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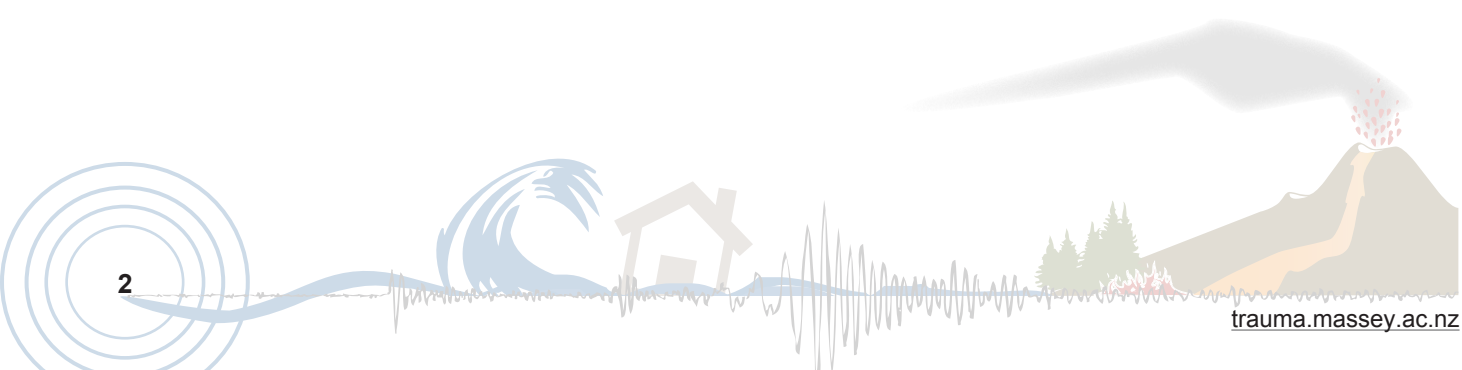

Land Use Planning and Policy for Earthquakes in the Wellington Region, New Zealand (2001-2011)

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Abstract

Local land use plans often have poor approaches to identifying natural hazards and mitigating for their effects. This paper uses earthquake hazards in the Wellington Region, New Zealand as a case study. A project was undertaken in 2011 to see whether the earthquake hazard had been better recognised and mitigated for in Wellington Region land use planning documents since 2001. In general, it was found that councils' land use policy statements and plans better recognise the risk from the earthquake hazards today than they did a decade previously. There are still areas where land use planning for earthquakes can improve, including strengthening relationships between central government legislation, addressing a wide variety of hazards associated with earthquakes (not just fault rupture), and continued evaluation of policy to ensure earthquake risk is recognised, information is updated, and effective mitigation measures are employed.

Keywords: *Land use planning, Policy, Earthquakes, Wellington Region.*

1.0 Introduction

No single approach to bringing sustainable natural hazard mitigation into existence shows more promise at this time than increased use of sound and equitable land-use management. By planning for and managing land use to accomplish sustainable mitigation for natural hazards, disasters – though not wholly eliminated – can be reduced to a scale which can be borne by the government, communities, individuals and businesses exposed to them (Mileti 1999). Several studies have documented successful examples of how individual communities have integrated vulnerability data and natural hazard mitigation policies into local planning (Berke, Kartez and Wenger 1993, Berke and Godschalk 2009). However, in general, such practice is still not widespread with few communities having integrated mitigation provisions into their local land-use plans and development ordinances (Berke and Smith 2009). This is a common problem internationally, and arises for a number of political and economic reasons (Mileti 1999).

A project was undertaken to explore this issue in an earthquake context to see if and how earthquake hazard information and mitigation provisions have been integrated into land use plans and policies. The Wellington Region, New Zealand (which is divided into eight separate cities and districts), was used as a case study (Figure 1). A comparison was made between a 2001 desk-based study (Becker and Johnston, 2001, 2002) that documented how earthquake hazards were addressed within local planning documents, and more recent 2011 planning documents, to see whether earthquake hazard and mitigation options had been better recognised since 2001.

Figure 1. The Wellington Region (Greater Wellington) and local city and district councils

This paper first outlines the 2001 desk-based study that reviewed the incorporation of earthquake hazards into the Wellington land use planning and policy environment. It then goes on to discuss the changes that have occurred from 2001 to 2011 in terms of guidance, land use planning and policy, earthquake hazard information and environmental influences (including recent earthquake events). Finally, the paper discusses influences on the evolution of Wellington earthquake planning and policy over time, and makes recommendations for further improving land use planning and policy for earthquakes.

2.0 Context

2.1 The earthquake hazard in the Wellington Region

The Wellington Region lies within the deforming boundary zone between the Pacific and Australian plates (Figure 2), within one of the most seismically active areas of the country. The region is cut by earthquake producing active faults – both on and offshore. It is underlain by the subduction interface between the Australian and Pacific plates, and has been violently shaken by earthquakes in 1848, 1855 and 1942 (Downes 1995, Pondard and Barnes 2010, Robinson, Van Dissen and Litchfield 2011, Stirling et al. 2012).

Wellington City is bisected by the active Wellington Fault, with many engineered lifelines (e.g. water, electricity, roads, telecommunications) crossing this fault. Surface fault rupture and a large earthquake (approximately magnitude 7.5) on the Wellington Fault is regarded as New Zealand's probable maximum earthquake

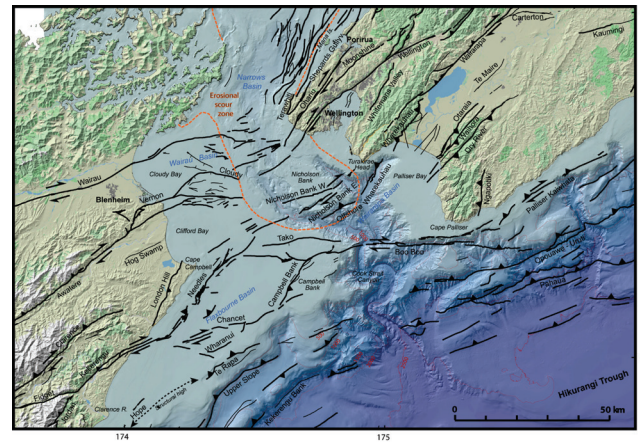

Figure 2. Location of the Wellington Region, showing major earthquake fault lines (NIWA image in Van Dissen et al., 2010).

loss event (Cousins et al. 2009), and the likelihood of such an event occurring within the next 100 years is approximately 10% (Rhoades et al. 2011). Parts of the region are vulnerable to different earthquake hazards (strong ground shaking, surface fault rupture, liquefaction, landslides and tsunami). Characterising these hazards, and attempting to mitigate their effects, has been the focus of government and private investigation and policy over many years, and continues to this day (Grant-Taylor et al. 1974, Greater Wellington Regional Council 1996, Wellington City Council 2009, Van Dissen et al. 2010).

2.2 Responsibility for dealing with Earthquake Hazards

Five key pieces of legislation contribute to natural hazard management in New Zealand: the Resource Management Act 1991 (RMA), Building Act 2004, Civil

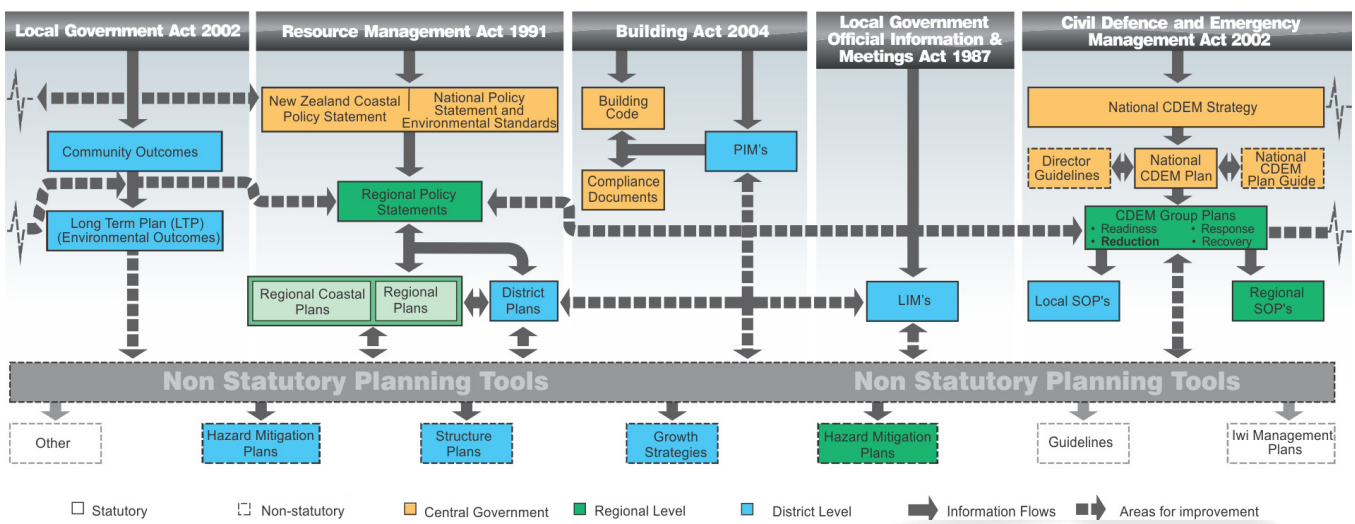

Figure 3. Legislative context for hazard management in New Zealand showing the hierarchy of planning provisions (Glavovic et al. 2010). Solid arrows show established relationships between provisions, while dashed arrows highlight relationships that ought to be improved. Relationships may be one- or two-way.

Defence Emergency Management Act 2002 (CDEM Act), Local Government Act 2002, and the Local Government Official Information and Meetings Act 1987.

Figure 3 presents the five main statutes that govern natural hazards planning at different levels of government, namely central (orange), regional (green) and district/city (blue) levels. The hierarchy of plans established under each law provide various statutory and non-statutory tools for natural hazards planning. These legislative provisions and the tools they provide constitute a robust 'toolkit' for natural hazards planning. However, many of these tools are not well known or used to their full potential to reduce hazard risk and build community resilience (Glavovic et al, 2010). Two key tools in the 'toolkit' that can be used to reduce risk from natural hazards include Regional Policy Statements and District Plans. Provision can be included in these documents (i.e. appropriate objectives, policies, and methods) to ensure that a prudent approach to land use planning is taken to mitigate earthquake effects. The following section outlines a 2001 analysis of the Wellington Regional Policy Statement and district plans which was undertaken to identify how these planning documents dealt with earthquake hazards at the time.

3.0 Policy and planning for earthquake hazards in Wellington

3.1 Analysis of regional policy statements and district plans in 2001

3.1.1 Outline of analysis.

The Wellington Regional Policy Statement and nine district plans were analysed in 2001 to identify if earthquake hazards had been acknowledged and incorporated into land use planning (Becker and Johnston 2001, 2002). A similar analysis was conducted in the Hawke's Bay, Bay of Plenty, and Waikato regions in 2000 (Becker and Johnston 2000, 2002). The Wellington project used a similar methodology to the 2000 study.

A content analysis of the Wellington planning documents was undertaken which involved (Becker and Johnston, 2000):-

a) "Deciding which aspects of earthquake hazards, and [natural] hazards in general, to identify as being present in plans and policy statements. These were then converted into categories for coding.

b) Reading each plan or policy statement and using a simple coding system to denote whether or not a category was present in a plan. For each category yes=y and no=n. In some cases the question was not applicable and "–" was entered as a data figure.

c) Statistical analysis."

Table 1 details the coding categories and the content analysis of regional policy statements and district plans in 2001.**3.1.2 Identification of earthquakes as a hazard.**

The Wellington planning documents had strong acknowledgement of earthquake hazards. All the planning documents indicated that earthquakes could affect the region or district, and all but one planning document identified the location of fault lines within the relevant area, and described the earthquake hazard and its potential effects. Three quarters of district plan maps identified natural hazards, including fault lines. Only the Masterton and Carterton district plans did not specifically mark seismic hazard areas, fault avoidance zones or fault lines on planning maps. The Masterton District Plan included maps showing fault lines, but these

Table 1. Results of the planning document analysis for Wellington Region in 2001

Categories identified in plans and policy statements	Summary		WRPS	M	C	WC	KC	SW	P	UH	LH
	Yes	No									
Structure of the Plan/Policy Statement											
- Has a specific section on natural hazards (in contrast to hazards being mentioned throughout the document)	8 (89%)	1 (11%)	Y	Y	Y	N	Y	Y	Y	Y	Y
Hazard and Earthquake Definitions Does the plan/policy statement:											
- Have the definition of a hazard?	5 (56%)	4 (44%)	Y	Y	Y	N	N	N	Y	N	Y
- List earthquakes as hazards?	6 (67%)	3 (33%)	Y	Y	Y	N	Y	N	N	Y	Y
- Mentions earthquakes as a hazard that could affect the district or region?	9 (100%)	0 (0%)	Y	Y	Y	Y	Y	Y	Y	Y	Y
- Locate the fault lines in the district or region (in the text or on a map)?	8 (89%)	1 (11%)	N	Y	Y	Y	Y	Y	Y	Y	Y
- Describe the earthquake hazard and its effects	8 (89%)	1 (11%)	Y	Y	Y	N	Y	Y	Y	Y	Y

Categories identified in plans and policy statements	Summary		WRPS	M	C	WC	KC	SW	P	UH	LH
	Yes	No									
Objectives Does the plan/policy statement have:											
- Objectives that are 'all hazard' based?	8 (89%)	1 (11%)	Y	Y	Y	Y	Y	Y	N	Y	Y
- Specific Objectives for earthquakes?	2 (22%)	7 (78%)	N	N	N	N	N	N	Y	N	Y
- Specific Objectives for other hazards?	2 (22%)	7 (78%)	N	N	N	N	N	N	Y	N	Y
Policies Does the plan/policy statement have:											
- Policies that are 'all hazard'?	7 (78%)	2 (22%)	Y	Y	Y	Y	Y	Y	N	Y	N
- A specific policy or policies on earthquakes?	3 (33%)	6 (67%)	N	N	N	N	Y	N	Y	N	Y
- Specific policies for hazards other than earthquakes?	4 (44%)	5 (56%)	N	N	N	Y	Y	N	Y	N	Y
Methods Does the plan/policy statement have:											
- Methods that are 'all hazard'?	7 (78%)	2 (22%)	Y	Y	Y	Y	Y	Y	N	Y	N
- Methods that mention earthquakes specifically?	5 (56%)	4 (44%)	Y	N	N	N	N	Y	Y	Y	Y
- Methods that mention specific hazards but not earthquakes?	7 (78%)	2 (22%)	Y	N	Y	N	Y	Y	Y	Y	Y
Rules											
- 'All hazard' rules?*	3 (38%)	5 (62%)	-	Y	Y	Y	N	N	N	N	N
- Rules for earthquakes/ fault lines?*	7 (87%)	1 (13%)	-	N	Y	Y	Y	Y	Y	Y	Y
- Specific hazard rules but not for earthquakes/fault lines?*	4 (50%)	4 (50%)	-	N	Y	N	Y	Y	N	Y	N
Assessment Criteria Does the plan/policy statement have:											
- General hazard assessment criteria? *	2 (25%)	6 (75%)	-	Y	N	N	N	Y	N	N	N
- Specific assessment criteria with regards to earthquakes? *	2 (25%)	6 (75%)	-	N	N	Y	N	N	N	Y	N
Performance Standards for Earthquakes											
- Are there any performance standards for earthquakes?	4 (44%)	5 (56%)	N	N	Y	N	N	Y	N	Y	Y
The Building Act 1991 Does the plan/policy statement refer to:											
- The Building Act 1991 regarding earthquakes?	4 (44%)	5 (56%)	N	N	Y	N	N	N	Y	Y	Y
- The Building Act 1991 regarding hazards in general?	9 (100%)	0 (0%)	Y	Y	Y	Y	Y	Y	Y	Y	Y
Practicalities of Planning for Earthquakes Does the plan/policy statement:											
- Note the limitations/practicalities of planning for earthquakes?	6 (67%)	3 (33%)	Y	N	Y	Y	N	N	Y	Y	Y
- Suggest that due to the nature of earthquakes, control is not possible through district plan/regional policy statement?	0 (0%)	9 (100%)	N	N	N	N	N	N	N	N	N
Earthquake Hazard Information Does the plan/policy statement:											
- Recognise there is a need for the council to update the local seismic hazard information, or acknowledge there is a lack of information available to the district or region?	5 (56%)	4 (44%)	Y	N	Y	N	Y	Y	N	Y	N
- Account for new hazard information come to light?	4 (44%)	5 (56%)	Y	Y	Y	Y	N	N	N	N	N
Environmental Outcomes Does the plan/policy statement have:											
- 'All hazards' based environmental outcomes/results?	8 (89%)	1 (11%)	Y	Y	Y	Y	Y	Y	N	Y	Y
- Hazard specific environmental outcomes/results?	1 (11%)	8 (89%)	N	N	N	N	N	N	Y	N	N
Hazards on District Planning Maps											
- Are local hazards included on land use planning maps? (as opposed to having a separate map with hazards on)*	6 (75%)	2 (25%)	-	N	N	Y	Y	Y	Y	Y	
Monitoring											
- Monitoring that is all 'all hazard'?	5 (56%)	4 (44%)	N	Y	Y	N	Y	N	N	Y	Y
- Monitoring specifically for earthquakes?	1 (11%)	8 (89%)	N	N	N	N	N	N	N	N	Y
- Monitoring of specific hazards but not earthquakes?	1 (11%)	8 (89%)	N	N	N	N	N	N	N	N	Y
- Monitoring only covered elsewhere in plan and does not mention natural hazards?	4 (44%)	5 (56%)	Y	N	N	Y	N	Y	Y	N	N

* Does not apply to Regional Policy Statements

(WRPS=Wellington Regional Policy Statement; M=Masterton District Plan; C= Carterton District Plan; WC=Wellington City District Plan; KC=Kapiti Coast District Plan; SW=South Wairarapa District Plan; PC=Porirua City District Plan; UH=Upper Hutt District Plan; LH=Lower Hutt District Plan)

were not integrated with the official planning maps. While not officially linked to its Regional Policy Statement, Wellington Regional Council had also published a series of earthquake hazard maps to show the range of earthquake hazards likely to affect different areas (Greater Wellington Regional Council, 1996 a, b, c, d).

Approximately half of Wellington Region policy statements and plans recognised the need to account for new natural hazard information when it came to light, and had updated their plans accordingly. Half of Wellington Region planning documents stated there was a lack of seismic hazard information, or that their information needed to be updated.

In general, the Wellington Region planning documents supported the fact that land use planning could be a useful tool for earthquake risk reduction. None stated that land use planning for earthquakes was impossible. However, 67% did suggest there were limitations on planning for earthquakes (for example, there was suggestion that it is impossible to plan to mitigate for all the effects of ground shaking).

3.1.3 Objectives, Policies and Methods.

When looking specifically at objectives and policies, the majority (~80%) of Wellington Region policy statements and plans tended to take an "all hazards" approach rather than an earthquake-specific one. Less than a third of Wellington Region planning documents had any earthquake-specific objectives or policies. Specific objectives and policies cited by district plans are included in Table 2.

Just over half of the planning documents from the Wellington Region mentioned earthquakes when discussing methods to mitigate for natural hazards. Eighty seven percent of district plans had rules specifically targeting the mitigation of earthquake hazards. Table 3 presents examples of earthquake-specific rules found in district plans. A quarter of Wellington planning documents had assessment criteria for natural hazards in general and earthquakes in particular, while 44% had performance standards for earthquake hazards.

3.1.4 Monitoring of effectiveness of policy statements and plans.

In the Wellington Region, monitoring planning provisions for natural hazards was referred to in just over half (56%) of policy statements and plans. When looking at earthquake-specific monitoring, only one planning document referred specifically to monitoring for planning provisions related to earthquake hazards. The other planning documents (44%) covered monitoring in a

Table 2. Earthquake-specific policies and objectives found in Wellington-based district plans as of 2001.

