

# Disaster Preparedness for Children and Families: a Critical Review

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Published online: 20 May 2015

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**Abstract** Preparedness for disasters is universally low; children and families are particularly vulnerable groups. Against this backdrop, research on disaster preparedness for children and families is reviewed, with a focus on disaster preparedness and prevention education programs. Following definitions and theory/rationale, research is critically analyzed. While findings indicate a large growth in research in the past 15 years and largely positive findings, significant challenges remain. These challenges include issues related to methodological rigor, long-term effectiveness, and implementation. Recent research reflecting these important challenges is reviewed. At the same time, other recent research documents real potential for these programs, including findings which suggest that increased attention to incorporating theory- and evidence-supported components can enhance outcomes. Thus, despite some important limitations and challenges, research done to date signals promise for these programs in reducing risk and increasing resilience to disasters for children, families, and the households and communities in which they live.

**Keywords** Disaster preparedness · Prevention · Disaster risk reduction (DRR) · DRR preparedness education programs · Children and families

## Introduction

Household- and community-level preparedness for disasters tends to be universally low [1], and children, and households with children, tend to be particularly vulnerable to the adverse effects of disaster exposure [2]. Against this backdrop, disaster preparedness education programs have been developed to help equip children, families, and larger communities to reduce risk and increase resilience to hazardous events. This area of policy, practice, and research has been growing internationally over the past two decades [3, 4]. With the UN's post-2015 successor agreement to the 10-year Hyogo Framework for Action (HFA) on Disaster Risk Reduction (DRR), further growth is likely in this area. For example, socially based DRR solutions, including community preparedness for disasters, looks to be a more prominent focus. This includes a particular emphasis on preparedness for children and families [5]. This review article summarizes developments through critical analysis of recent literature and a description of current, and sometimes controversial, hypotheses and findings.

Whereas there are a multiplicity of descriptive case examples of disaster preparedness programs for children and families [3] as well as supportive theory and guidance [4], empirical research is scarce. Despite this imbalance, research has been increasing. Prior to 2000, only one study was published. Since then, at least 37 studies have been published in the refereed and gray literatures. Recent systematic reviews [6•, 7•] have been conducted. The more comprehensive of these reviews [6•] analyzed the first 35 of these studies. The

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This article is part of the Topical Collection on *Child and Family Disaster Psychiatry*

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following section describes the main findings from that review. Across that section, a number of basic questions are addressed, starting with “What does it mean to be ‘prepared for disasters’ and what specific outcomes are preparedness programs intended to accomplish?” Another basic question is “Do these programs actually help children and families to prepare more effectively for disasters?” A corollary question is “Do children have interest in these programs or do these programs potentially raise fears or cause other problems?” That is, research documents that disasters (e.g., fires, earthquakes, bombings) are typically major fears of childhood [8]. Additionally, focus groups of teachers have wondered aloud about whether school-based preparedness programs might create problems, including exacerbating children’s fears [9]. An overall guiding question in this review was what effect do disaster preparedness programs have on children’s cognition (e.g., knowledge about hazards and risk reduction, risk perceptions), motivation/emotion (e.g., interest, disaster fears), and behavior (e.g., preparedness activities at school and home). Moving on from these more “instrumental outcomes,” another question is linked to “ultimate outcomes”: Do these programs actually reduce risk and increase resilience when a disaster strikes?

## Rationale and Theory

The rationale underlying disaster preparedness programs is as follows: predisaster risk reduction and resiliency building, including “preparing to respond,” require motivation, knowledge, skills, and DRR-focused behaviors, including planning and practice. A main aim of disaster preparedness and resiliency education programs is to reduce risk in relation to hazardous events through helping children and families learn exposure- and vulnerability-risk-reduction strategies<sup>1</sup> that are motivated and facilitated through a resiliency-building process. In other words, the intention is to reduce risk and increase resiliency to both the physical and psychosocial effects of disasters. Such an approach is intended to incorporate but also move beyond the prevention and treatment of various mental health outcomes. That is, DRR disaster preparedness education programs tend to emphasize knowledge, skills, and actual personal and social behaviors that mitigate risk and increase resilience, both physically and psychosocially. As an example, in an earthquake, one risk for injury includes projectiles. Thus, learning how to reduce the occurrence of flying or falling objects in a household has significant value (e.g., securing bookcases, shelves, and other objects). Neck injuries and tripping/falling are additional risks which can be

