility. It is widely socially accepted that it is up to individuals to prepare for a disaster. While some community members may attempt to encourage others to prepare, they feel there is only so much they can do. They feel unable to push people too hard on the subject, as at the end of the day it is ultimately a personal decision on whether an individual will prepare or not. Interviewee 14 summed up this wider societal belief by saying, “I think that [preparing is] a personal judgement that [people] need to make for themselves. All you can do is give them the information and then they go ahead and do whatever they need to do.” Interviewee 46 discussed how he talks about hazards and preparedness, with one topic being about what people have and haven’t done for preparedness. His conversation eventually stops because he doesn’t want to get into a situation where he is berating others for not preparing. He considers it a “personal choice” as to whether people prepare or not, and feels it is not his place to be telling others off for not preparing. The “personal judgement call” belief is part of a social norm that hinders discussion and advocating of preparedness in communities.

The influence of others has a profound effect on preparedness being a social norm. People’s opinions can be influential in both encouraging and discouraging a preparedness ethos. Interviewees were more likely to take notice of other people’s opinions if they considered the others to be ‘like themselves’ or people they could relate to (e.g., family or friends). If another influential person thought preparing was important, then the interviewee was more likely to agree and take the advice on board; conversely if another person held negative viewpoints about preparing, then the interviewee was more likely to share that viewpoint and be disinclined to prepare. For example, Interviewee 28 related how she learned from her parents to always have water, flashlights, batteries, lanterns and other preparedness items. Interviewee 40 said that his positive attitude to preparedness and planning had rubbed off on his family members, and consequently they were prepared also. Those who had not prepared often said that they couldn’t think of anyone else they knew who was prepared, and, like these other people, they were under-prepared. The interviews also revealed that an ‘embarrassment factor’ might serve to encourage preparedness amongst individuals. Several interviewees stated that they did not want to be embarrassed by being ‘caught short’ in a disaster, therefore they undertook preparations to ensure that this would not happen. They did not want other people to see that they were under-prepared.

One of the key questions to ask is: How does preparedness become a social norm? The interviews threw up a number of examples that give some insight on how this can be developed. The first is from an interview with a Napier resident who discussed preparedness for Y2K. Interviewee 34 considered preparedness for the Y2K event different from general disaster preparedness in that there was more of a social norm to prepare for Y2K. He stated:

My wife was quite keen in Y2K, year 2000, that we store some water under the house, and it's still there. And that's about all we did at that stage.

*Why do you think Y2K was something that your wife decided to do something for?*

Because it was a social norm—everybody was doing it. There was a lot of advertising, people were saying the telephone must be off, the power stations were going to close down, and therefore the water [stop] pumping. We did a few reasonably easy things in order to deal with it but the sceptics were matched by the optimists and so, oh yeah okay, we'll put some water under the house. But we didn't really make up an emergency kit.

From his description it appears that the frequency of advertising and discussion about the Y2K event brought it more into the realm of being 'normal' for people, and thus became an event that many people prepared for. Therefore it appears that critical awareness, reflected in frequent thought and discussion, is essential for developing preparedness as a norm.

Another example of a type of preparedness that is seen as a social norm is response to earthquakes. When asked what they would do following an earthquake, most interviewees (especially those living in Napier) said they would get under a table or a doorframe. While this is not reflective of current advice (i.e. drop, cover and hold, Ministry of Civil Defence & Emergency Management 2010), it is consistent with what people have been taught in the past. When asked where they had heard this advice, people suggested that they had known it as long as they could remember. This information had become so much a part of what people knew that they could not remember its origins. Responding to an earthquake in such a way was considered a normal and accepted response, and an example of a social norm amongst people. In the case of earthquake response, it is likely that people learned how to respond at school, with this information being supported by earthquake exercises and drills. Learning an activity at an early age, combined with repeated practice, has served to engrain this as a 'normal' response to experiencing an earthquake.

A third way in that preparedness might become a social norm is by emphasising that preparedness is a 'way of life'. Respondents that perceived preparedness to be 'a way of life' rather than a one-off set of activities to prepare for a hazard event were more often prepared. In this sense, preparedness was perceived to be useful as it provided benefits for daily living, rather than focussing on a single event that might never happen. It

became something people did as a matter of course, a ‘normal’ part of life. Interviewee 40 described how preparedness should be accepted as a ‘way of life’:

If [preparedness is] used in one place alone it will fall into disrepute, so it needs to—this is my suggestion—so it’s going to be more valuable, more likely to continue and be more successful if it’s a broad-brand brush that’s anticipated [...] It shouldn’t be a surprise. It should be a part of daily living. In the same way as you wash your hands. And you keep things clean. You know that if you don’t you could get sick because things are dirty. Just as simple as that.

Fourth, direct or indirect experience of a disaster could assist in creating norms in a community. In Napier, for example, experience of the 1931 Hawke’s Bay earthquake, combined with active thought and discussion about the event, had led to the development of norms around risk perception beliefs and earthquake-related practices. Because the city had experienced an event, interviewees understood the risk from earthquakes was real, and it was likely that a destructive earthquake could happen again in future. Earthquakes had become so much of a social norm that many people actually shared the perspective that Napier had an ‘earthquake culture’ (Moore 1964; Turner et al. 1986). This earthquake culture was regularly discussed, was embedded in local history, and is celebrated every year on the anniversary of the 1931 earthquake. Interviewee 38 discussed the various inputs required to create an earthquake culture in the Hawke’s Bay, including how it has influenced beliefs and practices:

Well, I guess, you know it could be dangerous because it has been. And, you know, the sea disappeared and thousands of acres of land lifted right out of the sea two and a half metres. And lots and lots of people died when [Napier] city fell down. And a lot of Hastings fell down too. So I guess everyone in Napier, and in fact it’s quite surprising, [...] there wouldn’t be a tourist [...] that comes here that doesn’t [...] know that the city suffered a major earthquake. I guess it’s so much of the tourism stuff, the Art Deco thing, that the city has very cleverly capitalised on. So people read about that and they must read a couple of lines down to discover that the Art Deco is the building theme of the ‘20s and ‘30s, perpetuated here in the 1930s after the city fell down in an earthquake. I mean, you can get people all over the world, and they say “What is there to see?” I say, “Well, you can go and see the gannets or there’s 67 wineries or there’s the Art Deco”. “Oh, yeah, I know about the Art Deco”. They do. So it’s part of the general culture, knowledge, experience. It’s dangerous.