District Plan	Objectives	Policies
Lower Hutt	*" To avoid or reduce the risk to people and their property from natural hazards associated with seismic action, landslides, flooding and coastal hazards"*	a) *"That the area at risk from fault rupture causing permanent ground deformation along the Wellington Fault Line be managed by the Wellington Fault Special Study Area to address the effects of subdivision and development on the safety of people and their property.* b) *That suitable engineering and emergency management measures be adopted to safeguard people and their property from liquefaction, groundshaking and tsunami hazards..."*
Porirua City	*"To minimise the risk from earthquakes to the wellbeing and safety of the community".*	Policy C12.1.1 *"To minimise the effect of earthquake ground shaking and amplified effects on soft ground through controls on the location and materials of pipelines and services".* Policy C12.1.2 *"To minimise the effects of ground damage from Ohariu fault movement in rock or very stiff soil types".* Policy C12.1.3 *"To minimise the effects of ground damage from Ohariu fault movement in intermediate and flexible, or deep soil"* Policy C12.1.4 *"To manage the effects of ground damage from earthquake induced liquefaction of soils."* Policy C12.1.5 *"To minimise the effects of ground damage created by slope failures, earthquake induced slope instability and landslides".*
Kapiti Coast	No earthquake-specific objectives	Policy 6 *"Promote a viable alternative access to the north of the district in the event of an earthquake"*

Table 3. Examples of Earthquake Specific rules found in Wellington-based district plans available as of 2001.

District Plan	Earthquake-specific rules
Lower Hutt	*"14H 2.1 Restricted Discretionary Activities* *a) All structures and buildings on any site where the whole site or a portion of the site falls within the Wellington Fault Special Study Area, excluding the following:* *i) Proposed accessory buildings which are not required for habitable or working purposes; or* *ii) Utilities;* *which are Permitted Activities".* *"14H 2.1.1.1 Matters in which Council has Restricted its Discretion* *a) Safe separation distance of Structures and buildings from the Wellington Fault line:* *14H 2.1.1.2 Standards and terms* *a) Safe separation distance of Structures and buildings from the Wellington Fault line:* *For all structures and buildings, an engineering report will be required to confirm that the Wellington Fault Line is not within 20.0m of any proposed structure or building, or that the necessary engineering precautions have been taken".*
Porirua City	Rural Zone rules and standards *"New dwellings shall not be built within a fault avoidance zone 40m either side of the fault traces shown on the Judgeford Hills Structure Plan unless further investigation, which may include trenching, has established the exact location of the relevant fault, in which case the separation distance may be reduced to 20m".* Under Policy C12.1.2 it states: *"Essential activities (as defined in Part M) are a limited discretionary activity in seismic hazard areas. For other activities, any seismic hazard will be a factor in the consideration of a resource consent application".* In applying discretion council says it will consider the location of the site, appropriateness of the proposed activity on the site, and the potential of seismic hazard to disrupt that activity. Further information may be required as part of a resource consent process to clarify the extent of the risk and the consequences of the hazard.
Kapiti Coast	Under residential and rural zone rules and standards: *"The following are controlled activities, provided they comply with the controlled activity standards:…* *…Any building which is within 20 metres of an earthquake fault trace as shown on the Planning Maps. The matters over which the Council reserves control are:* • *The imposition of conditions to ensure appropriate engineering design to avoid, remedy or mitigate any adverse effects resulting from ground rupture".*
Wellington City	*Rule 5.1.3.7* *"In any Hazard (Fault Line) Area, residential buildings shall have a maximum height of 8m and shall be specifically designed to the requirements of New Zealand Standard 4203:1992 'Code of Practice for General Structural Design and Design Loadings for Buildings."* *Rule 5.3.6 (Discretionary (Restricted) Activity)* *Residential buildings within a Hazard (Fault Line) Area are Discretionary Activities (Restricted) if they do not comply with the conditions for Permitted Activities in respect of:* *5.3.6.1 building height* *5.3.6.2 construction type.*
Carterton	*"10.6.2 Conditions for Permitted Activities:* *Setback Requirements:* *(a) Any essential facility shall be setback at least 20 metres from any faultline identified in Appendix 10A and on the Planning Maps."* *"10.6.3 Discretionary Activities* *(c) Any use or storage of hazardous substances within any mapped flood plain area or within 20 metres of any fault line identified in Appendix 10A and plan maps"* *(d) Any essential facility within any floodplain area or within 20 metres of any mapped fault line".*
South Wairarapa	*Rules in the South Wairarapa District Plan were more concerned with building standards in seismic areas, rather than limiting development on or around faults.*
Upper Hutt	*"Any new habitable building or structure to be erected within the fault band identified on the Planning Maps" is considered a discretionary activity. Matters of discretion within the fault band include:* • *The accuracy of information relating to the location of the fault.* • *The potential effects of an earthquake in terms of the nature and scale of use proposed for the building.* • *The extent to which the building complies with Clause B1 Structure of the New Zealand Building Code".*

separate section and did not relate it directly to natural hazards or earthquakes.

3.1.5 Reference to the Building Act.

All Wellington planning documents made some reference to linkages with The Building Act 1991 (which ensures that buildings are built to adequate earthquake standards), with 44% making direct links between earthquakes and The Act.

3.1.6 Comparison with other regions.

The policy and plan analysis for the Wellington Region revealed that Wellington land use planners appeared to be more advanced in terms of planning for earthquake hazards than those in the northerly regions studied in 2000 (Becker and Johnston 2000, 2002). In particular, earthquake hazards and the impacts of a potential earthquake were more widely acknowledged and there was greater location of earthquake hazards on planning maps.

3.2 Evolution of the planning environment since 2001

3.2.1 Development of Guidance for Active Faults

After the 2000 study of northerly regions and evidence from a new development on Kapiti Coast showing that limited attention was afforded to earthquake fault rupture hazards, the Parliamentary Commissioner for the Environment (PCE) directed that guidance was needed (Parliamentary Commissioner for the Environment, 2001). As a consequence MfE commissioned the development of a new guideline, entitled *Planning for the Development of Land on or Close to Active Faults,* referred to from here on as the Active Fault Guidelines (Kerr et al., 2003).

The Active Fault Guidelines provide a risk-based approach for dealing with the fault rupture hazard specifically. They recommend that information about the nature of a fault rupture hazard (e.g. location, recurrence interval) and development type (e.g. use and construction type) be collected before decisions are made about if, and how, a risk will be treated. The key principles of the guidelines as stated in the Active Fault Guidelines are to:

- "Gather accurate active fault hazard information;
- Plan to avoid fault rupture before development and subdivision;
- Consider, and as appropriate, account for fault rupture hazard in areas already developed or subdivided
- Communicate risk in built up areas subject to fault rupture".

Examples of resource consent categories are also included, to give planners guidance as to how to deal with a particular type of fault in a District Plan. It is suggested that planning permissions for activities be more permissive if the risk is low and become more restrictive as the risk rises.

3.2.2 Changes to land-use planning policy practice in the Wellington Region since the 2001 desk-top study: A 2011 review

3.2.2.1 Wellington City Council (WCC).

In 2001, WCC commissioned a study on the impact of a Wellington Fault earthquake on properties (Perrin and Wood 2002). The study discovered that the district plan maps did not accurately reflect the fault's location, and further studies were reviewed that revealed updated information held about the fault. In light of the new information, and because current provisions were not achieving their intention (i.e. multiple units had been built in the active fault zone), Wellington City Council decided on a district plan change (Plan Change 22). The plan change was publicly notified on 6 September 2003. In April 2004 the Council approved the recommendations of the District Plan Hearing Committee.

Key changes to the plan included (Wellington City Council 2004):-

- Clarification of the explanation to policies for earthquake hazard;
- Changes to wording, highlighting the importance of building to the Building Code and focussing on the need for lighter building materials;
- Reduction of the number of permitted residential units per site to one;
- New assessment criteria for discretionary activities, including the requirement to provide geotechnical and engineering reports;
- A new rule for assessing multi-unit developments;
- A new rule for the Suburban Centre Zone, because the hazard area did not previously pass through this zone;
- Changes to other hazard rules to maintain consistency across the Plan; and
- Updated planning maps.

3.2.2.2 Kapiti Coast District Council (KCDC).

In November 2000, KCDC notified a proposed plan change focussed on planning for active faults. However, this plan change was withdrawn after submissions suggested more information was needed to locate fault traces. In 2003, a GNS Science report for KCDC identified the fault traces (some in more detail than others depending on the accessibility of the fault) and provided planning recommendations based on the Active Fault Guidelines (Van Dissen and Heron 2003). Figure 4 shows one of the maps created to identify the location and definition of the Ohariu Fault on the Kapiti Coast.

Following the study, community consultation took place, followed by the drafting of new content for the district plan (Saunders, Becker, and Glassey 2009). In 2007, proposed changes (Plan Change 61) to the district plan included (Kapiti Coast District Council 2007):

- Updating the District Plan maps with the location of fault traces;

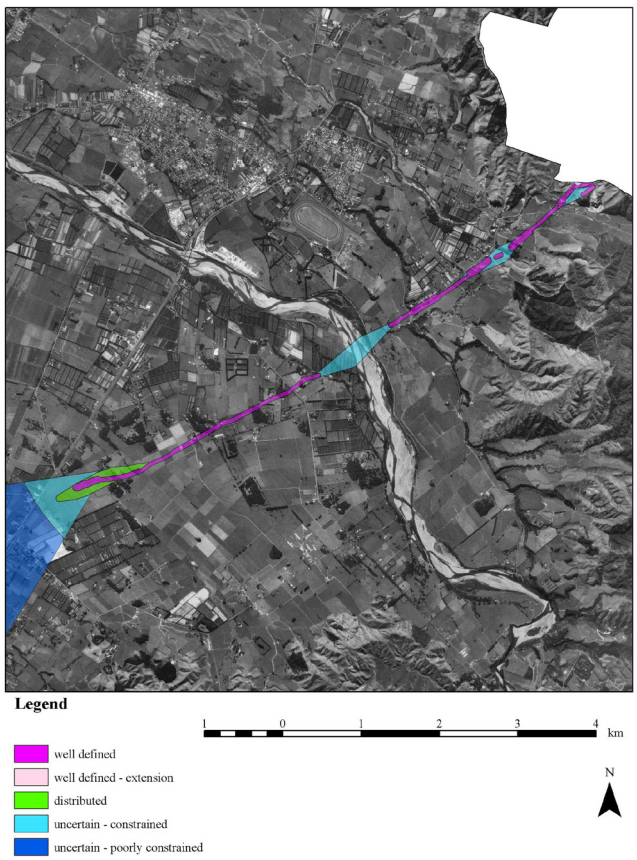

Figure 4. The Northern Ohariu Fault showing Fault Avoidance Zones (Van Dissen and Heron, 2003).

- Adding an objective and policies which reflect Council's goal and approach to development on or near fault traces;
- Promoting a risk-based planning approach to determining the status of a development based upon the Building Importance Category and the Recurrence Interval of the faultline.
  - Altering rules and standards in relation to subdivision by encouraging all new allotments created by subdivision to have building sites clear of the identified fault trace; and;
  - Setting out the matters that will be considered by Council in assessing an application if a building site cannot be clear of the fault trace, e.g. the provision of geotechnical information.
- Altering rules and standards in relation to new buildings by:
  - Allowing non-habitable buildings e.g. sheds and garages to be located over the fault trace; but
  - Encouraging all other buildings to be located away from the fault trace. Where this is not possible, it sets out the criteria Council will consider in assessing such an application.

The plan change became operative on 14 October 2010 (Kapiti Coast District Council 2011). While this plan change took several years, there was evidence of developers using the proposed rules and the Active Fault Guidelines in the Kapiti Coast district to guide new development before the rules became operative. Symmans and Leith (2006) reported that, as part of their assessment for a new residential hillside subdivision, they had located the fault trace and assessed appropriate setbacks for development. Subdivision building lots were created to ensure building platforms were outside the potential fault ground rupture and deformation areas.

3.2.2.3 Wairarapa councils (Masterton, Carterton and South Wairarapa districts).

In 2003 and 2004 the Masterton, Carterton and South Wairarapa District Councils prepared a combined District Plan where a variety of natural hazards, including fault lines, were identified in the region. The specific matters relating to active faults which were identified within the District Plan are (Wairarapa Combined District Plan 2011):

- Updating the District Plan maps with the location of fault traces;
- Adding an objective and policies which reflect Councils' goals and approach to development on or near fault traces;
- Creating rules and standards in relation to subdivision by encouraging all new allotments created by subdivision to take into account natural hazard avoidance or mitigation;
- Creating rules and standards in relation to new buildings by:
  - Allowing non-habitable buildings e.g. sheds and garages to be located within the Faultline Hazard Area; but
  - Encouraging all developments involving habitual buildings to be located away from the identified Faultline Hazard Areas. Where this is not possible, the development is a discretionary activity and all relevant effects associated with the construction of a habitual building within the Faultline Hazard Area can be considered.

3.2.2.4 Other changes in the Wellington Region.
Since 2001, in addition to the changes made to the district plans, other changes have occurred in planning and policy including:

- A second generation of plans and policy statements have begun to be developed, e.g. Wellington Regional Council has drafted up a proposed Regional Policy Statement for the region;
- Structure planning has taken place, guiding where and how Wellington will grow in the future (Quality Planning 2011);
- The Wellington Civil Defence Emergency Management (CDEM) Plan has been developed and implemented; and
- Attempts have been made to ensure public earthquake-prone buildings are upgraded to meet requirements under the Building Act 2004.

Research has also led to a better scientific understanding of earthquake hazards in the region, and much of the research has been through the "It's Our Fault" programme. A better understanding of Wellington's earthquake risk can help inform future planning and policy. The latest results for this study have indicated that the risk of a large (Magnitude 7.5) Wellington Fault earthquake has decreased from a 30% risk of rupture in the next 100 years (D. A. Rhoades, Stirling, Schweig, & Van Dissen, 2004) to approximately 10% (Rhoades et al., 2011; Rhoades, Van Dissen, Langridge, Little, Ninis, Smith, & Robinson, 2010).

3.2.2.5 A change of focus – risk-based planning.
Since the release of the Active Fault Guidelines, there has been a change in focus to land use planning for active faults, with research identifying a risk-based planning approach. This approach has been described in the Active Fault Guidelines and takes into account the Building Importance Category, Fault Complexity, and Recurrence Interval (Kerr et al. 2003). This approach has been refined further within Saunders (2011), and Saunders, Prasetya and Leonard (2011). A risk-based planning approach allows for the consideration of the consequences from the fault rupture, and the likelihood of this event occurring, when determining whether a proposal should proceed. This allows for more robust planning decisions when determining what activities councils will allow within their fault hazard zones.

3.2.2.6 Recognition of a variety of hazards associated with earthquakes.
The Darfield (4 September 2010) and Christchurch (22 February 2011) earthquakes have demonstrated the impact earthquakes can have on the urban environment. Both earthquakes caused severe damage to unreinforced masonry buildings, and in the 22 February earthquake, two multi-storey buildings collapsed. Severe liquefaction and lateral spread in both earthquakes damaged many residential and commercial buildings, and many residential areas within liquefaction zones now have to be abandoned. Landslides on the Port Hills also caused damage to houses and properties.

The Canterbury earthquakes have demonstrated that:

- Earthquakes pose a range of hazards including ground shaking, landslides, liquefaction, lateral spread, fault rupture and tsunami. All of these hazards should be considered when reducing earthquake risk.
- Land use planning has a role in reducing risk from earthquakes.
- Policy guidance and rules need to help reduce the effects from the other earthquake hazards aside from fault rupture.

The Canterbury earthquakes have spawned the evolution of new recommendations and guidance. In particular, a review of the RMA by the Government appointed RMA Principles Technical Advisory Group (TAG) resulted in recommendations for improving natural hazard provisions (TAG, 2012), which included prioritising risk as a matter of national importance. Currently, 'risk' is not included in the RMA, so the recommended changes to the natural hazard provisions of the RMA to include risk is considered to be a positive response to improving the management of land use in areas susceptible to natural hazards (Saunders & Beban, 2012b). As well as possible legislative changes, non-regulatory guidance on land use planning for liquefaction has been developed (Saunders & Berryman, 2012). The Canterbury earthquakes have also sparked intensified debates about the performance of earthquake prone buildings and the actions that need to be taken to ensure buildings are up to the required performance standards for earthquakes.

4.0 Recent planning studies relevant to the Wellington Region

4.1 Active Fault Guideline Follow-up Study

In 2005, a follow-up study to the Active Fault Guidelines assessed if, and how, local authorities used the guidelines, and whether they had found them useful (Becker, Saunders and Van Dissen 2005). Planners from local authorities across New Zealand (88 regional and territorial authorities) were surveyed, followed by detailed interviews with eleven individual planners. The survey revealed there was reasonable awareness of the Active Fault Guidelines (60% awareness). However, actual use of the Active Fault Guidelines was less, with only a third of respondents reporting that they used it on a day-to-day basis. Even fewer respondents stated that long-term changes had been made to processes, such as amending district plans or regional policy statements (Becker et al. 2005, 2006).

Most respondents felt that the Active Fault Guidelines were easy to understand and apply but had some difficulty knowing how to apply the resource consent tables to their local fault situations and planning environments. Local authorities that made the best use of the Guidelines worked closely with physical scientists or geotechnical specialists to define fault rupture hazard and devise planning methods that fitted the local situation (making use of the consent tables). The follow-up study found that, to achieve good planning outcomes with respect to fault rupture, it is essential that strong partnerships are formed between scientists/specialists and planners, so as to accurately identify the risk posed by fault rupture and to formulate a local solution (Becker et al. 2005, 2006).

4.2 Pre-event Recovery Planning

Pre-event recovery planning is the consideration of recovery, and implementation of solutions, before a disaster occurs. By working through solutions before an event occurs, recovery can be greatly improved, resulting in better coordination, efficiency and appropriately targeted reinstatement of affected areas (Becker et al. 2008). The publication "Wellington after the Quake" (EQC 1995) highlights some of the planning issues that may need to be addressed before and after a big earthquake. McKay (2005) says five key tasks are part of pre-event recovery planning for Wellington, including:

- Business continuity planning within council and other organisations;
- Ensuring the CDEM Group Plan recognises urban development as an integral part of the post disaster recovery process;
- Defining operational roles and responsibilities of planners in the recovery;
- Consideration of how information on the disaster relevant to city planning is to be gathered; and
- Consideration of how the statutory system (e.g. RMA) will work in a major disaster.

Despite recognising the need for pre-event recovery planning, the topic has been given limited attention in Wellington. In 2008, Becker, et al., published a methodology on pre-event planning for land use which outlines key things that regional and district councils can put into their policies and plans to address the impacts of disasters and to aid effective recovery. A workshop was run involving central government, emergency management staff and resource management planners from the Wellington Region to analyse the methodology, provide feedback, and discuss opportunities for incorporating the methodology into future planning. Feedback from the workshop helped improve the methodology in general but did not feed directly into subsequent land use planning efforts.

5.0 Discussion

5.1 Evolution of land use policy and planning for earthquakes in the Wellington Region, 2001-2011

An analysis of Wellington plans and policy statements revealed that the Wellington Region was reasonably advanced in 2001 with respect to planning for earthquakes, in comparison with other regions (Becker and Johnston, 2000, 2002). Earthquake hazards and the impacts of earthquakes were widely acknowledged in planning documents, there was some attempt to address earthquake hazards through objectives, policies and methods, and earthquake hazards such as fault lines were located on planning maps. However, gaps still existed in terms of the existence of adequate and accurate information about earthquake hazards, and how this knowledge was dealt with in terms of planning practice (e.g. the accurate location of fault lines and how district plans dealt with the placement of buildings on or near these fault lines).

Since 2001, a number of drivers have caused a change in planning practice in the Wellington Region (Figure 5). External pressure exerted by the public and key organisations, coupled with research evidence on the lack of earthquake planning (Becker and Johnston, 2000, 2002) forced a re-think on how earthquake hazards were planned for at a land use level. Recommendations by the PCE to develop fault planning guidance (Parliamentary Commissioner for the Environment, 2001), led to the development of the Active Fault Guidelines (Kerr et al., 2003). The external pressure and new guidance motivated a number of councils to improve their planning for earthquakes. Over the following 10 years, councils made a significant number of improvements to their plans including: commissioning expert investigations to clarify earthquake hazards (especially with regard to fault traces) and adding these to planning maps; creating clearer objectives and policies; developing improved rules and standards related to setback, subdivision and types of buildings allowed in fault zones; and requiring geotechnical reports in earthquake hazard areas. Improvements to policy and planning have been slow (often requiring 'second generation' planning for District Plans to begin before changes have taken place), reflecting the fact that improvements take a long time to work though the planning process and that patience is required when seeking change.

