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Event-related household discussions following the Boston Marathon bombing and associated posttraumatic stress among area youth

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Abstract

Objective—Despite research documenting the scope of disaster-related posttraumatic stress (PTS) in youth, less is known about how family processes immediately post-disaster might associate with child outcomes. The 2013 Boston Marathon bombing affords a unique opportunity to assess links between immediate family discussions about community trauma and child mental health outcomes.

Method—The present study examined associations between attack-related household discussions and child PTS among Boston-area youth ages four to nineteen following the Marathon bombing (N=460). Caregivers completed surveys two to six months post-attack about immediate household discussions about the events, child exposure to potentially traumatic attack-related experiences, and child PTS.

Results—During the Marathon bombing and manhunt, there was considerable heterogeneity in household discussions across area families, and several discussion items were differentially predictive of variability in children's PTS. Specifically, after controlling for children's direct exposure to the potentially traumatic attack/manhunt events, children showed lower PTS when it was their caregivers who informed them about the attack and manhunt, and when their caregivers expressed confidence in their safety and discussed their own feelings about the manhunt with their child. Children showed higher PTS when their caregivers did not discuss the events in front of them, asked others to avoid discussing the events in front of them, and expressed concern at the time that their child might not be safe. Child age and traumatic attack/manhunt exposure moderated several links between household discussions and child PTS.

Conclusions—Findings underscore the importance of family communication and caregiver modeling during times of community threat and uncertainty.

Keywords

trauma; PTSD; family functioning

Disasters are highly destructive occurrences that disrupt and overwhelm entire communities at once. A very large body of research now documents that child exposure to natural and manmade disasters, and their aftermaths, are associated with considerable youth internalizing and externalizing symptoms, posttraumatic stress (PTS), and related functional impairments (Comer, Dantowitz, et al., 2014; Comer et al., 2010; Furr, Comer, Edmunds, & Kendall, 2010; Hoven et al., 2005; La Greca, Silverman, Lai, & Jaccard, 2010; Lowe, Godoy, Rhodes, & Carter, 2013). Despite robust associations observed between child disaster exposure and the development of PTS, there is also great heterogeneity in outcomes across disaster-exposed youth (Furr et al., 2010), with a substantial proportion of exposed youth functioning remarkably well (Kilmer & Gil-Rivas, 2010; La Greca et al., 2013; Lai, Kelley, Harrison, Thompson, & Self-Brown, 2014; Masten & Narayan, 2012).

To optimally inform post-disaster clinical efforts, it is critical to clarify key factors associated with the heterogeneity of outcomes across exposed children and adolescents. Previous work suggests a number of factors may contribute to youth vulnerability to stress reactions following traumatic events, including the level/dose of trauma, exposure to multiple traumas, pre-existing psychopathology, coping resources, social support, neurobiological processes, genetic factors, and socio-environmental adversity (e.g., poverty, poor access to quality education) (see Cloitre et al., 2009; Comer & Kendall, 2007; De Bellis, 2001; Furr et al., 2010; La Greca et al., 2013; Pynoos, Steinberg, & Piacentini, 1999). Increasing research suggests that exposure to *post*-disaster factors, events, and environments also help shape child responses (e.g., Comer et al., 2010; Comer, Kerns, et al., 2014; Silverman & La Greca, 2002). Notably, disasters have profound psychological impacts on the adults in children's lives—such as parents and school personnel—who during times of community crisis are responsible for securing children's safety, serving as models of coping, and helping youth make sense of and process that which is unfolding (Goto et al., 2014; Hafstad, Gil-Rivas, Kilmer, & Raeder, 2010; Kerns et al., 2014; Lowe et al., 2013). There is evidence that adult reactions to disasters can be even stronger predictors of child PTS than children's own direct disaster exposure (McFarlane, Policansky, & Irwin, 1987).

Given the developmentally appropriate reliance on caregivers for information and guidance following threat, there has been particular emphasis in the recent disasters literature on identifying how parents process disasters with their children. Following the September 11th attacks, parents of New York City (NYC) schoolchildren took various approaches to discussing the attacks with their child, addressing a range of topics including emotional, sociocultural, and civic issues (Stoppa, Wray-Lake, Syvertsen, & Flanagan, 2011). Consistent with research supporting the impact of vicarious learning, verbal threat information, and parental modeling on children's ability to cope with fear (Barrett, Rapee, Dadds, & Ryan, 1996; Ollendick & King, 1991; Reynolds, Field, & Askew, 2014; Ugland, Dyson, & Field, 2013), recent research conducted after the 2013 Boston Marathon Bombing suggested that caregiver distress may be another post-disaster family variable that negatively

contributes to child outcomes among disaster-exposed youth (Kerns et al., 2014). Other studies find that a familial approach to coping may improve child outcomes following a disaster (DeVoe, Bannon, & Klein, 2006; Hafstad et al., 2010).

Despite dissemination of clinical materials and professional guidelines for discussing disasters with youth, there has been little research evaluating the utility of various recommendations to parents in reducing disaster-related youth distress and psychopathology. Recent empirical work, however, has begun to evaluate ways in which parents can help their child cope with disasters and related events. For example, experimental research following the September 11th attacks demonstrated that when children geographically removed from the terrorist attacks were shown a terrorism-related news clip intended to evoke threat perceptions and then asked to discuss the clip with their mothers in the laboratory, children demonstrated lower post-discussion threat perceptions when their mothers had previously been trained to calmly discuss the events and model effective coping strategies than when their mothers were not given any instruction (Comer, Furr, Beidas, Weiner, & Kendall, 2008). Such work can inform causal inferences about indicated family discussion strategies and can provide experimental evidence with which to inform indicated approaches for families when discussing disaster-related events with their children. However, experimental paradigms with distally exposed youth are limited in their ecological validity and generalizability to proximally exposed families in acute distress. Given that it is not possible to implement an experimental manipulation with immediately affected families as a traumatic event is unfolding, there is a critical need for correlational studies in the immediate aftermath of disasters to complement the experimental work that has been conducted on more removed families.