When looking at the data from Timaru it is also possible to see how experience of the 2006 snowstorm caused many activities to become more 'normal' and assisted in creating social norms following the storm. For example, it was normal for people to talk about the snowstorm after the event and it became more acceptable to get prepared.

Finally, vicarious experience of disaster was also noted as having the potential to help create norms. Interviewee 1's wife made reference to the 2004 Indian Ocean tsunami, and how after that event everybody seemed interested in disasters and how it was considered the 'in thing'. Interviewee 1's wife said, "It was just after the tsunami in Asia, wasn't it, we decided that [tsunami] was the 'in thing' at that stage, what everybody was interested in." Her comments suggest that the media coverage and experience of this event raised the profile of tsunami hazards, and as a consequence it was normal to think about and find ways to address this issue for a while.

## **Trust**

The interviews revealed that trust appeared to be an influence on the overall process of getting prepared. Trust worked in diverse ways. If an individual had trust in an individual or organisation giving advice about hazards and preparedness, they were more likely to believe and act upon the advice. However, trust in an organisation could also lead a person to believe that the organisation was taking care of the problem (transfer of responsibility), and therefore think they did not need to prepare. This effect was especially evident with respect to building safety, as many people stated that they trusted the building legislation to ensure that their homes were built to withstand an earthquake. As a consequence, few had undertaken any specific preparedness measures with respect to mitigating earthquake impacts on buildings.

Distrust in an organisation also had an interesting effect. In some instances people did not trust that an organisation had a hazard problem covered, and therefore they undertook preparations to ensure their safety and wellbeing. For example, Interviewee 39 from Napier, who was well prepared, stated that some of this preparedness was related to the fact that he didn't trust the government to look after the provinces during times of quiescence, and therefore didn't trust the government to provide in an emergency either. When Interviewee 16 was asked why he thought people don't prepare, he noted that transfer of responsibility due to trust is certainly an issue:

I think particularly in a place like Timaru there's that acceptance that there's an organisation to look after you if things go wrong. Which I suppose is pretty comforting really. And whether that adds to complacency or not I don't know but it certainly, for those that think about it, they do know that that service is there.

A lack of trust may also encourage people to undertake inappropriate actions. For example, Interviewee 18 doesn't trust that large shopping centres have prepared for earthquakes by restraining items and so as a consequence thinks she will run out of such a place in an earthquake (rather than drop, cover, and hold). She said, "You walk through a shop like 'The Warehouse' or something or a supermarket, those high stands, they are higher than you can reach. You can't get anything off the top shelf as a rule. And they're just standing there. I wouldn't want to be in one of those buildings if there was an earthquake. I'd be outside fast!" The interviews show that trust is an important societal factor to consider in the preparedness process.

### **Societal Requirements**

The requirements that institutions impose on people can have an influence on whether people undertake adjustment adoption or not. In the interviews, some mentioned that they undertook preparedness measures if they were required to do so, for example, because of insurance company requirements, or requirements by legislation. Interviewee 12 outlined how her husband's insurance company required a degree of preparedness before they would provide insurance: "You mention things tied down on the floor. [My husband's] insurance company has asked him to have the more valuable items in his stamp collection in something that is anchored to the floor. Which is something he now has to do. But that's the first time that anchor[ing furniture] to the floor has sort of come into our conscious level very much at all." Occupational Health and Safety or OSH (as per the Health and Safety in Employment Act 1992) was mentioned by a number of interviewees as being the driver for undertaking disaster preparedness activities in the workplace. Interviewee 6 described how OSH contributed to preparing for disasters in the workplace:

At work we talk about OSH. We have an OSH representative who they obviously go to for things like this during the OSH planning. And issues are raised from around the country about various disaster things, you know, what we can do locally and being prepared and that's when our disaster packs came into the clinic, about two or three years ago. At the family centres they have a proper disaster pack that they brought in with the blankets and all that sort of thing. In our little clinic, because you wouldn't expect many people to be there, we've just got a basic container that each nurse put together. Some clinics are better prepared than others. [...] It's part of the OSH requirements. It's part of that quality stuff, if you're running a quality accreditation programme you've got to contribute all those things.

The Building Act (2004) requires that all new buildings are constructed according to the Building Code to protect life safety in an earthquake, and that certain older buildings (e.g., public buildings, multi storey and multi-unit residential buildings) are retrofitted to bring them up to the code. Such a requirement means that some earthquake mitigation does take place for new and larger buildings; however the majority of New Zealand's typical older residential buildings are not covered by legislative requirements and the retrofitting of these buildings is entirely voluntary. Coupled with this is the belief by many individuals that the Building Act has widely addressed the safety of residential housing, often regardless of building type or age. As a consequence, little retrofitting of earthquake-prone residential buildings takes place.

## **Discussion**

### **Summary of Key Social Influences and Implications for Earthquake Education**

The interviews revealed that a number of key social influences have a bearing on the preparedness process. The themes that emerged from the analysis include community (community participation, sense of community); leadership; responsibility (responsibility for preparing, responsibility for others); social norms; trust; and societal requirements.

First the interviews confirmed that community participation plays a significant role in the preparedness process, as suggested by previous researchers (Heller et al. 2005; McIvor et al. 2009; Paton 2008; Paton et al. 2008a; 2008b; 2008c; 2009; 2010a; 2010b; 2011). Participation helps initiate thought and discussion about hazards and preparedness. Such discussions raise people's awareness of the consequences of disasters and the need to prepare. Certain types of participation can also help build individuals' practical ability to undertake preparedness tasks. Consequently, participation can assist with empowering people to develop solutions to hazard-related issues. Leadership from an individual can help encourage community participation to occur. Group dynamics in a participatory setting can assist with developing social norms. For example, community participation can help develop normative beliefs that preparing is important and motivate people to undertake preparedness actions as part of 'normal' behaviour, as demonstrated in the example of the Napier dinner group.

