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

John McClure [1]
Justin Velluppillai [1]
[1] School of Psychology, Victoria University of Wellington, Wellington, New Zealand

We thank Malou Beintmann and Liv Henrich for valuable comments on this research.

Author correspondence:
John McClure,
School of Psychology,
Victoria University of Wellington
PO Box 600
Wellington 6140
New Zealand.
Email: john.mcclure@vuw.ac.nz

URL: http://trauma.massey.ac.nz/issues/2013-1/AJDTS_2013-1_McClure.pdf

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*.

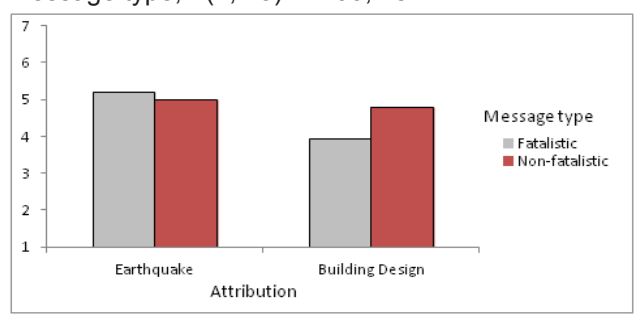

Figure 1: Attributions to Earthquake magnitude and Building design according to Message type. Earthquake Fatalism

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.