<sup>1</sup> Exposure reduction strategies are aimed at reducing actual hazard exposure; vulnerability reduction, reducing the effects of being exposed.

avoided by not moving during shaking through initiating the “duck, cover, and hold” position under a stable shelter (e.g., a desk) [10].<sup>2</sup> In the psychosocial sphere, learning how to deal with stressful events through various social, familial, cognitive, emotional, and behavioral adaptive capacities has documented value in increasing resilience [2], including in relation to disasters [11•, 12, 13].<sup>3</sup>

## Disaster Preparedness Programs for Children and Families: the (Largely) Good News

The aim of the systematic review [6••] was to “characterise the current state of the evaluation of disaster education programs for children” (p. 2), with a focus on the types and sources of evaluations, research methods, study participants, outcome indicators, and analytic approaches. Most of the 35 studies (94 %,  $n=33$ ) assessed program impact and outcomes (i.e., student learning, attitudinal, behavioral, and other outcomes), and 34 % ( $n=12$ ) assessed process outcomes (i.e., implementation and delivery factors). Of the 35 evaluations, 13 (37 %) used experimental ( $n=1$ ) or quasi-experimental designs ( $n=12$ ). Ten of these included some form of pretest and posttest. In terms of sampling, most studies had sample sizes of less than 300 children and youth ( $n=18$ ; 51 %), with 6 studies having sample sizes greater than 1000 (17 %). Programs evaluated in 10 studies (29 %) were identified for the review as “non-specific” (i.e., some form of unspecified DRR

<sup>2</sup> Whereas running to a doorway used to be recommended, with findings that implicate “movement during shaking” as a primary risk for injury [10], this is no longer recommended as a risk reduction behavior.

<sup>3</sup> Various disaster mental-health-focused programs are available [11, 12], including those that are prevention-focused [13]. The aim in disaster preparedness programs as defined here is both physical and psychological preparedness and prevention. Owing to space limitations, a review of mental health prevention/resiliency programs was not possible, but the reader is referred to work by Pfefferbaum and colleagues on primary through tertiary approaches [11, 12] and by Wolmer on primary prevention as delivered by teachers in school settings [13, 35]. It is worth noting that one of these papers [11] includes a set of evidence-supported recommendations to help those who deliver these programs in various settings (e.g., pediatric, school) be more prepared. This paper also highlights school-based disaster prevention and preparedness programs, including those that are mental health/resiliency focused and those that are the subject of this review paper. Of course, as discussed in this paper, those disaster preparedness programs which incorporate a range of evidence-supported resiliency-enhancing components and principles would be thought to be more effective [11].

education), and the developer of the education delivered is unknown. Of specific programs evaluated, 9 were developed by academic researchers, 9 by government agencies, 5 by nongovernmental organizations, and 3 by schools. One program was developed through collaboration of government agencies and nongovernmental organizations. In 3 cases, the program developer was not specified. Most evaluations were small in scale. Programs implemented on a larger scale included 7 developed by national government agencies.

In terms of *impact/outcome findings*, and using conservative criteria, 23 of the 33 studies (70 %) describing impacts/outcomes reported “mostly positive” findings, meaning the programs were found to have positive effects on various risk reduction and resilience preparedness indicators.<sup>4</sup>

While across all studies, a range of indicators were used, in most studies, the participating children self-reported on the main outcomes of interest, and indicators typically were knowledge-based (e.g., of hazard risks, of protective, mitigation, and preparedness actions). Other indicators included whether children discussed hazards with teachers, peers, household members; socio-emotional factors (e.g., anxiety in themselves or perceived in parents; coping confidence and self-efficacy; helpful people and networks); attitudes (e.g., on perceived knowledge and preparedness; risk perceptions; interest in the subject); and home-based preparedness. In terms of home-based DRR/preparedness activities, a significant minority of evaluations assessed indicators in the home (46 %,  $n=16$ ). However, of these 16, only 2 included parents as additional reporters of home DRR/preparedness activities [14, 15]. In these 2 studies (one cross-sectional; the other, quasi-experimental), both indicated that levels of parent reported home-based activities were positively related to children’s involvement in DRR education. In the quasi-experimental study [15], this included beneficial, and significant, changes seen from pretest to posttest and as a function of intervention condition. More on this study is provided in the next section when considering active ingredients in these programs.

