Disaster preparedness: a social-cognitive perspective

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Abstract

Despite considerable effort and expenditure on public hazard education, levels of disaster preparedness remain low. By integrating and expanding on natural hazards and health research on protective behaviour, this paper proposes a social cognitive model of disaster preparedness. The model describes a developmental process that commences with factors that motivate people to prepare, progresses through the formation of intentions, and culminates in decisions to prepare. Following their critical appraisal, variables implicated at each stage are identified and their role in the preparedness process described. The implications of the model for the conceptualisation and assessment of preparedness is discussed, as is its implications for risk reduction and communication strategies.

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Introduction

Promoting and maintaining household disaster preparedness is important. Disaster preparations or adjustments (e.g. storing food and water, securing high furniture and water heaters, preparing a household emergency plan) reduces the risk of injury and damage within a household and facilitates a capability for coping with the temporary disruption associated with hazard activity. Given the infrequent nature of hazard activity, the maintenance of preparedness over time is essential to sustaining individual resilience (Paton, 2000).

It is frequently assumed that providing the public with information on hazards and how to mitigate their consequences to the public will encourage preparation (Smith, 1993). This assumption is unfounded. Despite considerable efforts and expenditure on public hazard education, levels of preparedness remain low (Ballantyne *et al.*, 2000; Duval and Mulilis, 1999; Lindell and Whitney, 2000; McClure *et al.*, 1999; Mulilis and Duval, 1995; Paton *et al.*, 2000; Paton *et al.*, 2001a,b). Indeed, public hazard education programs may actually reduce perceived risk and levels of preparedness. Ballantyne *et al*'s. (2000) finding that this outcome resulted from people transferring responsibility for safety from the self to others illustrates how people's reasoning can support decisions not to prepare. Furthermore, a substantial discontinuity between people's risk beliefs and their level of preparation suggests that adoption decisions are influenced by additional motivational and interpretative processes. These findings highlight a need for a more systematic understanding of the reasoning and judgement that underpin decisions regarding disaster preparedness.

Parallels between these issues and those unearthed in studies of the adoption of health protective behaviours (Abraham *et al.*, 1998; Bennett and Murphy, 1997) provides a promising avenue for researching disaster preparedness. In particular, this work suggests that adjustment can be better understood by moving from a focus on the antecedents of behaviour (in this case risk perception) to the cognitive processes that underpin behaviour change and its maintenance over time.

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The pursuit of this line of inquiry is justified by the fact that, in regard to the variables identified in health research, natural hazards research has both reinforced their potential to influence adjustment decisions (Bishop *et al.*, 2000; Duval and Mulilis, 1999; Lindell and Whitney, 2000; Paton *et al.*, 2000, 2001a,b), and identified several additional social cognitive variables capable of influencing this process. For example, Mulilis and Duval (1995) and Duval and Mulilis (1999), using their Person Relative to Event model, demonstrated a role for problem-focused coping. Bishop *et al.* (2000) and Paton *et al.* (2001a,b) demonstrated how a model comprising social cognitive variables (problem-focused coping, self-efficacy, and sense of community) predicted preparedness and resilience to natural hazard (salinity and volcanic ash fall respectively) effects. By integrating this work with that on health protective behaviour, and including a wider range of variables, this paper outlines a more comprehensive social-cognitive model of natural hazard preparedness.

Model development

Several models of protective behaviour describe how the relationship between motivating factors and risk reduction behaviour is mediated by intentions (Abraham *et al.*, 1998; Ajzen, 1991; Ajzen, 1998; Bagozzi, 1992; Bennett and Murphy, 1997; Godin and Kok, 1996; Gollwitzer, 1993). It can be inferred from this that the adoption process will comprise three phases, each influenced by a specific set of variables. The first concerns factors that motivate people (precursor variables). The second concerns the variables that link this initial motivation with the formation of intentions. The third phase describes the relationship between preparatory intentions and actual preparation.

