

# The association between parent-reported child disaster reactions and posttraumatic stress disorder in parent survivors of disasters and terrorism

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**BACKGROUND:** Disaster studies establishing an association between parent and child disaster reactions usually discuss results in terms of the influence of parents on their children. This study explores a complementary interpretation of this association by focusing on the potential influence of children on their parents.

**METHODS:** Investigations of 5 disasters and terrorist events included a combined sample of 556 survivor parents and their 1,066 children. Structured diagnostic interviews were administered to survivor parents to obtain diagnostic assessment of pre- and post-disaster psychiatric disorders. Parent survivors also provided information about their own demographics and disaster experiences and about each child's demographics, disaster-related experiences, and disaster reactions (posttraumatic stress symptoms, behavior changes, increased school behavior problems, and decline in grades).

**RESULTS:** The results revealed an association of parent posttraumatic stress disorder with parent injury in the disaster, parent lifetime pre-disaster psychiatric disorder, parent direct exposure to disaster trauma, and each of 4 child disaster outcomes.

**CONCLUSIONS:** The analysis suggests the potential for child factors to influence survivors' reactions. Clinicians should query survivors about their children's reactions and ascertain the need for services for the children. Future research should examine the potential that children's reactions influence parent outcomes.

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## INTRODUCTION

Major natural disasters and terrorist events over the last several decades have generated extensive research to identify the mental health outcomes of disasters and factors that influence those outcomes. Although not extensively studied, parenthood appears to create risk for adverse disaster outcomes.<sup>1,2</sup> For example, after the September 11, 2001 attacks, parents in lower Manhattan had higher rates of posttraumatic stress symptoms than adults who were not parents.<sup>3</sup> Having dependent children was among other factors that predicted psychological distress among Hurricane Katrina survivors.<sup>4</sup> Research on child development and family systems reveals that children can have negative (eg, daily tension, diminished psychological well-being) as well as positive (eg, enjoyment, personal growth) effects on their parents.<sup>5</sup>

Comprehensive review and meta-analytic trauma and disaster studies have documented an association between parental posttraumatic stress symptoms and various child outcomes, including child posttraumatic stress symptoms, depressive symptoms, behavior problems, and distress, even in the absence of trauma exposure in children.<sup>6-9</sup> This association does not appear to be to the result of common exposures, as established in a study of the 2013 Boston Marathon bombing that revealed an association between children's functioning and caregiver distress even after controlling for shared trauma exposures.<sup>10</sup> Reviews of child disaster research also have concluded that parental post-disaster symptoms are associated with symptoms in their children.<sup>1,6</sup> In addition to possible similar disaster exposure and experiences, this parent-child association might reflect shared genetics and biology<sup>7,8</sup> and/or aspects of parent-child interaction and parenting.<sup>6</sup> Most disaster studies examining the association have focused on the influence of parental reactions on their children's reactions.

This study incorporated data from investigations of 5 separate disasters and terrorist events to explore the association between parent and parent-reported child disaster reactions. Although the study cannot establish a cause-effect relationship, the goal was to entertain a complementary interpretation of the results by focusing on parent posttraumatic stress disorder (PTSD) rather than on child outcomes. To emphasize the importance of considering a range of post-event outcomes in children, 4 broad categories of predictors were assessed: disaster-related posttraumatic stress symptoms, post-disaster behavior changes, school behavior problems, and grades.

In addition, the analysis considered the number of children in the household as well as other common predictors of disaster-related PTSD in adults, including disaster exposure (both parent and child), demographic variables, and pre-disaster psychiatric disorder.<sup>1,2,11</sup>

## METHODS

This research was approved by the institutional review boards of Washington University School of Medicine and, for the Oklahoma City and Nairobi bombing investigations, by the University of Oklahoma Health Sciences Center. Written informed consent was provided by all participants. The combined sample for this study consisted of 1,341 adult survivors of 5 disasters collected into 3 databases. The rationale for combining the data from these 5 disasters across 3 databases is that these incidents represented severe disasters with multiple fatalities, and the data in all of the sites were collected by the same research team using consistent methodology.