Other influences have also had an impact on the planning process, the Canterbury earthquakes being a primary example of this. The Canterbury earthquakes have demonstrated the range of hazards associated with earthquakes (such as ground shaking, fault rupture, landslides, liquefaction, lateral spread and tsunami) that need to be planned for. This has led to a wider dialogue about how land use planning can contribute to reducing earthquake risk. From this dialogue has come the development of new guidance (i.e. liquefaction guidance (Saunders & Berryman, 2012)) and recommendations on how to improve the RMA by elevating natural hazard risk to a "matter of national importance" (TAG,

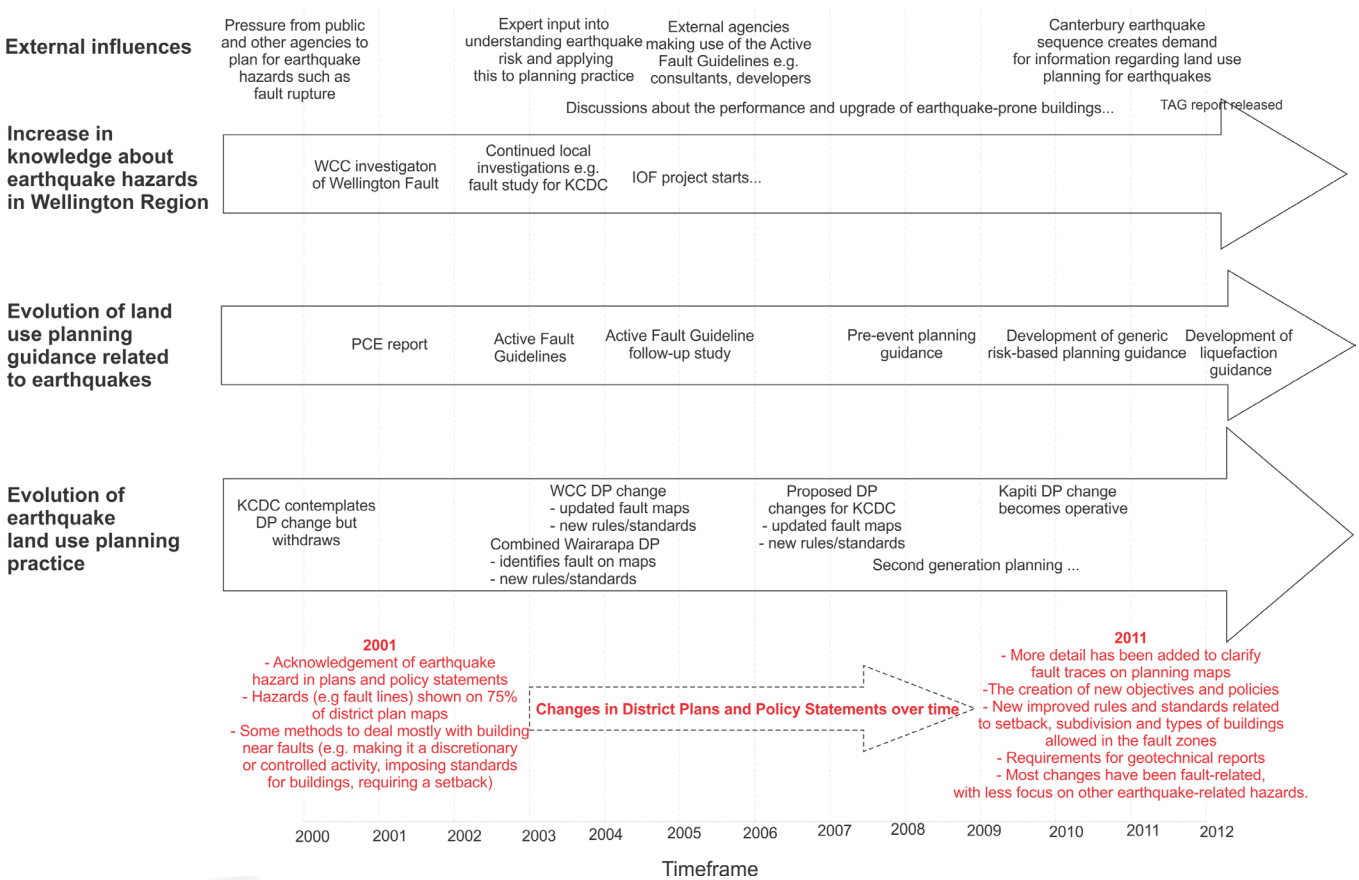

Figure 5. Changes in earthquake policy and planning in the Wellington Region, 2001-2011, and key drivers influencing that change. Abbreviations: WCC=Wellington City Council; KCDC=Kapiti Coast District Council; IOF=It's Our Fault; TAG=Technical Advisory Group; PCE=Parliamentary Commissioner for the Environment; DP=District Plan. Relevant studies mentioned: (Perrin and Wood, 2002; TAG 2012; Van Dissen and Heron, 2003). Relevant guidance mentioned: (Becker et al., 2005, 2008; PCE, 2001; Kerr et al., 2003; Saunders and Beban, 2011; Saunders and Berryman, 2012).

2012). The Canterbury earthquakes have also had an influence on building legislation and policy. While discussions in Wellington about the performance and upgrade of earthquake prone buildings have been going on for some time, the Canterbury earthquakes have heightened this debate and hastened action on building improvements.

Research has also contributed to improving policy. For example, research has helped us better understand the nature of earthquake hazards and how they can be applied in policy and practice; and research has enabled the development of new risk based planning guidance which can be used as a methodology to address earthquake-related and other natural hazards (Saunders & Beban, 2011, 2012a).

The range of influences on the evolution of earthquake policy and planning over the last 10 years illustrates that undertaking effective land use planning for earthquakes is not as simple as making a decision about what to do and then implementing that decision. Many factors have to be present for effective planning to take place including, external pressure for change (e.g. from organisations or the public), provision of appropriate advice (e.g. from earthquake research or the development of guidance), and expert input into the process (e.g. experts who understand the earthquake hazard, experts in devising planning solutions). Events such as the Canterbury earthquake sequence can drive pressure and willingness for change, but a key challenge is garnering such support in times of earthquake quiescence. Establishing conversations in the wider community about earthquake risk and how to deal with that risk is a good starting point for devising improvements to land use planning for earthquakes. These two improvements are outlined in further detail below.

5.2 Future improvements to policy and planning for earthquakes

While an evolution of earthquake land use planning has occurred over time in the Wellington Region, and improvements have been made, further progress is required to ensure that the region becomes more resilient. Work is required to improve both the overarching structures that support land use planning (i.e. central government legislation and policy) and the planning practice that occurs at local government level (i.e. regional and district planning practice).

5.2.1 Improvements to central government legislation and policy

As identified in Figure 2, there are five key pieces of legislation which contribute to the management of natural hazards in New Zealand. This legislation provides New Zealand with a solid policy, legal, and institutional foundation to manage natural hazards (Glavovic, Saunders and Becker 2010). However, as demonstrated within Figure 2, there is the ability to improve the relationships between the various pieces of legislation to integrate these better and ensure effective natural hazard risk reduction is achieved. Currently, effective risk reduction is hampered by gaps, overlaps, redundant provisions, contradictions and perverse incentives. Once identified, these issues need to be addressed, and where appropriate, policies and laws need to be better aligned to facilitate a more holistic and cooperative government approach (Glavovic et al 2010). Recommended changes to natural hazard provisions of the RMA will, in some part, address these issues. Risk, recommended to be included the RMA as a matter of national importance, will allow a consistent risk management approach to be taken across the legislation, particularly risk reduction which is required under the CDEM Act (Saunders & Beban, 2012b).

5.2.2 Improvements to regional and district policy and planning

The analysis of planning documents for the Wellington Region in 2001 and subsequent changes through to 2011 showed many improvements in planning for earthquakes over time. However, gaps still remain in planning practice. In particular, many of the objectives, policies and methods used in the Wellington Regional Policy Statement and district plans have tended to be focussed predominantly on the fault rupture hazard, with little attention paid to other earthquake-related hazards such as ground shaking, liquefaction, landslides, and lateral spread. Councils need to begin considering how these additional hazards can be factored into their land use planning within a risk-based approach. Given that the planning process can be drawn out, such actions need to begin now to ensure that provisions are included in plans for the future. A partnership approach between experts who understand the nature of these hazards (e.g. scientists, engineers, civil defence personnel) and planning staff is essential to ensure an accurate understanding of the effects of these hazards, and in developing ways of injecting this knowledge into practical land use planning.

While integration of central government legislation and policy is important for effective functioning to reduce natural hazard risk, it is also important that integration occurs at a local government level. In particular, land use planning documents should be consistent and integrated with other council documents that deal with natural hazards. For example, provisions for dealing with earthquakes should be consistent between documents such as the Regional Policy Statement, District Plan, Annual Plan, Civil Defence Emergency Management Plan and local Structure Plan. Consistency can best be achieved by ensuring that regular conversations happen between different departments as relevant plans are being developed. If integration is achieved, there is an opportunity for effective risk reduction to be realised.

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7.0 References

Becker, J. S., & Johnston, D. M. (2001). *District plan and Regional Policy Statement analysis of earthquake hazards in the Wellington Region, unpublished data*.

Becker, J. S., & Johnston, D. M. (2000). *Planning and policy for earthquake hazards in New Zealand* (GNS Science Report 2000/28). Lower Hutt: Institute of Geological & Nuclear Sciences.

Becker, J. S., & Johnston, D. M. (2002). Planning for earthquake hazards in New Zealand : a study of four regions. *Australian journal of emergency management, Autumn 2002*, 2-8.

Becker, J. S., Saunders, W. S. A., Hopkins, L., Wright, K. C., & Kerr, J. E. (2008). *Pre-event recovery planning for land-use in New Zealand : an updated methodology* (GNS Science Report 2008/11). Lower Hutt: GNS Science.

Becker, J. S., Saunders, W. S. A., & Kerr, J. E. (2006). *Two years on from the release of the Active Faults Guidelines : are policy and plan makers around New Zealand making use of these guidelines, and if so, how?* Paper presented at the Earthquakes and urban development : New Zealand Geotechnical Society 2006 Symposium, Nelson, February 2006. Proceedings of technical groups / Institution of Professional Engineers New Zealand. 31(1).

Becker, J. S., Saunders, W. S. A., & Van Dissen, R. J. (2005). *Planning for the development of land on or close to active faults : a study of the adoption and use of the Active Fault Guidelines* (GNS Science Report 2005/16). Lower Hutt: Institute of Geological & Nuclear Sciences Limited.

Berke, P., & Smith, G. (2009). Hazard Mitigation, Planning and Disaster Resiliency: Challenges and Strategic Choices for the 21st Century. In S. University of Santiago de Compostela (Ed.), *U.f Paleo (Ed), Building Safer Communities. Risk Governance, Spatial Planning and Responses to Natural Hazards* (pp. 1-20). Spain: IOS Press.

Berke, P. R., Kartez, J., & Wenger, D. (1993). Recovery after disasters: Achieving sustainable development, mitigation and equity. *Disasters, 17*(2), 93-109.

Berke. P., &. Godschalk, G. (2009). Searching for the good plan: A meta-analysis of plan quality studies. *Journal of Planning Literature, 23*(3), 227-240.

Cousins, W. J., Power, W. L., Destegul, U., King, A. B., Trevethick, R., Blong, R., et al. (2009). *Earthquake and tsunami losses from major earthquakes affecting the Wellington region*. Paper presented at the Why do we still tolerate buildings that are unsafe in earthquakes : New Zealand Society for Earthquake Engineering 2009 Conference, 3-5 April, Christchurch, New Zealand.

Downes, G. L. (1995). *Atlas of isoseismal maps of New Zealand earthquakes* (Vol. 11). Lower Hutt: Institute of Geological & Nuclear Sciences.

Earthquake Commission. (1995). *Wellington after the 'quake : the challenge of rebuilding cities.* Wellington: Centre for Advanced Engineering.

Glavovic, B. C., Saunders, W. S. A., & Becker, J. S. (2010). Land-use planning for natural hazards in New Zealand : the setting, barriers, 'burning issues' and priority actions. *Natural hazards, 54(3)*, 679-706; doi:610.1007/s11069-11009-19494-11069.

Grant-Taylor, T. L., Adams, R. D., Hatherton, T., Milne, J. D. G., Northey, R. D., & Stephenson, W. R. (1974). *Microzoning for earthquake effects in Wellington* (DSIR Bulletin 213). Wellington: DSIR.

Greater Wellington Regional Council. (Cartographer). (1996). *Sheet 1 Wellington Combined Earthquake Hazard Map 1:30000, Pub . No. WRC/RP-T-96/13*

Greater Wellington Regional Council. (Cartographer). (1996). *Sheet 2 Porirua Combined Earthquake Hazard Map 1:30000, Pub. No. WRC/RP-T-96/15*.

Greater Wellington Regional Council. (Cartographer). (1996). *Sheet 3 Hutt Valley Combined Earthquake Hazard Map 1:30000, Pub. No. WRC/RP-T-96/14*

Greater Wellington Regional Council. (Cartographer). (1996). *Sheet 4 Kapiti Combined Earthquake Hazard Map 1:30000, Pub. No. WRC/RP-T-96/16*.

Kapiti District Council. (2007). *Meeting notes of the KCDC Environment and Regulatory Committee, 30 August 2007*.

Kapiti District Council. (2011). *District Plan Changes. Kapiti Coast District Council.* . Retrieved from http://www.kapiticoast.govt.nz/Planning/District-Planning/District-Plan-Changes/.

Kerr, J., Nathan, S., Van Dissen, R. J., Webb, P., Brunsdon, D., & King, A. B. (2003). *Planning for development of land, on or close to active faults : An interim guideline to assist resource management planners in New Zealand* (GNS Client Report 2002/124).

McKay, B. (2005). Plan tectonics! City planning and the role of planners after the great Wellington earthquake. *Planning Quarterly, June*, 6-9.

Mileti, D. (1999). *Disasters by Design: A Reassessment of Natural Hazards in the United States*. Washington, D.D.: Joseph Henry Press.

Parliamentary Commissioner for the Environment. (2001). *Building on the edge: the use and development of land on or close to fault lines.*

Perrin, N. D., & Wood, P. R. (2002). *Defining the Wellington Fault within the urban area of Wellington City* (GNS Client Report 2002/151).

Pondard, N., & Barnes, P. M. (2010). Structure and paleoearthquake records of active submarine faults, Cook Strait, New Zealand: implications for fault interactions, stress loading, and seismic hazard. *Journal of Geophysical Research. Solid Earth, 115*, B12320, doi:12310.11029/12010JB007781.

Quality Planning. (2011). Structure Plans. from http://www.qp.org.nz/plan-topics/structure-planning.php.

Rhoades, D. A., Stirling, M. W., Schweig, E. S., & Van Dissen, R. J. (2004). *Time - varying earthquake hazard in the Wellington Region* (GNS Client Report 2004/141).

Rhoades, D. A., Van Dissen, R. J., Langridge, R. M., Little, T. A., Ninis, D., Smith, E. G. C., et al. (2010). *It's our fault : re-evaluation of Wellington Fault conditional probability of rupture*. Paper presented at the Earthquake prone buildings : how ready are we? : 2010 NZSEE conference. Retrieved from http://db.nzsee.org.nz/2010/Paper23.pdf

Rhoades, D. A., Van Dissen, R. J., Langridge, R. M., Little, T. A., Ninis, D., Smith, E. G. C., et al. (2011). Re-evaluation of conditional probability of rupture of the Wellington-Hutt Valley segment of the Wellington Fault. *Bulletin of the New Zealand Society for Earthquake Engineering, 44(2)*, 77-86.

Robinson, R., Van Dissen, R. J., & Litchfield, N. J. (2011). Using synthetic seismicity to evaluate seismic hazard in the Wellington region, New Zealand. [AS]. *Geophysical Journal International, 187(1)*, 510-528; doi: 510.1111/j.1365-1246X.2011.05161.x.

Saunders, W. S. A. (2011). *Innovative land-use planning for natural hazard risk reduction in New Zealand. .* PhD Thesis, Massey University, Palmerston North.

Saunders, W. S. A., & Beban, J. G. (2011). Risk-based approach to natural hazards. *Planning quarterly, 183*, 18-21.

Saunders, W. S. A., & Beban, J. G. (2012). *Putting R(isk) in the RMA : Technical Advisory Group recommendations on the Resource Management Act 1991 and implications for natural hazards planning* (GNS Misc. Ser. 48). Lower Hutt: GNS Science.

Saunders, W. S. A., Becker, J. S., & Glassey, P. J. (2009). *Active fault and landslide guidelines for planners*. Paper presented at the The 21st EAROPH World Congress and Mayors' Caucus at Himeji & Awaji, Hyogo : refereed paper.

Saunders, W. S. A., & Berryman, K. R. (2012). *Just add water : when should liquefaction be considered in land use planning?* (GNS Misc. Ser. 47). Lower Hutt: GNS Science.

Saunders, W. S. A., Prasetya, G., & Leonard, G. S. (2011). *New Zealand's next top model : integrating tsunami inundation modelling into land use planning* (GNS Misc. Ser. 34). Lower Hutt: GNS Science.

Saunders, W. S. A. &. Beban, J. G. (2012). *A framework for risk-based land use planning for natural hazards*. Paper presented at the 6th Australasian Natural Hazards Management Conference.

Stirling, M. W., McVerry, G. H., Gerstenberger, M. C., Litchfield, N. J., Van Dissen, R. J., Berryman, K. R., et al. (2012). National seismic hazard model for New Zealand : 2010 update. *Bulletin of the Seismological Society of America, 102(4)*, 1514-1542; doi: 1510.1785/0120110170.

Symmans, B. S., & Leith, K. J. (2006). *Residential subdivision over active fault & landslide terrain*. Paper presented at the Earthquakes and urban development : New Zealand Geotechnical Society 2006 Symposium, Nelson, February 2006. Proceedings of technical groups / Institution of Professional Engineers New Zealand. 31, 99-112.

Technical Advisory Group. (2012). *Report of the Minister for the Environment's Resource Management Act 1991.*

Van Dissen, R. J., Barnes, P., Beavan, R. J., Cousins, W. J., Dellow, G. D., Holden, C., et al. (2010). *It's our fault : better defining earthquake risk in Wellington*. Paper presented at the Geologically active : delegate papers 11th Congress of the International Association for Engineering Geology and the Environment, Auckland, Aotearoa, 5-10 September 2010.

Van Dissen, R. J., Berryman, K. R., King, A. B., Webb, T. H., Brackley, H. L., Barnes, P., et al. (2009). *It's our fault : better defining the earthquake risk in Wellington : results to date & a look to the future*. Paper presented at the Why do we still tolerate buildings that are unsafe in earthquakes : New Zealand Society for Earthquake Engineering 2009 Conference, 3-5 April, Christchurch, New Zealand.

Van Dissen, R. J., & Heron, D. W. (2003). *Earthquake Fault Trace Survey, Kapiti Coast District* (GNS Client Report 2003/77).

Wairarapa District Council. (2011). *Wairarapa Combined District Plan*.

Wellington City Council. (2004). *Approval of District Plan Change 22: Hazard (Fault Line) Areas Re-alignment and rules*.

Wellington City Council. (2009). Earthquake-prone buildings policy, from http://www.wellington.govt.nz/plans/policies/earthquake/index.html

Children's knowledge, cognitions and emotions surrounding natural disasters: An investigation of Year 5 students, Wellington, New Zealand.

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Abstract

New Zealand schools have a responsibility to ensure that children are informed about potential natural disasters, and are prepared with protective strategies. The present study aimed to investigate children's knowledge, cognitions, and emotions concerning natural disasters, with a particular focus on earthquakes and tsunami. Thirty Year-5 school students (aged 9-10 years) from the Wellington region of New Zealand participated in researcher-led focus groups. The children were generally well informed, demonstrating an understanding of causes, characteristics, and potential consequences of earthquakes and tsunami. Thoughts and expectations regarding natural hazards, earthquakes in particular, centred on the unpredictability of natural disasters and on the expectation that there would be significant earthquakes in their region in the future. However, the children demonstrated assurance that the school and family were prepared with emergency supplies, and that they themselves and their families knew strategies for keeping safe in a disaster event. The children discussed these reassurances as a factor in reducing their fear of disasters, fear being the predominant negative emotion discussed by the children. The children indicated that learning at school had contributed to discussions with friends and family, this finding suggesting that disaster education at school is a critical component of children's education and that this education has a flow-on effect at home and in the wider community.