In summary, it was apparent from the interviews that community participation plays an important role in the information interpretation and preparedness process and should be factored into future earthquake education programmes. Leadership should also be fostered as part of the community participation process. Leaders should be identified and empowered to participate in hazards and preparedness issues so their passion and drive does not wane, or so they do not experience problems inspiring action because of limited access to resources.

In this study, the concept of sense of community was found to link with community participation, whereby individuals who felt a sense of community were more likely to participate with respect to hazard-related issues. In a disaster context this was often reflected in community members assisting with response to a disaster, contributing relief, or helping develop preparedness in communities that they considered to be vulnerable.

As discussed previously, sense of community has found to be of mixed influence in previous studies, with some studies reporting sense of community to be influential on the preparedness process (Bishop et al. 2000; Paton et al. 2006a; 2011; Prior and Paton 2008) and others finding no obvious link (Paton et al. 2001b; 2005). A difference in influence may occur because studies have been undertaken in differing contexts (e.g. different hazards, different geographic locations, urban versus rural situations, quantitative versus qualitative investigation), and therefore the complex nature of sense of community has not yet been fully explored. This remains an area for future research.

The concept of sense of community linked with responsibility. Those individuals who identified that they felt a sense of community also often said that they felt a responsibility to their fellow community members to either be prepared themselves (so they can be available to respond on a personal and community level to a disaster) or assist others to prepare. Feeling a responsibility for others appeared to be a key motivator to getting prepared in general. Interviewees stated that they were more likely to be prepared so they could ensure the safety of others they were responsible for (such as children, a spouse, parents, other family members, work colleagues, community members and animals). Researchers (Carter-Pokras et al. 2007; McIvor et al. 2009) have previously noted the importance of a sense of social responsibility for others as a motivator in the preparedness process. This is also reflected in previous earthquake preparedness studies, where people who have dependents such as children state that they are more likely to be prepared (Dooley et al. 1992; Edwards 1993; Russell et al. 1995; Turner et al. 1986).

Sense of community and feeling a responsibility for others was also linked with social injunctive or personal injunctive norms regarding people's feelings of moral obligation to look after other people in general. Earthquake education initiatives should work with community development programmes to build an overall sense of community, and emphasise the responsibilities that individuals have to protect both those they are close to, and the wider community.

Consistent with previous research (Garcia 1989; Jackson 1977; 1981; Mulilis and Duval 1995; 1997; Perry and Lindell 2008), the interviews confirmed that individuals who feel that preparing for earthquakes is a personal responsibility are more likely to undertake adjustment adoption. However, the interviews also revealed that most people perceive that collective responsibility (for example, institutional or community responsibility) similarly exists for preparing, the nature of which is different from individual household responsibility. Previous research confirms that despite personal

responsibility being important, individuals often see preparedness as a shared commitment (Mulilis and Duval 2001).

Current educational campaigns have a strong focus on individual responsibility for preparing; however, such programmes fail to capture any collective responsibilities that people perceive there to be. The interviews show that members of the public perceive a role for the ‘wider community’ in preparedness, but this is often not focused on as part of educational campaigns. The research also revealed an appetite amongst those involved in community groups to take part in preparedness and response activities, but people were unsure of how such groups could become practically involved. Important questions to be asked include: What is the role of wider society in earthquake adjustment adoption? What tasks are solely the roles of individuals, and what tasks should communities be engaging in? How can this be achieved? Gruev-Vintila and Rouquette (2007) found that for collective mitigation actions to take place, individuals must already be personally involved in a degree of risk-related practice, so one suggestion might be to begin with empowering individuals to prepare, and evolve toward undertaking collective action.

Social norms were identified as having an influence on the preparedness process. As discussed earlier, norms regarding the importance of caring for community members often influenced people’s desire to prepare. In terms of beliefs, the predominant normative belief among interviewees was that, while preparedness was important in general, earthquake preparedness was not normal or a widespread activity. Few knew of, or had observed, other people undertaking earthquake preparedness measures. Others went as far to say that they believed preparing was “over the top”; that those who prepared were “paranoid” or “crazy”; or that getting prepared was a “personal judgement call”. Such beliefs hindered people’s motivation to prepare. Solberg et al. (2010) suggest that norms can have either a positive or a negative effect on seismic hazard adjustment adoption. Helpful norms may steer people toward undertaking preparedness, but as seen above, unhelpful norms can serve to stifle positive adjustments. The development of helpful attitudinal and behavioural norms for preparing was found in the interviews to be influenced by:

- Participating in a group situation or activity, particularly in which interaction took place;
- Being exposed to frequent information which acted to stimulate thought and discussion about hazards and preparedness;
- Repeated practice of activities related to hazards and preparedness;
- Learning from an early age about earthquakes and preparedness;
- Framing preparedness in a broader sense, making it more applicable to people’s daily lives and current normative beliefs, e.g., “Preparedness is a way of life”; and

Experience of disaster, particularly where the experience was shared by others assisted with the development of widespread risk perceptions and a realisation of the importance of preparing.

Given that communities can be geographically-based or linked by wider social networks, and that individuals may be members of many different communities, challenges exist in developing social norms. Earthquake educators need to think laterally about how to interact with a diverse range of communities in developing such norms, and account for their different ways of interacting and learning.