Moreover, there is some evidence that age may affect the impact of post-disaster family processing of disaster-related events. Prior work has shown heightened negative responses to disaster-related stimuli among older children compared to younger children (Comer et al., 2008; Green et al., 1991). Other work has shown that adolescent symptoms, relative to the symptoms of younger children, are more likely to be influenced by family variables (e.g., discipline, parent-child relationship quality, parents' marital quality) following a disaster (Felix, You, Vernberg, & Canino, 2013).

The 2013 Boston Marathon bombing and subsequent manhunt offers a unique opportunity to examine the extent to which event-related household discussions in the immediate aftermath of a disaster may be linked to child PTS, given the enormous number of families that were directly affected (e.g., more than half a million families attended the Marathon and roughly one million families were under the subsequent shelter-in-place warning during the manhunt). Schools in the region were closed on the day of the Boston Marathon, and so unlike other terrorist events that occurred during school hours, the vast majority of Boston-area youth were under their parents' care during the attack. Moreover, whereas most researched terrorist attacks have targeted office buildings of high symbolic value, the Marathon attack specifically targeted a family event in which large numbers of parents and children jointly attended and experienced the activities together. Throughout the subsequent manhunt roughly one million families were advised to shelter-in-place in their homes, prolonging the amount of time that the majority of children were under the care of their

caregivers throughout the events. Given these unique characteristics of the Boston Marathon attack, understanding how event-related household discussions may have been associated with child PTS affords a critical opportunity for further informing our understanding of family communication during times of crisis and its potential impact on youth.

The present study examined event-related household discussions among area families ($N = 460$) during the 2013 Boston Marathon bombing and subsequent shelter-in-place warning, as well as links between types of household discussions and child PTS. We hypothesized that there would be heterogeneity in household discussions across area families, and that different manners in which caregivers addressed the bombings with their children would have differential associations with child PTS in the first six months after the attack. Specifically, we hypothesized that 1) children who during the week of the bombing and subsequent manhunt were informed about what was happening by their caregivers, 2) whose caregivers expressed confidence in their safety, and 3) whose caregivers monitored household conversations and discontinued them if they believed they could be unnecessarily frightening for their child would show lower PTS than their peers whose caregivers were not the ones informing them about what was happening, whose caregivers did not express confidence in their safety, and whose caregivers did not monitor household conversations and discontinue them if they could be unnecessarily frightening for their child. We also predicted that 4) children whose caregivers encouraged them to focus on other, more pleasant topics would show lower PTS than children whose caregivers did not do so, and 5) that children whose caregivers introduced their own event-related fears to their children would show higher PTS than children whose caregivers did not introduce their own event-related fears to their children. Moreover, we hypothesized that 6) associations between event-related household discussions and children's PTS would be moderated by age, such that these links would be stronger among older children relative to younger children, given evidence that older children may be more able to comprehend, as well as be frightened by, traumatic community events (Comer et al., 2008; Green et al., 1991), as well as evidence that adolescent symptoms, relative to the symptoms of younger children, are more likely to be influenced by family variables (Felix, You, Vernberg, & Canino, 2013). Finally, we hypothesized that 7) the associations between event-related household discussions and children's PTS would be moderated by actual child exposure to the bombing and subsequent manhunt.

Methods

Design

All procedures were approved by the Boston University Charles River Campus Institutional Review Board. Two to six months post-attack (June 15, 2013 – October 15, 2013), English-speaking caregivers of children ages four to nineteen years, living <25 miles from the Boston Marathon bombing site or Watertown, MA were recruited through flyers, local listservs, pediatrician's offices, and school-based and community outreach (e.g., study staff presenting at and recruiting from "Boston Strong" rallies or prayer vigils). Interested caregivers ($N=1,105$) were directed to contact study staff or visit a study website for additional information. Caregivers of 460 of Boston area youth meeting eligibility criteria

consented and completed a one-time survey (41.6% response rate). Caregivers provided informed consent and completed questionnaires through a data-encrypted Internet-based survey program requiring server authentication. Respondents with more than one child were directed to complete study forms about their oldest child in the study's target age range. Caregivers were provided a \$30 gift card upon completion of their participation, and were given the option of donating their compensation directly to the One Fund Boston.

Participants

Full demographic details of the sample ($N=460$) can be found elsewhere (Comer, Dantowitz, et al., 2014). The majority of caregiver respondents were college-educated (81.3%), biological mothers (76.4%), with non-Hispanic white children (81.3%). Children ranged from ages four to nineteen years with a mean age of 11.8 years ($SD=3.8$) and there was a fairly even age distribution across the sample: 21.8% were ages four to seven years, 24.2% were eight to ten years, 24.0% were 11–13 years, 19.9% were 14–16 years, and 10.2% were 17–19 years. Almost half of the sample reported household incomes below \$100,000 (46.7%), with roughly 15% earning less than \$50,000 and 31% earning between \$50–99,999. Average household size ranged from one to seven individuals with a mean of 3.8 people per household ($SD=1.04$). The majority of households consisted of dual caregivers (79%); 18.8% of respondents were single caregivers and 2.1% of respondents reported that three or more individuals were primarily responsible for taking care of the child. At the time of the attack, the average participating family was dwelling 7.0 miles from the bombing site and 7.2 miles from the final apprehension site in Watertown, MA. Roughly 20% of the sample lived within five miles of the Marathon finish line, and 35% of the sample lived within five miles of the Watertown, MA apprehension site.