Keywords: *disasters; education; children; earthquakes; cognitions; knowledge; emotions; preparedness*

Introduction

On 22 February 2011, a magnitude 6.3 earthquake struck Christchurch, New Zealand, causing significant damage and the loss of 185 lives (Cubrinovski et al., 2011). The following month, a magnitude 8.9 earthquake off the coast of Japan triggered a tsunami that besieged the coastal town of Sendai and surrounding areas (Stimpson, 2011). While New Zealand has been fortunate not to have experienced a large tsunami in recent history, the Japanese tsunami demonstrated that the impact of a coastal tsunami can be catastrophic. New Zealand's position along the meeting point of the Australian and Pacific tectonic plates (GNS Science, 2011), as well as the country's extensive coastline make earthquakes and tsunami an ever-present threat. Preparing effectively for the threat of natural disasters can help us to mitigate some of the damage done when natural disasters do occur, potentially saving lives and helping the recovery of people impacted by the event. Children have an important role to play in preparation for disasters, as the education of a child can influence others in the home (Evans & Oehler-Stinnett, 2006).

Children's knowledge about natural disasters

Many studies (e.g., Finnis, Johnston, Ronan, & White, 2010; Ronan & Johnston, 2003) have supported the value of hazards education programmes in schools, particularly the learning benefits for children who are repeatedly involved in hazards programmes at different levels of the school system (Ronan & Johnston, 2001; Tarrant & Johnston, 2010b). Finnis, Johnston, Becker, Ronan, and Paton (2007), state that the effectiveness of a school programme can be enhanced by the children learning, not only about the characteristics of a natural disaster, but about what occurs before, during, and after a particular type of disaster.

Becker, Johnston, Paton, and Ronan (2009) discuss a series of one-on-one interviews undertaken with 48

adults across New Zealand to examine factors which lead to disaster preparedness in homes. One of the positive factors discussed by participants was having children who were involved in disaster education programmes at school. Individuals surveyed said that their children would come home with information about preparing for a disaster, and the family or parent and child would make plans or prepare resources together for their home. This suggests that of homes with children in disaster education programmes at school, not only do the children themselves benefit from an effective programme, but potentially the entire family unit becomes better prepared as a result of the information. It is important that all children have the opportunity to learn about natural disasters and to understand protective strategies. If a child learns about the nature of particular natural disasters and knows appropriate safety strategies to apply before, during, and after the event, this knowledge could enable not only the child and his or her family to survive, but also his or her community to survive the event and its aftermath (Ronan & Johnston, 2005).

In relation to studies supporting the value of hazard education programmes in schools (e.g., Finnis, Standring, Johnston & Ronan, 2004; Ronan & Johnston, 2001), Wachtendorf, Brown and Nickle (2008) highlight the need for such programmes to consider the social capabilities of the students involved. Effective hazards education programmes in schools also involve interaction with parents (Ronan, Crellin & Johnston, 2010). A study by Coomer et al. (2008), examining emergency management education in 216 schools encompassing Years 1-13 in the Greater Wellington region, found that 86% of schools surveyed had some form of emergency management education in their curriculum, earthquake being the most widely discussed disaster in Wellington classrooms. Patton and Sylvester (1998) and Johnston, Tarrant, Tipler, Coomer, Pedersen, and Garside (2011) stress the value of children learning and practising hazard education activities and drills at school. Repeated drills can be evaluated right after they are practised, and the learning can be applied immediately if required.

Reported benefits of school hazards programmes also include increased awareness of risks and, particularly, more-realistic risk perceptions (Mitchell, Haynes, Hall, Choong & Oven, 2008; Ronan & Johnston, 2001) as well as motivating preparedness (Shaw, Shiwaku, Kobayashi & Kohyashi, 2004). These benefits are demonstrated in Ronan and Johnston's (1999) study examining the effects of witnessing relatively harmless volcanic activity on students aged between 7 and 13 years. Ronan and Johnston found that the most positive effect on coping was to have participated in an information-based intervention group. This finding suggests that knowledge is a key aspect of positive coping, and can assist those young people to understand the processes of a natural disaster and to feel less stressed and out of control following such events.

Children's cognitions concerning natural disasters

Perceptions of risk appear to result in either a lack of action (along with acceptance of inevitability), or motivation to prepare for a particular event (Mileti & Peek, 2002). Shaw et al. (2004) stress that a realistic awareness of potential hazards is critical to motivate preparedness. Shaw et al. point out that it is not necessary to experience a particular type of disaster to create awareness, but that education can create the knowledge and perceptions of events that lend to coping. Perceptions of event-likelihood, and beliefs about one's ability to survive and cope with a disaster are linked to an understanding of the nature of a particular disaster, and to levels of preparedness for the disaster. Preparedness for a disaster is a critical part of hazards education in New Zealand schools (e.g., preparedness is a key component in *What's the Plan Stan?,* the hazards and emergencies programme made available by the New Zealand Ministry of Civil Defence and Emergency Management, to all schools in the country). Expectations about the likelihood of a particular disaster occurring, and thoughts about how the disaster might impact on oneself and one's family, can be instrumental in motivating preparation (Tarrant & Johnston, 2010b). Information and preparation are important tools in allowing children to feel in control of their environment, and when individuals know they have the tools to get themselves through a disaster, there is generally less fear created by the uncertainty of events.

Children's emotions concerning natural disasters

Children have been identified in previous literature (e.g., Ronan & Johnston, 2005) as being at higher risk than adults for distress following a disaster. Unusual events can be frightening, as we have little experience of them. Fear is a normal emotion, and its purpose is to alert us to potential danger. For example, in instances of heightened fear, the fight or flight response is adaptive for survival (Greenberg, Carr & Summers, 2002). Following a significant earthquake in Athens in 1999,

Groome and Soureti (2004) found that levels of stress were highest in people who had thought their lives were in danger during or immediately after the earthquake, demonstrating the link between thoughts and emotion.

Johnston, Ronan, Finnis, Leonard, and Forsyth (2011) investigated children's understanding of natural hazards in 71 Te Anau, New Zealand, children aged 9-11 years who had experienced a significant earthquake. The study was conducted in 2003, seven months after the magnitude 7.1 Fiordland earthquake (August 2003) which was centred 70 km north-west of Te Anau and was approximately 12 km deep (Geonet, 2003). Seven months after the earthquake, 51% of the children were upset by thinking or talking about earthquakes. Johnston et al also found that 30% of the children believed that talking about earthquakes would upset their parents. According to Ronan and Johnston (2003) the children's perceptions of parental upset may provoke similar emotional responses in their children.

Preparedness within the home environment, such as having survival supplies and plans in place, as well as an emotional awareness of the possibility of a disaster and an understanding that they can get through it, can have a positive impact on the likelihood that a child will be able to get through a disaster event both physically and emotionally (Ronan and Johnston, 2005). Where children understand the nature of the hazard, have knowledge of protective behaviours, and know they have strategies for coping with the event, it is likely that negative emotions such as fear and distress can be tempered. Emotions can also be influenced by the behaviours of people around us. For instance, where a child observes that his or her caregivers are calm and appear to be coping in a crisis event, it is more likely that the child will remain calm and cope (Ronan & Johnston, 2003). Ronan and Johnston (2005) demonstrated links between understanding of hazards and emotion, finding that knowledge about emergency management and preparedness led not only to better prepared homes, but also to reduced anxiety toward potential disasters.

Since it is not feasible to protect a child from being exposed to all news coverage and social discussion concerning natural disasters, it is important to be aware of how children understand and respond to the information they do receive. Therefore, the aims of the present study were to investigate the children's knowledge about natural disasters, together with their cognitions and emotions related to disasters.

Method

Research Design

Previous studies of New Zealand school children's perspectives on various aspects of disasters, and on their level of preparedness, have been frequently survey-based (e.g., McDermott & Palmer, 2002; Tarrant & Johnston, 2010b). There are few studies conducted in New Zealand that examine children's perspectives of disasters from a qualitative stance. Thus, in the present study, focus groups of 9-10 year olds were employed to gather data. Children of 9-10 years generally have verbal and comprehension skills sufficiently developed to discuss ideas among themselves in controlled group situations (Morgan, Gibbs, Maxwell, & Britten, 2002). Focus group format allows participants to share thoughts, feelings, and information, and can encourage discussion around a topic. Morgan et al. (2002) also suggest that the input from other children in a group can stimulate and encourage discussion and that groups of around four to five children provide an ideal size within which to conduct discussions. Thus, children were grouped in these numbers in the present study.

Data from the focus groups was subjected to thematic analysis to identify themes and categories of discussion in the present study.

Participants

Initial contact was made with 17 schools in the Wellington region. Of these, four expressed interest in participation and were included in the study. Schools came from the north, west, south, and central areas of Wellington. Schools ranged from deciles two to ten. Five students were randomly selected from the roll of each available class (seven Year 5 classes in total across the four schools), and consent forms sent home to parents. The randomly selected students present on the day of the focus groups and who had a completed parent-consent form were included in the study. The students themselves also consented to taking part in the focus groups. A total of thirty children (12 boys and 18 girls) aged 9-10 years participated in the study. Three of the schools were represented by two focus groups each, and the fourth school (Central Wellington) was represented by one focus group. Table 1, below, shows a summary of school and participant information.

Table 1: School and participant summary

School		Participants		
Decile	**Area of school**	**Gender**	**Ethnicity**	**Age (years)**
2	**North Wellington**	Male	NZ Euro	9
		Male	Maori/Euro	9
		Male	Maori/ Cook Isl.	9
		Male	Cook Isl.	10
		Female	Not Stated	9
		Female	Maori/Euro	9
		Female	Samoan	9
		Female	Samoan/Tokelauan	10
		Female	Cook Isl.	10
3	**South Wellington**	Male	Not Stated	9
		Male	Not Stated	9
		Male	Not Stated	9
		Male	Assyrian	9
		Male	Assyrian	9
		Male	NZ Euro	9
		Male	Samoan	9
		Female	Asian	9
		Female	Euro/Samoan	9
		Female	Indian	9
9	**Central Wellington**	Male	NZ Euro	9
		Female	NZ Euro	9
		Female	Maori	9
10	**West Wellington**	Female	British	9
		Female	British	10
		Female	NZ Euro	9
		Female	NZ Euro	9
		Female	NZ Euro	9
		Female	NZ Euro	9
		Female	NZ Euro	10
		Female	NZ Euro	10
		N=30		

Focus Groups

Sessions began with the researcher introducing herself and explaining to the children what was expected to take place in the focus groups. The children were made aware that they could leave at any point if they wished. Each participant chose a pseudonym, which they wrote on a name tag and decorated. Group guidelines were read to the children (for example: *laughing is fine, but not when it hurts people).* A video and voice recorder were used and the children were made aware of this. The researcher explained that these recordings were to help the researcher remember what was said in the focus groups. Focus groups each ran for up to 60 minutes.

Interview-questions

The researcher used a set of 15 core questions focused on knowledge of natural disasters, and cognition and emotion as they relate to natural disasters, earthquakes and tsunami in particular. Knowledge-questions also included enquiry regarding preparedness for natural disasters. The children's discussion was focussed on the key research questions of the study (detailed earlier), but children were able to develop ideas of importance to them, and to extend discussion around their ideas and the core questions. In order to keep the mood positive, groups always ended by discussing how the children could make themselves feel better if they felt stressed or upset about disasters.

Data analysis

Data was transcribed by the researcher, as a simple orthographic transcription which was checked against both video and audio recordings to ensure accuracy. Coding followed the six-phase procedure outlined by Braun and Clarke (2006) and themes were identified within the transcribed data, and assigned categories. Themes and sub-themes were organised under the three main areas of the investigation: knowledge; cognitions; and emotions.

Results and Discussion

Children's Knowledge about Disasters

When the children were asked to describe features of disasters, the most common were: destructive/ dangerous, frightening, and unpredictable. When asked to make a list of natural disasters, many items mentioned in the groups were clearly not natural disasters (e.g. wars or crashes). These errors may imply that the chldren were either unaware that these were not classified as natural disasters or that man-made disasters share some common features with natural disasters, such as provoking fear, and causing destruction. Knowledge is the framework through which we make sense of events and give them meaning. Pieces of information, factual or false, form the framework children use to develop their understanding of disasters.

While not all children were clear on correct geological terminology, children in all groups were able to identify that earthquakes were caused by underground plates "crashing together" and that earthquakes at sea have the potential to cause a tsunami. Several children

from one school were further able to explain that this process causes mountains to form, and land to sink, demonstrating a higher level of knowledge. Those children also mentioned a personal interest in disasters, attempting to seek out information from the focus group leader to extend their understanding. While levels of knowledge about disasters and natural processes varied, all children demonstrated basic understanding of how earthquakes and tsunami occur, and of the risks involved.

Awareness of current events

To help the researchers' understanding of children's awareness of current events regarding disasters, participants were asked to talk about any disasters that they could recall. The earthquake and tsunami disaster centring on Sendai (Japan) in 2011, and the earthquakes in Canterbury/Christchurch (New Zealand) prior to the present study were mentioned early in every group. In a study of effects on memory and recall in children by Lehmann and Hasselhorn (2010), the authors found that items that were both *repeated* and *recent* were more easily recalled. Events remaining uppermost in children's (and adults) minds can have both negative and positive effects. First, repeated exposure to negative information can lead to believing that events are more common or dangerous than they really are (Comer, Furr, Beidas, Babyar, & Kendall, 2008). Secondly, valuable lessons about disasters, such as preparedness, can also become ingrained through repetition. Children in all of the focus groups indicated that at school they had learnt more about the nature of earthquakes and tsunami following the Japanese and Christchurch events.

Knowledge about safety

All focus groups demonstrated that they had an understanding of how to keep safe in an earthquake or tsunami, either at school or at home. All of the groups could recall what they were required to do for safety drills at their school within the past year. One child discussed the drill procedure with great detail: *After the earthquake [our teacher] would do the roll, just to make sure everyone's there... after we all got checked we go down to the bottom field and stay there until some people would come... if my parents are dead, my next door neighbours, and if my neighbours are dead, my grandma, and if my grandma is dead then I don't know what happens next* (female, 9yrs). Although knowing *what* they did, some groups disagreed among themselves over the exact purpose of the drill.

Children in one particular school were able to identify several different potential earthquake hazards in the room where they were sitting, including an unstable wall (internal division), large windows, a ceiling-mounted projector, a smart-board, and clocks. They mentioned that they had been learning in class about identifying hazards in their environment. Identifying hazards in the immediate environment was mentioned only by this Decile 10 school. Otherwise, in the present study children from different schools appeared similarly informed regarding hazards and protective strategies. That is, findings on knowledge did not vary according to decile ranking (decile rankings representing socio-economic areas). This finding contrasts with two New Zealand studies concerning primary school aged children (Tarrant & Johnston, 2010a; Tipler, Tarrant, Coomer, & Johnston, 2010) where children from lower socio-economic areas were the least informed about natural disasters, and demonstrated the lowest levels of preparedness. It is unclear whether differences between the present study and the Tarrant and Johnston, and the Tipler et al. studies are explained simply by the different type of data gathering, or by the small number of participants in the present study, or by greater attention in schools to disasters and protective strategies following the Christchurch earthquakes that began late in 2010, and the Sendai, Japan earthquake and tsunami that occurred in February 2011. Both of these events occurred after the conductance of the two New Zealand survey studies mentioned above, and before the present study. Children in the focus groups did comment that they had learned more at school about earthquakes and tsunami following the events in New Zealand and Japan, perhaps suggesting a shift in hazards awareness and safety in schools.

All children described having at least one emergency item in their homes, most having several. All groups could identify key items for a home, such as water, food and first aid kits. Some children went into greater detail about emergency items and protective behaviours (such as not overburdening getaway kits). Overall, the children showed pride in the preparations they had undertaken, and demonstrated detailed and informed thinking about their safety during and after a disaster, an earthquake in particular.

Sources of information about disasters

All children had first-hand experience of events such as lightning, thunder, hail and snow, and 23 of the 30 children could recall having felt an earthquake. All

earthquake experiences were described as 'small', with children having had little fear during the event itself, but many children expressed fear of whether there may be another, significant earthquake later.

Outside of school, parents were key sources of information, followed by television, and the internet. One child discussed experiences of getting in trouble for talking about disasters too much at home. It is possible members of the family were upset by recent disasters, and preferred not to hear about them, or perhaps they sought to discourage this child, believing it may be distressing for him. The value of discussion in this age group is that this can "help the child to realise that their reactions are shared by others and provides a framework to help them work through their feelings" (Paton & Sylvester, 1996, p 224). Whatever the reason for discouraging a child to talk about disasters, children who do not have opportunities to ask questions may develop incorrect beliefs about disasters and may experience unnecessary stress as a result of this.

Many participants watched the news daily, and some said they would only watch it when they had been told to, or when they knew that something interesting would be shown. Many of the stories the children described were graphic and caused strong emotional responses. Emotional responses and images of people covered in blood, buildings collapsing, and bodies were all described by the children. For example (referring to the Christchurch earthquakes): *I don't feel sad when I hear about it, but when I see it on the news with all the pictures and stuff it does [make me feel sad]* (female, 9yrs). One child recalled crying while seeing images of Christchurch earthquake destruction on the news, while another described feeling sick. In a study examining the effects of television viewing on children, Comer et al. (2008) found that higher, unmonitored television viewing led to increased perception of children's own vulnerability to world threats. This suggests that viewing news about disasters has the potential to make children feel unsafe. For these reasons, it is important that children's viewing is controlled by parents, and that parents are available to talk to their children about media content to which the children have been exposed (Gentile & Wash, 2002).

Vicarious experience through current events can also have positive effects on individuals. For example, several children told what seemed to be the story of Tilly Smith (see Randall & Berger, 2005). Tilly Smith, a 10 year old British girl on holiday with her parents in Thailand during the 2004 Boxing Day tsunami, warned beachgoers of the approaching tsunami, based on her knowledge about disasters gained through studying tsunami at school. The story of Tilly Smith may have resonated especially with the children recounting the story, as the children in the present study were a similar age to Tilly at the time of the tsunami.

Children's Cognitions about Natural Disasters

For the purposes of the present study, cognitions were considered in terms of thoughts about disasters, and expectations, and beliefs concerning disasters.

Thoughts

Losing family was the primary concern for participants. Most discussion of injury or death was volunteered as being a consequence of not following proper safety procedures. Thoughts about being trapped were also common and children stated that they worried about this, focussing not on injury, but on isolation. One child said: [After an earthquake] *I'd probably feel lonely, because I might be trapped and then probably somebody might not find me* (male, 9yrs). Participants' discussions about their fears mirrored information they had seen on television, or discussions they had had at school concerning major disasters. Their concerns demonstrated that the children had recognised potential risks and considered which risks might affect them personally.

Expectations

Children were asked to name one disaster they believed most likely to affect them in Wellington. Thirty-three percent of the children believed an earthquake to be the most likely disaster. Tsunami, lightning/thunder storm, hail, or tornado were all selected as being the next most likely disaster (10% each). Only 3% of the children believed house fire to be the most likely disaster to affect them. Findings of the present study contrast with findings of an investigation of expectations in a study (Tarrant & Johnston, 2010b) of Intermediate School students aged 11-12 years in Wellington, New Zealand, conducted prior to the Christchurch earthquake and Japan earthquake and tsunami of 2011. When the Intermediate school children were asked about the likelihood of particular disasters affecting them, a house fire (30.9%) was considered to be the most likely form of hazard to affect them at home, followed by earthquake (28.3%). Unsurprisingly, fire was also

the most upsetting for children to think about, with 27% saying that it 'often' scared them. It is likely that in the present study, children's perceptions were influenced by recent, ongoing news events. The recency and levels of destruction in the Christchurch and Japan events, together with follow-up discussions at school, had likely focused children's attention on earthquakes in their own country and, in particular, the likelihood of earthquakes in the vulnerable city in which they live.

Children made attributions about where disasters occur. For example*:* [tsunami] *usually happens in Thailand* (female, 9yrs). The children were largely aware that earthquakes occur in some locations more than others, due to fault lines, and most children held the belief that there would likely be an earthquake in Wellington in the future. Part of the reason the children seemed to expect an earthquake in Wellington may have been their exposure to predictions about this, indicating they had heard predictions at school and, for some of the children, on television. Additionally, at the time the focus groups were held (September, 2011), there had been a national public focus on earthquake-awareness and preparedness following the Canterbury, New Zealand, earthquake sequence that began in September 2010.

Beliefs

One child relayed an event where his family had heard that an earthquake was expected to occur in Wellington on a specific date: *They said it'll happen, so we went to my auntie's house, coz that's the safest place and we said lots of prayers and then it didn't happen… we thanked God in our prayer* (male, 9yrs). While this child was aware of the causes of earthquakes (he had described these previously), he also placed responsibility with God. Participants in another group discussed the role of taniwha in earthquakes, specifically Ngake and Whataitai (whom Maori tradition accepts as residing in the waters of Wellington harbour). [In New Zealand Maori tradition, taniwha are supernatural creatures that may be terrifying or protective (Keane, 2013)]. Two children (one Maori, the other European) in one focus group felt fear regarding the taniwha because they had read stories where taniwha used earthquakes to punish people.