As seen in previous research (Karanci and Askit 1999; McIvor et al. 2009; Paton 2007b; 2008; Paton et al. 2008a; 2008b; 2008c; 2009; 2010a; 2010b), trust and distrust were identified in the interviews as a distinct influence in the preparedness process. Trust in information types and sources, and in institutions themselves, often leads to people being more likely to undertake earthquake adjustment adoption. Conversely, trust sometimes had the opposite effect, as too much trust in an institution could lead to people believing that the institution was taking care of the hazard issue and thus they didn't need to prepare. Distrust had a similar multi-dimensional effect, whereby some individuals who distrusted information or an agency would not prepare, while others' distrust motivated them to undertake preparedness. As was evident with Interviewee 18, the distrust of individuals in institutions can also lead people to taking inappropriate actions. In a complementary Turkish example, Green (2008) found that perceived distrust in the building practices of professional builders and contractors led people to undertake inappropriate actions by building their own, often sub-standard homes in the hope that they would be safer in an earthquake than those built by the professionals.

Information should be delivered by sources that people can trust and relate to. In some cases this could be an institution that people trust, or a relevant individual (e.g. family and friends, trusted community members, trusted leaders). Information should also be of good quality, and consistent between different sources.

Individuals' trust in information is not the only important facet of trust, however, and building elements of wider 'social trust' should also be considered (Drottz-Sjöberg 2000). Educational strategies should aim to build trust in populations and reduce distrust, while at the same time emphasising the fact that people have a responsibility to prepare. Other suggestions for emergency managers wishing to build trust in populations include ensuring provision of adequate knowledge and expertise; taking events seriously when the situation requires; dealing with uncertainty; being honest and open; showing concern and care; ensuring adequate performance over decisions that are made; and counteracting negative stereotypes (Peters et al. 1997; Petts 2008; White and Johnson 2010).

Finally there was some indication that imposing requirements on community members (such as legislative or insurance requirements) could serve to ensure that disaster preparedness measures were undertaken. Unfortunately, few requirements currently exist in New Zealand to undertake earthquake mitigation actions in a residential household setting, so the examples presented in this paper were indirect and a only potential indication of the influence that imposing requirements might have. Social contextual factors have been shown to have an influence on the effectiveness of

legislation for earthquake preparedness (Anbarci et al. 2005; Davis 1989; Palm 1981; Spence 2004) and must be accounted for when imposing formal requirements.

### **Models for Understanding Social Influences on Earthquake Information Interpretation and Preparedness**

Primarily due to a previous focus on intra-individual studies, rather than a holistic approach to understanding preparedness, understanding of the social influences on the interpretation of earthquake information and adjustment adoption has been incomplete. This has limited the ability of emergency managers to design earthquake education strategies that incorporate and account for societal influences. To develop a better model which incorporates the social influences of the information interpretation and preparedness process, it may be necessary to draw from wider resilience models rather than rely on those based on EV theories such as TRA and TPB.

Paton and colleagues (e.g. Paton 2005; 2006; 2007a; Paton et al. 2000; 2001a; 2001b; 2006b; 2008b; 2010a) provide a good starting point for understanding many of the social influences on hazard preparedness. Previous research using structural equation modelling has identified a number of key factors that influence hazard adjustment adoption, including collective efficacy, community participation, articulation of problems, trust and empowerment. Their model of resilience also describes a number of other social influences on preparedness such as social support, capacity, power and resources (Paton 2006). They also acknowledge that preparedness is but one aspect, and that response and recovery are also important considerations within the overall scheme of resilience. Norris et al. (2008) present another model, which provides a good example of how social aspects may influence resilience. Their model of disaster resilience focuses on a 'set of adaptive capacities' and considers that four primary networked resources are required to achieve resilience, including economic development; social capital; information and communication; and community competence.

Resilience-based models, such those discussed above, are more effective at incorporating a range of cognitive, emotive, environmental and social influences of earthquake preparedness. The continued formulation and evolution of such models in an earthquake context will allow a better understanding of the full range of influences of preparedness, and will allow the development of more effective earthquake education strategies.

### **Research Limitations**

While a range of social influences on the information interpretation and preparedness process were identified in this paper, it is likely that some gaps still exist that have not been addressed. For example, while no mention has been made of resource issues,

interview participants did state that lack of resources (such as money or time) were barriers to getting prepared (see Becker et al., 2012). According to work by Norris et al. (2008), economics constitutes a part of resilience, and thus should be considered a core societal consideration in the context of encouraging preparedness for disasters.

A second limitation of this study is that community participation was only referred to by interviewees in a limited sense. Participants discussed a few examples of people getting prepared as a consequence of undertaking hazard-related community activities, but such activities were not particularly common, as they do not form a core part of current earthquake education initiatives. Future work might involve undertaking more participatory community activities directed at earthquake preparedness, and analysing the influence these have on the preparedness process. Evaluation is important in determining whether earthquake education initiatives are effective or not, and what subsequent changes need to be made to programmes (Finnis et al. 2007).

According to Myers (2002) people are less influenced if they are asked their opinions privately, rather than in public. Therefore, one limitation of the interviews is that while people may have been happy to say that preparing is, or is not, important in a private setting; it may not be truly representative of what they might actually say in public. Further research should involve investigating people's beliefs in a social rather than just an individual context (e.g., by use of focus groups or observation). Such research will allow the influence of social aspects to be identified as people interact with others in real time.

Finally, the data collected for the research has several limitations. Data collected was qualitative rather than quantitative, so while details related to the information meaning-making and preparedness process have been identified, representativeness across the wider population has not been measured. Future quantitative work is required to test whether findings are applicable more generally across the wider population. In addition, some bias may be present in the sample of interviewees, including an over-representation of 'community-minded people'; an over-representation of people interested in earthquakes and preparedness; and an over-representation of older people in the sample (i.e. over half the sample were 60 years or over).

### **Note**

1. This manuscript was processed by the Co-Editor, Michael K. Lindell, and Editorial Assistant, Shih-Kai Huang.

### **Acknowledgements**

The authors would like to thank the following agencies that provided financial support for this project: the New Zealand Hazards Platform; GNS Science; Canterbury Civil

Defence Emergency Management Group; and Hawke's Bay Civil Defence Emergency Management Group. The authors would also like to acknowledge the support of local emergency management officers who assisted in setting up the research, and express their thanks to household residents from Napier, Wanganui and Timaru who took part in the study as interviewees.

