

# Children's disaster experiences and psychological symptoms: An international comparison between the Chilean earthquake and tsunami and Hurricane Katrina

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### Abstract

Improved understanding of the psychological impact on children following natural disasters is needed to assist with psychological recovery. The purpose of this exploratory study was to

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compare the disaster experiences and psychological symptoms of children, ages 8 to 17, following the Chilean earthquake and tsunami, and Hurricane Katrina. Over one-third of all students ( $N = 827$ ) met the symptom cut-off for mental health referral. Two one-sided test (TOST) procedures revealed similar symptom levels among the Chilean and Hurricane Katrina samples and similar numbers of reported disaster experiences. Interestingly, the Chilean earthquake and tsunami sample reported more direct disaster related losses and the Hurricane Katrina sample reported more recovery related issues. The findings suggest that even with cultural and type of disaster experience differences, children's responses to disasters are similar across cultures and that mental health services are needed to support recovery.

### **Keywords**

Children, disaster, international, mental health, trauma symptoms

Literature on mental health symptoms after disasters has shown that, for some children, there is increased risk for anxiety, posttraumatic stress symptoms, and depression. Symptoms of PTSD have been well researched in children who have experienced natural disasters including earthquakes, tsunamis, and hurricanes (Goenjian et al., 2005; John et al., 2007; Kolaitis et al., 2003; Kronenberg et al., 2010; La Greca et al., 1996; Lonigan et al., 1994; Osofsky et al., 2009; Piyasil et al., 2007; Pynoos et al., 1993; Russoniello et al., 2002; Vernberg et al., 1996). For example, a study of 16- and 17-year-old children following a 1999 earthquake in Greece (Roussos et al., 2005) as well as studies of 13-year-olds following Hurricane Mitch in Nicaragua (Goenjian et al., 2001, 2005) showed that exposure to a natural disaster was consistently related to increases in the severity of PTSD symptoms. Research data are becoming available on the effects of Hurricane Katrina on children and adolescents, and studies reflect the unprecedented scale of the storm and complexity of the recovery. In a sample of 166 students in the 9th through 12th grades, Marsee (2008) found that 63 percent of students had symptoms of PTSD 15 to 18 months following the hurricane and that the PTSD symptoms together with high levels of aggression were associated with emotional dysregulation. Weems et al. (2009) expanded the understanding of post-Katrina symptomatology finding that, among a sample of 52 children with a mean age of 11 years in the six to seven months following Katrina, level of posttraumatic stress symptomatology was significantly associated with hurricane exposure.

Many of these studies have reported co-morbid symptoms of depression in children following natural disasters. Although there is overlap in symptomatology of both PTSD and depression, including anhedonia, sleep difficulties, problems with concentration, irritability, and a restricted range of affect (APA, 2000), the research has been clear in demonstrating the distinct presence of each disorder following disasters (Goenjian et al., 2001; Kolaitis et al., 2003; Roussos et al., 2005). For example, a study exploring PTSD and depression in children between the ages of 7 and 17 who experienced a super-cyclone in India found that, although PTSD and depression were significantly correlated, most children with PTSD did not meet criteria for depression, and 56 percent of children with a diagnosis of depression did not meet criteria for PTSD (Kar et al., 2007).

### **Disaster experiences**

Natural disasters may result in children experiencing losses such as: homes, neighborhoods and community; toys and clothes; death of family members and friends, life-threatening experiences

(Osofsky et al., 2007). To some extent all of grief and loss related variables have been found to be associated with the development of psychological symptomatology following natural disasters (Lonigan et al., 1994; Roussos et al., 2005; Russoniello et al., 2002; Vernberg et al., 1996). In a study of over 5000 children ages 9 to 19 PTSD was associated with those who experienced displacement and damage to their homes as a result of Hurricane Hugo (Lonigan et al., 1994). Similarly, Russoniello et al. (2002) found that 9- to 12-year-old children whose homes were flooded as a result of Hurricane Floyd were three times more likely to have symptoms of PTSD compared to those whose homes did not flood. Hamada et al. (2003) reported that 6- to 12-year-old children who experienced Hurricane Iniki were more likely to report posttraumatic symptoms if they felt that their lives or the lives of others were threatened at the time of the hurricane. Further research by Osofsky et al. (2009) found that variables including separation from a caregiver and evacuating to a shelter were associated with posttraumatic stress symptoms in 7- to 19-year old students two years after Hurricane Katrina.