It is important when considering responses to an event, to understand something of the person's essential cultural and religious beliefs. Previous research of the effect of religious beliefs on stress suggests that religion has a buffering effect on stress (e.g., Smith, McCollough & Poll, 2003). In the present study, for example, a child reported feeling safer when his family prayed that a predicted earthquake not occur.

Children's Emotions about Natural Disasters

A certain level of fear may motivate preparedness and protective behaviours. Most children acknowledged that they feel fear sometimes, but some expressed much stronger fear reactions such as saying they had had nightmares, or troubling thoughts following the Christchurch earthquake. In addition to some children saying they felt frightened when they thought about earthquakes, some children appeared to be excited about experiencing earthquakes, perhaps feeling that they were part of shared experiences and discussions.

Anger was discussed as a response to a potential earthquake where family members might be hurt. Some children expressed feeling frustrated regarding disasters, saying there is no one on which to place the blame. One child described wanting to 'fight' the earthquake. While the child made this comment jokingly, it is interesting to note that he phrased his anger as a physical response to a physical event, perhaps suggesting this child wanted to exert control over what he perceived as an uncontrollable situation.

Emotion and coping strategies

Children discussed that learning ways to keep themselves safe had helped them to feel more positive about their ability to cope during and after a disaster, and this had also helped to reduce their fear about possible events. Key aspects of coping that the children discussed were preparedness, knowing loved ones were safe, and the use of distraction, discussed below.

Knowledge of correct safety behaviours, and having appropriate preparations in place were expressed throughout discussions as the most important protective factors in disasters. Consequently, almost all of the children expressed feeling safer knowing that their loved ones were also prepared for a disaster (with emergency kits and safety-knowledge) and were aware of what to do in a disaster. When fear of losing loved ones was such a common concern for the children, it was not surprising that the children repeatedly mentioned wanting to know that their loved ones were safe.

Ronan and Johnston (2003) stress the relationship between parental coping and coping in their children. For example, perception of fear in parents led to higher reported fear in children. Similarly, if children perceive their parent as being calm, in control, and aware of

protective behaviours, the children are likely to feel calmer and more confident about their own and the family's safety.

Without specifically referring to coping by name, children referred to becoming engaged in activities that would distract them from fears or worries about earthquakes. They talked about doing activities they enjoy, or of 'having happy thoughts' to cope with fears or worries. One child succinctly described the use of distraction for coping with difficult thoughts, by saying: *It will get anything that gets me worried out of my mind* (male, 9yrs). Avoidance of negative thoughts may have positive implications for mental health, as rumination has been linked with increased occurrences of depression (Abela & Hankin, 2011). Coping strategies help to manage fear and other negative emotions so that these fears do not become intrusive to everyday life. Coping strategies are an important part of the resilience necessary to get through difficult events (Duncan, 1996).

Conclusion

The children demonstrated knowledge about disasters and disaster preparedness, displaying pride at being involved in the process of helping to make themselves and their families safe. The children's pride speaks to the value of the relationship between school and home in developing preparedness. It is important that disaster education programmes spiral through the school curriculum, with repetition of programmes every year, informing children about the nature of specific natural disasters, along with strategies to help keep the children safe and to build their resilience. Disaster education programmes are particularly important for primary school children who are more dependent on adults for their safety and care than are secondary school students. For families, it can be advantageous to include the children when undertaking preparedness in the home. Including the whole family in preparedness can have the dual benefits of improving outcomes in the event of a disaster, and relieving some of the child's anxiety by demonstrating that those around them have the intention and skills to survive and cope. It is of note that the children in the present study were able to demonstrate understanding of multiple coping strategies for dealing with stress around disasters. Further, the children's knowledge of safe practices regarding earthquakes and tsunami was confirmed as a key aspect of their belief that they would be able to cope in the event of an earthquake.

There is some indication from the children's discussion of disaster stories and images, that viewing news stories was linked to a certain amount of stress in some children. The children's stress was further compounded by them having been told either at school, at home, or via the media, that they should be expecting a future serious earthquake in Wellington, the city in which they live. Accordingly, when asked to indicate what they believed to be the most likely disaster to affect them in Wellington, earthquake and tsunami rated highest. Children were able to cite recent disasters of various types, either national or international, that had been given news coverage in the year or so prior to the present study being undertaken. It would be useful to investigate how children conceptualise particular disaster types and their likelihood in their own environment, based on the children's repeated exposure to media coverage of disaster events.

Although the present study was limited to only 30 Year-five children (9-10 year-olds), the study provides a useful perspective of the children's understanding of natural disasters, of their thoughts and expectations concerning a threat in their own environment, of their emotional responses to natural disasters, and of coping strategies in these children. It would be useful for future studies to examine perspectives of natural disasters in teachers and caregivers in order to have a greater context for 9-10 year old children's perspectives and responses.

It would also be of value for subsequent studies to consider using a greater number of participants, and examine some of the themes identified in the present study, in greater depth. For example, some of the children discussed the role of media in their understanding of recent disasters, and their viewing of potentially graphic and emotional disaster-images. It could be of interest to investigate children's viewing of disaster footage from the children and their parents' perspectives, to examine how images of natural disasters affect the child's sense of safety.

The children were enthusiastic about the subject matter of the focus groups, and eager to participate when talking about disasters. The children appeared to have enjoyed learning about different types of disasters at school, at home, and via the media. As interest can be a key motivator for learning, it is possible that by engaging students in education programmes that cover a range of disaster types, children from early in primary school may gain a greater understanding of natural disasters, and particularly of disasters to which

they are most vulnerable geographically. Education programmes would include information and learning for appropriate levels of preparedness and would enable learning of strategies designed to assist children to cope in the face of a disaster. Many children (and adults) in New Zealand are exposed to the potential for natural disasters, much of the country being prone to earthquakes and tsunami. Children's natural curiosity, and human interest in dramatic events in particular, provide a springboard for developing comprehensive natural disasters and hazards programmes in our schools that stress preparedness and resilience.

> **If... you know what to do in an earthquake, then you'll probably survive, but if you just stand there going 'what am I going to do?' then you probably won't, because things will start falling** (Female, 10 years).

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References

Abela, J. R., & Hankin, B. L. (2011). Rumination as a vulnerability factor to depression during the transition from early to middle adolescence: A multiwave longitudinal study. *Journal of Abnormal Psychology, 120* (2), 259–271.

Becker, J. S., Johnston, D. M., Paton, D., & Ronan, K. (2009). Community resilience to earthquakes: Understanding how individuals make meaning of hazard information, and how this relates to preparing for hazards. *2009 NZSEE Conference,* Conference Paper No. 4.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3* (2), 77-101.

Comer, J. S., Furr, J. M., Beidas, R. S., Babyar, H. M. & Kendall, P. C. (2008). Media use and children's perceptions of societal threat and personal vulnerability. *Journal of Clinical Child & Adolescent Psychology, 37* (3), 622–630.

Coomer, M., Johnston, D., Edmonson, L., Monks, D., Pedersen, S., & Rodger, A. (2008). Emergency Management in Schools- Wellington. GNS Science Report, 2008/4.

Cubrinovski, M., Bradley, B., Wotherspoon, L., Green, R, Bray, J., Wood, C., Pender, M., Allen, J., Bradshaw, A., Rix, G., Taylor, M., Robinson, K., Henderson, D., Giorgini, S., Ma, K., Winkley, A., Zupan, J., O'Rourke, T., DePascale, G., & Wells, D. (2011). Geotechnical Aspects of the 22 February 2011 Christchurch Earthquake. *Bulletin of the New Zealand Society for Earthquake Engineering, 44* (4), 205-226.

Duncan, D.F. (1996). Growing up under the gun: Children and adolescents coping with violent neighbourhoods. *The Journal of Primary Prevention, 16* (4), 343-356.

Evans, L., & Oehler-Stinnett, J. (2006). Children and natural disasters: A primer for school psychologists. *School Psychology International,* 27 (1), 33-35.

Finnis, K., Johnston, D., Becker, J., Ronan, K. R., & Paton, D. (2007). School and community-based hazards education and links to disaster-resilient communities. *Regional Development Dialogue*, 28 (2), 99-108.

Finnis, K., Johnston, D., Ronan, K., & White, J. (2010). Hazard perceptions and preparedness of Taranaki youth. *Disaster Prevention and Management, 19* (2), 175-184.

Finnis,K., Standring, S., Johnston, D., & Ronan, K. (2004). Children's understanding of natural hazards in Christchurch, New Zealand. *The Australian Journal of Emergency Management, 19* (2), 11-20.

Gentile, D. A., & Walsh, D. A. (2002). A normative study of family media habits. *Journal of Applied Developmental Psychology*, *23*(2), 157-178.

Geonet (2003). *Aug 22 2003 - Fiordland Quake Biggest For Many Years.* Retrieved 22 August, 2013 from: http://info.geonet.org.nz/display/home/2003/08/22/Aug+22+2003+-+Fiordland+Quake+Biggest+For+Many+Years

GNS Science. (2011). Earthquakes at a plate boundary. Retrieved 10 July, 2011, from http://www.gns.cri.nz/Home/Learning/Science-Topics/Earthquakes/Earthquakes-at-a-Plate-Boundary.

Greenberg, N., Carr, J. A., & Summers, C. H. (2002). Causes and consequences of stress. *Integrative and Comparative Biology*, *42*(3), 508-516.

Groome, D., & Soureti, A. (2004). Post-traumatic stress disorder and anxiety symptoms in children exposed to the 1999 Greek earthquake. *British Journal of Psychology,* 95, 387-397.

Johnston, D., Ronan, K., Finnis, K., Leonard, G., & Forsyth, J. (2011). *Children's understanding of natural hazards in Te Anau, New Zealand, following the 2003 earthquake.* GNS Science Report 2011/05.

Johnston, D., Tarrant, R., Tipler, K., Coomer, M., Pedersen, S., & Garside, R. (2011). Preparing schools for future earthquakes in New Zealand: lessons from an evaluation of a Wellington school exercise. *The Australian Journal of Emergency Management, 26* (1), 24-30

Keane, B. (2013). Taniwha. In Te Ara: The Encyclopedia of New Zealand, updated 25 September 2011. Retrieved 29 February, 2013 from: http://www.teara.govt.nz/en/taniwha.

Lehmann, M. & Hasselhorn, M. (2010). The dynamics of free recall and their relation to rehearsal between 8 and 10 years of age. *Child Development, 81* (3), 1006–1020.

McDermott, B. M., & Palmer, L. H. (2002). Post disaster emotional distress, depression and event related variables: findings across child and adolescent developmental stages. *Australian and New Zealand Journal of Psychiatry, 36*, 754-761.

Mileti, D. S, & Peek, L. (2002). Understanding individual and social characteristics in the promotion of household disaster preparedness. In T. Dietz & P. C. Stern (Eds.), *New Tools for Environmental Protection: Information, Education and Voluntary Measures* (pp. 125-140). Washington, DC: National Academy Press.

Mitchell, T., Haynes, K., Hall, N., Choong, W., & Oven, K. (2008). The Role of Children and Youth in Communicating Disaster Risk. *Children, Youth and Environments, 18* (1), 254-279.

Morgan, M., Gibbs, S., Maxwell, K., & Britten, N. (2002). Hearing children's voices: Methodological issues in conducting groups with children aged 7-11 years. *Qualitative Research, 2* (1), 5-20.

Patton, D. & Sylvester, A. (1996) Traumatic stress in education. In D. Paton, & N. Long (Eds.), *Psychological Aspects of*

Disasters: Impact, Coping and Intervention (pp. 221-236). Palmerston North, New Zealand: The Dunmore Press.

Randall, C., & Berger, S. (2005). Honour for young girl who saved tourists from tsunami. The Telegraph. Retrieved 23 November, 2011, from http://www.telegraph.co.uk/news/uknews/1506286/Honour-for-young-girl-who-saved-tourists-from-tsunami.html.

Ronan, K., Crellin, K., & Johnston, D. (2010). Correlates of hazards education for youth: a replication study. *Natural Hazards, 53*, 503–526

Ronan, K. R., & Johnston, D. (1999). Behaviourally-based interventions for children following volcanic eruptions: an evaluation of effectiveness. *Disaster Prevention and Management, 8* (3), 169-176.

Ronan, K. R., & Johnston, D. (2001). Correlates of Hazard Education Programs for Youth. *Risk Analysis, 21*(6),1055-1063.

Ronan, K. R. & Johnston, D. (2003). Hazards Education for Youth: A Quasi-Experimental Investigation. *Risk Analysis, 23*(5), 1009-1020.

Ronan, K. R., & Johnston, D. (2005). Promoting Community Resilience in Disasters: The Role for Schools, Youth and Families. New York: Springer.

Shaw, R., Shiwaku, K., Kobayashi, H., & Kobayashi, M. (2004). Linking experience, education, perception and earthquake preparedness. *Disaster Prevention and Management, 13* (1), 39-49.

Smith, T. B., McCollough, M. E, & Poll, J. (2003). Religiousness and depression: Evidence for a main effect and the moderating influence of stressful life events. *Psychological Bulletin, 129* (4), 614–636.

Stimpson, I. (2011). Japan's Tohoku Earthquake and Tsunami. *Geology Today, 27* (3), 96-98.

Tarrant, R. A. C., & Johnston, D. M. (2010a). *An investigation of the relationship between socio-economic status and hazards-preparedness in Intermediate school* children, GNS Science Report 2010/19.

Tarrant, R. A. C., & Johnston, D. M. (2010b). *Preparedness to cope with hazards: A survey of Wellington Intermediate schools*, GNS Science Report 2010/02.

Tipler, K., Tarrant, R.A.C., Coomer, M.A., & Johnston, D. M. (2010). School children's access to hazard education: An investigation according to socio-economic status. *GNS Science Report, 2010/35.*

Wachtendorf, T., Brown, B.,& Nickle, M. C. (2008). Big Bird, Disaster Masters, and High School Students Taking Charge: The Social Capacities of Children in Disaster Education. *Children, Youth and Environments, 18*(1), 456-469

The effects of news media reports on earthquake attributions and preventability judgments: Mixed messages about the Canterbury earthquake

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Abstract

The research examined the effects of two different types of message in the news media in the weeks following the February 2011, Canterbury earthquake. Fatalistic messages portrayed widespread, generalized damage with no reference to the performance of different types of buildings, whereas informed messages conveyed the distinctiveness of damage and the flawed design of most buildings that were damaged. The study examined the effects of these two different messages on judgments of the cause and preventability of the earthquake damage, fatalism about earthquakes in general, and estimates of the proportion of buildings that were damaged. Participants (N = 75) read either fatalistic messages or informed messages. Informed reports led to higher attributions for damage to controllable causes and higher preventability ratings than fatalistic reports. These findings show that the different messages in the news media have contrasting effects on judgments about damage in a recent, local, earthquake, despite competing real world information. These results clarify which messages are likely to facilitate preparedness for earthquakes and other hazards, and have several implications for risk communication strategies.

Keywords: *Risk communication, Fatalistic messages, Attributions for damage, Preventability of damage*

Introduction

Why do earthquakes cause so much damage and why are citizens not more prepared for them, despite numerous warnings? One reason is that earthquakes seem unpredictable, and send no reliable warning signals like changes in the weather. Large earthquakes are also infrequent in most places, occurring once in a lifetime or less. However, they are not entirely unpredictable in the longer term and scientists can estimate the likelihood of an earthquake in a given area. Furthermore, the unpredictability of earthquakes does not entail the unpredictability of damage and loss suffered in an earthquake (Smith, 1993). Preparations greatly reduce the potential for harm during an earthquake. These include strengthening the buildings people live or work in, securing items around the house and removing vulnerable structures such as brick chimneys. So although predicting earthquakes is difficult, preparedness is possible and makes a big difference to people's outcomes.

However, despite the fact that damage and loss of life is preventable through these measures, many people fail to make basic preparations for earthquakes (Ronan & Johnston, 2005; Russell, Goltz, & Bourque, 1995; Turner, Nigg, & Paz, 1986). Turner et al. (1986) showed that many citizens in an earthquake-prone location failed to implement basic preparations, such as storing food and water. These preparations are achievable for most people and do not require significant cost or time. Many citizens had no working flashlight, no working radio, and no first-aid kit, and for other items had even lower levels of preparedness, with few participants arranging their cupboards suitably for an earthquake. Thus, despite professing the belief that an earthquake was imminent, most respondents did not translate that belief into tangible acts of preparation (Turner et al., 1986). Similarly, in the earthquake region focused on in this paper in Canterbury, New Zealand, only 28% of households met the requirements for basic preparation in 2010 (Statistics New Zealand, 2012).

This lack of preparation raises the question: Why do people not prepare? There are a number of reasons

why people do not take voluntary preparations for hazards such as earthquakes, including misperception of the risk, failure to recognize that consequences off the hazard may be controllable, and social and cultural factors such as norms (Paton, 2003; Solberg, Rossetto & Joffe, 2010). Although these and other factors contribute to preparation, this paper focuses on news media factors that affect people's fatalism and their belief that preparation can make a difference to their outcomes in a disaster.

Earthquake fatalism and preparedness

Fatalism and related causal judgments comprise one reason people do not prepare (Coleman & Thorson, 2002; Cowan, McClure, & Wilson, 2002; McClure, Allen, & Walkey, 2001; McClure, Walkey, & Allen, 1999; Paton, 2003). People who are fatalistic about earthquakes think that nothing they do will influence their outcomes in an earthquake; they tend to have an external locus of control (Spittal, Siegert, McClure, & Walkey, 2002). Fatalism hinders preparation, in that people who feel they cannot influence their outcomes in an earthquake are less likely to prepare (McClure et al., 2001). Turner et al. (1986) investigated the link between fatalism and earthquake preparation and found that citizens who endorsed a set of fatalistic statements were significantly less prepared for earthquakes. Turner et al. (1986) claimed that fatalism leads to people disregarding risk warnings and making fewer preparations for an hazard. Framed in terms of learned helplessness (Seligman, 1972), people generalize from the uncontrollability of the earthquake to incorrectly infer that people's outcomes are also uncontrollable (McClure & Hurnen, 1997)

The effects of media messages on earthquake fatalism and damage preventability

Given that fatalism hinders people's preparedness for earthquakes, it is beneficial to decrease this fatalism. Research on risk communication shows that the framing of messages about risks shapes people's perceptions of those risks (Coleman & Thorson, 2002; Fischhoff, 1995; Iyengar, 1991). For most citizens, news media reports are a key source of information about earthquakes. Following major events, many people rely on the news media as their primary - or only - source of information (Piotrowski & Armstrong, 1998). This can assist in disseminating important information, but it can also have negative effects.

The messages conveyed by the media can frame an event in ways that influence citizens' judgments (Vasterman, Yzermans, & Dirkzwager, 2005). Coleman and Thorson (2002) showed that media messages that presented context and base rate information about health issues led to less fatalistic judgments about prevention than media reports that lacked this information (Ivengar, 1991). Similarly with earthquakes, research has shown that certain messages about earthquakes can influence causal beliefs relating to fatalism, if not fatalism itself. The news media often present damage in earthquakes as indiscriminate. McClure et al. (2001) showed that people saw earthquake damage as more preventable if they read portrayals showing that damage was distinctive, than portrayals where damage was indiscriminate. Scenarios with distinctive damage also led citizens to attribute earthquake damage more to building design than did scenarios with generalized damage (McClure et al., 2001; McClure, Walkey, & Allen, 1999). So different messages about earthquakes affect people's judgments that earthquake damage can be prevented and their willingness to prepare.

Causal judgments are also affected by whether messages present rate-based or anecdotal information (Ivengar, 1991; McClure, Sibley, & Sutton, 2007). Rate-based information in the earthquake context describes the proportions of different types of buildings damaged by earthquakes, such as the percentage of modern buildings that are damaged. In contrast, the anecdotal information that characterizes news media reports describes single cases of damaged buildings, such as a single instance of a modern building damaged by an earthquake, while ignoring the wider picture of how well modern buildings performed overall. McClure et al. (2007) showed that rate-based information led people to attribute damage more to building design. Consistent with research on causal mechanisms (Ahn & Bailenson, 1996), related research showed that messages that most damaged buildings have vulnerable designs also led people to attribute the damage more to building design than messages omitting this information (McClure, Sutton & Wilson, 2007).

