Childhood Trauma and Adulthood Physical Health in Mexico.

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Abstract:

Background

The present study examined the effect of childhood trauma on adulthood physical health among a randomly selected sample of adults (N = 2,177) in urban Mexico.

Methods

Adults were interviewed about their experiences of trauma, post-traumatic stress disorder, depression, and physical health symptoms using Module K of the Composite International Diagnostic Interview, the Center for Epidemiologic Studies Depression Scale, and the Physical Symptoms Checklist.

Results

Trauma was prevalent, with 35% reporting a traumatic event in childhood. In general, men reported more childhood trauma than women, with the exception of childhood sexual violence where women reported more exposure. For men, childhood sexual violence was related to total and all physical health symptom subscales. For women, childhood sexual violence was related to total, muscular-skeletal, and gastrointestinal-urinary symptoms; hazards/accidents in childhood were related to total, muscular-skeletal, cardio-pulmonary, and nose-throat symptom subscales. Depression mediated the relationship between childhood sexual violence and physical health symptoms for men and women. Among women only, PTSD mediated the relationship between childhood sexual violence and total, muscular-skeletal, and gastrointestinal-urinary symptoms. PTSD also mediated the relationship between hazards/accidents in childhood and total, muscular-skeletal, cardio-pulmonary, and nose-throat symptoms.

Conclusion

These findings can be used to increase awareness among general practitioners, as well as community stakeholders, about the prevalence of childhood trauma in Mexican communities and its impact on subsequent physical health outcomes. With this awareness, screening practices could be developed to identify those with trauma histories in order to increase positive health outcomes among trauma survivors.

Article:

Introduction

There is a general consensus in the field of trauma research that individuals who are exposed to traumatic events also experience psychological and physical health problems (Friedman and Schnurr 1995; Galea et al. 2005; Koss and Heslet 1992; Norris et al. 2002b; Ullman and Siegel 1996). In particular, mental health consequences of trauma, such as depression, anxiety, and posttraumatic stress disorder (PTSD), have been the focus of much of the research (Breslau et al. 1998; Kessler et al. 1995; Norris and Kaniasty 1994; Norris et al. 2002b; Resnick et al. 1993; Sorenson and Golding 1990). Research has also suggested that exposure to traumatic events affects physical health (Flett et al. 2002; Schnurr and Green 2004; Ullman and Siegel 1996). Furthermore, studies have shown a relationship between childhood exposure to trauma and adult physical health (Felitti et al. 1998; Moeller et al. 1993; Shaw and Krause 2002; Spertus et al. 2003; Thompson et al. 2002; Walker et al. 1999); however much of this work has been conducted in the US and other developed countries. This is a shortcoming because some types of trauma (e.g., natural disasters) are more prevalent, and typically more severe, in developing areas of the world (De Girolamo and McFarlane 1996; International Federation of Red Cross and Red Crescent Societies 2004), and these populations may be particularly susceptible to adverse health effects given their poverty and lack of healthcare resources. To begin to fill this gap, the present study focuses on how childhood trauma affects physical health in adulthood among a sample of adults in the developing country of Mexico.

Although there is research on the effect of trauma exposure on physical health, studies have mostly sampled victims of specific types of trauma (e.g., war veterans, victims of physical and sexual abuse, and victims of natural and human-caused disasters). For example, the Centers for Disease Control and Prevention conducted a survey of over 7,000 male veterans and found that those who served in Vietnam reported greater prevalence of diseases, somatic symptoms, and fertility problems compared to those who did not serve (CDC 1987). In the Epidemiologic Catchment Area study, a lifetime history of trauma exposure was associated with reports of poor self-rated health and a greater number of chronic medical conditions, even with demographic

characteristics, psychiatric history, and other stressful life events controlled (Ullman and Siegel 1996). In a meta-analysis of studies on the relationship between sexual assault history and physical health, results showed that sexual assault history was associated with a 46% increased likelihood of poor subjective health (Golding et al. 1997). Furthermore, experiencing emotional or verbal abuse was significantly related to irritable bowel syndrome in adulthood (Talley et al. 1994).

From the disaster literature, a review by Norris et al. (2002b) showed that many victims of disaster report declines in their physical health and an increase in somatic concerns. In past studies, disaster victims have scored higher than norms or controls on objective measures of morbidity (Holen 1991; Palinkas et al. 1993), as well as on self-reported somatic complaints or checklists of medical conditions (e.g., Clayer et al. 1985; Murphy 1984; Norris et al. 2006; Phifer et al. 1988). In particular, research has shown that physical health is negatively affected regardless of whether the disasters were natural or human-caused, and is particularly compromised for victims who were forced to relocate after the disaster (Escobar et al. 1992; van den Berg et al. 2005).

Embedded in the research on trauma and health are studies suggesting that childhood trauma has an impact on physical health in adulthood. Evidence suggests that emotional abuse, neglect, and physical and sexual abuse experienced in childhood are associated with adverse physical health outcomes in adulthood (Moeller et al. 1993; Shaw and Krause 2002; Spertus et al. 2003; Thompson et al. 2002; Waldinger et al. 2006; Walker et al. 1999). For example, adult women who reported childhood sexual abuse also reported higher levels of gastrointestinal disorders, chronic pelvic pain, and other physical conditions in adulthood (Heitkemper et al. 2001; Leserman et al. 1996; Rimsza and Berg 1988; Walker et al. 1992). In other studies childhood maltreatment was significantly associated with headaches (Golding 1999), chronic back pain (Pecukonis 1996), and shortness of breath in adulthood (McCauley et al. 1997).

Another type of childhood trauma that has been examined is parental loss. However, there are few studies on the effects of early parental loss on subsequent physical health. Findings from one study suggest that early parental loss did not have an effect on adult physical health, for either chronic or acute health problems (Maier and Lachman 2000). Additional research is needed to understand not only how parental loss, but other types of traumatic bereavement in childhood, affect adult physical health.