Unlike symptoms of PTSD, depression has not been found to be consistently related to level of disaster exposure or proximity. Depression has been associated with several different factors including reported difficulties at home following the disaster (Roussos et al., 2005), death of a family member (Goenjian et al., 2001), and feeling that one's own life or the lives of family members were in danger (Thienkrua et al., 2006).

Once the threat of the disaster has ceased, recovery begins and these recovery related disaster experiences can also affect mental health symptoms. Academic discourse on recovery following natural disasters often focuses on enhancing a positive experience. Conversely negative experiences following recovery can introduce, prolong, or exacerbate trauma symptoms or evoke delayed onset trauma symptoms (Bonanno and Mancini, 2008; Masten and Obradovic, 2008). Another important factor that is only recently receiving attention is the impact the recovery process can have on mental health. Stressors following the disaster, during the recovery period, have also been found to impact mental health including family and community disruption; transferring to new schools; parental unemployment and continued separation from parents (Brown and Perkins, 1992; Kronenberg et al, 2010; McFarlane, 1987; Pynoos and Nader, 1988). Terranova et al. (2009) provided further support for the importance of relationships in their study of sixth grade students who evacuated for Hurricane Katrina but did not experience significant flooding. In this group of children, negative peer interactions were associated with symptoms of PTSD eight months following the storm.

Previous studies on children have focused on differences in disaster experiences and the association with increased risk for negative psychological symptoms; however because of limitations in disaster research, such as lack of comparison groups, generalizability, resources, and the myriad of experiences unique to each disaster, it becomes difficult to describe levels of psychological distress (Masten and Osofsky, 2010; Steinberg et al., 2006). Part of why it is difficult to describe levels of psychological distress is because of the many different experiences among disasters. The controversy of whether trauma symptoms share universal similarities or are culturally defined also adds to this difficulty (Hauff and Vaglum, 1994; Marsella et al., 1996). Reviews of the literature and direct comparisons suggest that overall symptoms share universal similarities with unique variance for particular symptoms such as intrusiveness, avoidance and arousal (Jian et al., 2002; Norris et al., 2001). Logistically cross-cultural comparisons prove challenging for disaster research and the limited rigorous studies that do exist are on adults. Dyregrov et al. (2002) implore the importance of improved understanding of how culture plays a role in the traumatic response for children. This study attempts to improve understanding of culture in reference to child trauma symptoms by comparing international natural disasters utilizing the same methodology and highlighting similarities rather than differences.

*Hurricane Katrina.* Hurricane Katrina made landfall on 29 August 2005 off the Louisiana coast. High winds, heavy rains, storm surges, followed by massive flooding caused by levee breaches, resulted in one of the deadliest and costly hurricanes in US history (Knabb et al., 2006). Hurricane Katrina caused unprecedented personal and community devastation, including displacement, property destruction, and financial loss to those living along the Gulf Coast. In the state of Louisiana, over 1500 deaths were linked to Hurricane Katrina (Knabb et al., 2006), with damage to over 875 schools with over 40 totally destroyed (US Army Corps of Engineers, 2006).

*Chilean earthquake and tsunami.* Almost five years later another community faced levels of destruction similar to Hurricane Katrina. The earthquake started on 27 February 2010 at 3:34 am and lasted 2 minutes and 45 seconds. It reached a magnitude of 8.8 on the moment magnitude scale and impacted from the V to the IX region of the country. It was followed by a huge tsunami that impacted the Chilean coasts between the V and IX region. The earthquake and tsunami destroyed vast areas of the country where 13 million of inhabitant reside (80% of the country's population). This earthquake has been considered the second worst in the history of Chile and one of the five biggest earthquakes registered in the world. The victims to date include 521 deceased and 56 people missing (Ministry of Internal Affairs, 2010). More than 500,000 houses were severely damaged and a total of 2 million people suffered relevant losses to their properties.