These findings show that different messages about earthquakes can modify people's judgments about damage from earthquakes. News media reports on earthquakes and other disasters tend to focus on loss of life, widespread damage to buildings and infrastructure and sensational aspects of the disaster, rather than conveying the wide variations in building performance in countries that apply building codes (Gaddy & Tanjong, 1986; Wilkins & Patterson, 1987). Reporting often relies

on readily available, eye-witness reports rather than professionals such as engineers (Walters & Hornig, 1993). With other hazards such as hurricanes and floods, news media may similarly play an important role in promoting or lessening preparations.

Although research has examined the nature of news reports about risks in other domains (e.g., Coleman & Thorson, 2002; Ivengar, 1991), research directly examining the effects of media reporting on earthquake preparedness is sparse. Cowan, McClure and Wilson (2002) presented participants with newspaper reports following the 1995 earthquake in Kobe, Japan and the Los Angeles 1994 earthquake. Cowan et al. identified two different types of articles, the first representing reports in the few days immediately after the earthquakes and the second characterizing reports one year after the event. These reports parallel Ivengar's (1991) distinction between thematic frames that give more context and episodic frames that focus on anecdotal and sensational events. Cowan et al. noted that "days after" reports emphasized the scale of the damage with portrayals of generalized and widespread damage; they also used colourful, emotive descriptions. In contrast, the "year after" reports talked about the percentage of buildings damaged, and focused on distinctive damage and the particular structure of buildings that suffered most damage.

Cowan et al. presented participants with composite articles representing each of these reports. The two types of message had different effects on participants' judgments. Those reading "year after" reports judged building design as a more likely cause of earthquake damage than those reading "day after" reports. The "year after" group also judged the damage as more preventable and gave lower estimates of the proportion of buildings that were damaged. However, fatalism about the value of preparing for earthquakes in general did not differ across the two messages.

The present study

Cowan et al.'s (2002) study focused on judgments about earthquakes that were geographically distant from the participants (In Kobe and Northridge, USA). In addition, participants were unable to apply real world knowledge about the particular earthquakes in the scenarios, because the earthquakes were deliberately not identified. There is no research exploring the effects of media reporting on earthquake judgments in a setting where the earthquake is identified and is close to the participants, both in time and location. The Canterbury, New Zealand earthquake in February, 2011 was widely reported, especially in New Zealand, occupying the front page of newspapers, television and internet media for several months following the event. This research examined whether exposure to newspaper messages about a recent earthquake affects damage attributions, judgments of preventability, fatalism, and estimates of damage in a setting where people carry significant real world knowledge about the earthquake. Media reports of course are not limited to newspapers; however, we focused on newspaper reports because with these media, it is possible to control for different components of content and reduce confounds between these elements.

The study used newspaper articles from New Zealand newspapers published in the four weeks immediately after the February 2011 Canterbury earthquake. The articles were grouped into fatalistic versus informed descriptions of the outcomes of the earthquake. The classification of messages was based on previous research. Fatalistic messages were similar to Cowan et al.'s (2002) "days after" reports and included descriptions of widespread damage, anecdotal information about buildings that collapsed and no mention that damage was distinctive. Informed messages were similar to Cowan et al.'s "year after" reports and described distinctive buildings that were damaged, rate-based information about the proportion of buildings damaged, and structural information about buildings that performed well or performed poorly. The messages we used in this study were composite messages based directly on replications of newspaper excerpts. Thus we did not modify these reports in ways that we know from previous research would have enhanced their effects.

This design differs from related studies that examined effects of media reports on judgments about an earthquake (e.g., Cowan et al., 2002), as it uses messages that were published concurrently rather than a year apart. However, predictions paralleled those for previous research. We predicted that participants exposed to fatalistic messages would attribute earthquake damage less to building design than those shown informed messages, whereas their attributions to earthquake agency would not differ. We also expected those who read the informed reports to rate the earthquake damage more preventable than those reading fatalistic reports, and to give lower estimates of the percentage of buildings damaged. Finally, we

predicted that fatalism ratings would not differ for the two types of messages.

Method

Design

The present study used a mixed design in which participants were randomly assigned to one of the two conditions: fatalistic and informed messages. After reading the article, participants completed a questionnaire, rating their attributions for the damage, judgments that the damage could have been prevented, fatalism, and the percentage of buildings in Christchurch that were badly damaged in the earthquake.

Participants

The participants were members of the public approached in the central city in Wellington. Participants were recruited over a week and participated voluntarily. The questionnaire was completed by 77 participants. Of these, 38 read the fatalistic message and 39 read the informed message. Two questionnaires from the informed condition were excluded as the participants were unable to read English (the article was read to them and they responded verbally), leaving a total of 37 participants.

Materials

The questionnaires presented two versions of news reports on the Canterbury earthquake. The two versions of the questionnaire differed in regard to which article was included: the fatalistic or the informed version. In both conditions, the articles consisted of short extracts from newspaper reports following the February, 2011, Canterbury earthquake, presented in a three column layout designed to appear like an actual newspaper article. In contrast to Cowan et al.'s (2002) use of articles from two periods a year apart, which comprised typical day-after and year-after earthquake reports, all the articles in this study were from New Zealand newspapers published in the month after the earthquake.

Cowan et al. (2002) identified two main differences between "days after" and "year after" reports. The first difference was in the extent of damage, general or specific (distinctive). The "days after" reports implied generalized damage, similar to non-distinctive damage described by McClure et al. (2001). "Year after" reports contained more specific descriptions of damage to distinctive buildings. The second difference between Cowan et al.'s (2002) "days after" and "year after" articles was the level of causality imputed in the earthquake. The "days after" reports portrayed the earthquake as an agent directly inflicting damage and taking lives, whereas "year after" reports did not have this feature. Cowan et al. noted that these active-verb sentences lead people to attribute damage to the earthquake as the primary cause of outcomes. Similar messages were published after the Canterbury earthquake, referring to "Mother Nature" moving foundations.

Both types of statements that Cowan et al. observed in "days after" and "year after" reports were represented in media reports published within a month of the 2011 Canterbury earthquake. In addition, the Canterbury earthquake articles included references to the effect of building design on outcomes (McClure et al., 2007). Thus the fatalistic statements were defined by several features: they presented descriptions of widespread damage; they made fatalistic assertions that the damage could not have been prevented; and they omitted unaffected areas or buildings that were undamaged. In contrast, the informed statements contained information about the distinctiveness of buildings that collapsed, and how well modern and strengthened buildings stood up. They also focused on the types of buildings that were damaged – mostly older, unreinforced buildings – and information on building codes. Statements were only included if two coders agreed they were fatalistic or informed in regard to these features. We combined the fatalistic and informed excerpts to create the fatalistic and informed "articles", respectively (See Appendix A). The selected statements were not altered from the original in any way. Importantly, whereas Cowan et al. removed references to the cities where the earthquakes occurred (e.g., Kobe), the present study retained identifying features such as the city, the building names and the names of government officials. These details and the article headings made the earthquake easily identifiable.

The questionnaire included five questions measuring the preventability of damage, attributions, fatalism and the proportion of buildings that were damaged. Two questions measured judgments that the damage could be prevented: "How likely is it that something could have been done to prevent the buildings mentioned in the article from being badly damaged?", and "How likely is it that the buildings mentioned in the article would have suffered less damage if they had been strengthened to meet current earthquake building codes?" Ratings were

on a 7 point Likert scale, 1 being "Most unlikely" and 7 being "Extremely likely".

For the attribution measures, the instructions read: "Rate each of the following statements according to how good you think each one is as an explanation of what happened with respect to the buildings". The attribution statements were "It was probably a powerful earthquake" and "The buildings that were damaged probably had a poor structural design". Ratings were on 7 point Likert scales from 1 – "Poor explanation" to 7 – "Good explanation".

Turner et al.'s (1986) four fatalism items, as adapted by Cowan (1998), read: "Earthquakes are going to cause widespread loss of life and property whether we prepare for them or not"; "If people make preparations for the earthquakes they are almost certain not to work"; "There is nothing people can do about earthquakes, so there is no point trying to prepare for that emergency"; and "The way I look at it, nothing is going to help if there were an earthquake". Ratings were on 5-point Likert scales, from 1 - "Strongly agree" to 5 - "Strongly disagree".

The question to assess damage estimates read: "Estimate approximately what percentage of the buildings in the city mentioned in the article might have been badly damaged in the earthquake". This was followed by an eleven point scale from 0% to 100% (from Cowan et al., 2002).

Procedure

Participants were offered a chocolate bar for their voluntary involvement in the study. The researcher was present to answer any questions.

Results

Preventability of Earthquake Damage

Table 1 shows the mean ratings for preventability by message type (fatalistic and informed). A 2 (Message type: Fatalistic, Informed) x 2 (Preventability Question: General, Building codes) mixed design ANOVA was performed. Message type was a between subjects variable and Preventability Question was a within subjects variable.

A main effect was found for Message type, $F(1, 73) = 15.81$, $p < .001$, $\eta^2 = .18$. Participants who viewed the informed message ($M = 5.07$, $SD = 0.20$) judged the damage more preventable than those who viewed the fatalistic message ($M = 3.93$, $SD = 0.20$). There was also a main effect for Question, $F(1, 73) = 28.95$, $p < .001$, $\eta^2 = .28$. Preventability ratings were higher for the building codes question ($M = 4.96$) than the general preventability question ($M = 4.03$). No interaction was found between Message type and Preventability Question, $F(1, 73) = 0.06$, *ns*.

There was a correlation between the building codes preventability question and attributions for the damage to earthquake magnitude, $r(75) = -.31$, $p < .01$, and to building design, $r(75) = .39$, $p < .001$. Participants who saw the damage as more preventable attributed it less to earthquake magnitude and more to the design of the damaged buildings.

Table 1: Mean preventability ratings for the two preventability questions (*SD* in brackets).

Preventability Question	Fatalistic Message	Informed Message
General	3.45 (1.66)	4.62 (1.26)
Building Codes	4.42 (1.59)	5.51 (1.22)

Attributions for Earthquake Damage

Figure 1 shows the mean ratings for the attribution measures. A correlation analysis showed that the two attributions (Building Design, Earthquake Magnitude) were uncorrelated, $r(75) = .24$, ns. A 2 (Message type: Fatalistic, Informed) x 2 (Attribution: Building Design, Earthquake Magnitude) mixed design analysis of variance (ANOVA) was performed. A main effect was found for attribution, $F(1, 73) = 8.29$, $p < .01$, $\eta^2 = .10$. However, this effect was qualified by an interaction between attribution and message type, $F(1, 73) = 4.21$, $p < .05$, $\eta^2 = .05$. Those in the informed condition attributed damage more to building design ($M = 4.78$, $SD = 1.53$) than those in the fatalistic condition ($M = 3.92$, $SD = 1.50$). However, attributions to earthquake magnitude showed no difference between the fatalistic message ($M = 5.21$, $SD = 1.68$) and informed message ($M = 5.00$, $SD = 1.31$). No main effect was found for message type, $F(1, 73) = 1.99$, *ns*.

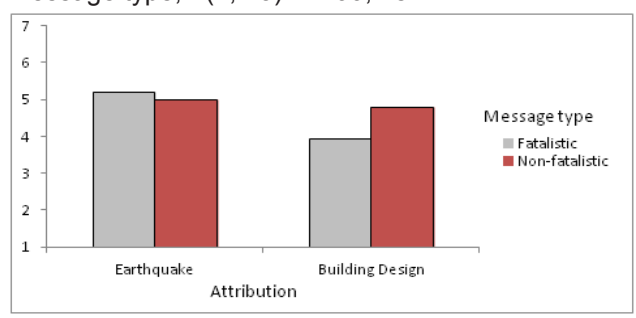

Figure 1: Attributions to Earthquake magnitude and Building design according to Message type. Earthquake Fatalism

The fatalism scale has a Cronbach's alpha of .71. Table 2 shows the mean rating of agreement with each of the four fatalistic statements for the two message types. A 2 (Message: Fatalistic, Informed) x 4 (Fatalism item) ANOVA was performed on the fatalism ratings. A main effect was found for fatalistic statements, $F(1, 72) = 47.94$, $p < .001$, $\eta^2 = .40$, reflecting a difference in levels of agreement with the four items. No main effect was found for message type, and no interaction was found between message type and fatalism ratings.

Table 2: Mean fatalism ratings (SD in brackets).

Item	Fatalistic	Informed
1	2.78 (1.25)	2.97 (1.21)
2	3.86 (0.82)	3.92 (0.83)
3	4.16 (1.04)	4.32 (0.92)
4	4.00 (0.97)	4.38 (0.79)

Estimates of Percentage of Buildings Damaged

The mean damage estimate was 52.37% (*SD* = 17.77) for the fatalistic message and 52.57% (*SD* = 15.97) for the informed message A one way ANOVA on the damage estimates found no difference between the damage estimates with fatalistic and informed messages.

Discussion

Effects of the two types of message

As predicted, the different messages embedded in newspaper reports about the 2011 Christchurch earthquake affect judgments of the preventability of the damage and explanations for that damage. Despite the high availability of real world knowledge about the Canterbury earthquake, participants' views of that earthquake were influenced by a single exposure to selected messages about the earthquake damage consistent with social psychological theories of causal judgment. However, the results also show that this single exposure to information about one earthquake is insufficient to change people's fatalism about earthquakes in general. Interestingly, this exposure apparently does not override their real world knowledge about the extent of damage in the Canterbury earthquake, as measured by their estimates of the percentage of buildings that were badly damaged.

The two different newspaper reports led to different attributions for the earthquake damage. People who read the fatalistic reports attributed the damage less to building design than those who read informed reports. Building design is a controllable factor contributing to earthquake damage, whereas earthquake magnitude is uncontrollable. Hence informed reports that include information about distinctive damage and structural features that affected the outcomes of buildings led people to attribute earthquake damage more to the controllable cause. Fatalistic reports, on the other hand, omit this distinctive and structural information and portray indiscriminate damage, implying a sense of human powerlessness to moderate the earthquake's consequences. They are reflected in participants' lower attributions to building design.

Participants who attributed damage more to building design also saw the damage as more preventable than those who attributed the damage less to building design. This shows that messages that lead people to recognize that earthquake damage partially reflects controllable causes also enhances their view that the damage can be prevented – a key prerequisite of voluntary actions to prepare for earthquakes. Other research shows that people who attribute damage more to building design are more likely to prepare for earthquakes (McClure et al., 1999).

Despite affecting people's attributions to controllable causes (building design), the informed messages did not affect participants' attribution to earthquake magnitude. Indeed, there was no difference in the two groups' beliefs about the role of earthquake magnitude in causing damage in Canterbury. One explanation for this finding, which is consistent with previous findings (e.g., Cowan et al., 2002), is that people believe that earthquake magnitude is a necessary cause of earthquake damage, even when they recognize that other causes play a role. This interpretation is supported by the finding that the two attributions for damage (building design and earthquake magnitude) were uncorrelated. Thus, no matter how much participants thought that the damage was due to building design, they believed that the earthquake magnitude was also a significant cause of the damage – which makes sense. Salient information such as a single newspaper report does not modify this belief even though it affects judgments about the role of building design in the damage.

As predicted, the results also show that the different media messages affected people's perceptions of the preventability of earthquake damage. Consistent with previous research (e.g., Cowan et al., 2002), participants shown informed messages judged the earthquake damage as significantly more preventable

than those shown fatalistic messages. This is an important finding, because the belief that damage is preventable relates positively to taking action to prepare for earthquakes (Turner et al., 1986).

Although the different earthquake messages affected participants' attributions for damage and preventability ratings, they did not affect participants' fatalism about earthquakes in general. Those who read the fatalistic messages were no more fatalistic on the fatalism scale than those who read the informed messages. Using the same fatalism measure, Cowan (1998) found the same result. Although the fatalism measure had a moderate reliability, the items may confound attitudes to social change and personal actions (Coleman & Thorson, 2002). Alternatively, it may be that general fatalistic attitudes to events such as earthquakes are more difficult to move than attributions for specific instances of damage.

There was also no difference between those viewing the fatalistic and informed messages in estimates of the percentage of buildings damaged by the earthquake. This contrasts with Cowan et al.'s (2002) finding of a difference in damage estimates, with participants reading "year after" reports giving lower damage estimates than those reading immediate reports. We predicted that the informed messages would similarly produce lower estimates of damage in the present study, but this prediction is not supported. This result suggests that the messages we used here did not override participants' real world knowledge about the damage resulting from the Canterbury earthquake, even though they influenced judgments about the causes of that damage and its preventability. It is possible that instead of calling on the information they read in the messages, participants were using their real world knowledge from media reports, relatives and friends in Canterbury, or had visited Canterbury themselves (Becker, Paton, Johnston, & Ronan, 2012; Paton, 2003). These interactive and experiential factors can over-ride more passive effects of the media (Becker et al., 2012). Indeed, the similarity of the damage estimates for the two groups in this study supports the view that the groups did not differ in their real world knowledge about the earthquake.

These findings extend understanding of the effects of media reporting on earthquake judgments in two significant ways. Firstly, whereas previous studies have examined the effects of media reports of hypothetical or unidentified earthquakes, the present study used reports of a local, recent, and identified earthquake. Participants had real world knowledge of the Canterbury earthquake, through media reports, word of mouth and even personal experience. Despite this real world knowledge, which appeared to colour participants' views about the earthquake, the results of the present study are largely consistent with previous research and with our predictions.

Secondly, whereas Cowan et al. (2002) examined the effects of reports written at different time intervals after major earthquakes, the present study focused on different articles published within one month of the Canterbury earthquake. The effects of these different messages suggest that media reporting in the days and weeks after an earthquake play an important role in shaping citizens' judgments about earthquakes – both positively and negatively.

Previous studies have shown that different messages about earthquakes affect people's judgments about damage in those earthquakes (Cowan et al., 2002; McClure, Sibley, et al., 2007; McClure, Sutton, & Wilson, 2007). This research clarifies which messages decrease fatalistic cognitions by leading people to attribute damage to controllable factors such as building design. The present study adds to these findings in showing that both types of reports - fatalistic and informed - appear contemporaneously in the days and weeks immediately after an earthquake. Furthermore, these different messages had contrasting effects on people's judgments about earthquakes, despite citizens' high exposure to competing information. The present study shows that despite competing contextual knowledge, a single exposure to certain messages about a known recent earthquake can produce significant differences in important judgments about earthquakes. The Canterbury earthquake in February 2011 dominated the news in New Zealand for over a month and the participants in this study had been exposed to extended media coverage conveying stories and images about the earthquake. Even though participants possessed this pre-existing knowledge about the earthquake, a single selected report affected their judgments that damage could have been prevented and their explanations for that damage.

Wider implications for risk communication

Research on the effects of different messages has implications for media reporting and interpretation. People are aware that the media sensationalizes news,

including earthquakes, yet they are still susceptible to the effects of the incomplete portrayals that the news media often provide. Given the effects of these types of sensational media reports on people's earthquake perceptions and preparedness, it is important to enhance both informed reporting and informed reading.

A key message in this research for risk communications is that after a disaster, citizens are exposed to diverse messages with different implications and consequences. It is important that risk communicators firstly point out the different effects of these messages and secondly point out the relative accuracy of these messages. This can be illustrated in terms of comments by the builder of the Grand Chancellor Hotel in Christchurch which tilted and threatened to topple after the 2011 earthquake. He said: "The fact of the matter is that no building in the world will hold up if you've got this sort of ground movement. You can have the best architects, the best engineers and the best contractors, but if nature's going to drag things away from the foundations, there's nothing you can do." (Fairfax, 2011) When such views are published, risk communicators can point to the contrasting comments of engineers that a huge majority of buildings constructed to current building codes in fact performed well in this earthquake and in others overseas. A related point is that risk communicators can anticipate that these fatalistic messages will circulate after a disaster and be ready to counter these claims with evidence about causes and patterns of damage, rather than merely presenting their own messages disregarding citizens' beliefs and other messages in the media. Risk communicators can also note that the type of causal question that is asked about these events shapes perceptions of the causal factors that contribute to the outcomes (McClure & Hilton 1998).

The news media do shape people's beliefs about different domains (Bandura (2001), and a diet of fatalistic messages about 'natural' disasters is likely to lead people to have more fatalistic beliefs about whether harm can be prevented or reduced by preparatory actions. The news media are guided by the motive to generate interest and make a profit for their owners, but they also represent the 'fourth estate' of government and have a social responsibility to communicate accurately as well as sensationally (Schultz, 1998). Fortunately, these different motives for the news media need not be in conflict. As has been noted elsewhere (Cowan et al., 2002), many aspects of disaster damage such as distinctive damage are newsworthy as well as providing lessons on the effects of inadequate preparation.