### References

- Ajzen, I. 1985. "From Intentions to Actions: A Theory of Planned Behaviour." Pp. 11-40 in *Action Control: From Cognition to Behaviour*, edited by J. Kuhl and J. Beckmann. Berlin: Springer-Verlag.
- Ajzen, I. 1991. "The Theory of Planned Behavior." *Organizational Behaviour and Human Decision Processes* 50: 179-211.
- Anbarci, N., M. Escaleras, and C.A. Register. 2005. "Earthquake Fatalities: The Interaction of Nature and Political Economy." *Journal of Public Economics* 89: 1907-1933.
- Armaş, I. 2006. "Earthquake Risk Perception in Bucharest, Romania." *Risk Analysis* 26: 1223-1234.
- Becker, J.S., D. Paton, D.M. Johnston, and K.R. Ronan. 2012. "A Model of Household Preparedness for Earthquakes: How Individuals Make Meaning of Earthquake Information and How this Influences Preparedness." *Natural Hazards* 64: 107-137.
- Bishop, B., D. Paton, G. Syme, and B. Hancarrow. 2000. "Coping with Environmental Degradation: Salination as a Community Stressor." *Network* 12: 1-15.
- Breinbauer, C., M. Maddaleno, and H. Maddaleno. 2005. *Youth: Choices and Change, Promoting Healthy Behaviours in Adolescents*. Washington DC: Pan American Health Organisation.
- Building Act. 2004. No. 72. Available at <http://www.legislation.govt.nz/act/public/2004/0072/latest/DLM306036.html>. Retrieved on June 23, 2011.
- Burger, J.M., and M.L. Palmer. 1992. "Changes in and Generalization of Unrealistic Optimism Following Experiences with Stressful Events: Reactions to the 1989 California Earthquake." *Personality and Social Psychology Bulletin* 18: 39-43.
- Carter-Pokras, O., R.E. Zambrana, S.E. Mora, and K.A. Aaby. 2007. "Emergency Preparedness: Knowledge and Perceptions of Latin American Immigrants." *Journal of Health Care for the Poor and Underserved* 18: 465-481.
- Charmaz, K. 2006. *Constructing Grounded Theory*. London, California, New Delhi: Sage Publications.
- Colmar Brunton. 2012. *Ministry of Civil Defence & Emergency Management*. Campaign Monitoring Research, July 2012.

- Cowan, J., J. McClure, and M. Wilson. 2002. "What a Difference a Year Makes: How Immediate and Anniversary Media Reports Influence Judgements about Earthquakes." *Asian Journal of Social Psychology* 5: 169-185.
- Davis, M.S. 1989. "Living Along the Fault Line: An Update on Earthquake Awareness and Preparedness in Southern California." *Urban Resources* 5: 8-14.
- Dooley, D., R. Catalano, S. Mishra, and S. Serxner. 1992. "Earthquake Preparedness—Predictors in a Community Survey." *Journal of Applied Social Psychology* 22: 451-470.
- Drottz-Sjöberg, B. 2000. "Exposure to Risk and Trust in Information: Implications for the Credibility of Risk Communication." *The Australasian Journal of Disaster and Trauma Studies* 2000(2). Available at <http://www.massey.ac.nz/~trauma/issues/2000-2002/drottz.htm>. Retrieved on July 30, 2007.
- Duval, T.S., and J-P. Mulilis. 1999. "A Person-relative-to-Event (PrE) Approach to Negative Threat Appeals and Earthquake Preparedness: A Field Study." *Journal of Applied Social Psychology* 29: 495-516.
- Earthquake Commission. 2011. *Monitoring the Effectiveness of the Earthquake Commission's Communication Programme: Quarter 2 2011*. Wellington: Earthquake Commission.
- Edwards, M.L. 1993. "Social Location and Self-protective Behavior: Implications for Earthquake Preparedness." *International Journal of Mass Emergencies and Disasters* 11(3): 293-303.
- Endo, R., and J. Nielsen. 1979. "Social Responses to Natural Hazard Predictions." *Western Sociological Review* 10: 59-69.
- Farley, J.E. 1998. *Earthquake Fears, Predictions, and Preparations in Mid-America*. Carbondale and Edwardsville: Southern Illinois University Press.
- Farley, J.E., H.D. Barlow, M.S. Finkelstein, and L. Riley. 1993. "Earthquake Hysteria, Before and After: A Survey and Follow-up on Public Response to the Browning Forecast." *International Journal of Mass Emergencies and Disasters* 11(3): 305-321.
- Finnis, K.K., D. Johnston, J. Becker, K.R. Ronan, and D. Paton. 2007. "School and Community-based Hazards Education and Links to Disaster Resilient Communities." *Regional Development Dialogue* 28: 99-108.
- Fishbein, M., and I. Ajzen. 1975. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Folkman, S. 1997. "Positive Psychological States and Coping with Severe Stress." *Social Science and Medicine* 45(8): 1207-1221.
- Garcia, E.M. 1989. "Earthquake Preparedness in California: A Survey of Irvine Residents." *Urban Resources* 5(4): 15-19.
- Green, R.A. 2008. "Unauthorised Development and Seismic Hazard Vulnerability: A Study of Squatters and Engineers in Istanbul, Turkey." *Disasters* 32: 358-376.