Data from the World Health Organization 2010 Health Statistics shows similarities between the United States and Chile on a number of key health factors (see Table 1). In Chile, neuropsychiatric disorders are estimated to contribute to 30 percent of the global burden of disease and in the United States the estimate is similar at 31 percent (WHO, 2011). The two obvious differences were in the population and gross national income. United States and Chile also differed on religious affiliation where the United States has 22 percent Catholic and 52 percent Protestant; Chile has 75 percent Catholic and 22 percent Protestant (Nation Master, n.d.). While differences exist, the many similarities between the two countries support the comparisons and cultural similarities of the two countries.

*Disaster response and recovery.* The governing document for disaster response in the United States is the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The Stafford Act outlines the roles and processes for Federal disaster response activities especially as they pertain to the Federal Emergency Management Agency (FEMA), which is an arm of the Office of Homeland Security (FEMA, 2013). FEMA works in collaboration with offices at state and local levels. Specifically for Louisiana the Governor's Office of Homeland Security and Emergency Preparedness is the state governing office with individuals offices located in each Parish (county). While the formal coordination of disaster response is at the federal, state and local levels, with massive disasters such as Hurricane Katrina assistance from nonprofit/non-governmental agencies, religious support, concerned citizens, and international aid was critical to recovery.

The National Emergency Office of Ministry of the Interior and Public Security is a technical organization of the Chilean government, in charge of coordinating the National Civil Protection System. The main mission is to plan and execute prevention, identify and rehabilitate systems in collective risk situations, emergencies and natural or man-made disasters. ONEMI (National Emergency Office) was created in March 1974 and is located in Santiago, Chile. The actual administration management is focused on the reinforcement of the Emergency and Early Warning System and strengthening the Civil Protection System. It also works on support and attention during emergency situations caused by various risk variables throughout the country (snow, frontal systems, post-frontal instability, coastline evacuation initiated by a tsunami warning, etc.). With a focus on prevention as the key to saving lives, last year ONEMI implemented public education on self-care topics through the Exercise Programs (drills) 'Atento Norte', 'Atento Sur' and 'Chile Preparado'.

**Table 1.** Statistics for health factor comparisons between Chile and the United States.

Health factors	Chile	US
Life expectancy at birth (years)	78	78
Infant mortality rate (probability of dying by age 1 per 1000 live births)	7	11
Children aged <5 years underweight (%)	0.5%	1.3%
Population using improved drinking-water sources (%)	96%	90%
Alcohol consumption among adults aged $\geq 15$ years (liters of pure alcohol per person per year)	6.8	5.2
Adults aged $\geq 15$ years who are obese (%)	Male, 19% Female, 25%	Male, 31% Female, 33%
Children aged <5 years overweight (%)	10%	8%
Population – total (000s)	16,804	311,666
Population – aged < 15 (%)	23%	20%
Population – median age (years)	31	36
Population living in urban areas (%)	88%	82%
Adolescent fertility rate (per 1000 girls aged 15–19 years)	49	41
Net primary school enrolment rate (%)	Male, 95% Female, 94%	Male, 91% Female, 92%
Gross national income per capita (PPP int. \$)	13,270	46,970

Note: Data from World Health Statistics (WHO, 2010).

ONEMI has also developed campaigns with several public institutions like CONAF and SERNATUR to strengthen preventive behavior.