The motivation phase: precursor variables

Consistent with both the health protective behaviour literature, and contemporary approaches to public hazard education, risk perception represents a valid precursor variable (Lindell and Perry, 1992; Sjöberg, 2000). However, while people may accept the fact that a given hazard can pose a threat, the motivating potential of this belief may be tempered by attributional processes such as normalisation bias or unrealistic optimism (Paton *et al.*, 2000). Consequently, there are grounds for exploring other precursors. Here a role for two additional precursor variables, critical awareness and hazard anxiety, is proposed.

Research into how community members respond to adverse circumstances has identified Critical Awareness as an important precursor (Dalton *et al.*, 2001). This variable describes the extent to which people think and talk about a specific source of adversity or hazard within their environment. Lindell and Whitney (2000) proposed the inclusion of a similar variable. However, their recommendation was based on a measure of traumatic stress symptomatology, intrusiveness, that is symptomatic of the subconscious processing of discordant information following a traumatic experience. In contrast, Dalton *et al.* (2001) describe a process that prevails under normal, and pre-disaster, circumstances, which describes conscious reasoning about issues people perceive as personally important. A role for critical awareness may be particularly important given the rarity of natural hazard activity, and the fact that, in contemporary society, people face adversity from several sources: natural hazards, unemployment, crime and so on.

Much public hazard education makes the erroneous assumption that these sources of adversity are either equally salient or that people can reason about them independently. It appears that "social hazards" encountered on a daily basis or whose existence and implications are reiterated through regular media attention, are perceived as more salient (Paton *et al.*, 2001a,b). Thus, during periods of hazard quiescence, when most readiness work must take place, natural hazards will compete with their social counterparts for attention, with the salience, or otherwise, of a hazard (natural or otherwise) evident in how much people think and talk about it. This contention is based on discursive arguments to the effect that people use language both to construct and to express their judgements. Reasoning and decision making (about a hazard) is represented in what and in how people communicate with one another (Bagozzi and Dabholar, 2000). Consequently, the relative importance of

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natural hazards will be reflected in the frequency with which people discuss them. This renders critical awareness a potentially important precursor variable. Only when natural hazards are perceived as salient or critical, by a person, are they likely to motivate protective behaviour.

As a consequence of their unpredictable and uncontrollable characteristics and their potential for creating substantial destruction and death, natural hazards represent a prime candidate as a source of anxiety. It has been argued that earthquake anxiety may reduce the likelihood that people will prepare for earthquakes (Duval and Mulilis, 1999; Lamontaigne and LaRochelle, 2000). For example, earthquake anxiety could be reduced by ignoring information about, or actions related to the source of their anxiety. There thus exist sound reasons for the inclusion of anxiety or fear as a motivating or de-motivating factor.

The presence of these factors, risk perception, critical awareness of hazards, and hazard anxiety are proposed as variables required to motivate protective behaviour. That is, some level of their presence is required for the adjustment adoption process to commence. If present at adequate levels, a person will progress to the next phase, forming intentions to adopt. Progression between motivation and intention formation is, however, influenced by another set of variables.

Intention formation variables

Health research has identified outcome expectancy (perceptions of whether personal actions will effectively mitigate or reduce a problem) and self-efficacy (beliefs regarding personal capacity to act effectively) as predictors of intention formation (Abraham *et al.*, 1998; Bagozzi and Edwards, 1998; Bandura, 1992; Bennett and Murphy, 1997; Schwarzer, 1992). Consequently, they are allocated a similar role in the present model.

Consistent with the predictions of the social cognitive approaches outlined above, it is proposed that outcome expectancy will precede efficacy judgements. The model postulates that once motivated to think about hazards, people then make judgements regarding whether their actions will mitigate hazard effects. If a person forms a favourable Outcome Expectancy, whether or not they progress towards the formation of preparedness intentions is a function of the level of their self-efficacy beliefs.

The inclusion of these variables in natural hazards research can be justified on several grounds. Risk reduction strategies attempt to motivate people to prepare for responding to infrequently occurring and highly destructive or disruptive hazards (e.g. earthquakes, volcanic eruptions) whose nature and intensity tend not to be perceived as lending themselves to mitigation by individual action (Spedden, 1998). Furthermore, because of their rarity, hazard effects are typically experienced vicariously through mass media coverage that tends to focus on the associated destruction and loss of life. In the absence of experience to counter perceptions derived at second hand, assumptions regarding the overwhelmingly destructive nature of hazard activity may be reinforced. Consequently, beliefs regarding the personal ability to mitigate hazard consequences will constitute an important mediating variable in the adjustment process.