Measures

Event-related household discussions—Given the idiosyncratic nature of the events, as well as the relative novelty of this area of inquiry, communication items were developed for the present purposes in consultation with noted experts and review of the literature. Specifically, the content and regulation of bombing-related household discussions on the day of the attack was assessed using a checklist in which parents indicated “yes” or “no” to the following items: (B1) I informed my child about what happened; (B2) There were aspects of the attack that I did not discuss with my child, out of concern that it could unnecessarily frighten him/her; (B3) I asked my child what questions he/she might have about the attacks; (B4) I discussed my feelings about the attack with my child; (B5) I expressed confidence to my child that he/she was safe; (B6) I encouraged my child to focus on other, more pleasant, topics; (B7) I did not restrict adult conversations when my child was present; (B8) I asked others to avoid discussing the Marathon attack in front of my child; and (B9) I monitored conversations about the attack that my child was exposed to, and was sure to end them if topics came up that I thought could frighten my child. These individual face valid items were developed to efficiently assess unique aspects of bombing-related household discussions and were not designed to hang together to reflect higher-order constructs of family communication.

The content and regulation of manhunt/shelter-in-place-related household discussions during the five days following the attack was assessed using a checklist in which parents indicated “yes” or “no” to the following items: (M1) I did not allow anyone to discuss the manhunt or lockdown in front of my child; (M2) I did not discuss the manhunt or lockdown in front of my child; (M3) I brought up the manhunt or lockdown to inform my child about what was happening; (M4) There were aspects of the manhunt or lockdown that I did not discuss with my child, out of concern that it could unnecessarily frighten him/her; (M5) I asked my child what questions he/she might have about the manhunt or lockdown; (M6) I discussed my feelings about the manhunt or lockdown; (M7) I expressed concern to my child that he/she might not be fully safe during the manhunt; (M8) I encouraged my child to focus on other, more pleasant, topics; (M9) I encouraged my child to engage in distracting activities, such as playing games or watching a movie; and (M10) I monitored conversations that my child was exposed to, and was sure to end them if topics came up that I thought could frighten my child. As with items assessing bombing-related discussions, these individual face valid items were developed to efficiently assess unique aspects of manhunt-related household discussions and were not designed to hang together to reflect higher-order constructs of family communication.

Child exposure to the bombing and manhunt—Child exposure to bombing and manhunt events was assessed using a checklist asking respondents whether their child: (a) attended the Marathon, (b) was injured in the attack; (c) directly witnessed injured people at the bombing; (d) directly witnessed dead bodies at the bombing; (e) was evacuated during the attack; (f) knew a person injured in the bombing; (g) knew a person killed in the bombing; (h) was under the shelter-in-place warning; (i) saw a heavier police presence in his/her neighborhood during the manhunt; (j) saw uniformed persons in his/her neighborhood not typically seen in civilian areas (e.g., National Guard, Homeland Security); (k) saw officers with guns drawn related to the manhunt; (l) heard manhunt-related gunshots or explosions; (m) saw manhunt-related gunshots/explosions, (n) saw manhunt-related blood, (o) had an officer knock on their door as part of the manhunt, (p) had an officer enter/search their home as part of the manhunt, (q) knew the officer slain in the manhunt, and/or (r) knew the transit officer injured in the manhunt. As reported previously (Comer, Dantowitz, et al., 2014; Crum, Cornacchio, Green, & Comer, under review), the average child in the sample experienced at least some traumatic exposure (average = 2.19 exposures, SD 2.68), with 20.8% experiencing at least four exposures and 4.6% experiencing at least eight. Adding the number of endorsed items between items *a* and *g* yielded a total *Bombing Exposure Tally* ranging from zero to seven. Adding the number of endorsed items between items *h* and *r* yielded a total *Manhunt Exposure Tally* ranging from zero to eleven.

Posttraumatic stress symptoms—Child posttraumatic stress symptoms were assessed with the *UCLA PTSD Reaction Index (RI)*, *Parent-Report Symptom Scale* (Steinberg, Brymer, Decker, & Pynoos, 2004). The *PTSD-RI* is a continuous measure of PTS symptoms that yields a total score that has demonstrated strong reliability ($\alpha = .88-.91$) and convergent validity, and it is the most commonly used assessments of children’s PTS following disasters (Furr et al., 2010). Internal consistency in the present sample was excellent ($\alpha = .95$).

Data analysis

We first determined the proportion of participants endorsing each of the event-related household discussion items by age group, and then conducted a series of regression models to determine the extent to which household discussion items, direct attack/manhunt exposure, age, and their interactions predicted child PTSD symptoms. For moderation analyses and interpretation, child age was entered as a continuous predictor, race/ethnicity was dichotomized as non-Hispanic white or racial/ethnic minority, and caregiver education was dichotomized as college-educated or non-college-educated. For each model examining bombing-related household discussion items on the day of the attack, the following variables were entered simultaneously in the prediction of UCLA PTSD-RI total score: (1) Age (continuous); (2) three sociodemographic covariates (race/ethnicity, caregiver respondent education and household income); (3) Bombing Exposure Tally; (4) the household discussion item, (5) the product term of Age X household discussion item; and (6) the product term of Bombing Exposure X household discussion item. Individual models were first tested for each bombing-related discussion item to assess preliminary associations with PTS, and then to assess the unique predictive contributions of each discussion item an additional model was tested in which all bombing-related discussion items were entered as simultaneous predictors. For each model examining manhunt/lockdown-related household discussion items during the five days following the attack, the following variables were entered simultaneously in the prediction of UCLA PTSD-RI total score: (1) Age (continuous); (2) three sociodemographic covariates (race/ethnicity, caregiver respondent education and household income); (3) Manhunt Exposure Tally; (4) the household discussion item, (5) the product term of Age X household discussion item; and (6) the product term of Manhunt Exposure X household discussion item. Again, individual models were first tested for each manhunt-related discussion item to assess preliminary associations with PTS, and then to assess the unique predictive contributions of each discussion item an additional model was tested in which all manhunt-related discussion items were entered as simultaneous predictors.