- Gruev-Vintila, A., and M.L. Rouquette. 2007. "Social Thinking about Collective Risk: How do Risk-related Practice and Personal Involvement Impact its Social Representations?" *Journal of Risk Research* 10: 555-581.
- Health and Safety in Employment Act. 1992. No. 96. Available at <http://www.legislation.govt.nz/act/public/1992/0096/latest/DLM278829.html>. Retrieved on June 23, 2011.
- Heller, K., D.B. Alexander, M. Gatz, B.G. Knight, and T. Rose. 2005. "Social and Personal Factors as Predictors of Earthquake Preparation: The role of Support Provision, Network Discussion, Negative Affect, Age, and Education." *Journal of Applied Social Psychology* 35: 399-422.
- Helweg-Larsen, M. 1999. "(The Lack of) Optimistic Biases in Response to the 1994 Northridge Earthquake: The Role of Personal Experience." *Basic and Applied Social Psychology* 21: 119-129.
- Hendrikx, J. 2007. "The June 2006 Canterbury Snowstorm." *Journal of Hydrology New Zealand* 46: 33-49.
- Hobfoll, S.E. 1989. "Conservation of Resources: A New Attempt at Conceptualizing Stress." *American Psychologist* 44(3), 513-524.
- Jackson, E.L. 1977. "Public Response to Earthquake Hazard." *California Geology* 30: 278-280.
- Jackson, E.L. 1981. "Response to Earthquake Hazard: The West Coast of North America." *Environment and Behavior* 13: 387-416.
- Johnston, R.J., D. Gregory, and D.M. Smith (eds.). 1994. *The Dictionary of Human Geography* (3rd ed.). New York, NY: Wiley-Blackwell.
- Kaiser, C.F., D.N. Sattler, D.R. Bellack, and J. Dersin. 1996. "A Conservation of Resources Approach to a Natural Disaster: Sense of Coherence and Psychological Distress." *Journal of Social Behavior and Personality* 11(3): 459-476.
- Karanci, A.N., and B. Askit. 1999. "Strengthening community participation in disaster management by strengthening governmental and non-governmental organisations and networks. A case study from Dinar and Bursa (Turkey)." *Australian Journal of Emergency Management* 13(4): 35-39.
- Karanci, A.N., B. Askit, and G. Dirik. 2005. "Impact of a Community Disaster Awareness Training Program in Turkey: Does it Influence Hazard-related Cognitions and Preparedness Behaviors?" *Social Behavior and Personality* 33: 243-258.
- Kirschenbaum, A. 2002. "Disaster Preparedness: A Conceptual and Empirical Reevaluation." *International Journal of Mass Emergencies and Disasters* 20(1): 5-28.
- Kirschenbaum, A. 2004. "Generic Sources of Disaster Communities: A Social Network Approach." *International Journal of Sociology and Social Policy* 24(10-11): 94-129.
- Lazarus, R.S., and S. Folkman. 1984. *Stress, Appraisal, and Coping*. New York, NY: Springer.

- Lindell, M.K., S. Arlikatti, and C.S. Prater. 2009. "Why People Do What They Do to Protect Against Earthquake Risk: Perceptions of Hazard Adjustment Attributes." *Risk Analysis* 29: 1072-1088.
- Lindell, M.K., and S.N. Hwang. 2008. "Households' Perceived Personal Risk and Responses in a Multihazard Environment." *Risk Analysis* 28(2): 539-556.
- Lindell, M.K., and R.W. Perry. 1992. *Behavioural Foundations of Community Emergency Planning*. Washington DC: Hemisphere Press.
- Lindell, M.K., and R.W. Perry. 2000. "Household Adjustment to Earthquake Hazard: A Review of Research." *Environment and Behavior* 32: 461-501.
- Lindell, M.K., and R.W. Perry. 2012. "The Protective Action Decision Model: Theoretical Modifications and Additional Evidence." *Risk Analysis* 32(4): 616-632.
- Lindell, M.K., and C.S. Prater. 2000. "Household Adoption of Seismic Hazard Adjustments: A Comparison of Residents in Two States." *International Journal of Mass Emergencies and Disasters* 18(2): 317-338.
- Lindell, M.K., and C.S. Prater. 2002. "Risk Area Residents' Perceptions and Adoption of Seismic Hazard Adjustments." *Journal of Applied Social Psychology* 32: 2377-2392.
- Lindell, M.K., and D.J. Whitney. 2000. "Correlates of Household Seismic Hazard Adjustment Adoption." *Risk Analysis* 20: 13-25.
- McClure, J., M.W. Allen, and F. Walkey. 2001. "Countering Fatalism: Causal Information in News Reports Affects Judgments About Earthquake Damage." *Basic and Applied Social Psychology* 23: 109-121.
- McClure, J., R.M. Sutton, and C.G. Sibley. 2007a. "Listening to Reporters or Engineers? How Instance-based Messages about Building Design Affect Earthquake Fatalism." *Journal of Applied Social Psychology* 37: 1956-1973.
- McClure, J., R.M. Sutton, and M. Wilson. 2007b. "How Information about Building Design Influences Causal Attributions for Earthquake Damage." *Asian Journal of Social Psychology* 10: 233-242.
- McClure, J., F. Walkey, and M. Allen. 1999. "When Earthquake Damage is Seen as Preventable: Attributions, Locus of Control and Attitudes to Risk." *Applied Psychology* 48: 239-256.
- McIvor, D., and D. Paton. 2007. "Preparing for Natural Hazards: Normative and Attitudinal Influences." *Disaster Prevention and Management* 16: 79-88.
- McIvor, D., D. Paton, and D. Johnston. 2009. "Modelling Community Preparation for Natural Hazards: Understanding Hazard Cognitions." *Journal of Pacific Rim Psychology* 3(2): 39-46.
- Mileti, D.S., and J.D. Darlington. 1997. "The Role of Searching in Shaping Reactions to Earthquake Risk Information." *Social Problems* 44: 89-103.
- Mileti, D.S., and C. Fitzpatrick. 1992. "The Causal Sequence of Risk Communication in the Parkfield Earthquake Prediction Experiment." *Risk Analysis* 12: 393-400.