### Participants

The first database included 289 adult survivors of 2 natural disasters: the 1993 St. Louis-area floods (volunteer sample recruited through mailing to residences in damaged areas,  $n = 162$ ) and the 1994 Northridge, California earthquake (volunteer sample recruited through mailing to residences in damaged areas,  $n = 127$ ), both assessed 3 to 4 months post-disaster. This natural disaster database had a total of 153 children age 3 to 17 living in the household at the time of the disaster. More details about this sample of disaster survivor parents and their children have been provided in previous publications.<sup>12-14</sup>

The second database included 673 adult survivors of 2 separate bombing incidents. The first sample in this database included 182 adult survivors of the 1995 Oklahoma City bombing (systematic sample from state registry), assessed 3 to 4 months after the disaster. The second sample in this database included 491 adult survivors of the 1998 Nairobi, Kenya bombing from 3 sources: 1) US government (volunteer sample of 53 American employees and 126 locally engaged Africans,  $n = 179$ ); 2) 6 businesses in the path of the bomb blast (systematically selected African sample from company employee rosters,  $n = 243$ ); and 3) the Kenyan Red Cross (randomly selected sample of African bombing rescue and recovery responders,  $n = 69$ ); all were assessed approximately 8 to 10 months after the

disaster. Additional details about the Oklahoma City<sup>14,15</sup> and Nairobi<sup>16,17</sup> samples are available in previous publications. The inclusion of these 2 disasters in this database is possible because the mental health outcomes of these 2 samples were remarkably consistent.<sup>16</sup> The combined bombing sample had a total of 724 children age 3 to 17 living in the household at the time of the disaster.

The third database included 379 adult survivors of the September 11, 2001 terrorist attack on New York City's World Trade Center towers (volunteer sample recruited through employee rosters of 8 affected companies in the geographic area) assessed approximately 3 years after the disaster. The September 11 sample had 189 children age 3 to 17 living in the household at the time of the disaster. More details about the September 11 sample of survivor parents and their children are available in earlier publications.<sup>18,19</sup>

The combined sample of 1,341 adult survivors included 556 parents. These parents had 1,066 children age 3 to 17 living in the household at the time of the disaster.

### Assessment interviews

Interviews were conducted with the Diagnostic Interview Schedule for DSM-IV (DIS-IV),<sup>20</sup> which provided full DSM-IV-TR<sup>21</sup> diagnostic assessment of several pre- and post-disaster psychiatric disorders in survivor parents as well as parent demographic variables (sex, age, race, level of education, and marital status). The Disaster Supplement to the Diagnostic Interview Schedule for DSM-IV (DIS-IV/DS)<sup>22</sup> also was administered to the parent survivors to collect information about their own disaster experiences and data on the number of children age 3 to 17 in the household at the time of the disaster, along with each child's sex, age, and disaster-related experiences. The Disaster Supplement also provided parent-reported data on 4 child disaster outcomes: 1) disaster-related posttraumatic stress symptoms (5 yes/no items: dreams/nightmares of disaster, disaster-related play/drawing, worry/upset by disaster reminders, talking about disaster, and avoidance of thoughts or upset feelings about the disaster), 2) behavior changes after the disaster (8 yes/no items: increased fearfulness, clinginess to adults, social withdrawal, sleep disturbance, nightmares, stomachaches/headaches, increased aggression, and regressed behaviors), 3) increased school behavior problems post disaster (1 yes/no item), and 4) decline in grades after the disaster (1 yes/no item). Summary variables were created for the mean count of child disaster-related posttraumatic stress symptoms and the mean number of child behavior changes after the disaster for

each family, and summary counts were established for the number of children who were positive for child variables.

### Data analysis

Statistical analysis was conducted using SAS version 9.4 (SAS Institute, Cary, NC). Univariate data are presented as raw counts and proportions, means, standard deviations (SD), and medians. Dichotomous variables were compared using 2-sided Chi-square tests. Level of statistical significance was set at  $\alpha = .05$ .

Four main multivariate models were tested using PROC LOGISTIC in SAS with the DESCENDING option for prediction of disaster-related PTSD in the parent (dependent variable) from the 4 main child outcomes respectively (independent variables, 1 child outcome per model). Independent covariates, simultaneously entered into each model, included parent variables (sex, age, race, level of education, and marital status as well as direct exposure to disaster trauma, injury in the disaster, and any pre-disaster psychiatric disorder), child variables (number of children in the household, child age, number of children exposed to the disaster, number of children separated from the parent because of the disaster, and number of children with disaster-related school absence), and a variable representing the number of months between the parent interview and the date of the disaster. Independent covariates not significantly associated with the dependent variable in any of the 4 models were excluded from the final models, except for number of children in the household, which, although not significantly associated with the dependent variable in any of the models, was retained in the models to adjust for potentially greater magnitude of variables in some models that were summed across children in the family.