Integral to recovery from Hurricane Katrina was the process of sharing lessons learned with other communities affected by natural disasters. Members from the faculty integral to leadership of Hurricane Katrina recovery (Hansel et al., 2011) were able to travel to Chile to provide guidance on child and adolescent mental health following natural disasters. The lessons learned centered on the importance of screenings following disasters so that the limited mental health services can reach children and adolescents most in need. Another positive of clinical screens following disaster is to understand trauma responses to guide the present recovery phase and recovery following future disasters. The purpose of this exploratory study was to describe and compare the disaster and recovery related experiences and psychological symptoms of children following the Chilean earthquake, tsunami and Hurricane Katrina. Based on clinical discussions, the similarities in the amount of destruction following both disasters, disaster related experiences and trauma symptoms were noted. Specifically it was hypothesized that disaster experiences would be similar among the two groups of students. It was also hypothesized that posttraumatic stress and depression symptoms would be similar. In addition to assessing for equivalence between the samples, this study also addressed broader symptomatology following disasters rather than focusing on specific diagnoses. It is important to improve understanding of the full array of trauma symptoms following natural disasters, rather than just looking at severity in terms of diagnostic criteria. Improved understanding can not only draw awareness to, but also help better define the magnitude of behavioral health services needed to assist children and adolescents with psychological recovery (Pfefferbaum et al., 2010).

## Method

This cross-sectional exploratory study included a convenience sample of 827 children and adolescents from Louisiana ( $n = 494$ ) and Chile ( $n = 333$ ). Screening procedures were similar in the two

countries – all child and adolescent survivors in schools based on number of children affected and school system requests for mental health support. To better understand the disaster related mental health needs of children and as part of regular school screenings, school systems administered a modified National Child Traumatic Stress Network (NCTSN) Disaster and Referral Interview (NCTSN, 2005) within six months of the disasters. Letters were sent home to notify parents of the screenings. The schools collaborated with two universities to prepare and analyze results. Input was obtained from national experts, school administrators, parents and students to ensure, relevance, cultural sensitivity and proper translation. Participation was voluntary and professionals from the universities were onsite to answer questions. The interview was administered confidentially, but not anonymously, so that it was possible to provide follow-up evaluations for students endorsing significant mental health symptoms and/or requesting to speak with a counselor. Study protocol was approved by the University Institutional Review Board.

### Measure

The NCTSN Disaster Interview was first used for screenings following the World Trade Center Attacks (NCTSN, 2002) and was adapted during the active 2004 Florida hurricane season (NCTSN, 2005). The interview includes questions on disaster and recovery related experiences and mental health symptoms. Disaster and recovery related experiences included *yes* or *no* responses to the following items: injured, witnessed injury, family/friends injured or killed, parent helped in recovery, separated from caregiver, currently separated from caregiver, parent unemployed due to disaster, housing others due to disaster, separated from pet and toys/clothes destroyed. A disaster experiences index was created and 1 point was given for endorsement of each disaster and recovery related experience; for the current sample, disaster index scores range from 0–7 ( $M = 1.80$ ,  $SD = 1.52$ ).

The symptom scale was based on the UCLA PTSD Reaction Index (Steinberg et al., 2004) and includes questions regarding depressive symptoms. Students respond to each item on a scale of 1 (*not at all*) to 4 (*very much*). To score the screener, 1 point is given for each question rated 3 or 4 with a score of 4 or more meeting the cut-off for mental health referral. Depression and posttraumatic stress subscales were derived from the NCTSN screener using clinical classification based on DSM-IV-TR criteria (APA, 2000). Depressive symptom scores range from 0 to 13 ( $M = 2.17$ ,  $SD = 2.98$ ) and include the following items: nothing is fun anymore (item 6); sleep difficulties (item 7); feeling jumpy nervous (item 8); difficulty concentrating (item 9); feeling irritable (item 11); feeling sad (item 12); appetite change (item 13); headaches/stomachaches (item 14); less energy (item 15); difficulty with schoolwork (item 16); worry about something bad happening (item 17); difficulty with family/friends (item 18); and harder to enjoy activities (item 20). Posttraumatic stress symptom scores range from 0 to 11 ( $M = 2.16$ ,  $SD = 2.60$ ) and included items 7–9, 16, 17 and: upset when thinking about hurricane (item 1); nightmares (item 2); upsetting thoughts (item 3); try not to think/talk about hurricane (item 4); stay away of trauma reminders (item 5); and worry about what will happen (item 10). The internal consistencies ( $\alpha$  coefficient) were .90 for depression and .88 for posttraumatic stress symptoms.