<sup>4</sup> In using conservative criteria to categorize findings as “mostly positive”, “mixed”, or “no effect”, some of the studies did have a number of positive findings but were classified as mixed. For example, one study classified as producing “mixed findings” had positive findings including DRR preparedness program participation being linked to significantly increased knowledge of key messages, benefits on emotional indicators and risk perceptions, with the exception of no differences seen in children’s reports of home-based preparedness indicators as a function of DRR education involvement.

It is worth emphasizing that measurement of impacts/outcomes was limited to short-term timeframes, though two studies used time lag, correlational designs across different cohorts. However, overall, and critically, no study evaluated effectiveness over a time interval that included assessment of a DRR education program assisting with risk reduction and adaptive coping during (or following) some hazard event. Also, 10 of the 33 impact/outcome evaluations (30 %) reported no or mixed findings or were inconclusive.

More (statistical) analysis is currently underway to examine the processes and mechanisms that underpin beneficial effects. To date, the overall statistical effect size (ES) of disaster education programs is unknown. We do know that the majority of studies, including the majority of studies using a prepost design, have consistently produced positive outcomes on important indicators. However, only one study to date [16] has reported ES’s to document the magnitude of change from pretest to posttest as a function of an education program. That study used a benchmarking design to compare findings with those from a previous quasi-experimental study [15]. The changes in student knowledge outcomes and disaster-related fears (i.e., their own and their perception of parents’ disaster fears) were in the small to medium ES range across both studies. In contrast, the ES’s reflecting changes in DRR actions undertaken at home were in the large range. While encouraging, with these ES calculations limited to two studies only, more research is needed.

### Disaster Preparedness Programs for Children and Families: Active Ingredients

While we have preliminary data on the general effectiveness of disaster preparedness education programs, we do not know *which specific ingredients are responsible for producing which benefits*. Thus, in addition to evaluating effectiveness of education programs, we need to understand what specific elements of a program produce DRR and resiliency gains. Only three quantitative studies to date have attempted to empirically identify the “active ingredients” of disaster preparedness education programs. The first two studies employed cross-sectional and correlational designs (i.e., case control designs) [14, 17]. Factors that predicted an increased number of child-reported preparedness activities at home were (1) the child’s knowledge of response-related protective behaviors and (2) involvement in a greater number of DRR education programs. Additional predictors identified in the other study [14, 17] were (3) more recent program involvement, (4) an increased perception of injury caused by a hazard, and (5) guided encouragement to talk with parents about what was learned in a disaster

preparedness education program.<sup>5</sup> In the other study [14], which included additional reports by parents, those factors predicting an increased number of parent-reported home DRR/preparedness activities were (1) the child's involvement in a recent disaster education program (within the past 2 years) and (2) child and parent discussions about what the child learned in a disaster education program.

The third study was a quasi-experimental study [15] that used a component analysis/dismantling strategy. Children between the ages of 11 and 13 ( $n=219$ ) were randomly assigned (based on classroom) to one of two conditions. The "usual condition" (UC) was a 6-week classroom-based program based on traditional reading and discussion classroom format focused on the topic of disasters. The "emergency management" (EM) condition included reading and discussion but also included theory-based components, including children learning specific DRR-related competencies and actions (e.g., DRR key messages) [18] and increased interactivity between the child and parents [4•]. This interactivity included a child-parent homework exercise focused on motivating, and guiding, home-based preparedness activities. Findings supported both types of formats, with children significantly benefitting in both conditions. For example, children's disaster-related fears significantly decreased from pretest to posttest, as did their perception of their parents having disaster-related fears.<sup>6</sup> However, compared to the UC condition, the EM education program produced significantly greater benefits from pretest to posttest on (1) child- and parent-reported home-based DRR activities and (2) increased child knowledge of important DRR key messages (i.e., prevention, mitigation, preparedness behaviors).

One area that has remained virtually unstudied is the *actual content of disaster preparedness educational materials*. Some

<sup>5</sup> In previous research, the idea that children perceiving injury risk are more prone to being fearful has not been supported. In fact, research has demonstrated that children who participate in DRR education programs tend to have reduced disaster-related fears, including in instances where they have an increased perception of disasters causing injury. Theory would suggest that an increased sense of confidence and learning DRR skills would allow children to see potential injuries not in a fearful way but, rather, in a way where a potential injury is seen as a problem that has various solutions that the child feels increasingly capable of carrying out compatible with the idea of seeing a "challenge" versus seeing a "threat" [14, 15].