## RESULTS

A total of 1,341 adult survivors in the combined disaster sample had 1,066 children, age 3 to 17, within 556 disaster survivor families (41% of the 1,341 families) at the time of the disaster. The 556 survivor parents with children age 3 to 17 constituted the combined sample for the current analysis. Fewer of the survivors in the natural disaster database (31%,  $n = 90$ ; Chi-square = 16.16,  $df = 1$ ,  $P < .001$ ) and in the September 11 database (31%,  $n = 116$ ; Chi-square = 66.65,  $df = 1$ ,  $P < .001$ ) and more of the survivors in the bombing database (52%,  $n = 350$ ; Chi-square = 61.89,  $df = 1$ ,  $P < .001$ ) had children compared

with the remainder of the total sample of adult survivors. A multiple regression model was used to test the associations of parent demographic characteristics of the sample from a list of independent variables simultaneously entered into the model, including sex, age  $\geq 40$ , non-white race, college education, current marital status, direct disaster trauma exposure, injury in the disaster, and disaster-related PTSD. In this model, compared with survivors without children, survivors with children were more likely to be male (50%,  $n = 277$  vs 46%,  $n = 361$ ;  $\beta = 0.22$ , standard error [SE] = 0.10, Wald Chi-square = 4.25,  $P = .039$ ; odds ratio [OR] = 1.54, 95% confidence level [CL], 1.02,2.32), non-college educated (68%,  $n = 378$  vs 56%,  $n = 434$ ;  $\beta = 0.30$ , SE = 0.12, Wald Chi-square = 6.89,  $P = .009$ ; OR = 1.84, 95% CL, 1.17,2.89), currently married (81%,  $n = 449$  vs 50%,  $n = 391$ ;  $\beta = 1.22$ , SE = 0.11, Wald Chi-square = 127.95,  $P < .001$ ; OR = 11.53, 95% CL, 7.55,17.61), injured in the disaster (48%,  $n = 267$  vs 35%,  $n = 274$ ;  $\beta = 0.23$ , SE = 0.11, Wald Chi-square = 4.27,  $P = .039$ ; OR = 1.58, 95% CL, 1.02,2.43), and diagnosed with a lifetime pre-disaster psychiatric disorder (39%,  $n = 216$  vs 37%,  $n = 290$ ;  $\beta = 0.28$ , SE = 0.11, Wald Chi-square = 6.43,  $P = .011$ ; OR = 1.75, 95% CL, 1.14,2.69) independent of all other variables in the model.

**TABLE 1** displays the characteristics of the combined disaster sample of 556 survivor parents overall and by disaster database. **TABLE 1** also presents the characteristics of the 1,066 children in these families who were age 3 to 17 at the time of the disaster, overall and separately by disaster database. The median number of children in a family was 2, and the median age of the children in these families was 10 (not shown in **TABLE 1**). Approximately 1 in 5 families had  $\geq 1$  children who were exposed to the disaster or who missed school because of the disaster. Families with  $\geq 1$  children who were exposed to the disaster had a mean (SD) of 1.6 (0.8) disaster-exposed children (not shown in **TABLE 1**). Families with  $\geq 1$  children who missed school because of the disaster had a mean (SD) of 1.5 (0.7) children with disaster-related school absence (not shown in **TABLE 1**). The median number of disaster-related posttraumatic stress symptoms and of post-disaster behavior problems in each family were both 1 (not shown in **TABLE 1**). The number of families with a child who had increased school behavior problems or a decline in school grades after the disaster was 10% to 20%. Families with  $\geq 1$  children who had increased school behavior problems had a mean (SD) of 1.2 (0.6) children with increased school behavior problems, and families with  $\geq 1$  children who had a decline in

grades had a mean (SD) of 1.4 (0.7) children with a decline in grades (not shown in **TABLE 1**).

**TABLE 2** presents results of 4 multivariate models predicting parent disaster-related PTSD from the 4 child outcome variables of interest (1 child outcome variable per model). Mean number of child disaster-related post-traumatic stress symptoms, mean number of child behavior changes after the disaster, number of children with increased school behavior problems post-disaster, and number of children with post-disaster decline in grades were all significantly associated with parent PTSD independent of the effects of all other variables in the models. In these models, parent female sex, parent unmarried status, parent direct exposure to disaster trauma (OR  $> 2$ ), parent injury in the disaster (OR  $> 3$ ), and parent lifetime pre-disaster psychiatric disorder (OR  $> 2$ ) were associated with parent PTSD independent of all other variables in the models.