### Participants

A total of 827 children and adolescents from Louisiana, USA and Santiago, Chile were screened. Children from Louisiana were survivors of Hurricane Katrina that occurred in 2005 and children from Chile were survivors of the 2010 earthquake and tsunami. The Hurricane Katrina child survivors were assessed in December 2005 and February 2006; 494 students ages 8 to 17 ( $M = 13.81$ ,

SD = 2.46) in St John the Baptist Parish were screened. This parish is located approximately 30 miles outside of New Orleans, Louisiana and was a heavily receiving parish for displaced students; 36 percent met the symptom cut-off for referral. The Chilean survivors were assessed from June to July 2010; 333 students ages 8 to 17 ( $M = 12.33$ ,  $SD = 2.60$ ), were screened. One hundred and twenty-one students from Pichilemu, a seaside town 200 miles south of Santiago that felt the earthquake and was devastated principally by the tsunami, completed the screening. Two hundred and twelve students from Quilicura, a Santiago neighborhood impacted by the earthquake, looting, and riots, completed the screening. A total of 333 Chilean students completed the screening and 35 percent met the symptom cut-off for referral.

### Analysis

Bivariate analyses were conducted to assess if differences exist on disaster and recovery experiences, requests to speak with a counselor, and mental health referrals by sample (Hurricane Katrina vs Chilean earthquake/tsunami). Specifically 2 x 2 chi square tests were utilized to compare proportions of students endorsing personal injury, witnessed injury, family/friends injured or killed, parent helped in recovery, separated from caregiver, currently separated from caregiver, parent unemployed due to disaster, housing others due to disaster, separated from pet, toys/clothes destroyed, requests to speak with a counselor and mental health referrals by sample. Point biserial and Pearson correlations were also conducted to assess relation among sample, age, posttraumatic stress, depression and disaster experiences. Bonferoni correction was computed to account for multiple comparisons and alpha was set at  $p < .003$ .

To answer the hypotheses – sample equivalence on disaster experiences and trauma symptoms – two one-sided test (TOST) procedures (Greene et al., 2009) were used with confidence intervals based on the Cohen's  $d$   $t$ -test effect sizes to determine the margin of equivalence (Weins, 2002; Wuensch, 2010). TOST procedures utilize traditional hypothesis difference testing, but extend the application to equivalence testing by asking whether the non significant difference is small enough to determine that the samples are indeed similar (Lauzon and Caffo, 2009). United States Food and Drug equivalence determination was used and based on whether the mean difference lies within the confidence interval of equivalence (Lachenbruch, 2001). Conservative determinants of equivalence were also used to evaluate overlap of the difference and equivalence confidence intervals (Greene et al., 2009).

### Results

Chi square tests were conducted to assess if differences exist on disaster and recovery experiences, counselor requests, and mental health referrals by sample (Hurricane Katrina versus Chilean earthquake/tsunami). Table 2 presents descriptive and bivariate statistics. Results suggest that a larger proportion of students in the Chilean earthquake/tsunami sample endorsed that they: were injured, had witnessed injury, had a parent help in recovery efforts, and wanted to speak with counselor, compared to the Hurricane Katrina sample. Results also suggest that a larger proportion of students in the Hurricane Katrina sample were separated from a parent or caregiver during the disaster, remained separated from parent or caregiver, had a parent unemployed, and were housing others due to the disaster. No statistically significant differences were revealed on separation from pet, personal items destroyed, friends or family injured or killed. A Chi square test of association also revealed no statistical significance on percentages of students meeting the cut-off for mental health referral by sample (see Table 2). Bivariate Pearson and point biserial correlations were conducted to assess relation among sample, age, posttraumatic stress, depression and disaster experiences