Product terms were all mean centered. Significant interaction terms were interpreted as evidence of moderation (see Baron & Kenny, 1986; Holmbeck, 1997; Kendall & Comer, 2011). Post-hoc probing following identification of significant age moderation examined simple slopes among older and younger children; post-hoc probing following identification of significant exposure moderations examined simple slopes among youth with no exposure and youth with high exposure (i.e., one SD above exposure mean).

Results

Bombing- and manhunt-related household discussions

Tables 1 and 2 present the proportion of respondents endorsing each household discussion item related to the bombing and manhunt, respectively, and also provides proportions broken down by age group. The most common bombing-related discussion endorsed by caregiver respondents was informing their child about the attack, followed by expressing confidence to their child that they were safe. Roughly three-quarters of respondents asked their child what questions he or she might have about the attack and discussed their own feelings about the

attack with their child. The least commonly endorsed bombing-related discussion items were expressing concern to one's child that they might not be fully safe and asking others to avoid discussing the attack in front of their child. The most common manhunt-related discussion endorsed by caregiver respondents was bringing up the manhunt/shelter-in-place to inform their child about what was happening, followed by discussing one's own feelings about the manhunt and shelter-in-place with their child and encouraging one's child to engage in distracting activities, such as playing games or watching a movie. The least commonly endorsed manhunt-related discussion items were not discussing the manhunt or shelter-in-place in front of one's child, expressing concern to one's child that he or she might not be fully safe, and not allowing anyone else to discuss the manhunt or shelter-in-place in front of one's child.

The proportions of respondents endorsing each bombing-related household discussion item significantly differed across age groups (see Table 1). Among caregivers of four to seven year olds, the most common bombing-related household discussion item endorsed was not discussing certain aspects of the attack out of concern that it could be frightening, whereas among caregivers of eight to sixteen year olds the most common discussions endorsed were informing one's child about what happened and expressing confidence that they were safe. Among caregivers of 17–19 year olds, the most common bombing-related discussions were caregiver discussing their own feelings about the attack with their child. The proportions of respondents endorsing each manhunt-related household discussion item also significantly differed across age groups (see Table 2). Among caregivers of four to seven year olds, the most common manhunt-related household discussion items endorsed were not discussing certain aspects of the manhunt out of concern that it could be frightening and monitoring conversations and ending them if topics might frighten the child. In contrast, the most common manhunt-related household discussion item endorsed among caregivers of eight to nineteen year olds was bringing up the manhunt or shelter-in-place to inform the child about what was happening.

Associations between bombing-related household discussions and child PTS

Table 3 presents details of the main effects of each bombing-related household discussion item in the prediction of child PTS, as well as the results of moderation analyses examining the interactions of Age X Household Discussions and Bombing Exposure X Household Discussions. Caregivers informing the child about the bombing on the day of the attack and caregivers expressing confidence to their child that they were safe both predicted lower child PTS two to six months following the events. Caregivers asking others to avoid discussing the attack in front of their child was associated with increased child PTS. Associations between child PTS and caregivers asking others to avoid discussing the attack in front of their child were robust across child age and bombing exposure. A follow-up model including all bombing-related household discussion items entered simultaneously as predictors of child PTS found the following items uniquely retained their significant associations with child PTS: caregivers expressing confidence that their child was safe ($\beta = -.17$, $p = .00$) and caregivers asking others to avoid discussing the attack in front of their child ($\beta = .11$, $p = .04$).

The positive association between caregivers being the one to inform their children about the bombing and lower child PTS was moderated by age such that there was a moderate association with lower PTS among older children ($B = -10.20$, $SE = 3.03$, $\beta = -.31$) but not among younger children ($B = -.92$, $SE = 1.78$, $\beta = -.05$). Across age groups, this association was highest among youth between the ages of 14–16 ($B = -13.50$, $SE = 4.15$, $\beta = -.33$). The positive association between caregivers expressing their confidence to their child that he or she was safe and lower child PTS was also moderated by age such that there was a medium effect of expressing confidence on reduced PTS among older children ($B = -9.10$, $SE = 2.39$, $\beta = -.35$) but not among younger children ($B = 1.00$, $SE = 2.00$, $\beta = .04$). Across age groups, this association was highest among youth between the ages of 11–13 ($B = -11.40$, $SE = 2.85$, $\beta = -.36$). Age also moderated the relationship between caregivers discussing their own feelings with their child about the attack and child PTS. Specifically, such discussions were associated with lower child PTS among older children ($B = -14.80$, $SE = 3.35$, $\beta = -.40$) but not among younger children ($B = .03$, $SE = 1.57$, $\beta = .00$). Across age groups, this association was highest among youth between the ages of 17–19 ($B = -18.90$, $SE = 3.73$, $\beta = -.61$).

In addition, children's direct bombing exposure moderated the relationship between caregivers expressing to their child that they might not be fully safe on the day of the attack and subsequent child PTS. Specifically, expressing to one's child that s/he might not be fully safe that day had a significant effect on child PTS among youth with higher bombing exposure ($B = 6.98$, $SE = 3.72$, $\beta = .23$), whereas there was no such effect among children who did not experience any bombing exposure ($B = 1.00$, $SE = 1.34$, $\beta = .04$).

