

Promoting Child and Family Resilience to Disasters: Effects, Interventions, and Prevention Effectiveness

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Citation: Ronan, Kevin R., Kylie Crellin, David M. Johnston, Kirsten Finnis, Douglas Paton, and Julia Becker (2008). "Promoting Child and Family Resilience to Disasters: Effects, Interventions, and Prevention Effectiveness." *Children, Youth and Environments* 18(1): xx-xx. Retrieved [date] from <http://www.colorado.edu/journals/cye>.

Abstract

Children and their families have been identified as particularly vulnerable to the effects of hazardous events. This paper combines a review of the literature with the findings of a program of research aimed at assisting children, youth, and families to more effectively cope with the effects of disasters. First, we briefly review the effects of disasters on children, and include a summary of important risk and protective factors research. We then summarize theory and research on interventions following a hazardous event. Finally, parallel to a current emphasis in our own research and practice agenda, we look at the role of preventive interventions in assisting children and their families to prepare effectively for disasters and, as a consequence, equip them both physically and psychologically. This includes a review of relevant theory and research on features of prevention

relevant to promoting children's resilience to the effects of a hazardous event. It also includes a summary of findings from evaluation of school-level hazards education programs in New Zealand, including one done recently in partnership between local emergency management and schools. Based on promising research to date, we highlight those factors that may underpin intervention effectiveness, whether before or after a hazardous event.

Keywords: children and youth, families, natural disasters, interventions, education, prevention

Effects of Disasters on Children and Families

Following a traumatic event, some degree of behavioral symptoms and adjustment reactions in children and families are expected and are normal psychological responses (Hagan 2005; Ronan and Johnston 2005). These symptoms can range from mild stress reactions to more serious responses such as anxiety-based problems including Acute Stress Disorder (ASD) and Posttraumatic Stress Disorder (PTSD) and a range of other reactions (Norris et al. 2002; Veenema and Schroeder-Bruce 2002). These other reactions can include grief reactions and mood difficulties (e.g., depression), health and sleep problems (e.g., increased physical complaints; sleep disruption is fairly common), and some problems more specific to children (e.g., tantrums, acting out, clinginess in younger children) (see Madrid et al. 2006). Disasters have also been found to lead to a loss of normal coping and social support resources and to additional stressors that can accrue as part of the response and recovery environment (e.g., financial loss; parent-child conflict).

Generally children (as well as adults) recover from traumatic experiences with time and support, and without professional intervention (Chemtob, Nakashima and Hamada 2002; Norris et al. 2002; Speier 2000). While it has been shown that many reactions to disasters are time-limited, there are a range of risk factors that can increase vulnerability to longer term effects. The degree of psychological effect on a child and their symptoms can depend on many risk factors including degree of exposure (particularly that involving life threat, injury, loss), pre-existing factors (e.g., demographic factors such as younger age, female gender), coping style (e.g., avoidant, blaming) and coping ability (e.g., "hardiness"), low perception of social support, and additional stressors (Chemtob, Nakashima and Hamada 2002a; Huzziff and Ronan 1999; LaGreca et al. 1996; Norris et al. 2002; Ronan 1997; Ronan and Johnston 2005; Vernberg et al. 1996). While all of these certainly raise risk for children, the most important risk factors in the Norris and colleagues (2002) large-scale review were in fact family factors.

Family Factors

A parent's reaction to a disaster predicts children's reactions (Deering 2000; Huzziff and Ronan 1999; Norris et al. 2002; Ronan 1997). In our own research, we have found that children's perceiving their parents to be upset about a hazardous event (e.g., a volcanic eruption) and perceiving distressing talk at home about the event both predicted reduced post-hazard-related coping ability (Huzziff and Ronan

1999). In fact, Norris and colleagues (2002) identified parents' disaster-related distress as perhaps the most prominent risk factor for children.

Symptoms of trauma in parents or trusted adults can be magnified in the children for whom they are caring (Pine and Cohen 2002). Parents' behavior affects children's behaviors, as well as their thoughts and feelings. Parents may also be so upset that they do not recognize their child's distress or are unable to assist the child with coping (American Academy of Pediatrics 1995; Hagan 2005). Realization that they are not in a strong position to help their children might also contribute to higher stress in the parent (Hagan 2005). Such a situation then can potentially have further effects on parents. For example, parents may seek treatment for their child before seeking treatment for themselves. However, it has been suggested that a parent may present the child as a way of presenting his or her own symptoms (American Academy of Pediatrics 1995).

We would add that there are a range of non-disaster-related family factors that also increase risk for decreased psychosocial functioning in youth (Ronan and Johnston 2005). For example, low levels of warmth; inept discipline practice; increased parent, marital, or family conflict; parental psychopathology; parental substance abuse; lack of parental supervision and other factors, all of which might be more prevalent in a family under duress, increase risk for problems in children (e.g., Ronan and Curtis 2007).