## DISCUSSION

Consistent with the child trauma literature,<sup>7,8</sup> the findings of this study revealed an association between parent PTSD and various child outcomes. There is some evidence that the association between parent-child PTSD symptoms becomes stronger over time,<sup>23</sup> although the current study revealed no significant difference in the association based on the time interval between the disaster and the assessment. The discussion below addresses the predictors of PTSD in survivors, potential mechanisms to explain the parent-child association, cultural considerations, limitations and future directions, and implications for services and intervention.

### The multivariate models predicting PTSD in survivors

The 4 multivariate models predicting the dependent parent PTSD variable included the same parent and child variables across models as well as one different independent variable in each model to capture each of the 4 child outcomes. The analysis revealed a consistent pattern of predictors across the 4 models, with parent injury in the disaster (OR  $> 3$ ), parent lifetime pre-disaster psychiatric disorder (OR  $> 2$ ), parent direct exposure to disaster trauma (OR  $> 2$ ), the child outcome (OR  $> 1$ ), parent female sex (OR  $> 1$ ), and single marital status (OR  $> 1$ ) all significantly associated with parent PTSD independent of the effects of all other variables in the models. These

**TABLE 1**  
**Characteristics of parents and their children overall and by disaster database**

Baseline characteristic	Disaster database			
	Natural disasters	Bombings	September 11 attacks	Combined sample
<b>Parent variables</b>				
N	90	350	116	556
Male sex, % (n)	37% (33) <sup>b</sup>	51% (177)	58% (67)	50% (277)
Years of age, mean (SD)	42.3 (10.8)	39.0 (7.0) <sup>c</sup>	46.3 (7.3) <sup>c</sup>	41.1 (8.3)
Non-white, % (n)	6% (5) <sup>c</sup>	78% (268) <sup>c</sup>	36% (42) <sup>c</sup>	57% (315)
College graduate, % (n)	24% (22)	25% (88) <sup>c</sup>	59% (68) <sup>c</sup>	32% (178)
Currently married, % (n)	88% (79)	81% (286)	72% (84) <sup>b</sup>	81% (449)
Number of children age 3 to 17, mean (SD)	1.7 (0.9) <sup>c</sup>	2.2 (1.0) <sup>c</sup>	1.6 (.9) <sup>c</sup>	1.9 (1.0)
Pre-disaster lifetime psychiatric disorder, % (n)	40% (117)	33% (225) <sup>c</sup>	43% (164) <sup>b</sup>	38% (506)
Disaster trauma exposure, % (n)	100% (90) <sup>c</sup>	99% (348) <sup>c</sup>	47% (55) <sup>c</sup>	89% (493)
Directly exposed, % (n)	100% (90) <sup>c</sup>	92% (321) <sup>c</sup>	24% (28) <sup>c</sup>	79% (439)
Witnessed trauma, % (n)	11% (10) <sup>c</sup>	87% (304) <sup>c</sup>	30% (35) <sup>c</sup>	63% (349)
Indirectly exposed through close associate, % (n)	18% (16) <sup>c</sup>	90% (306) <sup>c</sup>	19% (22) <sup>c</sup>	63% (344)
Injured in disaster, % (n)	29% (26) <sup>c</sup>	67% (234) <sup>c</sup>	6% (7) <sup>c</sup>	48% (267)
Disaster-related PTSD, <sup>d</sup> % (n/N)	27% (24/90)	34% (115/342)	25% (14/55)	31% (153/487)
<b>Child variables</b>				
N	153	724	189	1066
Number of children in household, mean (SD) <sup>e</sup>	2.2 (1.0) <sup>c,f</sup>	1.8 (0.9) <sup>c,f</sup>	2.1 (1.1) <sup>c,f</sup>	1.9 (1.0)
Number of male children, % (n/N) <sup>g</sup>	56% (83/147)	54% (387/711)	49% (93/189)	54% (563/1047)
Number of female children, % (n/N) <sup>g</sup>	44% (64/147)	46% (324/711)	51% (96/189)	46% (484/1047)
Child age, mean (SD)	9.9 (4.2)	10.1 (4.2)	10.6 (4.4)	10.2 (4.3)
Any child directly exposed to disaster, % (n)	87% (78) <sup>c</sup>	3% (9) <sup>c</sup>	11% (12) <sup>a</sup>	18% (99)
Any child separated from parent because of disaster, % (n)	30% (27) <sup>c</sup>	11% (37) <sup>c</sup>	18% (20)	15% (84)
Any child with disaster-related school absence, % (n)	37% (33) <sup>c</sup>	11% (38) <sup>c</sup>	41% (47) <sup>c</sup>	21% (118)
Number of disaster-related posttraumatic stress symptoms, mean (SD)	1.9 (1.4) <sup>c</sup>	1.2 (1.2) <sup>c</sup>	1.4 (1.3)	1.3 (1.3)
Number of post-disaster behavior problems, mean (SD)	2.4 (2.1) <sup>c</sup>	1.5 (1.9)	1.1 (1.5) <sup>c</sup>	1.5 (1.9)
Any child with increased school behavior problems, % (n)	19% (17) <sup>a</sup>	8% (29) <sup>b</sup>	14% (16)	11% (62)
Any child with decline in school grades, % (n)	24% (22) <sup>a</sup>	14% (48)	15% (17)	16% (87)