Associations between manhunt-related household discussions and child PTS

Table 4 presents details of the main effects of each manhunt-related household discussion item in the prediction of child PTS, as well as the results of moderation analyses examining the interactions of Age X Household Discussions and Manhunt Exposure X Household Discussions. The following manhunt-related household discussion items during the five days following the attack significantly predicted increased child PTS: caregiver not discussing the manhunt or shelter-in-place in front of the child, caregiver not allowing anyone to discuss the manhunt or shelter-in-place in front of child, caregiver not discussing specific aspects of the manhunt or shelter-in-place with their child out of concern that it could unnecessarily frighten him or her, and caregiver expressing concern to their child that he or she may not be safe. Caregivers bringing up the manhunt and shelter-in-place to their child to inform them about what was happening, as well as caregivers discussing their own feelings about the manhunt and shelter-in-place with their child, were both associated with reduced child PTS. As was conducted with the marathon exposure items, a follow-up model was conducted, including all manhunt-related household discussion items entered simultaneously as predictors of child PTS. Results of this analysis found that the following items uniquely retained their significant associations with child PTS: caregiver not allowing anyone to discuss the manhunt or shelter-in-place in front of child ($\beta = .12$, $p = .04$), caregiver not discussing specific aspects of the manhunt or shelter-in-place with their child out of concern that it could unnecessarily frighten him or her ($\beta = .12$, $p = .03$), and caregiver expressing concern to their child that he or she may not be safe ($\beta = .19$, $p = .00$).

Child age moderated a number of relationships between manhunt-related discussions and child PTS. Not discussing the manhunt or lockdown in front of one's child had a medium-to-large effect on child PTS among older children ($B = 22.72$, $SE = 5.40$, $\beta = .38$) but not younger children ($B = 2.59$, $SE = 1.64$, $\beta = .16$). Across age groups, this association was highest among youth between the ages of 17–19 ($B = 35.78$, $SE = 5.84$, $\beta = .68$). Similarly, not discussing specific aspects of the manhunt or lockdown with one's child out of concern that it might unnecessarily frighten him or her showed a medium association with elevated PTS among older children ($B = 8.90$, $SE = 2.36$, $\beta = .34$) but not younger children ($B = 2.87$, $SE = 1.94$, $\beta = .15$). Across age groups, this association was highest among youth between the ages of 14–16 ($B = 8.83$, $SE = 3.14$, $\beta = .29$). Moreover, caregivers bringing up the manhunt and shelter-in-place to their child to inform them about what was happening had a medium-to-large protective effect against child PTS among older children ($B = -12.40$, $SE = 2.63$, $\beta = -.42$), but not younger children ($B = 1.45$, $SE = 1.60$, $\beta = .09$). Across age groups, this association was highest among youth between the ages of 17–19 ($B = -9.20$, $SE = 3.15$, $\beta = -.40$). Caregivers discussing their own feelings about the manhunt or shelter-in-place with their child was associated with reduced child PTS among older children ($B = -5.11$, $SE = 3.24$, $\beta = -.15$), but not among younger children ($B = -.45$, $SE = 1.59$, $\beta = -.03$). Across age groups, this association was highest among youth between the ages of 17–19 ($B = -9.44$, $SE = 2.90$, $\beta = -.44$).

Children's direct manhunt/shelter-in-place exposure also moderated several of the links between household discussions during the five days after the attack and child PTS. Specifically, the significant effect of caregivers not discussing the manhunt or shelter-in-place on child PTS was not uniform across manhunt exposure levels, such that there was a large effect on child PTS among youth with higher manhunt exposure ($B = 21.64$, $SE = 5.49$, $\beta = .47$) whereas there was no such effect among youth with no manhunt exposure ($B = -1.57$, $SE = 1.76$, $\beta = -.08$). Similarly, the significant effect of not allowing anyone to discuss the manhunt or shelter-in-place on child PTS was not uniform across manhunt exposure levels, such that there was a large effect on child PTS among youth with higher manhunt exposure ($B = 21.52$, $SE = 5.27$, $\beta = .48$) whereas there was no such effect among youth with no manhunt exposure ($B = -.77$, $SE = 1.76$, $\beta = -.04$). Finally, the significant effect of expressing concern to one's child that they might not be fully safe was not uniform across manhunt, such that expressing this concern had a small-to-medium association with child PTS among youth with higher manhunt exposure ($B = 8.90$, $SE = 5.06$, $\beta = .23$), but not among youth with no manhunt exposure ($B = 2.86$, $SE = 2.04$, $\beta = .12$).

Discussion

Accumulating research finds significantly elevated PTS among youth dwelling in regions affected by terrorist attacks and disasters (Comer & Kendall, 2007; Hoven et al., 2005; Silverman & La Greca, 2002; Pfefferbaum et al., 1999), but meta-analytic work shows that there is enormous heterogeneity in PTS outcomes across exposed youth (Furr et al., 2010). There has been increasing evidence that identifying how families differentially discuss terrorist attacks may help to clarify some of this heterogeneity in outcomes (Comer & Kendall, 2007; Comer et al., 2008), and the present findings indicate that following the

Boston Marathon bombing, variability in how families discussed and regulated discussions about the events did indeed significantly predict child PTS two to six months later.

Broadly speaking, in the present cross-sectional analysis, youth showed better outcomes when informed by caregivers (rather than others) about the difficult events, when their caregivers expressed to them confidence in their security and did not express concerns about their safety, and when their caregivers did not avoid family discussions about the events or prevent others from discussing the events with their child. Many of the observed associations between household discussions and child PTS were particularly pronounced among older, rather than younger, youth. Moreover, youth with direct manhunt/shelter-in-place exposure showed significantly stronger associations than youth without such exposure between caregiver avoidance of event-related discussions and child PTS, as well as between and caregiver expressions of concern over child's safety and child PTS.