As has been pointed out, the role of parents and caregivers and the overall family environment cannot be underestimated following a disaster in terms of either increasing vulnerability or protecting children from deleterious psychological effects. In other words, while distressed parents can increase a child's vulnerability, a parent who is able to provide warmth, support, consistency, predictability, and a "coping model" for their child would be thought to decrease vulnerability (Ronan and Johnston 2005). In the next section, as we turn our attention to interventions recommended following a disaster, the idea of coping modeling will be elaborated in the context of what parents, and other adults, can do to set the stage for effective coping in their children.

Interventions for Children and Families Following Disasters

Following a disaster it is imperative that psychological support is available to children and their families and that family members, caregivers, teachers and others are made aware of the signs of psychological trauma. The physical effects of disasters on resources mean that psychological interventions should aim to reach the maximum number of people with optimal efficiency, using minimum funding and personnel in the fastest practical time possible. The interventions used should also be evidence-based to help ensure reliably positive outcomes.

One model that captures the philosophy of providing support to capitalize on limited resources is a multiple-gating, stepped care (MGSC) approach (Davison 2000; Haaga 2000; Hinshaw et al. 1997; Ronan and Johnston 2005). Drawing on research in mental health, including clinical psychology, the MGSC model of assessment and intervention comprises: a) multiple gating assessment; b) sequenced, or stepped,

interventions; and c) an inherent self-correcting feature, which catches those not helped at earlier gates (Davison 2000). This model calls for monitoring of intervention effectiveness and the provision of additional, “stepped up” services when a poor outcome results, providing a mechanism for self-correction (Sobell and Sobell 2000).

In terms of first-step interventions, providing for basic physical needs is seen to be important from a psychological perspective. When people experience loss or displacement, providing for the basic needs of safety, shelter, food, water, clothing, and so forth is important first for survival. Further, however, when people are physically safe and their basic needs are looked after, this is thought to increase a sense of emotional security and control.

Combined with physical needs, having other basic support available (e.g., “psychological first aid” that entails listening, soothing, providing information and referral; see Ronan and Johnston 2005) is also thought to be useful. Having this kind of support available directly and accessible on a voluntary basis is common in the post-disaster environment. For a number of reasons, we do not support Critical Incident Stress Debriefing for children and families as neither the data, nor the recommendations for use (e.g., not for primary victims; see Mitchell 2003), support its use with this population. Other guidelines for providing direct, basic support, environmental monitoring and technical support are available in more detail (NIMH 2002; also see Ronan and Johnston 2005).

Another form of basic support is through providing education and information through various media. Primarily designed to promote self-help within the community, interviews with the press, press releases, web-based information, handouts and other means such as videos can be a means for disseminating basic information on what parents and children can do to assist themselves. This includes messages for parents about their role in assisting their child to feel safe (e.g., normalizing initial distress and natural recovery through modeling the idea that “we can cope with this”), the value of getting back into routines, the value of allowing for communication a range of feelings, patience and a range of other basic tips, including referral information for those who would like more direct assistance. In a recent book (Ronan and Johnston 2005) for example, we provide examples of that information as well as an example of a press release we disseminated following some local flooding in 2004. While more direct support and various forms of information dissemination are recommended and used often, no research to date has directly evaluated the extent to which such basic forms of support actually assist children and families. However, the next section provides an example of some research that provided an indirect test in the context of a prospective study.

School, Group, and Individual Interventions

More direct interventions for children are possible, particularly through schools as well as local child- and family-focused mental health agencies. In terms of school-based interventions, these can be conducted in the context of school-wide easy-to-do screening (e.g., Chemtob, Nakashima and Hamada 2002) as well as empirically supported group-based interventions that can be conducted in larger (Ronan and

Johnston 1999) and smaller (Chemtob, Nakashima and Hamada 2002; Giannopoulou, Dikaiakou and Yule 2006; Goenjian et al. 1997; March et al. 1998) groups. If suitable progress is not made in group-based interventions, services can then be stepped up to more intensive individual and family-focused interventions.

According to the fairly scarce research that has been done directly testing interventions to date, all of the interventions have emphasized a cognitive-behavioral approach (see Ronan and Johnston 2005). Thus far, researchers working in the disasters and trauma areas (e.g., Giannopoulou, Dikaiakou and Yule 2006; also see Feather and Ronan 2006) have extended evidence-based treatment protocols developed for anxiety disorders (e.g., Kendall et al. 1992; Ronan and Deane 1998). The focus of these protocols is to help children and their families manage arousal and decrease associated anxiety and trauma. In our view, treatment is best delivered in two phases. The first phase aims to help children develop the skills necessary for the second phase of treatment. The second phase of treatment is exposure (imaginal and in vivo). Specific skills that children are taught throughout the first phase of treatment include: identifying self-talk, identifying emotional reactions and early cues, problem solving, relaxation, imagery, self-reinforcement, and realistic self-evaluations. While these skills are beneficial for children to learn prior to exposure, research has demonstrated that the main, active ingredient in successful interventions appears to be the second phase, exposure (Ronan and Johnston 2005).