<sup>6</sup> Research supports the idea that parents are a main source of disaster-related fears for children. Alternatively, research also supports parents' role in helping children cope more effectively. In fact, because of the strength of some findings, the adage that "as parents go in disasters (or other stressful events), so too their children" has a good deal of research support [2, 22].

research and analysis are underway on this topic including evaluating program content and proposing methodologies for analysis of the quality of DRR education materials [19, 20]. Recent research from the International Federation of Red Cross and Red Crescent Societies [18] has compiled and synthesized more than a dozen international sources of consensus-based expert-reviewed public DRR education "key messages." This research and compilation adds to the foundation for a process to establish more evidence- and theory-driven foundations for preparedness programs for children and families. On the psychosocial side, incorporating features known to enhance resilience [11•, 12, 13] would likewise be thought to enhance program effectiveness.

### Recent Research Findings

Since the Johnson et al. review [6•], some additional research and theory have been published. We first summarize a recent study with supportive outcomes and, then, in the next section, report on findings that reflect challenges.

As an example of movement in the direction of theory- and evidence-driven programming [3, 4•], a more recently published study is described [21]. A DRR preparedness education program for 11- to 17-year-old youths in a lower socioeconomic area in Canberra (Australia) was designed according to theory and was intended to extend previous DRR education research. Specifically, the preparedness program: incorporated the following features:

- More participatory and interactive; more child and youth input into the planning and delivery was included;
- Focused on factors linked to underlying drivers of risk (i.e., living in a high hazard area; lower socioeconomic groupings; involvement of some children and adolescents not engaged with school or vocational activities) [5•];
- Focused on incorporating DRR- and behavior-change theory within the program (e.g., was experiential, participatory and interactive and focused on both risk reduction and resilience; it included a focus on key messages, knowledge, attitudes/emotions, behavioral/action-oriented learning; included an "information-searching" component in between sessions [1]); included social-based learning and support (e.g., collective problem-solving discussions; a friendly competition to promote increased program engagement and interaction; encouragement to talk and do home-based DRR activities with parents);
- Focused on broader and multi-informant assessment. Compared to previous research, which primarily has focused on a relatively narrow range of knowledge indicators [6•], evaluation in this study included an expanded

range of knowledge, attitudinal/emotional, and behavioral/action-oriented outcomes, including those supported by key messages, and included assessment measures for both youth participants and their parents.

Main findings of that study included significant increases in both child- and parent-reported action-oriented indicators and child-reported increases in knowledge and emotion-focused/attitudinal indicators. For example, from pretest to posttest, parents reported an average increase of approximately 6 home-based preparedness/DRR activities. In that same interval, children reported a 39 % increase on DRR and resilience knowledge indicators. They also reported significantly lower levels of disaster-related fears and anxieties. Another finding was that information searching by youth participants in between sessions was found to be a predictor of DRR program gains. One other point worth noting was that youth participants endorsed high levels of interest in learning about disasters and DRR, supplementing findings in 7 other studies that children and youth endorse interest in and benefits for and from DRR preparedness programs [6••]. The main limitations of this study were as follows: (1) like other studies done to date, it did not include a follow-up component to see whether benefits transferred into the response and recovery phases of a hazard event and (2) it was a demonstration (pilot) study, like almost all other published (and unpublished) evaluations and case studies done to date internationally [5•, 6••, 7••]. As a pilot study, another weakness of that study, again like almost every other study done to date, was that it did not include various elements linked to more rigorous efficacy-based outcome evaluation (i.e., used a single group pretest-posttest design).

### Research on Disaster Preparedness Programs: Controversial Findings, Challenges

As seen in the previous section, across the research done to date, despite some significant methodological limitations, preliminary findings are largely supportive and fit with theory about ingredients of programs that should be considered: (a) help children increase their DRR knowledge; (b) encourage children to interact with others, including with each other, teachers, and caregivers about their learning; (c) promote experiential school-, home-, and community-based activities aimed at DRR and resilience; and (d) provide DRR education more than once [4•, 5•, 22]. By contrast, we present recent research in the next section that challenges the notion that preparedness programs will in all circumstances reduce risk. We also look at other problems linked to effective and scaled implementation of these programs.

### Key DRR Messages and School Drills: Effective Exercises or Rote-Based Routines?

Following the Japanese earthquake and tsunami in 2011, anecdotal evidence suggests that effective planning and preparedness played a key role in saving children's lives [23]. In Kamaishi City, there were high fatality rates, but this was not true for school children. Only 5 out of approximately 2900 school students died, reportedly owing to regular drills, education, and identifying evacuation routes on hazard maps [24]. By contrast, in schools that did not engage in such activities, fatalities were higher. For example, at the Okawa Elementary School, 74 children died or went missing, with a report suggesting that this was owing to evacuation guidelines that were not clear [25].