Compared with the rest of the sample:

<sup>a</sup> $P \leq .05$ .

<sup>b</sup> $P \leq .01$ .

<sup>c</sup> $P \leq .001$ .

<sup>d</sup>Of those with a PTSD-qualifying Criterion A trauma exposure in the disaster.

<sup>e</sup>Maximum queried number of children age 3 to 17 in household at time of disaster = 4 for natural disaster and bombing databases and 6 for September 11 database.

<sup>f</sup>Significance calculated from linear multiple regression model controlling for maximum queried number of children.

<sup>g</sup>19 children were missing sex data (6 for natural disasters, 13 for bombings, 0 for September 11).

PTSD: posttraumatic stress disorder; SD: standard deviation.

findings are discussed below with an emphasis on the influence of child outcomes on PTSD in parent survivors.

**Parent variables.** Dose of exposure is a key predictor of disaster outcome.<sup>1</sup> In the current study, a variable representing severity of exposure was injury in the disaster, which likely represented the highest dose of exposure for those who experienced it. Survivor injury was the strongest predictor of disaster-related PTSD,

and direct exposure was the third strongest predictor. Consistent with the literature that establishes its importance in disaster outcomes,<sup>2,11</sup> psychiatric history was the second strongest predictor of parent PTSD. The finding that female sex predicted PTSD in these parent survivors also is well supported in the disaster and general trauma literature.<sup>1,2,24</sup> Although research on the influence of marital status on disaster outcomes has yielded inconsistent

results,<sup>1,2</sup> the finding that single marital status predicted PTSD in the parents assessed in the current study is supported by other disaster studies.<sup>25,26</sup> and by the literature on family and marriage.<sup>5</sup>

**Children's reactions.** The pattern of results in the current study revealed that children's disaster reactions were second only to other common correlates of parent PTSD, including parent disaster-related injury, pre-existing psychiatric diagnosis, and exposure, in predicting PTSD in adult disaster survivors. This pattern was consistent for each of the 4 child reactions to the disaster studied, suggesting that a variety of child emotional, behavior, and functional problems can increase stress for parents, especially in those who are directly exposed. The findings augment the sparse literature suggesting that children's reactions could contribute to the burden of parenthood in the context of disasters, especially for single parents,<sup>25,26</sup> who might experience numerous stresses, including decreased social support post-disaster.<sup>26</sup>

### The association of parent and child reactions

Child, family, and developmental psychology researchers have questioned the direction of effect in associations between child characteristics and parent behavior. The current dominant view is that both parties in the relationship interact so that each constitutes an environmental component to which the other must adjust.<sup>27</sup> Despite acknowledging that the association between parent and child outcomes might be bidirectional, most disaster research discusses the association in terms of the parents' influence on their children and explores parent-child interactions and communication, parenting style, and the quality of the parent-child relationship.<sup>6</sup> Some researchers have noted that the influence of children on their parents might be even more important than the predominant interpretation that parental reactions influence their children. Commenting on the child development and family systems literature, which also has focused largely on the effects of parents on their children, Klahr et al<sup>28</sup> noted that the influence of parents on their children "may be rivaled in importance only by" the influence of children on their parents (p 105). The child disaster literature has similarly raised this issue. For example, in their study of emotional regulation in Israeli parents and their young children in the context of cumulative trauma, Pat-Horenczyk et al<sup>29</sup> raised the possibility that children's symptoms "may influence the mother more than the mother influences the child" (p 116).