Exposure combines assisting the client to look directly back at an anxiety-arousing situation while providing the client with coping techniques (e.g., distraction, refocusing, relaxation, coping self-statements, and coping cards; see Beck 1995) to manage the initial anxious arousal. This includes providing the overall rationale that "facing our fears" may seem threatening or scary, but that with continued exposure, the fear will begin to subside. A main theme of exposure is helping the client to break through continuing avoidance of anxiety-provoking stimuli. Avoidance and its counterparts "extinction" and "habituation" are known to increase/maintain and decrease anxiety-related states, respectively (Ronan and Johnston 2005).

While exposure is a relatively simple idea, the carrying out of exposure-based interventions needs to be conducted by someone qualified to do this kind of work. A main reason is that there are features of exposure interventions that if done incorrectly can potentially exacerbate trauma. For example, exposing clients too quickly to a traumatizing situation may not be in their best interests; rather, exposing them gradually (e.g., by first imaginably exposing the client to lower anxiety provoking elements), may be more helpful. Additionally, exposure intervals that do not allow for the client to feel safe by taking the time necessary to experience first the initial arousal but then, vitally, the relief that follows, can also be detrimental.

Another issue that is important to consider in any intervention following a hazardous event is the importance of parents and caregivers in the ability of children to cope with stressful events. For example, group-based interventions

conducted in the school setting can most certainly be helpful. However, if a child then returns home to an environment that does not support that intervention and instead promotes ongoing stress, fear and avoidance, the effects of the group intervention may be short-lived.

As a consequence, keeping in mind the adage that “as parents go, so too the children” is important in provision of services, from information and education all the way through more formal intervention approaches. Thus, if some school-based intervention is carried out, it may well be helpful to provide some information to parents about how they might assist their child in the aftermath of a disaster. Of course, we feel the best means to ascertain whether a child is in need of continuing services is through a multiple gating screening approach.

As an example of a school-based intervention after a hazardous event, we carried out a prospective study that used the ideas discussed in this section to track progress in a group of school children over a seven-month period following a volcanic eruption in New Zealand (Ronan and Johnston 1999). Three schools all within 11 kilometers of the base of the volcano, Mount Ruapehu, were involved with the study. A total of 112 children participated in the study. Four separate assessments across the seven-month interval assessed self-reported symptoms of PTSD as well as children’s perceived ability to cope with stimuli related to the eruptions. The first assessment was carried out one month after the initial eruption. At that point, based on scores on the stress measure, 69 of the 112 children reported some features of PTSD.

Owing to the fact that evidence points to natural resolution of distress following a hazardous event (NIMH 2002; Norris et al. 2002; Ronan and Johnston 2005), and that the schools involved mobilized some resources for children and parents, our next assessment two months later was aimed at assessing the extent to which children improved without any formalized intervention but with exposure to information of the sort described earlier in this section. Time was seen to be an ally, particularly for reported features of PTSD. Overall, the sample’s score of 23 on the Reaction Index (Frederick, Pynoos and Nader 1992) was reduced to 16. This corresponded to an effect size of .80. On the other hand, while coping scores improved overall, they only changed by an effect size of .22. Additionally, coping scores at one of the schools were actually seen to deteriorate over the two month interval. Interestingly, this school was also furthest from Mount Ruapehu. From our own interactions with school personnel, and based on anecdotal evidence, it appeared that this school also provided children and parents with the least amount of information and educational materials designed to assist recovery. Thus, while still representing an as yet unanswered empirical question, it may be that schools that are not close to the “epicenter” of a disaster may think their children to be out of harm’s way and, as a consequence, not provide them with a sufficient level of support.

At this two month interval, we then provided a one-hour large group intervention to the children. Children were randomly assigned, based on school, to one of two conditions. The first condition was referred to as the “exposure and normalizing”

(EXP) condition. A 20-minute video of the eruptions was accompanied by a presentation by a volcanologist and included discussions about the science of volcanoes and eruptions. Based on coaching from a child clinical psychologist, this also included information intended to “normalize” fears (e.g., discussing physical safety in relation to the physical science). The psychologist also presented information designed to normalize any distress or fears and talk about the science from a layperson’s perspective. The second condition, called the cognitive-behavioral (CBT) condition, included all of the EXP components and additionally included some other CBT features. One of them was the idea of “coping modeling” described earlier. Here, possible negative thoughts (i.e., “self-talk”) were modeled. This was followed by means available to modify those negative thoughts (e.g., access information, support from adults). In addition to this basic problem-solving sequence, additional modeling included how to dispel fears that were based on a lack of information. For example, one apparently prominent fear was that the local water supply was poisoned by the volcanic tephra (e.g., ash). Finally, the idea of self-reinforcement (“giving oneself a pat on the back”) for attempting to seek information/problem-solve was also included. The CBT condition was based on the principles of an evidence supported intervention program for anxiety-disordered (Ronan and Deane 1998) as well as traumatized (Feather and Ronan 2005; 2006) children.