One important consideration in conducting this research is that the effects of trauma exposure on health may not be direct. Reviews and past research have emphasized an indirect pathway between trauma, PTSD and physical health (Friedman and Schnurr 1995; Kimerling et al. 2000; Norris et al. 2006; Schnurr and Green 2004; Schnurr and Jankowski 1999; Zoellner et al. 2000). Others have proposed that individuals who develop depression following traumatic events may also be at increased risk of adverse health outcomes (Ford 2004). Therefore, when examining the role of trauma exposure on physical health it is also necessary to take into account the

comorbidity of PTSD and depressed affect, as both tend to be prevalent in the aftermath of trauma (Breslau et al. 2000; Ford 2004; Kessler et al. 1995; Norris et al. 2006).

Although tremendous progress has been made in our understanding of the impact that trauma exposure has on physical health, the field would benefit from additional data in three areas. First, many of the studies have been conducted with special populations (e.g., veterans, clinical samples) and settings (e.g., primary care clinics, college campuses). Additional data from the general population is needed to increase the generalizability of the research. Second, the focus of many studies has been restricted to certain types of trauma (e.g., sexual abuse). Consideration of a more diverse set of traumatic experiences and their impact on adult physical health is needed. Finally, a general deficiency in the literature is our lack of understanding about the effects of trauma on physical health worldwide because relatively little of the research has been conducted outside of the United States and other developed countries (Norris et al. 2002b).

To address these three gaps, the present study examined physical health outcomes of respondents in four Mexican cities and whether exposure to different types of traumatic events in childhood was related to adult physical health symptoms after controlling for age, education, living conditions and post-childhood trauma. In addition, we hypothesized that past-week depressed affect and whether the respondent had met criteria for a PTSD diagnosis in their lifetime would mediate the relationship between childhood trauma and adult physical health.

Method

Sampling and interviewing procedures

A multi-stage probability sampling design was used to draw samples of adults who were representative of Oaxaca, Guadalajara, Hermosillo, and Mérida. The sample for this larger study was comprised of 2,509 adults; 907 men and 1,602 women. Interviewers knocked on the doors of eligible households and asked the person who answered to take part in an international study of health in Mexico. The person's household was asked to participate in two phases of the project: first in a sociodemographic interview about the household, and then one person from the household would be randomly selected to participate in an in-depth interview about health issues they had faced in their lives. Sample size and response rates were 576 (79%) in Oaxaca, 713 (82%) in Guadalajara, 618 (76%) in Hermosillo, and 602 (70%) in Mérida. The primary reason for refusal to participate, when participants gave one, was lack of time for the interview.

Interviews were completed by trained, local interviewers in respondents' homes in private. The demographic interviews lasted about 1 h, and psychological interviews lasted about 2 h. Demographic and psychological interviews were typically completed on separate days.

Fieldwork managers checked all interviews for accuracy of selection procedures, completeness, and quality. Study procedures were approved by institutional review boards in the United States and Mexico and were reviewed for adherence to federal (US) guidelines for conducting research in international settings. More detail about the sampling and assessment procedures used in this study may be found in Norris et al. (2003).

Measures

Predictor variables

For the present study, respondents age 60 and older were removed from the larger study sample. Some research suggests that while retrospective reports of trauma exposure tend to be valid, the age at which the traumatic event is experienced may be reported inaccurately, especially by older adults and the elderly (Bernstein et al. 1994; Krause et al. 2004). In addition, among the elderly there are likely age-related declines in physical health that could influence the findings. Therefore, to reduce potential bias in responses related to childhood experiences of trauma and the subsequent effects of this exposure, the sample is comprised of respondents between the ages of 18–59 years. The subset for the present study is comprised of 2,177 respondents, of which 64% are women.1 The average age of participants was 34.7 years (SD = 11.2) and average level of education was 9.8 years (SD = 4.4; range 0–24 years). Demographic characteristics of the sample are presented in Table 1.

Table 1

Sample characteristics and study variables by sex

	Men (N = 778)		Women (N = 1,399)	
	M	SD	*M*	SD
Age	33.9	(11.3)	35.2*	(11.1)
Education level	10.7*	(4.3)	9.2	(4.4)
Poor quality of living conditions (1–4)	1.2	(0.3)	1.3*	(0.4)

	Men (N = 778)		Women (N = 1,399)	
	M	SD	*M*	SD
Depressive symptoms (0–3)	0.6	(0.4)	0.7*	(0.5)
Physical health symptoms (1–5)				
Total scale	1.4	(0.4)	1.6*	(0.5)
Muscular-skeletal	1.5	(0.5)	1.8*	(0.7)
Cardiopulmonary	1.2	(0.4)	1.3*	(0.5)
Nose-throat	1.4	(0.6)	1.5*	(0.7)
Gastrointestinal/urinary	1.5	(0.5)	1.6*	(0.7)
% Meeting criteria for PTSD diagnosis	6.6		14.9*	

Mean or percent higher in this group than in counterpart, * $p < .001$

Quality of current living conditions was assessed and included to control for impoverished conditions that could influence health status. The quality of current living conditions was scored as the mean of five items (α = .76), each measured on a four-point scale (1 = not at all, 4 = a lot). The items captured the extent to which respondents had experienced shortages of food and water, crowding, lack of electricity, and problems with sanitation. Approximately 54% of the sample had experienced at least one of these problems to some degree.

Past-week depressed affect was assessed by the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977). For each question, the respondent reported the number of days he or she experienced the symptom in the past week, on a four-point response format (0–3), α = .86. The scale has performed well within Hispanic and Mexican populations (Roberts 1980; Saldago de Snyder and Maldonado 1993). For the present analysis, we deleted five items that closely approximated items/symptoms on the measure of PTSD (concentration difficulties, fear, sleep disruption) or health (change in appetite, lack of energy). Scored as the mean of component items, the resulting 15-item measure had an α of .82.