While these anecdotal examples point to the promise of effective planning, practice, and drilling procedures, limited research has rigorously evaluated the effectiveness of drills [23]. A New Zealand study did examine the effects of participation drills on children's knowledge, skills, emotions, and school safety perceptions [26]. Students who participated in a drill and information session had higher knowledge scores and acquired the important skill of how to relocate safely. No changes in anxiety or school safety perceptions were seen, indicating that children did not appear to get scared or to see the school as a more dangerous place [26]. In another study, children were found to acquire skills and to provide comfort to peers during drilling exercises [27]. Children and teachers providing comfort and reassurance, while enacting effective and safe relocation procedures, were part of a set of recommendations borne of this study.

In contrast to this set of promising findings, a recent study evaluating the effectiveness of school disaster drills raises concerns [28]. This study evaluated a ShakeOut exercise combined with a tsunami evacuation drill in two Washington state schools (US), with 574 children and youth in grades 6–12. A major finding from this study was that the vast majority of the children and youth (96–97 %) knew that “drop, cover and hold” was the correct protective action, both before and after the drill. In addition, the same percentage (96 %) knew that this protected them from flying objects. Large percentages also knew other important aspects (e.g., the head is the most important part of body to protect) and reported no significant change in emotional upset when thinking or talking about earthquakes or tsunamis after the drill. However, and by contrast, when asked “what caused the most injuries during earthquakes?” only about half of the students endorsed flying objects and broken glass (52 % at pretest; 59 %, posttest). As a complement to this finding, a significant minority endorsed incorrect/do not know answers (e.g., building collapse, car accidents, I do not know) both before (42 %) and after (36 %) the drill. In addition, only 1 in 5 children knew that drop, cover, and hold prevented falling, a known major cause

of injury in earthquakes [10], both before (21 %) and after (20 %) the drill.<sup>7</sup> As a final, and important example, less than a quarter of children/youth knew that going to a doorway was an incorrect protective action (23–25 %), with three quarters or more of children endorsing going to a doorway or not sure at both pretest (75 %) and posttest (77 %). Going to a doorway was once endorsed by emergency management agencies but is no longer recommended as a safe protective action.

Thus, while other research findings to date support the potential of preparedness education, enthusiasm is tempered through the findings of this study. Clearly, more research is necessary to assess the value of DRR education in producing the types of immediate outcomes that translate into bona fide protective actions and other important risk reduction activities that prove effective during response and recovery phases of events. It may be necessary to rethink how school drills are conducted in order to enhance their role in DRR education.

### Teacher Views on DRR Education and Implementation

In addition to disaster preparedness program effectiveness, problems linked to effective, sustainable, and scaled implementation must be considered. Obstacles to prevention and intervention program implementation in public health [29], in mental health settings, including those for children and families [30] and in more specific relation to disaster preparedness education programs for children, families, and communities [9, 31], have been identified. Some clues to improving school-based disaster education program implementation come from studies of the New Zealand program, *What's the Plan, Stan (WTPS)* (9, 31–32).

A WTPS program kit was sent to every primary school in New Zealand for voluntary use in classrooms. To assess uptake and attitudes, both survey research and focus group research were conducted. The survey research included a survey sent to all 2115 primary schools in NZ, with 1020 being returned (47 % return rate). The survey itself assessed awareness, facilitators, deterrents, and use of WTPS [32]. For the focus group research, and additional survey work, Johnson and colleagues [9, 31] used a mixed methods approach. It was intended to get a representative mix of schools (small, medium, large) across the country in 7 of 16 regions, representing urban, regional, and rural areas and located on both the North and South Island. Thirty-one schools participated, with 49 teachers and principals taking part in focus groups. Of these, 12 who had used WTPS in their classroom also agreed to fill out an online survey. Additional interviews or focus groups were carried out with emergency management (EM) staff in each of the regional areas.

<sup>7</sup> Falling and tripping were the most common causes of injury after the two major 2010–11 Christchurch earthquakes [10].