Findings overall indicated that children improved as a function of the interventions and that, overall, there were no significant differences found between the EXP and CBT conditions (analyzed for the whole sample as well as separately for the symptomatic group). Given no significant differences, collapsing across the two conditions saw the self-reported PTSD features reduce significantly, corresponding to an effect size of .52; coping features also improved, corresponding to an effect size of .32. Four months later (i.e., seven months following the start of the study), PTSD scores were seen to continue improving whereas coping scores were maintained.

At this point, and in consultation with school principals, it appeared that all children in the study were back within normative functioning limits. Consequently, no further intervention was deemed to be necessary. If it were, then individual/family intervention would have been a possible next step. Why all children were back to within normative limits may in this study have been owing to the fact that the volcanic eruptions did not represent a large-scale disaster in that there was no loss of human life or large-scale damage. However, “lifelines” were affected, as were livelihoods (such as the tourist industry).

Similar to our study, Chemtob and colleagues (2002a) implemented a school-based screening and a psychosocial treatment program (delivered in both individual and group formats) for those children who were found to be experiencing severe traumatic symptoms two years after Hurricane Iniki in Hawaii. Of the 3,864 children initially screened, 248 (6.42 percent) were found to be experiencing severe traumatic symptoms as a result of exposure to the hurricane. Of the children assigned to the treatment condition (individual and group), which included “play, use of expressive art, and talk,” 214 (86.3 percent) completed the treatment

(Chemtob, Nakashima and Hamada 2002, 213). Here, children were significantly more likely to complete the group treatment than the individual treatment. Overall there was no significant difference between treatment outcomes for those children assigned to individual or group treatment, with children assigned to both treatment programs experiencing a significant reduction in trauma.

Unlike Ronan and Johnston (1999) a subset of children ($N = 40$) who had completed Chemtob, Nakashima and Hamada's (2002) treatment protocol continued to experience traumatic symptoms, culminating in a diagnosis of PTSD (Chemtob, Nakashima and Carlson 2002). One potential reason underlying this difference may be a result of the differing intensities of the hazards, with one being a relatively benign hazard (Ronan and Johnston 1999) and the other representing a more large-scale hazard (Chemtob, Nakashima and Hamada 2002; Chemtob, Nakashima and Carlson 2002).

As a concluding comment to this section, and to emphasize the point, even when conducting group or individual interventions in schools or other settings, the ultimate central role of parents in the treatment and care of children should not be overlooked in the aftermath of a disaster.

Prevention-Based Interventions: Readiness and Risk Mitigation through Education

In an attempt to diminish the impact of potential hazards, more research has begun to focus on preventive interventions for children. Underlying prevention is the belief that educating children and their families prior to an impending hazard will allow communities to better manage response and recovery activities (Klingman and Cohen 2004; Ronan and Johnston 2005). For example, it is well known that the public largely does not carry out the self-protective measures recommended by emergency management authorities during non-crisis times (Lindell 2000; Lindell and Whitney 2000; Paton and Johnston 2001; Karanci, Aksit and Dirik 2005; Peek and Mileti 2002; Whitney, Lindell and Nguyen 2004).

The Problem is Motivation, the Solution Starts at Motivation

One theme at the forefront of a number of current theoretical perspectives concerned with understanding why people do not prepare for hazards is differing levels of motivation. For example, Grothmann and Reusswig (2006) point to Protective Motivation Theory as one explanatory model. According to this theory, the adoption of a response is dependent on individuals' level of perceived threat and coping appraisal. Briefly, threat appraisal is related to individuals' perceptions of the likelihood of a hazard occurring and the likelihood that the occurrence of a hazard will be related to harmful consequences. On its own, threat appraisal is likely to lead to increased potential for at least some sort of a response. The effectiveness of the response is then thought to be in part a function of the individual's appraisal of their coping resources and ability. In this context, this includes the appraisal of the effectiveness of coping (protective) responses and the level of confidence in the ability to actively carry out protective responses. Consequently, "protection motivation" is thought to occur in the face of a perceived

threat where there are responses available that are thought to increase safety and protection.

Another model for understanding why people do, and do not, prepare assumes three main elements are necessary (Paton, Violanti and Smith 2003). The first revolves around the question (see Ronan and Johnston 2005), "is there some risk that is sufficient to cause enough concern to think about my doing something to reduce my (or our) risk?" More specifically, the two factors implicated here are what are known as "hazard concern" and "personal responsibility," respectively. The second element revolves around the question, "are there things I can do that will be effective and, if so, do I have the resources and ability to enact them effectively?" The factors implicated here are what are known as "adjustment efficacy" and "self-efficacy." Finally, the last stage is related to the idea of time, or "should I do something now or can I put it off until later?" Here, the ideas of "behavioral intention" and actual behavior enactment are implicated.