Similar arguments can be proposed for self-efficacy. Self-efficacy has been implicated as a precursor of adjustment adoption and resilience in natural hazards contexts (Bishop *et al.*, 2000; Duval and Mulilis, 1999; Hurnan and McClure, 1997; Lindell and Whitney, 2000; Paton *et al.*, 2001a,b). Second, the number and quality of action plans, and the amount of effort and perseverance invested in risk reduction behaviours is strongly dependent on self-efficacy (Abraham *et al.*, 1998; Bennett and Murphy, 1997). Given the rarity of hazard activity, and the need for the development of personal response plans, self-efficacy is likely to influence this process. Third, natural hazard effects are often perceived as uncontrollable. Self-efficacy has been identified as a significant influence on behaviour when dealing with issues perceived as less controllable (Godin and Kok, 1996).

While not present in health models, problem-focused coping (a predisposition to choose action directed at changing a situation) has been included here. While implicated as a predictor of disaster resilience and preparedness (Duval and Mulilis, 1999; Lindell and Whitney, 2000; Mulilis and Duval, 1995; Paton *et al.*, 2001a,b), its influence may be mediated by another factor, response efficacy (Abraham *et al.*, 1998; Lindell and Whitney, 2000; Mulilis and Duval, 1995).

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Response efficacy describes people's perceptions of the availability of the resources (e.g. time, skill, financial and physical resources, social networks) required to implement adjustments, the perceived benefits associated with adoption, and the degree of conflict between recommended actions and other important personal goals or needs (Lindell and Whitney, 2000; Karoly, 1998; Paton *et al.*, 2001a,b). While problem-focused coping may predispose people to confront a problem, these benefits may not be realised if people do not believe that they possess the resources to pursue a goal (Mulilis and Duval, 1995).

In addition to its theoretical importance, the inclusion of intentions may provide other benefits. For example, irrespective of their attitudes towards preparation, people who rent their homes may be unable to instigate some adjustments (e.g. securing furniture and water heaters, making structural changes to chimneys, etc.) because their lease precludes such activities. Or renters' decisions may be influenced by their perceiving their tenure in a house as temporary (e.g. looking for somewhere else to live, temporary employment within an area, etc.). To develop a comprehensive understanding of the preparedness process it is essential to incorporate a mechanism that is less likely to be confounded by factors that affect adjustment adoption but which are beyond the control of a given individual. The inclusion of "intentions" fulfils this function. The inclusion of intention also introduces a need to consider the possible existence of variables that affect whether intentions are converted into actual behaviour.