Whereas prior experimental evidence with remote youth following terrorist attacks has suggested that parent-child discussions may have an important role in determining child mental health outcomes (e.g., Comer et al., 2008), experimental paradigms with distally exposed youth are limited in their ecological validity and generalizability to families in acute distress who are proximally exposed in the immediate aftermath of terrorism. Although the present design precluded causal conclusions, these naturalistic findings provide an important complement to prior experimental work by examining associations between immediate household discussions and child outcomes in a sample of families dwelling in a region that was directly and recently attacked. In general, caregiver avoidance of communication about the events and reluctance to allow others to discuss the events with their child was associated with greater child PTS. Communication during the crisis that included caregivers being the ones to inform children about the events and caregivers sharing their own feelings about the events (aside from feelings that their child might not be safe) was associated with lower child PTS. This is consistent with experimental work in families unexposed to terrorism that has found that instructing parents to openly and candidly discuss threatening events with their children, but to model confidence in their security, is associated with improved child outcomes (Comer et al., 2008). These findings are also consistent with previous studies conducted in families not exposed to terrorism that highlight the key roles of parental emotion regulation and caregiver modeling in fostering optimal child outcomes following threat (Barrett, Rapee, Dadds, & Ryan, 1996; Ollendick & King, 1991; Reynolds, Field, & Askew, 2014; Ugland, Dyson & Field, 2013).

Event-related household discussions differed significantly across age groups. The most common bombing-related household discussion items endorsed among caregivers of younger children was not discussing certain aspects of the events out of concern that they could be frightening, whereas the most common discussions endorsed among caregivers of older children were informing children about the events and expressing confidence in their safety. Among caregivers of the oldest adolescents in the study, the most common discussions involved caregivers sharing with their children their own feelings about the events.

Moreover, the extent to which many household discussions were linked with child PTS differed significantly across age, with older youth showing much stronger associations between many household discussions and negative outcomes than younger children. These findings are consistent with previous research showing heightened negative responses to disaster-related stimuli among older youth relative to younger children (Comer et al., 2008; Green et al., 1991), as well as work showing that adolescent symptoms, relative to the symptoms of younger children, are more likely to be influenced by family variables following a disaster (Felix, You, Vernberg, & Canino, 2013). Younger children show less sophisticated cognitive reasoning and meta-cognitive skills than older children and adolescents, and as such caregivers and professional guidelines may perceive them as needing more help comprehending and making sense of difficult events. The present findings underscore the importance of maintaining a large focus on the needs of older youth when considering how best to discuss recent terrorist attacks with children. Importantly, the family variables assessed in the present study were all verbal items, and so it is not clear how age might interact with non-verbal domains of family interactions in the aftermath of terrorist events. Moreover, the wide variability in developmental needs of children within the same age group calls for an individualized approach to discussing traumatic events. Caregivers may do well to initiate conversations by assessing how much the child knows before evaluating the most developmentally sensitive approach to discussion of the event and the child's response to it.

The effect of direct exposure to the manhunt events on child PTS differed depending on whether caregivers avoided event-related discussions with their child or prevented others from having event-related discussions in front of their child. In an effort to protect youth exposed to potentially traumatic events from additional uncomfortable material, some caregivers may be inclined to avoid exposing children to event-related discussions. However, the present findings suggest that it may be the proximally exposed youth who fare the worst when caregivers choose to not discuss with children what is happening, or refuse to allow others to discuss what is happening in front of children.

Several limitations warrant comment. First, this study was cross-sectional and as such cannot speak to issues of temporal precedence or causality. It is possible that children who developed PTS showed immediate signs of emotional difficulty that in turn affected household discussions. Given the unpredictable nature of terrorism, collecting pre-disaster data on terrorism-exposed samples presents particular challenges (Comer & Kendall, 2007). Given the many studies of youth conducted in regions targeted by terrorism, researchers with pre-existing data collected incidentally prior to terror events would do well to follow up and collect post-event data that can afford causal conclusions about terrorism and the role of family discussions in predicting child outcomes. Such longitudinal design will be important for addressing issues of temporal precedence as well as dynamic transactional relationships between household discussions and child symptoms following a disaster. Second, caregiver reports were used to assess household discussions and discussion items were developed for the present purposes and may not reflect higher-order family communication factors. Future work utilizing smaller samples would do well to incorporate observations and coding of family discussions. Similarly, caregiver reports were used to assess child PTS and it is possible that other methods (e.g., child report, clinical interviews) would have yielded

different findings. As such the present findings may only speak to how caregiver perceptions of household communications were linked with caregiver perceptions of child distress. Third, although the present analysis was focused on child PTS, there is evidence that youth show a range of clinical problems beyond PTSD following terrorist attacks (Comer & Kendall, 2007; Hoven et al., 2005; La Greca, 2007). Similar research examining child depression, separation anxiety, generalized anxiety, and externalizing symptoms would be useful to collect in addition to data on PTS in order to examine whether the present findings are robust across other clinical outcomes. Fourth, we examined event-related household discussions but the present analysis did not examine caregiver's own adjustment and coping in the aftermath of the bombing. A growing literature is finding that caregivers' own adjustment, distress, and coping following disasters are linked with child post-disaster adjustment (e.g., Kerns et al., 2014; Scheeringa & Zeanah, 2008). Future work in this area would do well to examine whether event-related household discussions may mediate observed links between caregiver event-related coping/adjustment and child adjustment, such that caregiver coping and adjustment impact event-related household discussions, which in turn impact child adjustment.