Extending this enquiry beyond an understanding of why people do or do not prepare and moving into more of the "how to" of motivation change in relation to hazards preparation, Ronan and Johnston (2005) developed the *Strengthening Systems 4R (Risk Reduction, Readiness, Response, Recovery) Prevention Model* (SS4R). This model acknowledges the importance of understanding why people do and do not prepare for hazards, both theoretically (e.g., Paton 2003) as well as following the empirical evidence (e.g., Mileti and Darlington 1997; Peek and Mileti 2002). Extending on prior research of hazards as well as other areas (e.g., clinical psychology), this model places an emphasis on incorporating evidence-based features into interventions designed first to increase motivation to make changes.

The SS4R model looks to work by Miller and Rollnick (2002) on the role of motivation in psychological interventions to try and understand better the mechanisms that underpin people's willingness to consider and carry out change-related behaviors. According to the Miller and Rollnick model, a change in thinking and behavior can only take place when a person is "willing, able, and ready." First, a person's willingness to change has been linked to their level of emotional investment. Miller and Rollnick implicate the idea of "developing discrepancy" as one means of increasing that investment. That is, when an observable discrepancy between a desirable state of affairs and an individuals' current status is present, an individual appears to be more willing to consider the value of making change. A second element necessary to initiate change is the "able," or ability, factor. This component is analogous to one's coping appraisal from Protection Motivation Theory: it represents an individuals' confidence that the hazard adjustment will be effective (general efficacy) and that they are capable of carrying out the adjustment (self-efficacy). The final component necessary to initiate change according to this model is the "ready," or readiness, factor. This indicates that by itself an acknowledgement of the perceived importance and ability to carry out any given hazard adjustment is not enough; people need to possess a sense of urgency, or intention, that initiating change now rather than later is in their better interest. The overall process is summarized by Miller and Rollnick (2002, 22):

It is discrepancy that underlies the perceived importance of change: no discrepancy, no motivation. The discrepancy is generally between present status and a desired goal, between what is happening and how one would want things to be (one's goals). Note that this is the difference between two perceptions, and the degree of discrepancy (also a perception) is affected by a change in either. The larger the discrepancy, the greater the importance of change... So the challenge is to first intensify and then resolve ambivalence by developing discrepancy between the actual present and the desired future.

As emphasized in the quotation, the ideas of discrepancy—and even ambivalence—are seen to facilitate the change process. The actual mechanisms underlying this movement from discrepancy to consideration to intention to change are the ideas of “change talk,” “commitment strength,” and “decisional balance.” Change talk refers to discussions that first identify, and perhaps initially magnify, a discrepancy (i.e., between one's current status and a value or future goal state). Then, consideration of the advantages of change, or alternatively, the disadvantages of the current status can begin to move the person along the willing, able, and ready continuum. Further momentum is then thought to be gained through increasing optimism about making change (i.e., general and self-efficacy) as well as an increased commitment, or readiness, to enacting the change now.

Overall, once the decisional balance starts to favor change in the direction of the value or goal state (versus remaining at status quo), the “fuel” for the actual change then increases through change talk that reflects increased commitment, or readiness to change (Prochaska, DiClemente and Norcross 1992). Thus, in our model, this idea reflects a commitment to hazards education programs targeting intrinsic motivational factors as key to eliciting change in the form of hazard adjustments. Certainly, we also favor extrinsic motivation in the form of mandated building codes, land use plans and so forth. However, in terms of helping families to prepare more effectively for hazardous events, such mandated activities can sit comfortably alongside those additional voluntary activities that children and families can adopt to help them protect themselves and their households in the event of a major hazardous event.

Support for this model in the hazards readiness literature has come indirectly from a number of findings that appear to implicate motivation as a key factor in initiating change (Ronan and Johnston 2005). For example, having children in a household has been found to predict increased preparedness for a hazardous event (see review by Lindell and Perry 2000). While the reasons for this finding have never been specified, certainly one possible reason would relate to the idea of a motivational discrepancy (i.e., between current status of a lack of preparation for a local hazard and the value and goal state of protecting children from unnecessary risks). Additionally, support also comes from various studies including research by Lindell and Whitney (2000). These researchers found that when people were aware of the value of engaging in hazard adjustments (protection of people and property), they were more likely to report both an increased intention to adopt as well as actual adoption of hazard adjustments. Consequently, the belief that adjustments

will protect people and property is linked to an increased willingness to consider as well as make changes. In fact, in the Lindell and Whitney study, attributions about factors that could make it more difficult to carry out an adjustment (e.g., cost, effort, time, skill) did not predict intentions or actual adjustment behaviors. Thus, in hazards education programs, the idea of promoting the value of adjustments in terms of salient features of peoples' lives links to the idea of increased motivation.