Trauma exposure and PTSD were measured by using Module K of Version 2.1 of the Composite International Diagnostic Interview (CIDI) developed and translated into Spanish by the World

Health Organization (WHO 1997).[2] Respondents first report whether they have ever experienced one or more traumatic events from a set of events included in the CIDI. Traumatic events in the CIDI included physical assault, threatened with a weapon, sexual assault, sexual molestation, traumatic bereavement, injury or property loss in a disaster, injury or property loss in a fire, life threatening accident, and witnessing someone killed or injured. Then, the CIDI assesses, in order, all DSM-IV criteria for PTSD (APA 1994). The CIDI is structured so that people who experience more than one type of event are asked the symptom questions only for the one event judged by them to have been the most stressful.

We modified the protocol slightly so that all symptom questions were asked of anyone who had experienced an event (The typical approach is to skip to the next section of the interview once a criterion is not met). With WHO's permission and assistance, we also modified the event portion of Module K to collect information about the respondent's age at the time of the trauma (i.e., the respondent was asked if the event had occurred before the age of 12 [childhood], 12–15 [adolescence] or 16 and older [adulthood]). If the event happened more than once, respondents were asked to report the age at which it happened the first time and last time, which allowed separate variables to be created for adulthood and childhood trauma. Using the age breakdown above, in the present study almost 22% of respondents reported trauma exposure before the age of 12, 20% between 12 and 15 years old, and 60% reported exposure at 16 years and older. Because the focus of this paper was on the impact of childhood exposure to trauma on adult physical health we created variables for trauma exposure that represented whether these events occurred before the age of 16 (childhood) or 16 and older (post-childhood). For PTSD, we included a variable that measured whether the respondent had met criteria for PTSD in his or her lifetime. In the present study, 11.9% of the sample met criteria for a lifetime PTSD diagnosis (see Table 1 for data broken down for men and women).

Outcome variable

The scale of physical health symptoms was adapted and translated from the physical symptoms checklist (Leventhal et al. 1996). Each of the scale's items described a specific physical symptom experienced in the last month, with participant responses ranging from not at all true (1) to extremely true (5). Two items were removed (problems remembering things, sleeping problems) because of their close overlap with items on the measure of PTSD used in the present study. The scale was also factor analyzed as it had not been used in Mexico previously; during this process additional items were removed because of low factor scores (see Norris et al. 2006, for a description of these analyses). The resulting 20-item measure of physical health symptoms with four subscales was used ($\alpha = .90$): (1) cardio-pulmonary symptoms (e.g., chest discomfort or pain, high blood pressure, difficulty breathing) ($\alpha = .78$), (2) muscular-skeletal symptoms (e.g., pain or stiffness in shoulders, arms or hands; back problems; hip, leg, knee, or feet problems) ($\alpha = .77$); (3) nose-throat symptoms (e.g., nose or sinus problems; throat problems;

swollen glands) (α = .71), and (4) gastrointestinal/urinary symptoms (e.g., stomach or digestive problems; intestinal or bowel problems; urination problems) (α = .62). Scales were scored as the mean of component items (range 1–5). The average response across all symptoms was 1.51 (SD = .45); respondents reported that it was a "little true" that they had experienced physical symptoms in the past month (see Table 1 for a breakdown of physical health subscales for men and women).

Data analysis

T-tests and chi-square analyses were used to examine differences between men and women on predictor and outcome variables. Subsequent analyses used hierarchical linear regression, where physical health symptom subscales were dependent variables and exposure to specific types of childhood traumas were independent variables. Because the literature (as well as the present study; see Tables 1, 2) has overwhelmingly found sex differences in exposure to trauma as well as the consequences of trauma (Norris et al. 2002a; Tolan and Foa 2006), analyses were conducted separately for men and women. Age, education, living conditions, and post-childhood trauma exposure were entered first in the analyses. In the second step, variables representing childhood exposure to traumatic events were entered. Specific traumas in the present study were sexual violence (i.e., sexual assault, sexual molestation), physical violence (physical assault, threat with a weapon), accident/hazard (i.e., injury or property loss in a disaster, fire, or life threatening accident), traumatic bereavement, and witnessing someone injured or killed. Dummy codes were created to represent trauma experienced in adulthood (16 and older) and trauma experienced in childhood (before age 16). Positive scores for childhood violence indicate that at least one event occurred when the respondent was younger than age 16. Childhood and adulthood trauma variables were not mutually exclusive. As a test of mediation in each model, PTSD and depression were entered in the last step to examine whether the associations found decreased significantly after taking into account PTSD and depressive symptoms.

Table 2

Trauma exposure by sex (N = 2,177)

Type of trauma	Men			Women		
	n	%	(SE)	*n*	%	(SE)
Any trauma exposure						
Adulthood	547	70.3**	(1.6)	761	54.4	(1.3)

Type of trauma	Men			Women		
	n	**%**	**(SE)**	**n**	**%**	**(SE)**
Childhood	317	40.7**	(1.8)	447	32.0	(1.2)
Sexual violence exposure						
Adulthood	38	4.9	(0.8)	72	5.1	(0.5)
Childhood	40	5.1	(0.8)	119	8.5**	(0.8)
Physical violence exposure						
Adulthood	297	38.2***	(1.7)	229	16.4	(1.0)
Childhood	80	10.3***	(1.2)	51	3.6	(0.5)
Hazard/accident exposure						
Adulthood	292	37.5**	(1.7)	292	20.9	(1.1)
Childhood	141	18.1**	(1.4)	163	11.7	(0.9)
Traumatic bereavement						
Adulthood	227	29.2*	(1.6)	347	24.8	(1.2)
Childhood	91	11.7	(1.2)	154	11.0	(0.8)
Witnessing someone injured or killed						
Adulthood	230	29.6**	(1.6)	221	15.8	(1.0)
Childhood	125	16.1**	(1.3)	148	10.6	(0.8)

Percent higher in this group than in counterpart, * $p < .05$; ** $p < .01$; *** $p < .001$