Linking intentions and preparation

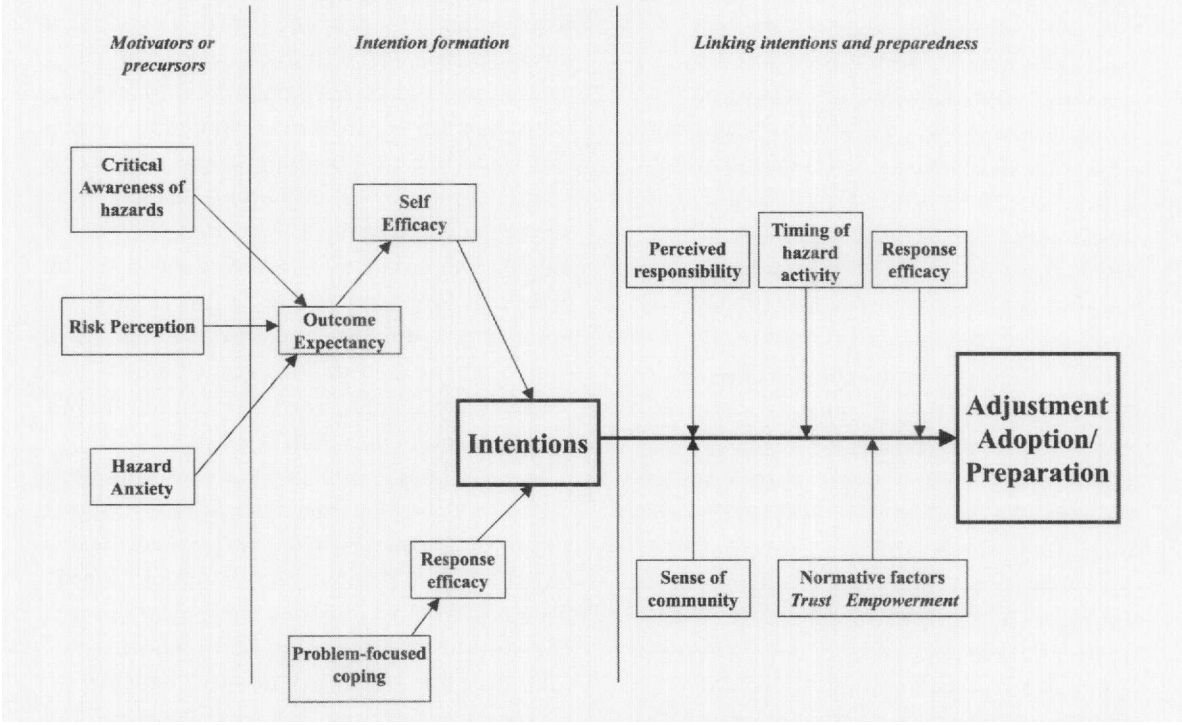
Several variables have the potential to moderate the conversion of intentions to preparations. Sense of community (feelings of attachment for people and places) can influence adjustment decisions (Bishop *et al.*, 2000; Paton *et al.*, 2000). People with strong feelings of belonging to a place may be more likely to convert intentions into actual preparedness. The degree to which people accept personal responsibility for their safety may act in a similar capacity (Ballantyne *et al.*, 2000; Duval and Mulilis, 1999; Lindell and Whitney, 2000; Mulilis and Duval, 1995; Paton *et al.*, 2000). If people perceive others (e.g. local councils, emergency management agencies) as being responsible for their safety, they are less likely to convert intentions to actions (Ballantyne *et al.*, 2000). The unpredictable and infrequent nature of natural hazard activity means that beliefs regarding the anticipated timing of the next damaging hazard event could moderate the relationship between intentions and adjustment adoption (Mulilis and Duval, 1995). The longer this time interval is perceived to be, the less likely people are to perceive any urgency to act on their intentions.

Intentions may be moderated by normative beliefs within a community (Paton, 2000). These are factors that could reflect actual experience, but can also reflect perceptions and beliefs formed through interaction with others, media reporting and so on. Two are proposed here to illustrate the potential role of normative factors. Paton and Bishop (1996) discussed the relationship between resilience to adversity and social justice (procedural and distributive justice). According to this view, the concepts of participation and empowerment (Dalton *et al.*, 2001; Paton, 2000) deserve inclusion. Recent work on the importance of trust in the authorities as a determinant of community action (Dillon and Phillips, 2001) warrants its inclusion here. Trust and participation/empowerment are thus included here as moderators.

The reasoning process that is illustrated by incorporating these variables in a model (Figure 1) helps explain why hazard education programs have proved less successful than might have been anticipated. People may not be motivated to prepare if they do not perceive natural hazards as critical or salient issues within their community (low critical awareness – about natural hazards themselves and/or in relation to other issues such as crime or unemployment). Motivation to prepare could also be affected because hazard anxiety reduces risk acceptance and encourages avoidance of information relating to risk reduction and readiness. Even if motivated, people may not formulate intentions if they perceive hazard effects as insurmountable (low outcome expectancy) or do not perceive themselves as having the competence to act (low self-efficacy).

Even if favourable hazard preparedness intentions are formed, they may not be acted on. The intention-preparedness link could be

Figure 1 The proposed social-cognitive preparation model



disrupted if people lack resources for implementation (low response efficacy), if they transfer responsibility for their safety from themselves to others (low perceived responsibility), or if they do not feel a sense of belonging (low sense of community) to their neighbourhood. This link could also be disrupted by a lack of trust in information sources, by a lack of consultation on community issues, or because the infrequent occurrence of hazard activity reduces any sense of urgency about preparation.

