J Abnorm Child Psychol (2009) 37:455–468
DOI 10.1007/s10802-008-9283-z

Impact of Traumatic Life Events in a Community Sample of Toddlers

Elizabeth A. Mongillo · Margaret Briggs-Gowan · Julian D. Ford · Alice S. Carter

Published online: 26 November 2008

Abstract Toddlers may be at particularly high risk for a number of psychiatric, developmental and neurobiological consequences in the aftermath of trauma. The social and emotional impact of potentially traumatic life events experienced between 6 and 36-months of age was assessed in an epidemiological birth cohort of 18- to 36-month-olds from the Greater New Haven Area. Event-exposed toddlers evidenced greater symptom severity on the ITSEA Internalizing, Externalizing, Dysregulation, Atypical and Maladaptive scales, as well on the CBCL Internalizing and Externalizing scales than those not exposed. Approximately one-fifth of event-exposed toddlers were reported by their parents to have experienced a dramatic change in functioning following the event, and were described as experiencing higher levels of symptoms consistent with Post-Traumatic Stress Disorder (PTSD), namely re-experiencing and arousal, than exposed toddlers whose parents did not report a change in their functioning. Implications for clinicians and child care providers working with toddlers and their parents are discussed.

Keywords Toddlers · Life events · Emotion regulation · Behavior problems · Post-traumatic stress disorder

According to the American Psychological Association (2000) *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV), a traumatic event is one in which an individual experiences, witnesses or is confronted with actual or threatened death, serious injury, or threat to the physical integrity of self or others, such that the individual experiences a sense of intense fear, helplessness, or horror. In attempting to define what constitutes a traumatic event, age and developmental level are likely to influence both what constitutes a "threat" and what will evoke a subjective reaction of fear, helplessness, or horror (as well as the specific nature of these reactions). Pfefferbaum (1997) identified a number of factors that may influence response to trauma and recovery, including age, gender, developmental level, family characteristics, psychiatric history, cultural factors, and characteristics of and level of exposure to the traumatic event. Of these, one of the strongest moderators appears to be age at the time of the event (Pfefferbaum 1997). Younger children are at greater risk regardless of whether the trauma occurs within the home or the surrounding environment, and the moderating effects of age seem to persist across various types of trauma (Famularo et al. 1994; Vila et al. 2001).

The present study is focused on very young children, whose experience of psychological trauma may be different than what adults or older children experience as traumatic because they have different cognitive (Evans et al. 1999) and emotion processing (Bell and Wolfe 2004) capacities. Young children also have rapidly developing brains that are potentially vulnerable to long-term structural (Carrion et al. 2001; De Bellis et al. 2002; Driessen et al. 2000) and functional (Perry 2000) impairment as a result of exposure to psychological trauma or PTSD. In addition, both meta-analytic and experimental evidence suggests that younger children may experience PTSD symptoms of greater duration and severity and may be more likely to develop significant PTSD symptoms following psychological trau-

E. A. Mongillo · A. S. Carter (✉)
Department of Psychology, University of Massachusetts Boston,
100 Morrissey Blvd.,
Boston, MA, 02125-3393, USA
e-mail: alice.carter@umb.edu

M. Briggs-Gowan · J. D. Ford
Department of Psychiatry,
University of Connecticut Health Center,
Farmington, CT, USA

ma than older children or adults (Famularo et al. 1994; Fletcher 1996; Glod and Teicher 1996). For example, earlier onset of maltreatment is associated with increased risk of hyperactivity and depression (Glod and Teicher 1996), suggesting that exposure to maltreatment in early childhood may lead to generalized problems with cognitive, affective, and somatic self-regulation that go beyond the anxiety-based condition of PTSD (Ford 2005).