Results

Prevalence of trauma exposure in adulthood and childhood

Approximately 60% (n = 1,308) of the total sample (<age 60) reported experiencing a traumatic event in adulthood. Specifically, 5% reported sexual violence and 24% reported physical violence in adulthood. Almost 27% reported experiencing a fire, disaster, or life threatening accident in adulthood. Twenty-six percent of the total sample reported traumatic bereavement, and 21% reported witnessing someone injured or killed. Regarding childhood trauma, 35% of the total sample (n = 764) reported experiencing a traumatic event in childhood. Seven percent reported sexual violence in childhood and 6% reported physical violence in childhood. In addition, 14% reported a fire, disaster, or life threatening accident. Of the total sample, 11% reported traumatic bereavement in childhood and 13% reported witnessing someone injured or killed in childhood (see Table 2 for specific percentages for men and women). For all but two types of events (two in childhood and one in adulthood), men reported exposure to more traumatic events than women. The exceptions were childhood sexual violence where women reported higher rates of exposure, and exposure to childhood traumatic bereavement and adulthood sexual violence where there were no sex differences.

Effects of childhood trauma on adult physical symptoms

Correlations of trauma predictor variables, and depression and PTSD for men and women are shown in Table 3. To examine the effects of childhood trauma type on physical symptoms after controlling for covariates that could affect symptomatology, we conducted five hierarchical linear regressions, one for the total and each physical health subscale (see Table 4 for men and Table 5 for women). Results varied depending on the type of childhood trauma and the set of physical symptoms.

Table 3

Correlations of study variables: trauma, depression, and PTSD by sex

	ASV	APV	AHaz	ABreav	AWit	CSV	CPV	CHaz	CBereay	CWit	Dep	PTSD
ASV	–	.15***	.11**	.13***	.12***	−.05	.04	.03	−.03	.03	.03	.13***
APV	.16***	–	.25***	.12***	.21***	.06	.03	.11**	.04	.09*	.02	.10**
AHaz	.03	.16***	–	.13***	.23***	.04	−.01	−.20***	−.04	−.01	−.02	.03
ABereav	.02	.09***	.06*	–	.15***	.04	.03	.09*	−.23***	.00	−.02	.05
AWit	.09***	.11***	.15***	.04	–	−.02	.01	.02	−.01	−.28***	−.05	.05
CSV	.03	.18***	.07**	.04	.04	–	.19***	.15***	.06	.06	.09*	.10*
CPV	.01	.01	.09***	.04	.02	.13***	–	.21***	.09*	.18***	.05	.13***
CHaz	.05	.13***	−.09***	−.01	.04	.14***	.14***	–	.10**	.16***	.07	.09*
CBereav	.02	−.01	.03	−.20***	.00	.06*	.04	.14***	–	.17***	.09*	.05
CWit	.07*	.09***	.02	.03	−.15***	.18***	.14***	.19***	.15***	–	.13***	.07

	ASV	APV	AHaz	ABreav	AWit	CSV	CPV	CHaz	CBereay	CWit	Dep	PTSD
Dep	.09***	.17***	.09***	.01	.05	.13***	.06*	.10***	.04	.06*	–	.17***
PTSD	.21***	.22***	.09***	.08**	.09***	.25***	.13***	.16***	.08**	.11***	.25***	–

Correlations for men above the diagonal and correlations for women below the diagonal

* $p < .05$; ** $p < .01$; *** $p < .001$

ASV adulthood sexual violence; *APV* adulthood physical violence; *AHaz* adulthood hazard; *ABereav* adulthood bereavement; *AWit* adulthood witnessing; *CSV* childhood sexual violence; *CPV* childhood physical violence; *CHaz* childhood hazard; *CBereav* childhood bereavement; *CWit* childhood witnessing; *Dep* depression (current); *PTSD* post-traumatic stress disorder (lifetime)

Table 4

Hierarchical linear regressions for men of trauma type on physical health (N = 778)

Variables	Total health symptoms				Muscular-skeletal				Cardio-pulmonary			
	r	Step 1 *β*	Step 2 *β*	Step 3 *β*	*r*	Step 1 *β*	Step 2 *β*	Step 3 *β*	*r*	Step 1 *β*	Step 2 *β*	Step 3 *β*
Age	−.02	−.04	−.03	.02	.03	.00	.01	.05	.01	.00	.00	.03

Variables	Total health symptoms				Muscular-skeletal				Cardio-pulmonary			
	r	Step 1 *β*	Step 2 *β*	Step 3 *β*	*r*	Step 1 *β*	Step 2 *β*	Step 3 *β*	*r*	Step 1 *β*	Step 2 *β*	Step 3 *β*
Education	−.10**	−.06	−.07	.01	−.14***	−.09*	−.10*	−.03	−.09*	−.06	−.07	−.01
Poor living conditions	.17***	.15***	.14***	.11**	.20***	.17***	.16***	.13***	.10**	.09*	.08*	.05
Sexual violence adulthood	.06	.04	.05	.03	.06	.04	.04	.02	.01	−.01	.00	−.03
Physical violence adulthood	.12***	.11**	.08*	.08*	.08*	.06	.07	.04	.09*	.09*	.07	.06
Hazard adulthood	.06	.03	.05	.05	.07	.04	.07	.07	.05	.04	.05	.05
Bereavement adulthood	−.02	−.03	−.05	−.05	.00	−.01	−.04	−.04	−.02	−.03	−.05	−.05
Witnessing adulthood	.02	−.01	.01	.01	.03	.01	.01	.02	.00	−.02	−.01	−.01
Sexual violence childhood	.14***		.13***	.09*	.10**		.08*	.04	.10**		.09*	.05
Physical violence childhood	.11**		.04	.04	.15***		.10**	.10**	.06		.03	.02