- Mileti, D.S., and P.W. O'Brien. 1992. "Warnings During Disaster: Normalizing Communicated Risk." *Social Problems* 39: 40-57.
- Ministry of Civil Defence & Emergency Management. 2010. "What to Do in an Earthquake." Available at <http://www.getthru.govt.nz/web/GetThru.nsf/web/BOWN-7GY5TP?OpenDocument>. Retrieved on July 23, 2010.
- Moore, H.E. 1964. *And the Winds Blew*. Texas: The University for Texas, Hogg Foundation for Mental Health.
- Mulilis, J-P. 1996. "Social Considerations of Disaster-Resistant Technology: The Person-relative-to-Event (PrE) Model of Coping with Threat." *Journal of Urban Technology* 3(3): 59-70.
- Mulilis, J-P. and T.S. Duval. 1995. "Negative Threat Appeals and Earthquake Preparedness: A Person-relative-to-Event (PrE) Model of Coping with Threat." *Journal of Applied Social Psychology* 25: 1319-1339.
- , 1997. "The PrE Model of Coping and Tornado Preparedness: Moderating Effects of Responsibility." *Journal of Applied Social Psychology* 27: 1750-1765.
- , 2001. "Personal Responsibility for Tornado Preparedness: Commitment or Choice?" *Journal of Applied Social Psychology* 31: 1659-1688.
- , 2003. "Activating Effects of Resources Relative to Threat and Responsibility in Person-relative-to-Event Theory of Coping with Threat: An Educational Application." *Journal of Applied Social Psychology* 33(7): 1437-1456.
- Mulilis, J-P., T.S. Duval, and K. Bovalino. 2000. "Tornado Preparedness of Students, Nonstudent Renters, and Nonstudent Owners: Issues of PrE theory." *Journal of Applied Social Psychology* 30(6): 1310-1329.
- Mulilis, J-P., T.S. Duval, and R. Lippa. 1990. "The Effects of a Large Destructive Local Earthquake on Earthquake Preparedness as Assessed by an Earthquake Preparedness Scale." *Natural Hazards* 3: 357-371.
- Mulilis, J-P., T.S. Duval, and R. Rogers. 2003. "The Effect of a Swarm of Local Tornadoes on Tornado Preparedness: A Quasi-Comparable Cohort Investigation." *Journal of Applied Social Psychology* 33(8): 1716-1725.
- Mulilis, J-P. and R. Lippa. 1990. "Behavioral Change in Earthquake Preparedness Due to Negative Threat Appeals: A Test of Protection Motivation Theory." *Journal of Applied Social Psychology*: 20(8, Pt 1), 619-638.
- Myers, D.G. 2002. *Social Psychology* (7th, International Edition ed.). New York, NY: McGraw-Hill.
- Norris, F.H., S.P. Stevens, B. Pfefferbaum, K.F. Wyche, and R.L. Pfefferbaum. 2008. "Community Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness." *American Journal of Community Psychology* 41(1-2): 127-150.
- Ozdemir, O. and C. Yilmaz. 2011. "Factors Affecting Risk Mitigation Revisited: The Case of Earthquake in Turkey." *Journal of Risk Research* 14: 17-46.

- Palm, R. 1981. "Public Response to Earthquake Hazard Information." *Annals of the Association of American Geographers* 71: 389-399.
- Paradise, T.R. 2005. "Perception of Earthquake Risk in Agadir, Morocco: A Case Study from a Muslim Community." *Environmental Hazards* 6: 167-180.
- , 2006. "Perception of seismic risk in a Muslim city." *Journal of North African Studies* 11: 243-262.
- Paton, D. 2005. "Community Resilience: Integrating Hazard Management and Community Engagement." Paper presented at the Proceedings of the International Conference on Engaging communities, Brisbane 14 - 17 August 2005.
- , 2006. "Disaster Resilience: Integrating Individual, Community, Institutional and Environment Perspectives." Pp. 305-319 in *Disaster Resilience*, edited by D. Paton and D. Johnston. Springfield, IL: Charles C. Thomas.
- , 2007a. *Measuring and Monitoring Resilience in Auckland*. GNS Science Report 2007/18. Lower Hutt: GNS Science.
- , 2007b. "Preparing for Natural Hazards: The Role of Community Trust." *Disaster Prevention and Management* 16: 370-379.
- , 2008. "Risk Communication and Natural Hazard Mitigation: How Trust Influences its Effectiveness." *International Journal of Global Environmental Issues* 8(1-2): 2-16.
- Paton, D., R. Bajek, N. Okada, and D. McIvor. 2010a. "Predicting Community Earthquake Preparedness: A Cross-cultural Comparison of Japan and New Zealand." *Natural Hazards* 54: 765-781.
- Paton, D., B.F. Houghton, C.E. Gregg, D.A. Gill, L.A. Ritchie, D. McIvor, P. Larin, S. Meinhold, J. Horan, and D.M. Johnston. 2008a. "Managing Tsunami Risk in Coastal Communities: Identifying Predictors of Preparedness." *The Australian Journal of Emergency Management* 23: 4 - 9.
- Paton, D., B.F. Houghton, C.E. Gregg, D. McIvor, D.M. Johnston, P. Bürgelt, P. Larin, D.A. Gill, L.A. Ritchie, S. Meinhold, and J. Horan. 2009. "Managing Tsunami Risk: Social Context Influences on Preparedness." *Journal of Pacific Rim Psychology* 3(1): 27-37.
- Paton, D., D. Johnston, L. Smith, and M. Millar. 2001a. "Responding to Hazard Effects: Promoting Resilience and Adjustment Adoption." *Australian Journal of Emergency Management Autumn* 2001: 47-52.
- Paton, D., G. Kelly, P.T. Bürgelt, and M. Doherty. 2006a. "Preparing for Bushfires: Understanding Intentions." *Disaster Prevention and Management* 15: 566-575.
- Paton, D., J. McClure, and P.T. Bürgelt. 2006b. "Natural Hazard Resilience: The Role of Individual and Household Preparedness." Pp. 105-124 in *Disaster Resilience*, edited by D. Paton and D. Johnston. Springfield, IL: Charles C. Thomas.
- Paton, D., M. Millar, and D. Johnston. 2001b. "Community Resilience to Volcanic Hazard Consequences." *Natural Hazards* 24: 157-169.