Another feature of the SS4R prevention model is that strengthening links between systems within a community is thought to help increase the potential for forums for increased motivation and change talk. Given that one main community linkage is the school-youth-family network, the strengthening of what children learn at school with what families do at home is thought to have potential in this area. Other features of our model discuss the role of the "messenger" (e.g., having a sense of personal accountability, focusing first on motivation and engagement with the audience, communication and leadership skills, and "providing hope on an evidence-based foundation"), the role of science in our helping efforts (e.g., using empirical literature to inform interventions, measuring change in our helping efforts, using research to help motivate and convince others), and other features including a model for maximizing resource allocation in education and intervention programs (see previous section on MGSC approach; Ronan and Johnston 2005).

A Role for School Education Programs: Rationale

As noted earlier, youth and families are particularly vulnerable to the effects of hazardous events (Norris et al. 2002; Ronan, Crellin and Johnston 1998). Not only are children perhaps the most vulnerable group following a hazardous event, research also implicates features of families in the degree of trauma following such an event. For example, parental distress is one of the most prominent factors in predicting children's distress (Ronan, Crellin and Johnston 2006). Additionally, children who have emotional and behavioral problems tend to have parents who have emotional and behavioral problems. Furthermore, children with diminished decision-making and problem solving skills also tend to have parents with diminished decision-making and problem-solving skills (Ronan and Johnston 2005). A final impediment within this relationship is the finding that problem-solving skills have been linked to emotional and behavioral functioning. For example, the presence of an anxious child within a household has been linked to parents supporting unhelpful (avoidant) coping strategies (Dadds et al. 1996).

Therefore, programs that specifically target youth, such as those within schools, have the potential to have the greatest impact on a good portion of the community who are at risk. Part of the idea here is that increased preparation is thought to decrease risk, facilitate decision-making under duress and promote an increased sense of control, or efficacy, in being able to cope effectively following a hazardous event (Ronan and Johnston 2005). However, another advantage of programs for children has to do with their enthusiasm. Importantly, we see children as a relatively untapped source of motivation within a community. Linked to this idea of a motivational reservoir, an additional advantage of programs within schools is that certain aspects of programs can lead to increased interactions between youth and

families as well, potentially, as between youth and families and the larger community (Ronan and Johnston 2005).

Research focusing on preventative interventions for adult community members may in fact provide indirect support for this line of reasoning. For example, a recent study (Karanci, Askit and Dirik 2005) carried out in Turkey compared community members ($N = 800$) who had and had not participated in a disaster training program. In comparison to non-participants, participants were significantly more likely to be worried about the occurrence of a future hazard, to estimate a higher perception of loss due to the occurrence of a future hazard, believe in the value of engaging in hazard adjustments, and actually engage in a greater number of adjustments. At face value, these are all very promising results. However, with regard to hazard adjustments, participants and non-participants both reported a mean of less than one (.35 and .18 respectively). This suggests that while community members appreciate the importance of hazard adjustments, they are not highly motivated to actually adopt such behaviors. Such findings point to a need to expand the focus of education programs to include children and to assess whether attitudes can be converted to actual preparedness behaviors.

A Role for School Education Programs: Research

In terms of including children and promoting an increase in preparedness, the results of studies examining the effectiveness of school-based hazard educational programs are encouraging (Ronan, Crellin and Johnston 2001; Ronan and Johnston 2001a; 2003). For example, an initial correlational study conducted by Ronan and colleagues (2001) with 460 school children examined the effect prior education had on a number of problem- and emotion-focused factors. For example, of the problem-focused factors examined, participation in a hazards education program was found to be related to greater hazard awareness and more hazard-related knowledge. Additionally, children who had participated in prior hazards education programs had more realistic perceptions of the likelihood of the occurrence of a hazard (e.g., endorsed low frequency events at lower levels) and the likelihood of physical injury due to the occurrence of a hazard (e.g., endorsed the likelihood of physical injury as greater).

There is some concern that exposure to hazards education programs may in fact create or worsen fears already held (Ronan and Johnston 2005). Therefore, the finding that children who had participated in prior education programs were more likely to have higher risk perceptions of injury due to the occurrence of hazards could be a concern if this increase were associated with a decrease in emotion-focused coping. However, this was found not to be the case. For example, Ronan and colleagues (2001) found that when compared to children who had participated in a hazards education program, significantly more children who had not participated in hazards education programs reported often feeling scared when thinking or talking about hazards. Furthermore, in comparison to those children who had participated in a hazards education program, children who had not participated in a hazards education program were significantly more likely to perceive that their parents became upset when discussing hazardous events.

Taken together, the results reported by Ronan and colleagues (2001) tended to suggest that participation in hazard education programs was beneficial for youth and their families. However, there was one area of concern. That is, this study found that participation in a hazard education program was not found to be significantly related to the number of hazard adjustments adopted in the home (Ronan et al. 2001). This finding could be attributed to a number of limitations within the design of the study. For example, Ronan and colleagues (2001) examined a quite limited number of hazard adjustments and relied solely on child self-reports.