Variables	Total health symptoms				Muscular-skeletal				Cardio-pulmonary			
	r	Step 1 β	Step 2 β	Step 3 β	r	Step 1 β	Step 2 β	Step 3 β	r	Step 1 β	Step 2 β	Step 3 β
Hazard childhood	.13***		.09*	.08*	.14***		.10**	.10**	.07		.05	.05
Bereavement childhood	.03		−.03	−.05	.01		−.03	−.05	.01		−.03	−.05
Witnessing childhood	.08*		.04	.01	.06		.01	−.02	.06		.03	.01
Lifetime PTSD	.14***			.04	.13***			.03	.11**			.05
Current depression	.39***			.36***	.36***			.33***	.31***			.29***
R^2 change		.05***	.04***	.12***		.06***	.03**	.10***		.03**	.01	.08***
Adjusted R^2		.04***	.07***	.20***		.05***	.07***	.17***		.02*	.03**	.10***

Variables	Nose-throat	Gastrointestinal-urinary

	r	Step 1 β	Step 2 β	Step 3 β	r	Step 1 β	Step 2 β	Step 3 β
Age	−.06	−.08	−.07	−.05	−.06	−.07	−.07	−.05
Education	−.01	.01	.00	.05	−.03	.00	−.01	.04
Poor living conditions	.11**	.11**	.10**	.08*	.12***	.12***	.12***	.09*
Sexual violence adulthood	.08*	.06	.07	.06	.03	.00	.01	−.01
Physical violence adulthood	.09*	.08*	.06	.06	.12***	.13***	.11**	.10**
Hazard adulthood	.03	.01	.02	.03	.04	.03	.04	.04
Bereavement adulthood	.01	.02	.00	.00	−.03	−.03	−.05	−.06
Witnessing adulthood	.02	.00	.01	.01	.01	−.01	.01	.01
Sexual violence childhood	.09*		.09*	.06	.16***		.16***	.13***
Physical violence childhood	.04		.00	.00	.05		.00	.00

Variables	Nose-throat				Gastrointestinal-urinary			
	r	Step 1 β	Step 2 β	Step 3 β	r	Step 1 β	Step 2 β	Step 3 β
Hazard childhood	.09*		.05	.05	.10**		.06	.05
Bereavement childhood	.03		.00	−.01	.01		−.05	−.06
Witnessing childhood	.06		.02	.01	.07		.03	.01
Lifetime PTSD	.05			−.02	.12***			.05
Current depression	.24***			.22***	.27***			.23***
R^2 change		.03**	.01	.05***		.04***	.03**	.06***
Adjusted R^2		.02*	.03**	.08***		.03**	.07***	.11***

* $p < .05$; ** $p < .01$; *** $p < .001$

Note: Correlations were comprised of Pearson or point-biserial, depending on whether associations were between two continuous variables or a binary and continuous variable

Table 5

Hierarchical linear regressions for women of trauma type on physical health ($N = 1,397$)

Variables	Total health symptoms				Muscular-skeletal				Cardio-pulmonary			
	r	Step 1 β	Step 2 β	Step 3 β	*r*	Step 1 β	Step 2 β	Step 3 β	*r*	Step 1 β	Step 2 β	Step 3 β
Age	.08**	.00	.02	.05*	.18***	.10***	.12***	.15***	.13***	.06*	.08**	.10***
Education	−.21***	−.14***	−.13***	−.04	−.24***	−.15***	−.14***	−.06*	−.22***	−.15***	−.14***	−.08**
Poor living conditions	.27***	.20***	.20***	.12***	.26***	.18***	.18***	.11**	.22***	.15***	.15***	.10***
Sexual violence adulthood	.09***	.06*	.05*	.01	.07**	.04	.04	.01	.06*	.04	.03	.00
Physical violence adulthood	.19***	.10***	.07**	.03	.18***	.09***	.06*	.03	.17***	.10***	.08**	.05*
Hazard adulthood	.16***	.12***	.12***	.09***	.16***	.12***	.12***	.09**	.11***	.07**	.07**	.05*
Bereavemen	.08**	.05*	.04	.04	.10**	.06*	.05*	.05*	.08**	.04	.04	.04

Variables	Total health symptoms				Muscular-skeletal				Cardio-pulmonary			
	r	Step 1 *β*	Step 2 *β*	Step 3 *β*	*r*	Step 1 *β*	Step 2 *β*	Step 3 *β*	*r*	Step 1 *β*	Step 2 *β*	Step 3 *β*
t adulthood												
Witnessing adulthood	.14***	.10***	.10***	.09***	.13***	.09***	.09***	.08**	.09***	.06*	.06*	.06*
Sexual violence childhood	.16***		.10***	.06*	.14***		.09**	.06*	.10***		.04	.01
Physical violence childhood	.06*		.01	.00	.04		.00	−.02	.03		−.01	−.02
Hazard childhood	.11***		.08**	.05*	.08**		.06*	.04	.10***		.08**	.06*
Bereavement childhood	.01		.00	−.01	−.01		.00	−.01	−.01		.00	−.01
Witnessing childhood	.06*		.02	.02	.03		.01	.01	.07**		.06*	.05*
Lifetime PTSD	.27***			.10***	.23***			.07**	.22***			.09***

Variables	Total health symptoms				Muscular-skeletal				Cardio-pulmonary			
	r	Step 1 β	Step 2 β	Step 3 β	r	Step 1 β	Step 2 β	Step 3 β	r	Step 1 β	Step 2 β	Step 3 β
Current depression	.45***			.36***	.42***			.33***	.32***			.23***
R^2 change		.14***	.02***	.12***		.16***	.01**	.10***		.11***	.01**	.06***
Adjusted R^2		.14***	.15***	.28***		.15***	.16**	.26***		.10***	.11**	.17***

Variables	Nose-throat				Gastrointestinal-urinary			
	r	Step 1 β	Step 2 β	Step 3 β	r	Step 1 β	Step 2 β	Step 3 β
Age	−.05	−.08**	−.07**	−.05	−.03	−.07**	−.06*	−.03
Education	−.05	−.04	−.03	.02	−.08**	−.07**	−.06*	.01
Poor living conditions	.15***	.13***	.13***	.08**	.15***	.11***	.11***	.04