**Table 2.** Chi square on disaster experiences, counselor requests and referrals by sample.

Variables	Hurricane Katrina ( <i>n</i> = 494)	Chilean earthquake/ tsunami ( <i>n</i> = 333)	$\chi^2$
Wants to speak with counselor	7.7%	50.2%	192.33*
Personally injured	2.6%	15.3%	44.82*
Witnessed injury	13.6%	26.4%	21.61*
Parent helped in recovery efforts	18.8%	46.8%	74.22*
Separated from caregiver	11.7%	5.1%	12.75*
Currently separated from caregiver	6.9%	2.1%	9.67*
Parent unemployed due to disaster	21.1%	9.3%	20.83*
Housing others due disaster	39.1%	3.9%	135.69*
Separated from pet	25.3%	33.0%	5.84
Family members/friends injured or killed	19.2%	25.8%	5.06
Personal items destroyed	17.2%	18.6%	0.27
Met cut-off for mental health referral	34.5%	37.7%	0.84

Note: \* $p < .003$ ;  $N = 827$ .

index. The correlation matrix is presented in Table 3. Results also suggest that younger students had higher scores on depression and posttraumatic stress and that the Chilean students ( $M = 12.33$ ,  $SD = 2.60$ ) tended to be younger than Hurricane Katrina students ( $M = 13.81$ ,  $SD = 2.46$ ).

The first step in assessing the hypotheses – sample equivalence on disaster experiences and trauma symptoms – was to conduct three independent sample *t*-tests. Table 4 presents the *t*-test results where no significant differences were revealed on disaster experiences, posttraumatic stress and depression by sample. Next confidence intervals of equivalence were calculated based on Cohen's *d* to assess if the non significant difference is small enough (see Table 4). Results revealed that the mean differences for disaster index and depression lay within the margin of equivalence. Due to existing literature and the significant relation among post traumatic stress and age, estimated marginal means for the Chilean sample, 2.10 ( $SE = 0.14$ ), and for the Hurricane Katrina, 2.21 ( $SE = 0.12$ ), sample were calculated. Mean difference (0.11) between these estimated marginal means lies within the margin of equivalence, suggests that a lack of equivalence between the samples is primarily due to age. Results also revealed that the margin of equivalence includes the margin of indifference, but overlaps into the margins of difference.

## Discussion

Children and adolescents impacted by Hurricane Katrina and the Chilean earthquake and tsunami reported multiple symptoms of depression and posttraumatic stress. Over one-third of the students met the symptom screener criteria for further evaluation. This finding across two major disasters occurring in different parts of the world emphasizes the importance of having supportive behavioral health services available. While previous studies have reported between 5 and 10 percent (Lonigan et al., 1998; Thienkrua et al., 2006) of children develop posttraumatic stress disorder, these findings include even more students that do not meet diagnostic criteria, but continue to struggle. It is important to note that many children exposed to disasters will cope successfully over time and demonstrate adaptive skills (Benight and Bandura, 2004). However, for children and adolescents that continue to struggle, it is crucial to assist them with the many stressors affecting their lives and to help them develop positive coping strategies. More investigation on supportive



**Table 3.** Pearson and point biserial correlations among sample, age, disaster index and symptoms.

	Age	Disaster index	Depression	PTS
Sample	.28**	-.04	.01	-.04
Age	—	-.07	-.15**	-.22**
Disaster Experiences Index	—	—	.38**	.38**
Depression	—	—	—	.85**

Note: \*\* $p < .001$ ;  $N = 827$ . Hurricane Katrina = 1. Chilean students' age ( $M = 12.33$ ,  $SD = 2.60$ ) and Hurricane Katrina students' age ( $M = 13.81$ ,  $SD = 2.46$ ).

**Table 4.** Difference and equivalence tests on symptoms and disaster experiences by sample.

	Sample $M$ ( $SD$ )		$t$	$p$	$\Delta$	$d$	95% CI difference		90% CI equivalence	
	Hurricane Katrina ( $n = 494$ )	Chilean earthquake/tsunami ( $n = 333$ )					Lower	Upper	Lower	Upper
Depression	2.19 (3.01)	2.15 (2.94)	-0.20	0.84	-0.04 <sup>a</sup>	0.01	-0.46	0.37	-0.10	0.13
Posttraumatic stress	2.07 (2.40)	2.29 (2.88)	1.13	0.26	0.22 <sup>b</sup>	0.08	-0.16	0.59	-0.04	0.20
Disaster experiences	1.76 (1.49)	1.86 (1.56)	1.02	0.31	0.11 <sup>a</sup>	0.07	-0.10	0.32	-0.04	0.19

Note:  $N = 825$ . Depression and disaster experiences  $d.f. = 825$ ; Posttraumatic stress  $d.f. = 636$ . Numbers in parentheses represent standard deviation. No significant differences were revealed by  $t$ -tests.