The present study examined the effects of a single exposure to media reports. People's long-term exposure to typical media coverage may generate entrenched beliefs about disasters that are hard to shift, as in the fatalistic attitudes reported here which were unaffected by the different messages. If media reports predominantly comprise sensational messages that provide little comparative data or context, they are likely to contribute to fatalistic attitudes (Ivengar, 1991). Risk communications also need to be reinforced by community engagement (Becker et al., 2012; Fischhoff, 1995; Jardine, 2008). In addition, citizens' actions and priorities are influenced by social norms, social networks, and the cultural context, and risk communications comprise only one of many influences on actions to prepare (Bandura, 2001; Becker et al., 2012; Paton, 2003; Solberg et al., 2010). These findings in risk communication must therefore be integrated with other strategies to be most effective in increasing preparedness. Nonetheless, risk communications do play a role, and the present research clarifies one way in which these communications can be more effective in countering the misleading and inaccurate messages that often emerge after a disaster. The present study focused on written news media but these principles are likely to apply equally to other news media such as television and to other hazards (Iyengar, 1991).

References

Ahn, W-K., & Bailenson, J. (1996). Causal attribution as a search for underlying mechanisms: An explanation of the conjunction fallacy and the discounting principle. *Cognitive Psychology, 31*, 82–123.

Bandura, A. (2001). Social cognitive theory of mass communication. *Media Psychology, 3*, 265-299.

Becker, J. Paton, D., Johnston, D. M., & Ronan, K. R. (2012). A model of preparedness for earthquakes: How individuals make meaning of earthquake information and how this influences preparedness. *Natural Hazards, 64*, 107-137.

Cowan, J. (1998). The effects of media descriptions on judgments about earthquakes. MSc Thesis, Victoria University of Wellington.

Cowan, J., McClure, J., & Wilson, M. (2002). What a difference a year makes: How immediate and anniversary media reports influence judgements about earthquakes. *Asian Journal Of Social Psychology, 5*(3), 169-185.

Fairfax (2011). http://www.stuff.co.nz/dominion-post/news/4720023/Strengthening-of-leaning-Christchurch-hotel-begins

Fischhoff, B. (1995). Risk perception and communication unplugged: Twenty years of research. *Risk Analysis, 15*, 137-145.

Gaddy, G. D. & Tanjong, E. (1986). Earthquake coverage of the Western Press. *Journal of Communication, 36*, 105-112.

Hurnen, F. & McClure, J. (1997). The effect of increased earthquake knowledge on perceived preventability of earthquake damage. *Australasian Journal of Disaster and Trauma Studies, 3*, 11.

Iyengar, S. (1992). *Is anyone responsible? Hew television frames political issues*. Chicago. University of Chicago Press.

Jardine, C. G. (2008). Considerations in Planning for Successful Risk Communication. In Everitt, B. & Melnick, E. (Eds.) *Encyclopedia of Quantitative Risk Analysis and Assessment*. John Wiley & Sons, Ltd., London.

McClure, J., Allen, M., & Walkey, F. (2001). Countering fatalism: Causal information in news reports affects judgments about earthquake damage. *Basic and Applied Social Psychology, 23*, 109-121.

McClure, J., & Hilton, D. (1998). Are goals or preconditions better explanations: It depends on the question. *European Journal of Social Psychology, 28*, 897-911.

McClure, J., Sibley, C., & Sutton, R. (2007). 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., Sutton, R., & Wilson, M. (2007). How information about building design influences causal attributions for earthquake damage. *Asian Journal Of Social Psychology, 10*, 233-242.

McClure, J., Walkey, F., & Allen, M. (1999). When earthquake damage is seen as preventable: Attributions. Locus of control, and attitudes to risk. *Applied Psychology: An International Review, 48*, 239-256.

Paton, D. (2003). Disaster preparedness: A social-cognitive perspective. *Disaster Prevention and Management, 12*, 201-216.

Piotrowski, C., & Armstrong, T. R. (1998). Mass media preference in disaster: a study of hurricane Danny. *Social Behavior & Personality: An International Journal, 26*, 341.

Ronan, K. R., & Johnston, D. M. (2005). *Promoting community resilience in disasters*. Springer: New York.

Russell, L. A., Goltz, J. D., & Bourque, J. B. (1995). Preparedness and hazard mitigation actions before and after two earthquakes. *Environment and Behavior, 27*, 744-770.

Schultz, J. (1998). *Reviving the fourth estate*. Cambridge, England: Cambridge University Press.

Smith, K. (1993). *Environmental Hazards: Assessing Risk and Reducing Disaster*. Routledge, London.

Solberg C, Rossetto T, Joffe H (2010) The social psychology of seismic hazard adjustment: re-evaluating the international literature. *Natural Hazards Earth Systems Science, 10*, 1633-1677.

Spittal, M., Siegert, R. S., McClure, J., & Walkey, F. H. (2002). The spheres of control scale; The identification of a clear replicable three-factor structure. *Personality and Individual Differences, 32*, 121-131.

Statistics New Zealand. (2012). *How prepared are New Zealanders for a natural disaster?* Wellington: Statistics New Zealand.Turner, R. H., Nigg, J. M., & Heller Paz, D. (1986). Waiting for disaster. London: University of California Press.

Vasterman, P., Yzermans, C. J., & Dirkzwager, A. J. E. (2005). The Role of the Media and Media Hypes in the Aftermath of Disasters. *Epidemiologic Reviews, 27*, 107-114.

Walters, L. M., & Hornig, S. (1993). Faces in the news: Network television news coverage of Hurricane Hugo and the Loma Prieta. *Journal of Broadcasting & Electronic Media, 37*, 219.

Wilkins, L., & Patterson, P. (1987). Risk analysis and the construction of news. *Journal of Communication, 37*, 80-92.

Appendix A:

Condition 1: Fatalistic Message

Canterbury Earthquake: February, 2011

Christchurch is on its knees. Much of the city and thousands of homes are condemned and vital infrastructure is severely damaged. Authorities say it could be five years before the rubble is cleared, such is the scale of the carnage….

The city of Christchurch looks like a war zone. Buildings are flattened, streets are violently ruptured and dead bodies lay in Cashel Mall covered with old towels and T-shirts….

Yesterday, Earthquake Minister Gerry Brownlee delivered the grim news that a quarter of the buildings in the inner city could be lost and a "huge demolition effort" would leave the central city off-limits for months….

"The fact of the matter is that no building in the world will hold up if you've got this sort of ground movement. You can have the best architects, the best engineers and the best contractors but if nature's going to drag things away from the foundations, there's nothing you can do."

Condition 2: Informed Message

Canterbury Earthquake: February, 2011

New Zealand requirements for earthquake design have been progressively upgraded since 1935. With some exceptions, old buildings performed poorly and new buildings came through well, especially given the extreme shaking…

Buildings constructed in recent times had held up well, but buildings constructed in the 1960s and 1970s had collapsed causing "excessive loss of life"….

Modern structures, with the exception of the 1972 CTV and 1963 Pyne Gould buildings, had stood up well during the shaky last five months; many older buildings had collapsed and claimed lives….

The current earthquake code applied retrospectively to all buildings, and the heritage buildings with strengthening fared better than some modern buildings.

A Systematic Review of the Measurement of Compassion fatigue, Vicarious Trauma, and Secondary Traumatic Stress in Physicians.

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Abstract

Compassion fatigue, vicarious traumatisation and secondary traumatic stress, are all terms used to describe the potential emotional impact on health professionals of working with traumatised patients and clients. These terms are often used interchangeably although recent thinking supports some differences. The consequence of experiencing emotional distress as a result of patient contact is not less in physicians than in other health care professionals. However, these constructs have received little attention in the physician work force. This article reports on a systematic review of literature that reported one or more of these three constructs and as well as including attempts to measure them.

Keywords: *compassion fatigue, vicarious traumatisation, secondary traumatic stress, physicians, systematic literature review*

Introduction

Compassion fatigue, vicarious trauma and secondary traumatic stress describe a group of potential occupational hazards that are increasingly being recognised as such among those who work in caring roles (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Emery, Wade, & McLean, 2009; Pearlman & Saakvitne, 1995). A description of the three constructs appears below.

Although these work-related experiences are described as possibly having negative personal effects, there is a view that they should be regarded as a normal consequence of working in a caring and helping profession, and therefore there is a need to depathologise and normalise such emotional responses in relation to working with traumatised patients (Jenkins & Baird, 2002). Additionally, recent literature has conceptualized certain positive changes resulting from trauma work as vicarious posttraumatic growth (Arnold, Calhoun, Tedeschi, & Cann, 2005) or vicarious resilience (Hernandez, Gansei, & Engstrom, 2007).

Studies that have explored compassion fatigue, vicarious trauma and secondary traumatic stress often emphasise the significant and enduring repercussions when any such negative experiences are ignored (Bauer & Kracen, 2003; Bride, Hatcher, & Humble, 2009; DuBois, 2010). Reports of clinicians' experiences are often reflected in outcomes of emotional distress, pain, and suffering, and may manifest in increased rates of absenteeism, reduced service quality, low levels of efficiency, high attrition rates and eventually, workforce dropout (Darr & Johns, 2008; Figley, 1999; Garrett, 1999; Gorman & Brooks, 2009).

This article presents findings from a larger study that explored the existence and significance of compassion fatigue, vicarious trauma and secondary traumatic stress amongst professionals (physicians, emergency personnel, teachers) working in health, emergency services (police, fire and ambulance) and education. In the larger study, a series of literature reviews was conducted. First, a review of the literature assisted in characterising each trauma construct. This was done in order to gain an understanding of the constructs of compassion fatigue, vicarious trauma and secondary traumatic stress with respect to their definitions, theoretical implications and measurement. Second, systematic reviews of the trauma literature with respect to physicians, emergency personnel, and teachers, were carried out, employing the use of methodological protocols and quality assessment guidelines to review and assess the quality of literature found. Findings of the search were appraised, generating a series of results that reported on the experiences of these trauma

experiences amongst the three groups of professionals. This current study reports the findings in relation to physicians.

While compassion fatigue has been referred to in a number of articles reporting stress in physicians, very few articles have been found that have attempted to measure compassion fatigue, or the other two related constructs of vicarious trauma and secondary traumatic stress. This systematic review was conducted to identify those articles that reported attempts at measurement of one or more of these constructs.

The presence of these constructs, although receiving relatively little attention in the lives of physicians, are none the less of importance. A doctoral dissertation by one of the authors of the current study (PH) found that 17 percent of the 253 Resident doctors participating in the research showed high levels of compassion fatigue (Huggard, 2009).

This article will briefly outline the three constructs of compassion fatigue, vicarious trauma, and secondary traumatic stress, as well as commonly used measures. A description of the review process will then follow, detailing the search strategies, and search criteria and appraisal criterion used to assess the data. The discussion will then review findings of the physician literature appraisal. The purpose of this article was not to conduct a critical appraisal of the three constructs; however, there is still an on-going need for continued debate in order that accurate exploration of the constructs within health care settings can be conducted.

Construct analysis

The following section attempts to clarify conceptually the constructs of Compassion Fatigue (CF), Vicarious Trauma (VT) and Secondary Traumatic Stress (STS). This was conducted as there have been reported definitional overlaps between the constructs (Thomas & Wilson, 2004), thus highlighting the need to appraise current conceptualisations of these terms in the literature.

Compassion fatigue

Compassion fatigue is described as the diminished capacity of a health professional when experiencing the distress at knowing about or witnessing the suffering of their patients and clients (Boscarino, Figley & Adams, 2004; Figley, 1995; Figley, 2002a). It results in behaviours and emotions subsequent to the knowledge of trauma inflicted upon a significant other (Figley, 1995). Earlier studies explored the vocational contexts of professionals working alongside trauma patients and the vicarious or empathetic responses of these professionals to the effects of trauma exhibited by their patients (Adams, Boscarino & Figley, 2006; Figley, 1995). This research helped to determine compassion fatigue as a consequential outcome of working with traumatised patients with emphasis placed on the level of exposure that professionals had to trauma and the capacity of professionals to empathise (Figley, 1995). Research on this construct contributed to the construction of two theoretical models which attempted to portray the general developmental pathways of compassion fatigue. Figley's model of Compassion Stress and Fatigue (Figley, 1995) and the reconceptualised version, the Professional Quality of Life (ProQOL) model (Stamm, 2005) both attempt to provide theoretical direction in understanding the development of compassion fatigue in a professional's life. A more recent description of the latter model is discussed in detail by Huggard, Stamm and Pearlman (2013).

Common instruments used for measuring compassion fatigue are the Compassion Fatigue/Satisfaction Self-Test (CFST) (Figley, 1995) and more recently, the ProQOL scale developed by Stamm (2005, 2009). The CFST measures the level of risk an individual might have to developing compassion fatigue and is perhaps the most universally applied measure due to its specific development for the measurement of both direct and indirect trauma (Bride, Radey & Figley, 2007; Marsay & Higson-Smith, 2005). The CFST scale was re-developed and re-named ProQOL following improvements in the psychometric problems of the CFST scale and also, to re-orientate current thinking behind compassion fatigue by emphasising the positive aspects of clinical practice such as compassion satisfaction (CS) – i.e. the gratifying and rewarding aspects of providing care (Stamm, 2005, 2009).

Vicarious trauma

Vicarious traumatisation is a term that describes the undesirable outcomes of working directly with traumatised populations and presents as negative transformative processes experienced by the health professionals when exposed to traumatised patients (Boscarino, Adams, & Figley, 2004; Figley, 2003; Pearlman & Saakvitne, 1995). This process arises out of the empathetic nature and engagement of the health

professional with the distressed patient or client (Figley, 2003; Trippany, Kress & Wilcoxon, 2004). At times, these negative and distressing effects of working with traumatised clients may not be recognised by the health professional (Trippany, Kress & Wilcoxon, 2004). The early description of vicarious traumatisation (McCann & Pearlman, 1990) conceptualised vicarious trauma as the change in cognitive representation and perception of the affected professional's psyche. Their Constructivist Self-Development Theory is a framework that helps to identify why clinicians respond to patient trauma in the way they do.

A commonly used method of measurement for vicarious trauma is the Traumatic Stress Institute Belief Scale – Revision L (TSI-BSL) which consists of an 80-item questionnaire measuring levels of disruption among five separate domains of safety, trust, control, esteem and intimacy (Jenkins & Baird, 2002). Another instrument used for measuring vicarious trauma is the Traumatic Stress Institute Life Events Checklist (TSI-LEC). In this measure, the scale attempts to identify the added vulnerability that an individual professional might have to the onset of vicarious trauma due to the personal trauma that may have occurred over the course of their own lives (Bride, Radey, & Figley, 2007).

Secondary Traumatic Stress

Secondary Traumatic Stress is a stress response resulting from witnessing or knowing about the trauma experienced by significant others (Bride, Robinson, Yegidis, & Figley, 2004; Figley, 1995; Figley, 2002b; Huggard, 2003). It has been defined as the destructive emotional distress resultant of an encounter with a traumatised and suffering patient or client who has suffered primary or direct trauma (Bride, Hatcher, & Humble, 2009). More recently, it is being recognised as driven by fear that arises from a threat to one's personal safety (Huggard, Stamm & Pearlman; 2013).

The Secondary Traumatic Stress Scale (STSS) developed by Bride, Hatcher, and Humble (2004) is a measure developed to quantify the negative effects that occur in those who encounter traumatised patients. The scale conceptualises secondary traumatic stress as a construct built upon the symptomatic components of post-traumatic stress disorder. It attempts to evaluate the incidence of arousal, avoidance and intrusion among professionals within these three sub-scaled domains.

There have been some attempts to better conceptualise the three constructs of compassion fatigue, vicarious traumatisation, and secondary traumatic stress (Baird & Kracen, 2006; Thomas & Wilson, 2004). While there appear to be similarities between the constructs, individually they each contribute to an understanding of the positive and negative aspects of caring. Common characteristics between these three constructs are that they may be experienced by anyone working in a helping and caring profession, they are the result of exposure to the suffering of others, and such experiences may result in long term negatives effects on one's ability to perform one's professional roles and maintain safe and effective therapeutic relationships with patients and clients.

Methodology

Systematic review methodology

A systematic review of electronic literature was conducted to obtain scholarly articles for appraisal. Systematic methodologies and quality criterion were reviewed and applied as guidelines for carrying out the search and appropriating the literature. Preliminary searches of the literature helped to identify suitable databases for inclusion whilst they also facilitated in the development and application of particular search conditions. The search criteria encompassing inclusion and exclusion measures, further narrowed the return of literature resulting in a small number of articles. There are several methodologies and guideline for the optimal reporting of systematic reviews and meta-analyses in healthcare research, specifically for quantitative studies such as observational studies, randomised control studies and public health interventions (Brand, 2009; Moher, Liberati, Tetzlaff & Altman, 2009; Sensky, 2003). One of these, the PRISMA protocol, was chosen to be used in the current study as this protocol is able to be applied to both meta-analytical and systematic literature reviews (Moher, Cook, Eastwood, Olkin, Rennie, & Stroup, 1999). Figure 1 depicts each step of the systematic retrieval of literature.

Search strategy

A series of databases, keywords and search criteria helped to narrow the return of literature on physicians. A number of wide-ranging databases were searched, including CINAHL Plus, ERIC, Medline & Medline In-Process (M/MIP), PILOTS, ProQuest Educational Journals (PQEJ), ProQuest Dissertations & Theses (PQDT), PsychINFO, and Scopus. Two categories of search terms were used for the retrieval of literature. The first category identified the professional of interest to the

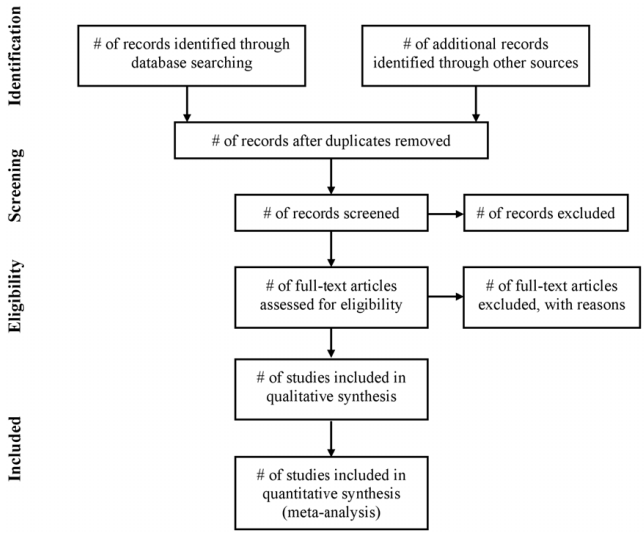

Figure 1.: The PRISMA guidelines, a flow of information through the different phases of a systematic review. Sourced from: Moher, D., Liberati, A., Tetzlaff, J. & Altman, D. G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Medicine, 6(7), e1000097. doi:10.1371/journal.pmed.1000097.g001

research (physicians) with the second category identified the trauma-related concepts that were of interest (compassion fatigue, vicarious trauma and secondary traumatic stress). These terms were combined with "AND" to produce a comprehensive search string for the retrieval of literature.

The literature returned from each database was screened for relevancy by the application of inclusion and exclusion criteria. For articles to have been made eligible for inclusion in one of the systematic reviews, the article must have: (i) at least studied or included the interested professional group/occupation and (ii) to have measured at least one of the traumatology concepts among this group. Exclusion of articles was based on those that were: (i) not of the English language, and, (ii) were documents other than journal articles, reports or theses/dissertations.

Quality appraisal

Systematic reviews require literature of the highest available quality to help answer proposed 'clinical' aims and objectives regarding the effectiveness of a given treatment or therapy (Glasziou, Vandenbroucke & Chalmers, 2004). Various criteria for assessing the quality of literature have been reported (Pluye, 2009), however no one set of assessment criteria was identified that would be suitable for the range of articles that might be retrieved during the current systematic review. From existing literature, a set of criteria was developed to assess the quality of literature retrieved (Table 1).

Table 1: Criterion used to appraise quality among the traumatology literature reviewed

Quality Criterion	Y/N
1. The research question/aims/objectives is clearly explained	___
2. An appropriate study design has been used	___
3. The study adequately describes the following:	
(i) Sample/Participants	___
(ii) Sample strategy	___
(iii) Methods	___
(iv) Data collection methods	___
(v) Context of collection	___
4. Construct description and definition	___
5. Researcher reflexivity provided	___
6. Ethical concerns mentioned	___

Quality criteria 5 (researcher reflexivity), used in this review, is a novel construct that concerns the researchers disclosure of their brief personal narratives on their current biases, beliefs, and behaviours, especially in the field of qualitative research (Watt, 2007). For each article found, titles and abstracts were initially examined to determine whether the selection criteria (physicians PLUS one or more of the three constructs PLUS measurement of the construct[s]) were met. If an article was unable to meet these criteria, the reference was excluded and the full text article was not retrieved. The data abstracted from each article includes author and year of publication, the journal or publication, research objectives, population or sample used for the study, the construct measured, type of instrument used to measure the construct, analysis measures undertaken and results of the study.