Preparedness

The components of the social-cognitive model presented here describe reasoning processes that raise additional issues regarding the conceptualisation and assessment of adjustment items. For example, the inclusion of response efficacy suggests that people's judgements about preparation include reasoning about their permanence and their ease of adoption. For example, once furniture and water cylinders are secured, no further action is required. In contrast, emergency kits must be checked and replenished regularly, gardens must cleared of combustible materials regularly if they are to maintain their capacity to mitigate risk. In regard to their relative ease of adoption, storing water is easier than securing furniture and hot water cylinders.

Items can be differentiated in regard to whether they require individual or collective action. For example, clearing yards of combustible material is only of value if all houses in a neighbourhood do so. Thus collective action is required, a more difficult process than deciding to store water. For adjustments that require changes in land use or zoning, community participation and empowerment within the political process is required (Paton, 2002).

Items can also be differentiated in regard to their function. For example, securing furniture helps safeguard household members from immediate injury. However, having a household hazard response plan and a supply of food and water facilitates an ability to cope with disruption. These examples suggest a need for a more searching conceptualisation of preparedness and its assessment. The ability to assess preparedness on each dimension could enhance the quality of the planning process. For example, communities could be assessed in regard to home safety, their ability to meet their own needs, and their capability for undertaking collective activities within a neighbourhood.

The reliability of self-report data is another issue deserving of additional attention. Lopes (2000) and Ballantyne *et al.* (2000)

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concluded that people estimated their preparedness by a process of inference rather than on objective assessment. On asking people to physically check their preparedness responses, Lopes found discrepancies between people's expectations and their actual levels of preparedness. Ballantyne *et al.* (2000) found that while 41 percent of respondents stated that they describe the list of protective actions described in the telephone book, only 15 percent could actually recall them when asked to do so.

The reliability of adjustment data could also be affected by the conflation of decision processes. While recorded as preparedness items, the presence of some items may not reflect a decision to prepare. For example, people could conflate a preparedness item like "having three days' food" with their shopping habits (i.e. they purchase groceries every few weeks for convenience), but they may not set aside food specifically for emergency use. Thus their supply of food reflects their shopping habits rather than a decision to prepare for earthquakes. Self-report data linked to decision processes that have little or nothing to do with hazard adjustment will inflate estimates of preparedness and result in community members being more reliant on emergency resources than might have been anticipated. While important indicators of an ability to cope with temporary disruption from hazard activity, caution must be exercised in regard to automatically interpreting their presence as indicative of either their availability to deal with adverse circumstances or people's beliefs about the importance of preparedness. In contrast, items such as securing tall furniture, preparing household emergency plans, regularly checking emergency kits reflect decisions to prepare for hazard activity. They thus provide more objective indices of adjustment behaviour and beliefs.

These observations highlight the importance of periodic audits of actual preparedness to assess the reliability of self-report data. They also signal the fact that, if inferential processes result in a perceived overestimate of preparedness, people's risk perception, their attentiveness to new preparedness information, their perceived need for preparedness, and their receptiveness to warnings could be compromised (Lopes, 2000; Paton *et al.*, 2000).

Intervention strategies

The model proposed here has implications for conceptualising and implementing risk reduction strategies. The model implies that they should mirror the developmental process described here: motivating people to prepare (precursor variables), facilitating the formation of intentions (intentions formation variables), and then promoting the conversion of intentions to preparedness (moderator variables). No one strategy will be capable of facilitating change in all variables. For example, the provision of information, based on sound risk communication principles (Tierney *et al.*, 2001) would be appropriate for facilitating elements such as risk perception, outcome expectancy, and for changing perception of the timing of hazard events. However, it is less appropriate as a means of influencing elements such as self-efficacy, problem-focused coping or trust, where strategies based on participation and empowerment (Dalton *et al.*, 2001; Paton, 2002) would be more appropriate.

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