Fifth, despite broad recruitment, findings may not generalize to the general population as population-based methods were not applied. Concerns about representativeness are somewhat tempered by the fact that the sample's sociodemographic composition was roughly comparable to those areas most directly affected by the bombing and manhunt (Boston's Back Bay and Watertown, MA). Future work would do well to examine associations between household discussions and child outcomes across more demographically diverse families. Fifth, information on child gender was not collected, and therefore the extent to which observed associations are robust across boys and girls cannot be evaluated. Finally, the participation rate was somewhat low (42%), however this rate is comparable to participation rates in related research (La Greca et al., 2010; McLaughlin et al., 2009) and may reflect unique challenges of studying communities in the aftermath of disasters and terrorism.

Despite these limitations, the present findings speak to the important role that family discussions can play in the psychological adjustment of youth following a terrorist attack. In particular, findings suggest that caregivers, particularly those of older children, should inform children of what is unfolding and communicate confidence in their security. In recent years, there has been an increase in high-profile, violent community traumas directly affecting children and family venues (e.g., Russia's Beslan school hostage crisis, Norway's Workers' Youth League camp attack, Nairobi's Westgate Mall attack, school shootings). The present findings are consistent with a growing body of evidence suggesting that to optimally understand and predict the impact of disasters on youth it is critical to examine the contexts in which child adjustment unfolds and events that occur after the initial disaster (Comer & Kendall, 2007; Comer et al., 2010; Kerns et al., 2014; Weems & Overstreet, 2008). Consistent with Bronfenbrenner's (1979) ecological model of development, children's post-disaster adaptation is affected by many factors both distal and proximal to children's daily experiences following the disaster. Even after controlling for the extent of child exposure to the actual Marathon attack and manhunt, we found that how families discussed the events with their children was significantly associated with child PTS levels, particularly among

older youth. Although further prospective longitudinal work is needed, the present findings underscore the central role of family as one of the primary contexts of child development and adaptation, and the importance of family communication in the immediate aftermath of terrorism.

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Table 1

Prevalence of endorsed bombing-related household discussions

Household discussion predictor	Prevalence in total sample N (%)	Prevalence within age groups					Significance Test
		4-7 N (%)	8-10 N (%)	11-13 N (%)	14-16 N (%)	17-19 N (%)	
Informed my child about what happened	400(85.7)	73(15.9)	101(22.0)	106(23.0)	77(16.7)	39(8.5)	$\chi^2(5, N=460)=28.54^{***}$
There were aspects of the attack that I did not discuss with my child, out of concern that it could unnecessarily frighten him/her	284(60.8)	85(18.5)	87(15.5)	71(15.4)	33(7.2)	4(1.0)	$\chi^2(5, N=460)=117.60^{***}$
I asked my child what questions he/she might have about the attacks	355(76.0)	68(14.8)	93(20.2)	96(20.9)	68(14.8)	27(5.9)	$\chi^2(5, N=460)=24.08^{***}$
I discussed my feelings about the attack with my child	355(76.0)	48(10.4)	88(19.1)	97(21.1)	76(16.5)	43(9.3)	$\chi^2(5, N=460)=65.74^{***}$
I expressed concern to my child that/she might not be fully safe that day	74(15.8)	10(2.2)	12(2.6)	20(4.3)	18(3.9)	12(2.6)	$\chi^2(5, N=460)=9.75^*$
I expressed confidence to my child that he/she was safe	389(83.3)	80(17.4)	101(22.0)	102(22.2)	65(14.1)	36(7.8)	$\chi^2(5, N=460)=24.21^{***}$
I encouraged my child to focus on other, more pleasant, topics	312(66.8)	73(15.9)	85(18.5)	88(19.1)	44(9.6)	19(4.1)	$\chi^2(5, N=460)=44.18^{***}$
I asked others to avoid discussing the Marathon attacks in front of my child	159(34.0)	62(13.5)	49(10.7)	30(6.5)	15(3.2)	2(0.4)	$\chi^2(5, N=460)=72.77^{***}$
I monitored conversations about the attack that my child was exposed to, and was sure to end them if topics came up that I thought could frighten my child	285(61.0)	82(17.8)	94(20.4)	69(15.0)	34(7.4)	5(1.5)	$\chi^2(5, N=460)=118.07^{***}$