<sup>a</sup>mean difference within the margin of equivalence.

<sup>b</sup>after controlling for age, estimated marginal means for the Chilean sample, 2.10 ( $SE = 0.14$ ) and for the Hurricane Katrina, 2.21 ( $SE = 0.12$ ), yield a mean difference of 0.11.

services to enhance the resilience and strengths of the larger proportions of children affected by or in close proximity to the disaster are needed (Terranova et al., 2009).

The overall results of the study support the hypothesis, that even with cultural differences, psychological symptoms of children following the Chilean earthquake and tsunami and Hurricane Katrina were indeed similar. The major differences found between the international samples were age differences, with the Chilean sample being younger. The results of this effect were similar to other studies revealing that younger children tend to report more symptoms (Bokszczanin, 2007; Giannopoulou et al., 2006; Kronenberg et al., 2010; Longian et al., 1994; McDermott and Palmer, 2002; Shannon et al., 1994). In addition to this finding, the Chilean sample also reported more disaster experiences. Interestingly, a main effect was not revealed on the number of disaster experiences; however, bivariate analyses revealed differences in types of disaster experiences. A greater proportion of students affected by the Chilean earthquake and tsunami sample reported personal injuries, witnessing injury, and family or friend injured; these experiences seem to be aligned more with direct disaster related losses. In contrast, students affected by Hurricane Katrina reported more continued parental separation, unemployment, school transfers, and housing others due to the disaster which seems more aligned with recovery related issues. Future studies should further investigate these differences and the effect on symptom trajectories and longer term outcomes. Future studies are also needed to address the limitations in the current study which include: a five-year difference between the disasters; the screening instrument is not validated and currently undergoing psychometric testing; the lack of measuring secondary traumas; sampling method;

cross-sectional design; and that the instrument was only recently translated. In addition, future studies and mental health services in general should not only address the negative effects of disaster, but also work to enhance the inherent resilience and strengths of child survivors.

In longer-term studies following Hurricane Katrina data indicate that mental health symptoms remained elevated three years post-disaster (McLaughlin et al., 2010) with 28 percent of children and adolescents still having significant posttraumatic stress and depressive symptoms (Kronenberg et al., 2010; Osofsky et al., 2009). Similarly, John et al. (2007) found that 11 percent of 5- to 18-year-old children who survived an earthquake and tsunami in Asia developed delayed onset symptoms of PTSD. Halpern and Tramontin (2007) commented that 40 percent of children who exhibited PTSD symptomatology 10 months after Hurricane Andrew remained symptomatic three and a half years later. Thus, there is a critical need to provide mental health services for children affected by the Chilean earthquake and tsunami. To date (December 2010), in Chile no initiative for funding in mental health have been applied and there is not a unitary specific mental health fund from the government in response to the earthquake and tsunami. With 50 percent of the students in the Chilean sample requesting to speak with a counselor and 34 percent meeting the posttraumatic stress symptom cut-off, there is a need for mental health supportive services. The similarities found between the two samples in this study not only support the need for services following the disasters in Chile, but also contributes to a broader international understanding of child and adolescents mental health outcomes following a disaster. While there were similarities in symptomatology, the differences found in this study and in literature advocating for deviation from medical models of disaster response toward a more psychosocial participatory practice (Bourassa, 2009) suggest that these mental health services should be targeted toward cultural norms and specific disaster related events. Intra-cultural manifestation might also be different and similarly would also warrant individualistic interventions, such as participation of parents, group and brief treatment methods, and psycho-education. When possible these mental health services should be provided by local providers, as they are the experts on their communities, however if outside humanitarian assistance is needed it should be closely coordinated and informed by host country nationals familiar not only with the differing norms within a particular region but also with the vast array of experiences within the specific disaster (ISAC, 2007).

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