Results of the search for Physicians

Fifty-six references were retrieved from the selected databases. Table 2 below displays the findings for each database searched before the removal of duplicates.

Table 2: Number of articles sourced from each database

Physician AND	CF	VT	STS
CINHAL Plus	5	0	0
ERIC	0	0	0
EThOS	0	0	0
M/MIP	6	3	1
PILOTS	0	0	2
PQDT	4	0	4
PQEJ	0	0	0
PsychINFO	4	0	2
Scopus	18	4	3

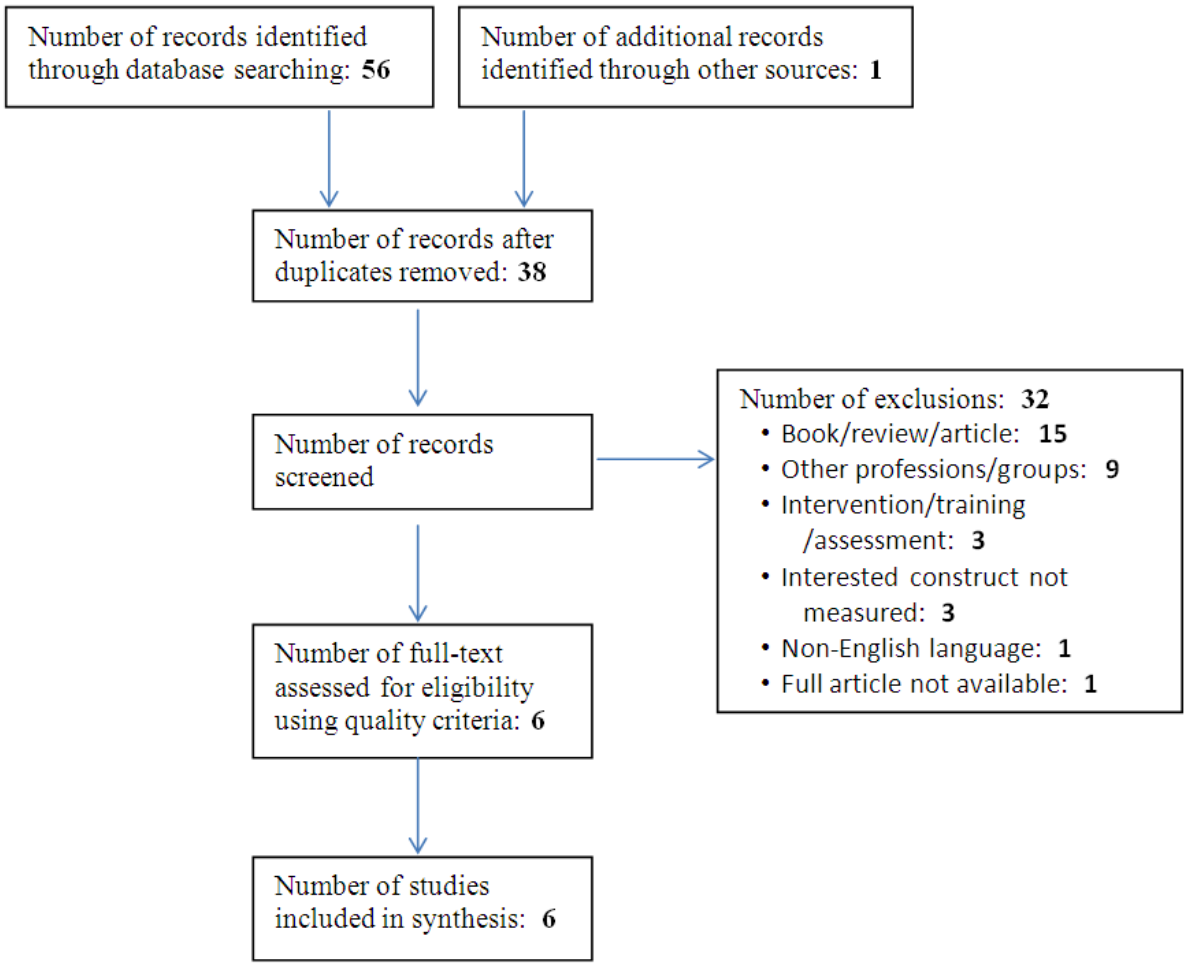

Figure 2. An adapted PRISMA flow diagram of the literature selection process for inclusion in the systematic review for Physicians

Results were then combined and duplicates removed, leaving 38 articles. Further analysis of reference titles, abstracts and reference lists was made. Of the 38 references, six were identified to have fulfilled the search criteria. Figure 2 shows the systematic process used for the search of literature.

Articles included in the review

Table 3 (next page) lists the six articles, dissertations, and reports that were identified as meeting the search criteria. The first reference (Markwell, & Wainer, 2009) is based on the earlier more extensive survey conducted by the Australian Medical Association (2008).

Quality appraisal

Quality appraisal of the 6 studies was carried out. Scores allocated to each criterion listed in Table 2 are shown in Table 4. Each 'Y' counts as 1 point, with the exception of criterion 3, which is broken up into five sub-questions and therefore a 'positive' or 'Yes' score being given only 0.2 points. These points are then added together, the highest total being 6. This is then divided by the total number of criteria to give a percentage in decimal form, the highest score being 1.0. Four articles met all the quality appraisal criteria previously listed in Table 2.

Table 4. Summary of quality scores

Criterion	1	2	3(i)	(ii)	(iii)	(iv)	(v)	4	5	6	Total Score
Articles											
Markwell	N	Y	Y	Y	Y	Y	N	N	N	N	0.3
AMA	Y	Y	Y	Y	Y	Y	Y	Y	N	N	0.67
Reese	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	1
Way	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	1
Van Deusen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	1
Garrett	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	1

Table 3. Physician-related references identified from the systematic review

Reference	Research Aims and Measures Used	Results
Markwell, A. L., & Wainer, Z. (2009). The health and wellbeing of junior doctors: Insights from a national survey. *Medical Journal of Australia, 191*(8), 441-444.	To assessed several areas related to junior doctors' health and wellbeing, including; intention to continue to practise medicine, perceptions of morale and wellbeing, career satisfaction, workload and the working environment, coping strategies when faced with work-related stress; and self-care and work-life balance. Compassion fatigue was measured using the ProQOL.	A majority of junior doctors (54%) met the criteria for compassion fatigue.
Australian Medical Association (2008). *AMA survey report on junior doctor health and wellbeing*. ACT, Australia: Australian Medical Association.	To obtain a view of the health and wellbeing of junior doctors and assess how well they are coping with the pressures of balancing work, study and, in many cases, family commitments at the start of their professional careers. The survey also aimed to establish a national baseline from which the Australian Medical Association will be able to monitor trends in the health and wellbeing of junior doctors. Compassion fatigue was measured using the ProQOL.	54% of doctors surveyed are at risk of compassion fatigue and/or secondary traumatic stress
Reese, M. (2008). *Compassion fatigue and spirituality with emergency health care providers.* Unpublished doctoral dissertation, Regent University, Virginia, USA.	To examine the relationships between the constructs burnout, compassion fatigue and compassion satisfaction (as measured by the ProQOL) with demographics, job satisfaction and spirituality among emergency health care providers.	A statistically significant relationship was found between spirituality and compassion fatigue. A statistically significant inverse relationship was also found between participant age and compassion fatigue
Van Deusen, K. M., & Way, I. (2006). Vicarious trauma: an exploratory study of the impact of providing sexual abuse treatment on clinicians' trust and intimacy. *Journal of Child Sexual Abuse, 15*(1), 69-85.	To examine whether male and female clinicians who treat sexual abuse survivors had altered cognitions about trust of and intimacy with others (as indicators of vicarious traumatisation) , as well as a history of personal childhood maltreatment. Vicarious traumatisation was measured using the Trauma Stress Institute Belief Scale.	There was no relationship between a history of child sexual abuse and vicarious trauma effects. Scores for self-reported disruption in cognitions about intimacy with others exceeded norms for mental health professionals.
Way, I., Van Deusen, K. M., & Cottrell, T. (2007). Vicarious trauma: Predictors of clinicians' disrupted cognitions about self-esteem and self-intimacy. *Journal of Child Sexual Abuse, 16*(4), 81-98	To explore whether male and female clinicians who treat sexual abuse survivors or offenders experience different vicarious trauma effects and the contribution of variables associated with vicarious traumatisation as measured by the Trauma Stress Institute Belief Scale. This study particularly focused on cognitions of self as an indicator of vicarious traumatisation.	Male gender predicted greater disrupted cognitions about self-esteem and self-intimacy. Clinician age (inverse relationship) and childhood emotional neglect predicted greater disrupted cognitions about self-intimacy.
Garrett, C. (1999). *Stress, coping, empathy, secondary traumatic stress and burnout in healthcare providers working with HIV-infected individuals* Unpublished doctoral dissertation. New York University, New York, USA	To explore how different healthcare providers experience stress, coping, empathy, burnout and secondary traumatic stress (measured by the Compassion Satisfaction/Fatigue Self-Test) to explore the differences between these professionals on a number of variables	Physicians in this study showed low levels of secondary traumatic stress

Discussion

The research results suggest that physicians, like other health professionals, may experience compassion fatigue and vicarious trauma; however no articles were found that described measuring secondary traumatic stress in physicians. The reason for such an absence of articles is unclear but may be due to a limited acceptance of the term "secondary traumatic stress" in the health professional literature. High presence of the risk of developing compassion fatigue was reported in two linked studies (Australian Medical Association, 2008; Markwell & Wainer, 2009). Two studies identified physician age as being significantly and inversely related to compassion fatigue (Reese, 2008) or vicarious trauma (Way, VanDeusen & Cottrell, 2007). Reese's study also reported a significant relationship between compassion fatigue and spirituality and Way et al. reported that male gender and childhood emotional neglect predicted vicarious traumatisation. Two studies (Garrett, 1999; VanDeusen & Way, 2006) reported that the nature of a physician's work may be a potential risk factor for the development of compassion fatigue or vicarious traumatisation. They suggested that physicians who provided certain types of care, such as sexual abuse therapy (Van Deusen & Way, 2006) or HIV-AIDS treatment (Garrett, 1999), may be at greater risk.

The generalisation of these results to wider populations of physicians must be treated cautiously, as the sampling methodologies employed across the studies limited the scope for generalisability. Most of the studies used some form of convenience sampling. This involved the recruitment of participants through organisational membership or through their employment in certain geographical areas and programmes. However, results from the studies included for review do indicate that the constructs are present in the groups of physicians studied. Literature identified since the current systematic review was conducted has reported on the presence of compassion fatigue in resident doctors (Huggard & Dixon, 2011; Huggard, Stamm & Pearlman, 2013).

Conclusion

The results of this study highlight that research into the presence of compassion fatigue, vicarious trauma and secondary traumatic stress in physicians has received little attention, despite being reported as negatives experience by this group of health professionals. This lack of literature suggests opportunities for further research in this area, and particularly research focusing on gaining an understanding of the causative effects. Within a clinical environment, the interaction of the various constructs, as well as with those of burnout and compassion satisfaction, is complex, and therefore the design of studies aimed at further exploring these constructs and interactions may present some methodological difficulty. An additional area of research relates to studying the effect of preventative or mitigating interventions aimed at assisting physicians to manage the effects of compassion fatigue, vicarious traumatisation, or secondary traumatic stress. Various articles report a variety of behaviours and practices aimed at mitigating the effects of compassion fatigue, vicarious traumatisation, and secondary traumatic stress. However, although a review of preventative interventions was not the purpose of the current study, no articles were identified in this systematic review that reported on research measuring the effectiveness of any such interventions.

References

Adams, R. E., Boscarino, J. A., & Figley, C. R. (2006). Compassion Fatigue and Psychological Distress Among Social Workers: A Validation Study. *American Journal of Orthopsychiatry,76*(1), 103-108.

Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital Nurse Staffing and Patient Mortality, Nurse Burnout, and Job Dissatisfaction. *JAMA: The Journal of the American Medical Association, 288*(16), 1987-1993.

Arnold, D., Calhoun, R.G., Tedeschi, R., & Cann, A. (2005). Vicarious posttraumatic growth in psychotherapy. *Journal of Humanistic Psychology*, *45*(2), 239-263.

Australian Medical Association (2008). *AMA survey report on junior doctor health and wellbeing*. ACT, Australia: Australian Medical Association.

Baird, K., & Kracen, A. C. (2006). Vicarious traumatization and secondary traumatic stress: A research synthesis. *Counselling Psychology Quarterly, 19*(2), 181-188.

Bauer, J., Häfner, S., Kächele, H., Wirsching, M., & Dahlbender, R. W. (2003). The burn-out syndrome and restoring mental health at the working place. *Burn-out und wiedergewinnung seelischer gesundheit am arbeitsplatz, 53*(5), 213-222.

Boscarino, J. A., Figley, C. R., & Adams, R. E. (2004). Compassion fatigue following the September 11 terrorist attacks: A study of secondary trauma among New York City social workers. *International Journal of Emergency Mental Health, 6*(2), 57.

Brand, R. A. (2009). Standards of Reporting: The CONSORT, QUOROM and STROBE guidelines. *Clinical Orthopaedics and Related Research, 467*, 1393 - 1394.

Bride, B. E., Robinson, M. M., Yegidis, B., & Figley, C. R. (2004). Development and Validation of the Secondary Traumatic Stress Scale. *Research on Social Work Practice, 14*(1), 27-35.

Bride, B. E., Radey, M., & Figley, C. R. (2007). Measuring Compassion Fatigue. *Clinical Social Work Journal, 35*(3), 155-163.

Bride, B. E., Hatcher, S. S., & Humble, M. N. (2009). Trauma Training, Trauma Practices, and Secondary Traumatic Stress Among Substance Abuse Counselors. *Traumatology, 15*(2), 96-105.

Darr, W., & Johns, G. (2008). Work Strain, Health, and Absenteeism: A Meta-Analysis. *Journal of Occupational Health Psychology, 13*(4), 293-318.

DuBois, A. (2010). *An inquiry of the lived experiences and contextual understandings of early childhood special educators related to children's trauma* (3427789). Unpublished doctoral dissertation. Duquesne University, Pennsylvania, USA.

Emery, S., Wade, T. D., & McLean, S. (2009). Associations among therapist beliefs, personal resources and burnout in clinical psychologists. *Behaviour Change, 26*(2), 83-96.

Figley, C. R. (1995). Compassion fatigue as secondary traumatic stress disorder: An overview. In C.R. Figley (Ed.). *Compassion fatigue: Coping with secondary traumatic stress disorder in those who treat the traumatized,* (pp. 1-20). New York, NY: Brunner/Mazel.

Figley, C. R. (1999). Compassion fatigue: Towards a new understanding of the costs of caring. In B. H. Stamm (Ed.), *Secondary traumatic stress: Self-care issues for clinicians, researchers, & educators* (2nd ed., pp. 3-28). Lutherville, MD: Sidran Press.

Figley, C. R. (2002a). Compassion fatigue: Psychotherapists' chronic lack of self care. *Journal of Clinical Psychology, 58*(11), 1433-1441.

Figley, C. R. (2002b). *Treating compassion fatigue*: New York, NY: Brunner-Routledge.

Figley, C. R. (2003). Compassion fatigue: An introduction. Retrieved November 15, 2011, from http://www.giftfromwithin.org/html/cmpfatig.html

Garrett, C. (1999). *Stress, coping, empathy, secondary traumatic stress and burnout in healthcare providers working with HIV-infected individuals.* Unpublished doctoral dissertation. New York University, New York, USA.

Gorman, D. F., & Brooks, P. M. (2009). On solutions to the shortage of doctors in Australia and New Zealand. *Medical Journal of Austalia, 190*(3), 152-156.

Hernández, P., Gangsei, D., & Engstrom, D. (2007). Vicarious resilience: A new concept in work with those who survive trauma. *Family Process*, *46*(2), 229-241.

Huggard, P. (2003). Secondary traumatic stress. *New Ethicals*, 9–14.

Huggard, P. (2009). *Managing compassion fatigue: implications for medical education*. Unpublished doctoral dissertation: University of Auckland, Auckland, New Zealand.

Huggard, P.K. & Dixon, R. (2011). "Tired of Caring": the impact of caring on Resident Doctors. *Australasian Journal of Disaster and Trauma Studies, 2011*(3), 105-111.

Huggard. P.K., Stamm, B.H. & Pearlman, L.A. (2013). Physician Stress: Compassion Satisfaction, Compassion Fatigue and Vicarious Traumatization. In C.R. Figley, P.K. Huggard & C. Rees (Eds.), *First Do No Self-Harm* (pp.127-145). New York: Oxford University Press.

Jenkins, S. R., & Baird, S. (2002). Secondary Traumatic Stress and Vicarious Trauma: A Validational Study. *Journal of Traumatic Stress, 15*(5), 423-432.

Markwell, A. L., & Wainer, Z. (2009). The health and wellbeing of junior doctors: Insights from a national survey. *Medical Journal of Australia, 191*(8), 441-444.

Marsay, G., & Higson-Smith, C. (2005). Exploring Compassion Fatigue and Trauma in the South African Learning Environment. Retrieved November 15, 2011, from http://www.learningandviolence.net/violence/MarsayViolence.pdf

McCann, I. L., & Pearlman, L. A. (1990). Vicarious traumatization: A framework for understanding the psychological effects of working with victims. *Journal of Traumatic Stress,3*(1), 131-149.

Meadors, P., Lamson, A., Swanson, M., White, M., & Sira, N. (2009). Secondary traumatization in pediatric healthcare providers: compassion fatigue, burnout, and secondary traumatic stress. *Omega: Journal of Death & Dying, 60*(2), 103-128.

Moher, D., Cook, D. J., Eastwood, S., Olkin, I., Rennie, D., & Stroup, D. F. (1999). Improving the quality of reports of meta-analyses of randomised controlled trials: the QUOROM statement. *Lancet, 354*(9193), 1896-1900.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Prisma Group, T. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med, 6*(7), e1000097.

Pearlman, L. A., & Saakvitne, K. W. (1995). Treating therapists with vicarious traumatization and secondary traumatic stress disorders. In C.R.Figley (Ed.), *Compassion fatigue: Coping with secondary traumatic stress disorder in those who treat the traumatized, (pp.*150-177). New York, NY: Brunner/Mazel.

Pluye, P., Gagnon, M.-P., Griffiths, F., & Johnson-Lafleur, J. (2009). A scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative and mixed methods primary studies in Mixed Studies Reviews. *International Journal of Nursing Studies, 46*(4), 529-546.

Reese, M. (2008). *Compassion fatigue and spirituality with emergency health care providers.* Unpublished doctoral dissertation, Regent University, Virginia, USA.

Sensky, T. (2003). The utility of systematic reviews: The case of psychological debriefing after trauma. *Psychotherapy and Psychosomatics, 72*(4), 171 - 175.

Stamm, B. H. (2005). *The ProQOL manual*. Pocatello, ID: Idaho State University.

Stamm, B. H. (2009). *The concise ProQOL manual.* Pocatello, ID: ProQOL. org.

Thomas, R.B. & Wilson, J.P. & (2004). Issues and controversies in the understanding and diagnosis of compassion fatigue, vicarious traumatization, and secondary traumatic stress disorder. *International Journal of Emergency Mental Health, 6*(2), 81-92.

Trippany, R. L., Kress, V. E. W., & Wilcoxon, S. A. (2004). Preventing vicarious trauma: What counselors should know when working with trauma survivors. *Journal of Counseling & Development, 82*(1), 31-37.

VanDeusen, K. M., & Way, I. (2006). Vicarious trauma: an exploratory study of the impact of providing sexual abuse treatment on clinicians' trust and intimacy. *Journal of Child Sexual Abuse, 15*(1), 69-85.

Watt, D. (2007). On becoming a qualitative researcher: The value of reflexivity. *The Qualitative Report, 12*(1), 82-101.

Way, I., VanDeusen, K. M., & Cottrell, T. (2007). Vicarious trauma: Predictors of clinicians' disrupted cognitions about self-esteem and self-intimacy. *Journal of Child Sexual Abuse, 16*(4), 81-98.