Variables	Nose-throat				Gastrointestinal-urinary			
	r	Step 1 β	Step 2 β	Step 3 β	r	Step 1 β	Step 2 β	Step 3 β
Sexual violence adulthood	.04	.03	.03	.00	.06*	.04	.04	.01
Physical violence adulthood	.06*	.01	−.01	−.03	.11***	.06*	.04	.01
Hazard adulthood	.11***	.10***	.11***	.09***	.10***	.09***	.09***	.06*
Bereavement adulthood	.02	.01	.01	.00	.03	.03	.02	.02
Witnessing adulthood	.10***	.08**	.07**	.07**	.09***	.06*	.06*	.04
Sexual violence childhood	.07**		.04	.01	.15***		.11***	.08**
Physical violence childhood	.06*		.02	.01	.04		.00	−.01
Hazard childhood	.08**		.06*	.04	.08**		.05	.03
Bereavement childhood	.02		−.01	−.02	.01		−.01	−.02
Witnessing childhood	.02		.00	.00	.04		.00	−.01

Variables	Nose-throat				Gastrointestinal-urinary			
	r	Step 1 β	Step 2 β	Step 3 β	r	Step 1 β	Step 2 β	Step 3 β
Lifetime PTSD	.16***			.09***	.19***			.08**
Current depression	.22***			.17***	.33***			.28***
R^2 change		.05***	.00	.03***		.05***	.02***	.07***
Adjusted R^2		.04***	.04	.08***		.04***	.06***	.13***

$* p < .05 ** p < .01 *** p < .001$

Note: Correlations were comprised of Pearson or Point-biserial, depending on whether associations were between two continuous variables or a binary and continuous variable

Men

As Table 4 shows, experiences of sexual violence in childhood were significantly related to total symptoms, and all physical health subscales (Step 2). Physical violence was related to muscular-skeletal symptoms. In addition, hazards/accidents in childhood were positively related to total and muscular-skeletal symptoms. The set of childhood exposure variables accounted for a small, but significant amount of variance in the total scale, muscular-skeletal, and gastrointestinal-urinary subscales (4, 3, and 3%, respectively).

Women

Childhood sexual violence was positively related to total symptoms, muscular-skeletal, and gastrointestinal-urinary symptoms (see Table 5). Hazards/accidents in childhood were positively related to all but gastrointestinal-urinary symptoms. Childhood bereavement was not significantly related to physical health symptoms. Witnessing someone injured or killed in childhood was related to only cardio-pulmonary symptoms. Childhood trauma variables accounted for a small but significant amount of variance in all but the equation related to nose-throat symptoms.

Testing PTSD and depression as mediators

Following Baron and Kenny (1986), evidence of mediation is suggested when the independent variable is related to the mediator and the dependent variable; the mediator is related to the dependent variable; and the effect of the independent variable on the dependent variable is less when the mediator is also in the equation. Therefore, to examine whether PTSD and depression were mediators to the childhood trauma-adulthood physical health symptoms relationship, these variables were entered in Step 3 (see Tables 4, 5 for men and women, respectively).

Men

When PTSD and depression were entered in Step 3 the set made a unique contribution to all symptom domains; however, only depression was significantly related to health symptoms. Notably, the effects of childhood sexual violence dropped out of the muscular-skeletal, cardio-pulmonary, and nose-throat symptoms equations when depression was taken into account. In addition, coefficients were reduced for the effect of childhood sexual violence on the total scale and the gastrointestinal-urinary symptoms subscale; and the effect of childhood hazards/accidents on total symptoms, though these were still significant in the last step. This

apparent evidence of mediation was further verified in a series of analyses that explicitly tested the indirect effects of these childhood traumas on health outcomes through depression.

First, to test for the necessary relationship between the independent variables and the proposed mediator, depression was regressed on the same variables included in the second step of the analyses on physical health (Table 4, Step 2). Only sexual violence in childhood (B = .20, SE = .07, β = .11, p < .05) and witnessing someone injured or killed in childhood (B = .09, SE = .04, β = .08, p < .05) were significantly related to depression. Next, when examining the effect of witnessing someone injured or killed in childhood (IV) on health outcomes (DV), results showed no significant relationships. Therefore, additional analyses to test for mediation were not conducted for this trauma type as the criterion that the IV be related to the DV was not met. By contrast, childhood sexual violence was related to all health outcomes. With this criterion met, we used Sobel's formula (cited by Baron and Kenny 1986) for calculating the indirect effect of the independent variable on the dependent variables via the mediator. Results showed that the indirect effects of childhood sexual violence on health outcomes through depression were significant for the total and all physical health subscales (data not shown), thus providing strong evidence of mediation. Finally, because PTSD was not significantly related to health symptoms, with depression controlled, no additional tests for mediation were conducted.

Women

When PTSD and depression were entered in Step 3, both made significant contributions to the total health symptoms scale as well as all subscales. The effect of childhood hazards/accidents dropped out of the muscular-skeletal and nose-throat symptoms equations when PTSD and depression were taken into account. In addition, coefficients were reduced for the effect of childhood sexual violence on total symptoms, muscular-skeletal, and gastrointestinal-urinary symptoms; the effect of childhood hazards/accidents on total symptoms and cardio-pulmonary symptoms; and the effect of witnessing someone injured or killed on cardio-pulmonary symptoms, though these were still significant in the last step. Again, the presence of mediation was verified in a series of analyses that explicitly tested the indirect effects of childhood trauma on health through depression and PTSD. First, depression was regressed on Step 2 variables and results showed that only childhood sexual violence was related to depression (B = .13, SE = .05; β = .07, p < .01). Calculated by using Sobel's formula, the indirect effects were found to be significant in these tests (data not shown), providing strong evidence that depression is a mediator of childhood sexual abuse and total, muscular-skeletal, and gastrointestinal-urinary symptoms.