Table 2

Prevalence of endorsed manhunt-related household discussions

Household discussion predictor	Prevalence in total sample N(%)	Prevalence within age groups(age range)					Significance Test
		4-7 N(%)	8-10 N(%)	11-13 N(%)	14-16 N(%)	17-19 N(%)	
I did not discuss the manhunt or shelter-in-place in front of my child	64(13.7)	34(7.4)	15(3.2)	8(1.7)	6(1.3)	1(0.2)	$\chi^2(5, N=460)=47.15^{***}$
I did not allow anyone to discuss the manhunt or shelter-in-place in front of my child	71(15.2)	32(7.0)	19(4.1)	13(2.8)	6(1.3)	1(0.2)	$\chi^2(5, N=460)=34.06^{***}$
I brought up the manhunt or shelter-in-place to inform my child about what was happening	359(76.9)	59(12.8)	97(21.1)	90(22.4)	71(15.4)	40(8.7)	$\chi^2(5, N=460)=30.23^{***}$
There were aspects of the manhunt or shelter-in-place that I did not discuss with my child, out of concern that it could unnecessarily frighten him/her	273(58.5)	79(17.2)	86(18.7)	68(14.8)	30(6.5)	9(2.0)	$\chi^2(5, N=460)=89.52^{***}$
I asked my child what questions he/she might have about the manhunt or shelter-in-place	333(71.3)	59(12.8)	85(18.5)	90(22.4)	68(14.8)	30(6.5)	$\chi^2(5, N=460)=16.87^{**}$
I discussed my feelings about the manhunt or shelter-in-place with my child	346(74.1)	43(9.3)	87(18.9)	98(21.3)	78(17.0)	39(8.5)	$\chi^2(5, N=460)=77.24^{***}$
I expressed concern to my child that he/she might not be fully safe	64(13.7)	7(1.5)	8(0.2)	12(2.6)	27(5.9)	10(2.2)	$\chi^2(5, N=460)=30.14^{***}$
I encouraged my child to focus on other, more pleasant, topics	324(69.4)	73(15.9)	89(19.3)	87(18.9)	54(11.7)	19(4.1)	$\chi^2(5, N=460)=34.66^{***}$
I encouraged my child to engage in distracting activities, such as playing games or watching a movie	342(73.2)	76(16.5)	96(21.0)	90(22.4)	55(12.0)	23(5.0)	$\chi^2(5, N=460)=36.81^{***}$
I monitored conversations that my child was exposed to, and was sure to end them if topics came up that I thought could frighten my child	292(62.5)	79(17.2)	94(20.4)	73(15.9)	37(8.0)	9(2.0)	$\chi^2(5, N=460)=93.35^{***}$

Table 3
Predicting posttraumatic stress symptoms from bombing-related household discussions

Household discussion predictor	Main effect			Age X Household Discussion variable			Bombing Exposure X Household Discussion variable			Model Fit	
	B	SE	β	B	SE	β	B	SE	β	F(8, 442)	Adjusted R ²
Informed my child about what happened	-4.0	1.4	-.13**	-0.8	0.3	-.27**	-1.0	1.0	-.10	14.27***	.19
There were aspects of the attack that I did not discuss with my child, out of concern that it could unnecessarily frighten him/her	-0.4	1.1	-.02	0.2	0.3	.04	-1.5	0.8	-.13	12.23***	.17
I asked my child what questions he/she might have about the attacks	-0.5	1.1	-.02	-0.1	0.3	-.02	-1.0	0.8	-.09	11.86***	.16
I discussed my feelings about the attack with my child	-2.0	1.2	-.08	-1.4	0.3	-.42***	1.0	0.8	.10	15.31***	.20
I expressed concern to my child that he/she might not be fully safe that day	2.4	1.3	.08	-0.3	0.3	.45	1.7	0.8	.13*	12.97***	.18
I expressed confidence to my child that he/she was safe	-3.9	1.3	-.13**	-0.7	0.3	-.24*	-0.5	0.8	-.04	14.08***	.19
I encouraged my child to focus on other, more pleasant, topics	0.2	1.0	.01	-0.5	0.3	-.12	0.8	0.8	.07	12.18***	.17
I asked others to avoid discussing the Marathon attacks in front of my child	2.4	1.1	.11*	0.2	0.3	.04	0.4	0.8	.03	12.47***	.17
I monitored conversations about the attack that my child was exposed to, and was sure to end them if topics came up that I thought could frighten my child	1.1	1.1	.05	0.2	0.3	.04	-1.1	0.7	-.09	12.14***	.17

Note: Models controlled for household income, race/ethnicity, caregiver respondent education, child age, and bombing exposure tally (see Methods).

Table 4
Predicting posttraumatic stress symptoms from manhunt-related household discussions

Household discussion predictor	Main effect			Age X Household Discussion variable			Manhunt Exposure X Household Discussion variable			Model Fit	
	B	SE	β	B	SE	β	B	SE	β	F(8, 438)	Adjusted R ²
I did not discuss the manhunt or shelter-in-place in front of my child	4.4	1.4	.14**	0.9	0.4	.13*	1.7	0.6	.17**	20.04***	.26
I did not allow anyone to discuss the manhunt or shelter-in-place in front of my child	5.0	1.3	.17***	0.4	0.4	.05	1.9	0.5	.19**	20.23***	.26
I brought up the manhunt or shelter-in-place to inform my child about what was happening	-2.5	1.1	-.10*	-1.1	0.3	-.32***	-0.1	0.6	-.01	18.00***	.23
There were aspects of the manhunt or shelter-in-place that I did not discuss with my child, out of concern that it could unnecessarily frighten him/her	2.5	1.0	.12*	0.8	0.3	.19**	-0.1	0.5	-.01	17.16***	.23
I asked my child what questions he/she might have about the manhunt or shelter-in-place	-1.0	1.0	-.04	-0.2	0.3	-.06	0.1	0.5	.00	15.01***	.20
I discussed my feelings about the manhunt or shelter-in-place with my child	-2.5	1.1	-.10*	-0.8	0.3	-.23**	-0.8	0.6	-.13	17.29***	.23
I expressed concern to my child that he/she might not be fully safe	3.0	1.4	.10*	-0.3	0.4	-.04	1.7	0.5	.17**	17.38***	.23
I encouraged my child to focus on other, more pleasant, topics	1.1	1.0	.05	0.2	0.3	.05	0.4	0.5	.07	15.16***	.20
I encouraged my child to engage in distracting activities, such as playing games or watching a movie	1.3	1.1	.05	0.2	0.3	.06	-0.1	0.5	-.02	15.09***	.20
I monitored conversations that my child was exposed to, and was sure to end them if topics came up that I thought could frighten my child	0.9	1.1	.04	0.5	0.3	.12	0.1	0.5	.01	15.37***	.21

Note: Models controlled for household income, race/ethnicity, caregiver respondent education, child age, and manhunt exposure tally (see Methods)