Few disaster studies have examined the influence of children's reactions on their parents.<sup>6</sup> Several studies have assessed unexposed parents of directly exposed children.<sup>30-32</sup> For example, Mirzamani and Bolton<sup>32</sup> found greater stress among the mothers of children exposed to a disaster than in women who experienced no negative life events. In a study of children directly exposed to the 1993 World Trade Center attacks, the severity of child distress at 3 months was a better predictor of parent distress at 9 months than was parent distress at 3 months, and the association between parent and child PTSD symptoms increased over time, which suggests that parent distress was greatly affected by their children's reactions.<sup>30</sup>

Research has also assessed parent-child dyads exposed to the same disaster,<sup>14,33,34</sup> including studies using a longitudinal design.<sup>34</sup> In a study of the Wenchuan earthquake, Shi et al<sup>34</sup> found that adolescent posttraumatic stress symptoms 12 months after the disaster predicted maternal, but not paternal, posttraumatic stress symptoms at 18 months. Not all studies agree, however. For example, using a dyadic approach to examine the association of parent and child disaster reactions 3 years after an earthquake, Juth et al<sup>33</sup> found that parental posttraumatic stress symptoms were associated with their children's general distress, but that child posttraumatic stress symptoms were not associated with parent general distress. Most survivors in the current study reported that their children were indirectly exposed to disaster, with parents from the natural disaster samples reporting a considerably higher proportion of direct exposure in their children. The analysis of the full sample revealed no differences in outcome related to their children's event exposure. The failure to find an effect of child disaster exposure might have been the result of the limited number of directly exposed children; the parent-child association might have been stronger in samples with more directly exposed children.

**Mechanisms.** Parent-child associations across a range of child, developmental, and family studies could represent shared biology or similar exposures and experiences, and there is good reason to assume that parents, parent reactions, and parenting behaviors influence multiple outcomes in their children. It also is possible, however, that the association reflects children's influence on their parents. The discussion of the association in the current study considers this complementary interpretation of the results.

**TABLE 2**  
**Multivariate models predicting parent PTSD**

	<i>df</i>	Beta	SE	Wald Chi-square	<i>P</i>	OR	95% CL
<b>Model 1</b>							
Mean number of child disaster-related posttraumatic stress symptoms	1	0.13	0.04	8.59	<b>.003</b>	1.14	1.04 to 1.24
Number of children in household	1	-0.02	0.12	0.02	.878	.98	0.77 to 1.25
Parent male sex	1	-0.61	0.23	6.91	<b>.009</b>	.54	0.34 to 0.86
Parent currently married	1	-0.64	0.27	5.42	<b>.020</b>	.53	0.31 to 0.90
Parent directly exposed to disaster trauma	1	0.82	0.39	4.35	<b>.037</b>	2.27	1.05 to 4.90
Parent injured in disaster	1	1.27	0.25	25.42	<b>&lt;.001</b>	3.55	2.17 to 5.80
Parent lifetime pre-disaster psychiatric disorder	1	0.95	0.22	18.61	<b>&lt;.001</b>	2.59	1.68 to 3.99
<b>Model 2</b>							
Mean number of child behavior changes post-disaster	1	0.08	0.03	7.17	<b>.007</b>	1.09	1.02 to 1.16
Number of children in household	1	0.06	0.11	0.24	.623	1.06	0.85 to 1.32
Parent male sex	1	-0.60	0.24	6.42	<b>.011</b>	.55	0.35 to 0.87
Parent currently married	1	-0.61	0.27	4.98	<b>.026</b>	.54	0.32 to 0.93
Parent directly exposed to disaster trauma	1	0.73	0.39	3.46	.063	2.07	0.96 to 4.45
Parent injured in disaster	1	1.28	0.25	26.04	<b>&lt;.001</b>	3.58	2.20 to 5.85
Parent lifetime pre-disaster psychiatric disorder	1	0.95	0.22	18.73	<b>&lt;.001</b>	2.59	1.68 to 3.99
<b>Model 3</b>							
Number of children with increased school behavior problems post-disaster	1	0.58	0.25	5.13	<b>.024</b>	1.78	1.08 to 2.93
Number of children in household	1	0.11	0.11	0.97	.325	1.12	0.90 to 1.38
Parent male sex	1	-0.72	0.23	9.68	<b>.002</b>	.49	0.31 to 0.77
Parent currently married	1	-0.58	0.27	4.59	<b>.032</b>	.56	0.33 to 0.95
Parent directly exposed to disaster trauma	1	0.79	0.39	4.07	<b>.044</b>	2.21	1.02 to 4.79
Parent injured in disaster	1	1.30	0.25	27.30	<b>&lt;.001</b>	3.69	2.26 to 6.02
Parent lifetime pre-disaster psychiatric disorder	1	0.97	0.22	19.28	<b>&lt;.001</b>	2.63	1.71 to 4.04
<b>Model 4</b>							
Number of children with post-disaster decline in grades	1	0.46	0.18	6.29	<b>.012</b>	1.58	1.11 to 2.62
Number of children in household	1	0.06	0.11	0.30	.582	1.07	0.85 to 1.33
Parent male sex	1	-0.71	0.23	9.36	<b>.002</b>	.49	0.31 to 0.78
Parent currently married	1	-0.57	0.27	4.32	<b>.038</b>	.57	0.33 to 0.97
Parent directly exposed to disaster trauma	1	0.82	0.39	4.33	<b>.038</b>	2.27	1.05 to 4.91
Parent injured in disaster	1	1.27	0.25	25.77	<b>&lt;.001</b>	3.56	2.18 to 5.81
Parent lifetime pre-disaster psychiatric disorder	1	1.01	0.22	21.10	<b>&lt;.001</b>	2.74	1.78 to 4.22