These methodological limitations were overcome in a later study completed by Ronan and Johnston (2001a). Using a sample of 560 schoolchildren between the ages of 7 and 13 years, Ronan and Johnston (2001a) included both child and separate parent reports of the number of hazard adjustments completed within the home and for this study used an increased pool of hazard adjustment items (i.e., 23 separate adjustments). This study did find support for the hypothesis that hazard education programs are linked to an increased number of hazard adjustments adopted in the home. That is, when compared to those children who had not participated in a hazards education program, those children who had participated reported engaging in significantly more hazard adjustments, as did their parents (Ronan and Johnston 2001a). Additionally, that study identified through multiple regression analyses the following factors as linked to increased readiness (i.e., increased home-based adjustments):

- increased interaction between children and parents about hazards programs;
- specific knowledge of emergency management procedures;
- multiple education program involvement;
- more recent education program involvement.

In order to examine more directly the effects of hazards education programs, and to implement some of the factors linked to increased readiness, we followed this study with a quasi-experimental study with 219 school children aged between 11 and 13 years (Ronan and Johnston 2003). Within this study, participants were randomly assigned, based on classroom, to one of two conditions. The first condition was based on planned school curricula, such as that which might be taught in geography classes. Specifically, this usual conditions (UC) program ran over six weeks and included the presentation of classroom-based readings and discussions about hazardous events and disasters. The second condition contained the same components of the first condition as well as more specific emergency management materials. Specific emergency management materials included information on hazard adjustments youth could perform either independently or in collaboration with their parents. This emergency management (EM) condition specifically aimed to increase family discussions about hazards and hazard mitigation strategies. For example, children within this condition were given a homework exercise designed to increase hazard-related discussions within the home and to motivate families to consider adopting a range of over 20 hazard adjustments.

Participation in either of the programs was found to be associated with a significant increase in both problem- and emotion-focused coping from pre-test to post-test (Ronan and Johnston 2003). Additionally, and as expected, the introduction of specific emergency management features within the education program was associated with significantly greater levels of hazards-related knowledge as well as child- and parent-reported home-based hazard adjustments (Ronan and Johnston 2003). For example, parents reported an average increase of over four hazard adjustments (4.43) in the EM condition (and 3.47 in the UC condition). With regards to emotion-focused coping factors, while both conditions saw a decrease in hazards-related fears as well as decreased child perceptions of parents' hazard-related fears, the EM condition did not significantly differ from the UC condition (Ronan and Johnston 2003). This result is not surprising as neither condition specifically targeted emotion-focused coping factors, focusing instead on helping increase knowledge as well as in the EM condition encouraging home-based hazard adjustments. However, that both conditions saw beneficial change is important and suggests that education programs in general are beneficial for children's emotional well-being. This lends further support to the notion that hazards education programs do not have to lead to or exacerbate hazard-related fears (Ronan and Johnston 2005).

More recent research using correlational (Ronan et al. 2007a) and quasi-experimental (Ronan et al. 2007b) designs have again confirmed the potential of hazards education programs for children. Prior to the implementation of a hazards education program, 407 school children's current beliefs, levels of preparedness, and levels of emotional functioning were assessed (Ronan et al. 2007a). As in previous research (e.g., Ronan and Johnston 2001), this assessment revealed that on average, children who reported participation in prior hazards education programs had increased accurate hazards knowledge, decreased inaccurate knowledge, increased reports of home adjustments, and more realistic risk perceptions. In terms of emotional features, participation in hazard education programs was also linked to a lower level of perceived parental fear (Ronan et al. 2007a).

In terms of predicting the adoption of hazard adjustments, the findings of Ronan and colleagues (2007a) replicated a number of findings from a previous correlational study (Ronan and Johnston 2001a). In addition to confirming that hazards education involvement was linked to an increased number of hazard adjustments, the study also confirmed the value of some related features. For example, the following factors were again found to predict a greater number of hazard adjustments: multiple program involvement, recency of program involvement, and increased interactions between children and parents. One new finding from this study was that the age of children was found to predict a number of preparedness indicators including factual knowledge, hazard adjustments, family planning, and increased interactions with parents. That is, in this study, the younger children were, the greater the effects of hazard education. While needing research confirmation, this finding may be a reflection of younger children's increased enthusiasm for: a) learning about hazards, and b) talking with their parents (Ronan et al. 2007a).

Our next study was designed to evaluate the more direct effects of a hazard education program (Ronan et al. 2007b). This program involved a partnership developed between schools and local emergency management, initially aimed at increasing awareness of, and behaviors related to, a new civil defense siren system for tsunamis. This need underpinned an education program, based on EM principles and focused mainly on tsunami preparation and warning response (e.g., the value of specific home-based preparation for tsunamis; what to do when the siren sounds) that produced benefits across a range of indicators. For example, following participation in this program, children ($N = 213$) were significantly more aware of the alarm and its purpose. Furthermore, while the program was focused mostly on preparedness in relation to tsunamis, children reported an increased number of home-based hazard adjustments across a range of hazards (an average increase of just under 2.5 adjustments per family), increased accurate hazards knowledge, decreased inaccurate knowledge, and a reduced level of fear. Thus, in this program, some generalized effects were seen for a program that was targeted more to a specific hazardous event. Given the findings overall, there does appear to be clear, evidence-based promise for children's involvement in hazards education programs.