Next, to examine PTSD as a mediator, PTSD was regressed on Step 2 variables from Table 5; results showed that childhood sexual violence (B = .93, SE = .12, β = .18, p < .001), childhood physical violence (B = .59, SE = .19, β = .08, p < .01), childhood hazards/accidents (B = .37, SE

= .11, β = .08, p < .01), and childhood bereavement (B = .30, SE = .12, β = .07, p < .01) were all related to PTSD. However, childhood physical violence and childhood bereavement were not related to any of the health symptoms scales and therefore, additional tests of PTSD as a mediator were not conducted for these variables. Using Sobel's formula, the indirect effects of childhood sexual violence were significant for the total, muscular-skeletal, and gastrointestinal-urinary subscales; indirect effects of childhood hazards/accidents were significant for the total, muscular-skeletal, cardio-pulmonary, and nose-throat subscales (data not shown).

Discussion

Trauma exposure was quite prevalent in this sample. Approximately 60% of respondents below age 60 reported trauma in adulthood, and 35% reported traumatic events in childhood. In general, men reported more traumatic events in childhood and adulthood than women, a finding that is consistent with previous research in the US and Canada (Breslau et al. 1998; Kessler et al. 1995; Stein et al. 1997). In addition, women reported higher rates of depressive symptoms and were more likely to meet criteria for PTSD than men. This discrepant finding between men and women, as well as the magnitude found in the current study, is similar to previous research with a community sample in the US (i.e., 13% of women and 6% of men in a US study met criteria for PTSD compared to 15% of women and almost 7% of men in the current study; Breslau et al. 1998). However, comparisons must be interpreted with caution as the methods and measures differ between studies.

Regarding our hypotheses, childhood trauma was associated with adult physical health symptoms after controlling for demographic variables, poor living conditions, and post-childhood trauma, but the effects were small. The childhood trauma variables that seemed to have the most consistent impact across models were childhood sexual violence and hazards/accidents. In particular, childhood sexual violence was significantly related to total symptoms, as well as muscular-skeletal, and gastrointestinal problems for women; and to the total and all symptom subscales for men. Childhood hazards/accidents were also related to one or more adult physical health symptoms for men and women. By contrast, childhood bereavement and witnessing someone injured or killed in childhood were not significantly related to any symptoms for men and only to cardio-pulmonary symptoms for women.

At first glance these results seem to be discrepant with previous research which suggests that traumatic bereavement and witnessing a traumatic event do affect health. However, much of the research has not differentiated between childhood and adulthood experiences of trauma. Previous research has also focused on mental health outcomes with results suggesting a small to moderate effect of these traumas on psychological symptoms (Breslau et al. 1998; Creamer et al. 2001; Edwards et al. 2003; Kessler et al. 1995; Norris et al. 2003). There is a dearth of research on the effects of these traumatic experiences on physical health outcomes. For example, the effects of

early witnessing on adulthood physical health have yet to be explored in any detail. With regard to traumatic bereavement, one study that did examine the relationship between childhood bereavement and physical health found that parental loss in childhood was not significantly related to either acute or chronic physical health symptoms (Maier and Lachman 2000). It may also be that, considering the Mexican context, death is more normalized than in the US or other developed countries. The facts of life and death are not hidden from children in Mexico, and once a year on the Day of the Dead everyone gathers at cemeteries to visit and commune with the dead (Carmichael and Sayer 1991). Therefore, while exposure to someone's death may be traumatic, it may have less of an impact on health than other types of trauma.

Another possibility is that our findings were due to the types of traumatic events included in the current study and how we measured them. The range of experiences captured by witnessing someone injured or killed and traumatic bereavement may have been too broad (e.g., the deceased or injured person was not necessarily a parent or other member of the family) to show an effect that would persist into adulthood. By contrast, violence was comprised of physically detrimental events and those that could also lead to increased anxiety (e.g., threatened with a weapon, sexual assault). Physical effects from these severe types of trauma may be apparent immediately in terms of muscular-skeletal problems from the attacks with an exacerbation of these problems over time; similarly, it is also possible that the ongoing distress created by the loss of control may erode health over time and result in more gastrointestinal symptoms (McEwen 1998). For cardio-pulmonary symptoms, childhood hazards/accidents were related to more symptoms for women. This finding is supported by past research that suggests that, in particular, disaster victims (who were included in our hazard/accident category) may experience excessive nervous system reactivity that increases vulnerability for cardiovascular illness (Friedman and McEwen 2004).

Consistent with our hypothesis, there was support for PTSD and depression as mediators of the relationship between some childhood traumas and adult physical symptoms. For men, depression mediated the relationship between childhood sexual violence and all health outcomes. For women, depression and/or PTSD mediated the relationship between childhood sexual violence, childhood hazards/accidents, and adult physical symptoms across all health domains. By contrast, although depression was a significant predictor and mediator for men, PTSD was not significantly related to health symptoms in any model. It may be that the low prevalence of PTSD among men contributed to the lack of significance when examining both the direct relationship on adult symptoms, and the indirect relationship of childhood trauma on adult symptoms through PTSD. One reason for the difference in prevalence could be that, in general, cognitions related to trauma, such as helplessness and emotional distress, may be more dissonant with men's self-concepts than with women's. This dissonance may be even greater in cultures that foster more traditional views of men and women, with the result being that men, and in particular Mexican men, may be more likely to suppress symptom experiences than women (Saxe and Wolfe 1999; Wolfe and Kimerling 1997). It is unclear in our study whether men did

indeed have a lower prevalence of PTSD or whether it was simply that they underreported symptoms. Additional research is necessary to examine this phenomenon in more detail as well as to investigate other potential mediators of the relationship between childhood trauma and adult physical health that are more meaningful for men.

Although the results of the present study show that there is a relationship between childhood trauma and adulthood physical health, the magnitude of this relationship appears smaller than in previous research. One reason may be due to the samples; most of the research has been conducted with samples in the US and other developed countries. By contrast, in Mexico, traumatic events in childhood may not be as salient to survivors in relation to the other hardships that they may endure in their lifetime (e.g., poor living conditions, physically demanding jobs), and therefore not as important to adult physical health. Indeed, 54% of our sample reported at least one problem in their current living conditions (e.g., shortages of food and water, crowding, lack of electricity, and problems with sanitation). Given the dearth of research on trauma and physical health in Mexico, additional work is needed. Of particular importance may be cross-cultural research, as well as research that is qualitative in nature so that we can begin to understand the intricacies of people's lives from an ecological perspective, including their individual experiences of trauma and health, the context in which the trauma occurred, and the resources available to the survivor afterward (which could directly impact the onset and chronicity of mental health problems such as depression and PTSD).