CL: confidence level; OR: odds ratio; PTSD: posttraumatic stress disorder; SE: standard error.

In general, parents are the primary support figures for their children. Children's needs are likely to increase after a disaster, intensifying the burdens on their parents, who must address the physical and social consequences of the event on their children as well as their own reactions and needs. The influence of children on their parents post-disaster might derive from parents' worry about the welfare of their children<sup>32</sup> and from parental concerns

about their ability to protect their children.<sup>30</sup> The difficulty parents experience in response to their children's distress might increase the normal stresses of parenting, leading to feelings of helplessness, which further increase parental distress.<sup>33</sup> Therefore, children's reactions might generate stress in their parents above and beyond that created by exposure to the event. That does not mean that children's reactions cause parental PTSD, but rather that

children's reactions are among a number of factors associated with parental PTSD.

A thought-provoking longitudinal September 11 terrorist event study provided evidence that the effect that children—especially children distressed by a disaster—have on adults could extend beyond the distress parents experience in relation to their ability to protect their children.<sup>25</sup> Phillips et al<sup>25</sup> found support in their nationally representative adult September 11 sample for their hypothesis that greater contact with children in general, as well as contact with their own children, would correlate with greater distress and perceived threats to the personal safety of the adults. Suggesting a more symbolic role for adults with children in general, the reactions and recovery of parents and other adults were influenced by their contact with or “responsibility for” children, especially children they perceived to be distressed and fearful after the attacks (p. 207).<sup>25</sup>

### Cultural considerations

The inclusion of the Kenyan sample in the bombing database warrants comment because of the potential for cross-cultural differences in PTSD prevalence and assessment. Scholars have questioned the application of western constructs related to mental health and illness in international settings<sup>35</sup> and advocated for attention to the influence of culture, acculturation, and globalization in delivering mental health services following mass trauma.<sup>36</sup> Addressing the conflict between medical and sociopolitical frameworks in conceptualizing the response to trauma and PTSD, Stein et al<sup>37</sup> argue for an integrated approach that recognizes the psychobiological dysfunction and incorporates the sociopolitical context and the cultural and social determinants of the experience and expression of trauma exposure and response. Supporting an integrated framework with respect to the current study, a comparison of Nairobi civilian and Oklahoma City bombing survivor samples (some of whom were included in the current bombing database) revealed similar post-disaster psychiatric profiles, with differences in coping and service use in the 2 samples.<sup>16</sup> In addition, Pfefferbaum et al<sup>17</sup> found no differences between US and African groups in most measures of survivor and youth outcomes in their study of these Nairobi survivors. Nonetheless, cross-cultural considerations cannot be dismissed and should be examined in future research.