- Paton, D., B. Parkes, M. Daly, and L. Smith. 2008b. "Fighting the Flu: Developing Sustained Community Resilience and Preparedness." *Health Promotion Practice* 9(4 Suppl): 45S-53S.
- Paton, D., S. Sagala, N. Okada, L.-J. Jang, P. Burgelt, and C.E. Gregg. 2010b. "Making Sense of Natural Hazard Mitigation: Personal, Social and Cultural Influences." *Environmental Hazards* 9: 183-196.
- Paton, D., L. Smith, M. Daly, and D. Johnston. 2008c. "Risk Perception and Volcanic Hazard Mitigation: Individual and Social Perspectives." *Journal of Volcanology and Geothermal Research* 172: 179-188.
- Paton, D., L. Smith, and D.M. Johnston. 2000. "Volcanic Hazards: Risk Perception and Preparedness." *New Zealand Journal of Psychology* 29: 86-91.
- Paton, D., L. Smith, and D. Johnston. 2005. "When Good Intentions Turn Bad: Promoting Natural Hazard Preparedness." *The Australian Journal of Emergency Management* 20(1): 25-30.
- Paton, D., M. Frandsen, and F. Tedim. 2012. "Community Preparedness for Forest Fire: Facilitating Community Engagement." In *A Dimensao Humana dos Incendios Florestais*, edited by F. Pedrosa and D. Paton. Porto, Portugal: Estrategias Criativas.
- Perry, R.W., and M.K. Lindell. 2008. "Volcanic Risk Perception and Adjustment in a Multi-hazard Environment." *Journal of Volcanology and Geothermal Research* 172: 170-178.
- Peters, R.G., V.T. Covello, and D.B. McCallum. 1997. "The Determinants of Trust and Credibility in Environmental Risk Communication: An Empirical Study." *Risk Analysis* 17: 43-54.
- Petts, J. 2008. "Public Engagement to Build Trust: False Hopes?" *Journal of Risk Research* 11: 821-835.
- Prior, T., and D. Paton. 2008. "Understanding the Context: The Value of Community Engagement in Bushfire Risk Communication and Education. Observations Following the East Coast Tasmania Bushfires of December 2006." *Australasian Journal of Disaster and Trauma Studies* 2008(2). Available at <http://www.massey.ac.nz/~trauma/issues/2008-2/prior.htm>.
- Rogers, R.W. 1983. "Cognitive and Physiological Processes in Fear Appeals and Attitude Change: A Revised Theory of Protection Motivation." Pp. 153-177 in *Social Psychophysiology* edited by J. Cacioppa and R. Petty. New York: Guildford Press.
- Russell, L.A., J.D. Goltz, and L.B. Bourque. 1995. "Preparedness and Hazard Mitigation Actions Before and After Two Earthquakes." *Environment and Behavior* 27: 744-770.
- Rüstemli, A. and A.N. Karanci. 1999. "Correlates of Earthquake Cognitions and Preparedness Behavior in a Victimized Population." *Journal of Social Psychology* 139: 91-101.

- Sattler, D.N., A.M.G. De Alvarado, N.B. De Castro, R. Van Male, A.M. Zetino, and R. Vega. 2006. "El Salvador Earthquakes: Relationships Among Acute Stress Disorder Symptoms, Depression, Traumatic Event Exposure, and Resource Loss." *Journal of Traumatic Stress* 19(6), 879-893.
- Sattler, D.N., C.F. Kaiser, and J.B. Hittner. 2000. "Disaster Preparedness: Relationships Among Prior Experience, Personal Characteristics, and Distress." *Journal of Applied Social Psychology* 30(7): 1396-1420.
- Sattler, D.N., A.J. Preston, C.F. Kaiser, V.E. Olivera, J. Valdez, and S. Schlueter. 2002. "Hurricane Georges: A Cross-National Study Examining Preparedness, Resource Loss, and Psychological Distress in the U.S. Virgin Islands, Puerto Rico, Dominican Republic, and the United States." *Journal of Traumatic Stress* 15(5): 339-350.
- Şakioroğlu, M., and A.N. Karanci. 2008. Positive Outcomes of 1999 Duzce earthquake. A Thesis Proposal Submitted to the Graduate School of Social Sciences of Middle East Technical University: Department of Psychology, Middle East Technical University.
- Solberg, C., T. Rossetto, and H. Joffe. 2010. "The Social Psychology of Seismic Hazard Adjustment: Re-evaluating the International Literature." *Natural Hazards and Earth System Science* 10: 1663-1677.
- Spence, R. 2004. "Risk and Regulation: Can Improved Government Action Reduce the Impacts of Natural Disasters?" *Building Research and Information* 32: 391-402.
- Spittal, M.J., J. McClure, R.J. Siebert, and F.H. Walkey. 2005. "Optimistic Bias in Relation to Preparedness for Earthquakes." *Australasian Journal of Disaster and Trauma Studies* 2005(1). Available at <http://www.massey.ac.nz/~trauma/issues/2005-2001/spittal.htm>.
- Spittal, M.J., J. McClure, R.J. Siebert, and F.H. Walkey. 2008. "Predictors of Two Types of Earthquake Preparation: Survival Activities and Mitigation Activities." *Environment and Behavior* 40: 798-817.
- Strauss, A.L., and J. Corbin. 1990. *Basics of qualitative research: Grounded theory procedures and techniques*. Newberry Park, CA: Sage.
- Tanaka, K. 2005. "The Impact of Disaster Education on Public Preparation and Mitigation for Earthquakes: A Cross-country Comparison Between Fukui, Japan and the San Francisco Bay Area, California, USA." *Applied Geography* 25: 201-225.
- Turner, R.H., J.M. Nigg, and D. Heller-Paz. 1986. *Waiting for Disaster: Earthquake Watch in California*. Berkeley: University of California Press.
- White, K.M., J.R. Smith, D.J. Terry, J.H. Greenslade, and B.M. McKimmie. 2009. "Social Influence in the Theory of Planned Behaviour: The role of Descriptive, Injunctive, and In-group Norms." *British Journal of Social Psychology* 48: 135-158.
- White, M.P. and B.B. Johnson. 2010. "The Intuitive Detection Theorist (IDT) Model of Trust in Hazard Managers." *Risk Analysis* 30: 1196-1209.