Readiness-Based Hazards Education Programs: Active Ingredients

Given this overall promise, a next question is what specific factors should we include in hazards education programs to promote maximal benefit? To begin to answer that question, and as introduced in the previous section, specific factors have been found to have particularly active roles in promoting change. For example, children who had engaged in a greater number of programs were more likely to have increased benefits (Ronan et al. 2007a; Ronan and Johnston 2001a). Additionally, more recent involvement in an education program (within the past two years) was more beneficial (Ronan et al. 2007a; Ronan and Johnston 2001a). This suggests that the effects of hazards education programs may diminish with time. Taken together, these findings suggest that the implementation of a hazard education program should not be a stand-alone event but should be repeatedly reinforced over time.

In addition to the administration of education programs, several factors associated with the content of hazard education programs were found to have a significant relationship with the outcome of studies. Assisting children to become more knowledgeable about specific emergency management procedures appears to have a range of benefits. For example, an increase in children's hazard-related knowledge has been associated with more realistic risk perceptions and lower levels of hazard-related fears (Ronan and Johnston 2003). Additionally, when compared to usual programs, programs with a specific emergency management focus had a significantly greater impact on children's hazard-related awareness, knowledge, and the number of hazard adjustments adopted in the household (Ronan and Johnston 2003). Thus, structured programs like the American Red Cross Masters of Disaster program and programs similar to it, appear to have merit for inclusion in education curricula. However, we would add that this and other programs like it would benefit from evaluation to confirm their potential. Finally, programs that emphasize an increased interaction between children and parents have been found to be

associated with family planning and practice and the adoption of an increased number of hazard adjustments (Ronan et al. 2007a; Ronan and Johnston 2001a; 2003).

Conclusions, Recommendations, and Future Directions

Linked with other active ingredients, we see the interactive component of education programs as perhaps their greatest strength. As findings from our research program have demonstrated, linking children's learning and enthusiasm with the family and home preparedness has potential in terms of both physical preparedness (Ronan et al. 2001; Ronan and Johnston 2001a; 2003; Ronan et al. 2007a; 2007b) and emotional readiness (Ronan et al. 2001; Ronan and Johnston 2003; 2007b). However, this link certainly merits extending beyond the school-youth-family network to the wider community. Initiatives undertaken to promote such links include collaborative networking between schools and emergency management (Ronan and Johnston 2005; Ronan et al. 2007b). Emergency management staff can often be a source for helping schools link in with other groups within the community. The development of such partnerships creates the potential for momentum to increase the quantity, and perhaps the quality, of hazard-based discussions within the community. Of course, linked to increasing motivation, these discussions have potential for increasing the discrepancy between the current status (e.g., low preparedness within the community) and an ideal status or goal (e.g., the increased protection of that local community from those local hazards that threaten it) (Ronan and Johnston 2005). However, while these ideas appear to have merit based on our research program (see also Ronan and Johnston 2005 for an example of such an initiative) as well as the research of others (e.g., Lindell and Whitney 2000; Peek and Mileti 2002), more empirical testing is necessary to further assess this promise. This would include a commitment by those who practice in this area to evaluate their own efforts. Another area for future research is assessing the added value of hazards education in schools as part of a larger community-based preparedness campaign, and as part of a coordinated response and recovery effort. As it relates to children and families, and their increased risk status, such initiatives may well create a road map for planned responses to disasters as well as more efficient and effective recovery from their effects.

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David M. Johnston has been employed with GNS Science since 1993 and his research is focused on reducing the vulnerability of New Zealand's society, economy and infrastructure to natural hazards. In November 2006, he took up a joint position with Massey University as Director of the Joint Centre for Disaster Research. He has been involved in developing integrated risk management strategies for different hazard events, using techniques such as scenario development, mitigation planning and community education programs. He is also interested in assessing social and economic impacts of natural and environmental hazard events. He is the Leader, Cities and Volcanoes Commission, International Association of Volcanology and Chemistry of the Earth's Interior, Assistant Editor of the International Journal of Mass Emergencies and Disasters and on the Editorial Board of The Australasian Journal of Disaster and Trauma Studies.

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Julia Becker has studied both natural hazards and resource management to tertiary Master's level before becoming part of the team at GNS Science in 2000. She has also completed studies in social science research, and is currently undertaking a Ph.D. Julia has experience in conducting social surveys which look at people's perceptions and awareness of social, environmental and hazard issues. Currently she is involved with research into enhancing community resilience and effective planning and policy for natural and environmental hazards in New Zealand. In addition to her work at GNS, Julia spent two years in the United Kingdom, from 2002-2004, working on environmental impact assessment, energy issues and urban development.

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