### Limitations

A strength of this study was the inclusion of 5 distinct disaster samples to create a large database of survivors of

both natural disasters and terrorist events assessed using consistent methods at various times after the incident: 3 to 4 months, 8 to 10 months, and approximately 3 years across samples. Because fathers have been less well studied than mothers, another strength was that fathers and mothers were equally represented. Unfortunately, the cross-sectional design precluded determining a causal relationship. Longitudinal studies of parent-child dyads are needed to clarify aspects of the parent-child association.

The use of structured interviews for full diagnostic assessment of PTSD in survivors added methodological rigor to the examination of a clinically significant effect rather than more ubiquitous and transient nonclinical outcomes, which likely would have yielded an even stronger parent-child association. In contrast, the use of brief questions to assess their children's reactions and the failure to assess survivors' spouses were limitations of the study.

The exclusive use of parent report was an important limitation. The parent disaster survivors did not report high rates of symptoms or functional impairment in their children. Because parents report observable manifestations of the child's reactions,<sup>38</sup> they tend to underreport their children's internalizing symptoms.<sup>39</sup> Moreover, survivors experience their own distress, and their focus on other pressing concerns post-disaster might divert their attention from problems in their children. Therefore, low symptom levels in the children might have been because of reliance on parents, rather than the children themselves, as informants about the children's experiences and reactions. It also is possible that distressed parents are more negative than non-distressed parents in assessing their children.<sup>9</sup> This might have been particularly important in the current study because of the level of direct exposure and the prevalence of post-disaster PTSD in the survivors. In addition to parent report, future studies should use multiple informants, with children reporting their own experiences and symptoms and teachers reporting on the children's school functioning.

### Implications for services and intervention

The results of our study suggest that children can influence the reactions of their parents even when the children's observable reactions are relatively mild, which raises issues about the focus of assessment and intervention and about who should receive services. Disasters create new problems for individuals and families and they can intensify existing problems. Individual reactions range from emotional distress to psychiatric illness. At



## CONCLUSIONS

the family level, disasters can alter dynamics, communication patterns, and functioning. Therefore, clinicians should query survivors about family stressors, interactions, dynamics, and functioning; initiate dialogue, as indicated, about the potential that child and family factors could influence survivors' reactions and recovery; and ascertain the need for individual assessment, intervention, and/or referral of survivors' children and other family members. Because parental posttraumatic stress symptoms are associated with various negative outcomes in their children,<sup>7,8</sup> clinicians should consider a range of potential symptoms and functioning in children rather than limiting their focus to posttraumatic stress symptoms. It is likely that children's reactions are associated with other outcomes in addition to PTSD symptoms in their survivor parents.

Disasters compound the burdens of parenthood<sup>1</sup> by increasing children's needs for protection,<sup>40</sup> resources,<sup>41</sup> and support.<sup>42</sup> After a disaster, parents must address the consequences of the event and their own reactions while also caring for their children. These challenges might be especially great for directly exposed survivors and for those who, similar to many of the parents in this study, develop psychiatric illnesses post-disaster. Feelings of inadequacy in shielding and supporting their children could lead parents to be more protective of their children or to withdraw from interactions with their children. Interventions with survivors and survivor families post-disaster should restore a sense of predictability by reestablishing routines and parental roles and should promote open communication.<sup>43</sup> Family members might have distinct experiences and different recovery trajectories,<sup>43</sup> some requiring individual attention. Interventions with families provide an opportunity to identify serious impairment among members<sup>43</sup> who might need individual assessment and treatment. Ultimately, decisions about the use of individual or family interventions, or both, must consider the reactions and unique needs of the survivors and their families.

Disaster studies have established an association between parent and child disaster reactions, with the results usually discussed in terms of the influence parents, parent reactions, and parenting behaviors exert on their children. This study used a large sample of survivors of 5 disasters, with equal representation of mothers and fathers, to explore the parent-child association from the complementary perspective of the influence of children on their parents. Our study makes several important contributions. For example, the findings reveal the importance of children's post-disaster symptoms and functioning, after common survivor variables (disaster-related injury, pre-existing psychiatric diagnosis, and disaster exposure), in predicting parent disaster-related PTSD. Perhaps equally important, the findings reinforce and encourage consideration of disparate interpretations of scientific findings. To advance a more complete understanding of the parent-child association, future research should examine the potential influence of children on their parents' reactions and consider this influence in interpreting the results. ■

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