In addition to sample and contextual differences there may be other reasons for the relatively low magnitude of the association between childhood trauma and adulthood physical health. For the present study, we included several control variables: age, education, poor living conditions, and post-childhood trauma exposure. Previous studies have included some, but not all of these control variables, e.g., education and age (Felitti et al. 1998; Shaw and Krause 2002), while others have only included age as a covariate (Spertus et al. 2003). Also, although previous research has shown a positive relationship between childhood and adulthood trauma exposure (Breslau et al. 1999; Coid et al. 2001; Follette et al. 1996; Schaaf and McCanne 1998), not all studies that have examined the effect of childhood trauma on adulthood mental and physical health have controlled for adulthood trauma. Furthermore, previous work often has not included other variables that could affect physical health and be intertwined with trauma, such as PTSD or depressed affect. Given the prevalence of PTSD and depression in the aftermath of trauma, this is an important oversight (Breslau et al. 1998, 2000; Creamer et al. 2001; Kessler et al. 1995; O'Donnell et al. 2004).

However, although we point out that previous studies may not have had adequate controls, and therefore may have overestimated the contribution of childhood trauma to adulthood physical health, it is also possible that our findings may be due to the overly conservative nature of our analyses (i.e., testing the effect of childhood trauma on adulthood physical health with adulthood trauma and other adversities controlled). Thus, further research about the associations between

trauma, depression, PTSD, and health symptoms, particularly in developing countries, is needed before any definitive conclusions can be drawn.

As with other studies, ours is not without limitations. Physical symptoms were based on self-reporting rather than physical examination; therefore we could not assess the presence of medical disorders. Rather, our findings describe subjective health rather than verified morbidity, but this is also true of most other studies conducted outside of clinics or laboratories. Another shortcoming is that the health measure had not been used in Mexico previously; thus, although its factor structure provided reasonable evidence of construct validity, we cannot assert with certainty that the measure was cross-culturally valid. In addition, there may have been a biased recall for events experienced in childhood. For example, respondents' current health status may have differentially influenced how they responded to questions about their past exposure to traumatic events (Shaw and Krause 2002).

Also, women were overrepresented in our sample compared to the Mexican census data. However, a comparison between selected men and women and the larger "populations" from which they were chosen suggest that the magnitude of the bias was relatively small. Finally, our findings are limited due to the cross-sectional nature of the data. While there is an increased confidence that the traumatic event preceded health outcomes because of the structure of our exposure questions, which were separate from our questions about current physical health, all data were collected at one point in time and so a true time ordering is difficult to distinguish with certainty.

Our study also had several strengths. Our sample was composed of a representative sample of community-dwelling men and women, whose selection was independent of whether or not they sought treatment for their physical or mental health symptoms. More comprehensive controls were included in the analyses so as not to overestimate the influence of childhood trauma on adult physical health. Also, previous research in this area has focused on US populations and therefore, by interviewing Mexicans about their experiences of trauma and health we extended our understanding of the relationship between childhood trauma and adult physical health more globally.

In conclusion, our results provide support for the premise that childhood trauma has a detrimental impact on adult physical health, though the impact appears to be small in our Mexico sample. Our study also supports the role of depression and PTSD as mediators of childhood trauma and adult physical health, though PTSD was a mediator for women only. The present study could be used to help raise the awareness of health practitioners and community stakeholders in Mexico about the prevalence of trauma among community residents and the effect of that exposure on individual and community health. In terms of the practical utility of these findings, after raising awareness, general practitioners could be encouraged to screen their patients for trauma history. The screening would provide the practitioner with additional information that could be used not only in the treatment of physical ailments but also to provide

patients with mental health services, if necessary. One outcome of screening is that patients may receive more comprehensive services, thus increasing the potential for positive health outcomes and patient well-being.

Additionally, it will be important to establish collaborative partnerships among practitioners, community-based agencies, policymakers, and researchers to develop intervention strategies that consider the relationship between trauma and health. And, not only are interventions needed to treat survivors after a traumatic event has already occurred, but just as important will be the development of prevention efforts to reduce the numbers of Mexicans exposed to trauma. We view this research as a step toward these goals by seeking to understand and document some of the experiences that affect the physical health of people in Mexico.

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Footnotes

1 The proportion of women in the sample was higher than it should have been (55%) according to Mexican census data. Preliminary analyses indicated that the bias occurred at the point of selection for the psychological interview, although the reason for this is not clear. Fieldwork supervisors reviewed audiotapes of each interview and verified that the interviewer selected the appropriate adult (the one with the most recent birthday) for the psychological interview regardless of who gave the sociodemographic interview or who was home at the time of that initial interview. Because information was collected about all household members during the initial interview, it was possible to compare selected men and women to the larger "populations" from which they were chosen on several variables. Analyses of the household demographic data indicated that female participants were quite representative of the larger population of women, but among male participants, younger, lower-income, and less-educated men were underrepresented. However, the magnitude of this bias appeared to be relatively small, with effect sizes ranging between .09–.12.

2 It is important to note that before undertaking our epidemiologic study we conducted preliminary research to determine whether PTSD was a relevant construct for Mexican trauma survivors. Results from qualitative interviews determined that Mexican respondents mentioned 14 out of the 17 specific PTSD criterion symptoms with little or no prompting (Norris et al. 2001b). In a subsequent quantitative study conducted with samples of disaster victims from the US and Mexico, a four-factor measurement model representing the accepted multi-criterion conceptualization of PTSD fit the data of the US and Mexican samples equally well (Norris et al. 2001a). Both studies implied that PTSD is a relevant and measurable construct in Mexico.