The large-scale survey study [32] found low to moderate levels of awareness (e.g., 24 % of those principals responding to the national survey indicated they knew of the resource but had not read it; another 24 % had never heard of it). In the other set of studies, across survey and focus group findings [9, 31], the research found that teachers appeared quite receptive to the program. However, there also were significant deterrents to classroom, and school, use of the program. Factors that appeared to facilitate use and implementation were also identified. The following factors were identified and can be summarized as follows [31]<sup>8</sup>:

- Facilitating factors to classroom/school use
- School-wide use of the resource\*
- Promotion of the resource by teachers
- Direct engagement with local emergency management (EM) staff
- Personal interest in the subject
- Student interest in the subject
- Good quality design
- Recent disaster
- Teacher training (if available)

\*strongest facilitator

In terms of deterrent factors, these were identified as the following:

- Deterrent factors to classroom/school use
- Lack of awareness of the resource\*
- Voluntary nature\*
- Lack of time/competing interests\*
- Perception that teacher training is needed\*
- Lack of school-wide use
- Lack of relevancy when no disaster has occurred
- Incompatibility with teaching methods
- Lack of direct engagement with local EM agency staff

\*strongest deterrents

Thus, from this set of studies, promoting programs at school through a combination of school-wide and local EM agency (and ministry-level, policy-based) support and providing teacher training appear to be critical factors required for scaled implementation and use of a resource. On the other hand, simply creating a resource and disseminating it for voluntary use at local school level, by teachers not aware or who lack confidence to deliver it, is unlikely to result in high levels of uptake and use. There are examples of national teacher training approaches, including those that use web technology for large scale, and relatively low cost, dissemination, with

<sup>8</sup> Reprinted with permission.

perhaps the best example of wider-spread dissemination potential being in Turkey [33]. However, as with other areas needing research, with implementation of preservice or in-service teacher training approaches, accompanying evaluations of effectiveness are required. To date, with this case study exception, no data are available on DRR program teacher training or its effectiveness.

## Conclusions

The final problem here, and the biggest one, is that no child and family preparedness education program study to date has used a time series experimental strategy and followed cohorts into the response and recovery phases of a hazard event.<sup>9</sup> Thus, future research will benefit from using more rigorous multi-informant efficacy (including randomized, controlled approaches, and dismantling strategies), effectiveness and mixed method approaches, including time series designs, to assess ultimate outcomes. Program content and delivery also need attention, including an increased focus on including evidence-supported components, both for physical preparedness [18] and psychosocial preparedness.<sup>10</sup> While findings to date are encouraging, research is needed to answer the fundamental question of whether these programs actually do decrease risk and increase resilience when intended, including saving lives, reducing impacts (e.g., injuries, psychosocial consequences, property damage; DRR costs), and helping children and families get back on their feet and bounce back more resiliently when disaster strikes. Coupled with more rigorous research in both efficacy and effectiveness terms,

<sup>9</sup> The same can be said for any DRR public education program, no study to date has followed cohorts over time, with one exception on reduction of house fires in Surrey, British Columbia that used a door-knocking campaign by firefighters to reduce the incidence of house fires in high-risk areas [34]. In addition, a mental health-focused teacher-delivered resilience program developed in Israel for children did follow children over time, including following disaster in Turkey [35] and Israel/closer to the Gaza Strip [13], and found reduced incidence of stress and trauma symptoms and increased adaptive functioning.

<sup>10</sup> A range of disaster-focused mental health interventions are available as signposts in the psychosocial sphere [12, 36]. So too are a useful set of recommendations in helping prepare those who deliver interventions through various settings, including pediatric settings and schools [11]. Drawing on other universal mental health prevention/resiliency-building programs is also recommended as these have been seen to reduce development of later problems and enhance social, emotional and other areas of functioning, including significant increases in achievement [37, 38].

research is also needed to support policy and practice implementation of evidence-supported DRR preparedness education programs in school and community settings.

**Acknowledgments** The funding support of Australia's Bushfire and Natural Hazards Cooperative Research Centre (BNHCRC) is gratefully acknowledged. This review paper was part of a larger scoping and review exercise for a 3-year BNHCRC-funded project on "building best practice in child-centered disaster risk reduction."

## Compliance with Ethics Guidelines

**Conflict of Interest** Briony Towers, Victoria A. Johnson, and David M. Johnston declare that they have no conflict of interest.

Kevin R. Ronan has received a grant from the Bushfire and Natural Hazards Cooperative Research Centre. Dr. Ronan has also received payment for development of educational presentations and paid travel accommodations from the Australia-New Zealand initiative: Disaster Resilience Australia-New Zealand Schools Education Network (DRANZSEN).

Eva Alisic has received a grant from the Bushfire and Natural Hazards Cooperative Research Centre.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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