Scheeringa et al. (1995) have argued that some of the DSM-IV criteria for PTSD are not developmentally appropriate for toddlers and need to be modified for meaningful use with this age group. Notably, none of the traumatized toddlers who participated in two important studies by Scheeringa and his colleagues (Scheeringa et al. 1995; Scheeringa et al. 2003) met the full DSM-IV criteria for PTSD, despite experiencing a number of PTSD symptoms. The failure to meet criteria appeared to stem partially from an inability to know whether the child had experienced intense feelings of fear, helplessness or horror at the time of the event, and partially from failure to meet the DSM-IV criteria of three or more avoidance symptoms (Scheeringa et al. 1995). Scheeringa et al. (2003) found that 68% of traumatized children in their sample met the adult requirement of having one re-experiencing symptom and 45% met the requirement of two symptoms of increased arousal. Although 39% of the children had at least one avoidance/numbing symptom, only 2% met the adult criterion of having three avoidance/numbing symptoms.

Scheeringa and his colleagues have raised the importance of employing a developmental approach to PTSD in young children, and have asserted that very young children do not possess the language skills required to report and/or experience some of the cognitive symptoms of PTSD, and have called for a greater emphasis on behavioral manifestations of reactions to trauma (e.g. avoidance of certain places or people associated with the trauma), and a lesser emphasis on cognitive manifestations (e.g. avoidance of thoughts or feelings associated with the trauma). Additionally, they have proposed developmentally modified diagnostic criteria for young children that have reduced requirements regarding avoidance symptoms (Scheeringa et al. 2003).

Scheeringa et al. (2003) have also investigated the impact of trauma on young children more broadly, and have found significantly higher levels of internalizing and externalizing symptoms on the CBCL among very young children who were exposed to psychological trauma relative to healthy controls who were not exposed to traumatic events. Additionally, children who met developmentally modified criteria for PTSD scored higher on the Child Behavioral Checklist (CBCL) Internalizing and Total scales, and had higher rates of Oppositional Defiant Disorder (ODD) and Separation Anxiety Disorder (SAD) than children who experienced a traumatic event but did not meet the developmentally modified criteria for PTSD (Scheeringa et al. 2003). While younger children did not differ from older children in the type of trauma experienced, Scheeringa et al. (2003) have found evidence in both this study and prior studies (Scheeringa and Zeanah 1995) of a potential "developmental window" between ages 18- and 48-months when children are particularly prone to re-experiencing symptoms. Moreover, younger children (age 1–3 years) were more symptomatic than older children, in that they experienced a greater number of PTSD, SAD, and Major Depressive Disorder (MDD) symptoms, had higher CBCL Internalizing and Externalizing scores, and higher rates of play reenactments and nightmares than older children (ages 4–6).

There is still very little known about the nature or impact of psychological trauma in toddlers. Two very recent studies have indicated the presence of PTSD symptoms in toddlers exposed to domestic violence (Bogat et al. 2006) and severe burns (Stoddard et al. 2006). Consistent with previous research (Scheeringa et al. 2003; Glod and Teicher 1996), which has indicated that toddlers exposed to potentially traumatic life events may experience a number of symptoms that are not included among the symptoms that comprise a PTSD diagnosis, several studies have documented elevated internalizing and/or externalizing symptoms in infants and toddlers exposed to a variety of traumatic events, including witnessing terrorist attacks (Chemtob et al. 2008; Wang et al. 2006), domestic violence (Levendosky et al. 2006) and burns (Meyer et al. 2000). Consistent with those findings, McDonald et al. (2007) examined the effects of exposure to family conflict and to violence toward a family member in an epidemiologic birth cohort sample of one- to three-year-old toddlers. Exposure to family conflict was associated with internalizing, externalizing, and self-regulation problems, as well as with maladaptive and atypical behaviors. However, specific patterns of potential PTSD symptoms among the exposed toddlers were not examined, nor were the potential impacts of other potentially traumatic adverse events.

Therefore, the current study was conducted to examine differences in social and emotional functioning between toddlers who had experienced one or more potentially traumatic life event(s) and toddlers who had not experienced any such events in a subset of the sample studied by McDonald and colleagues. In addition, to approximate the DSM-IV A2 criterion for young children for a traumatic event (i.e., one that results in fear, helplessness or horror, or disorganized or agitated behavior), differences in social and emotional functioning between toddlers whose parents reported a dramatic change in their child following the event(s) and toddlers whose parents did not report a dramatic change also were investigated. Using parent

observations of a sudden or dramatic change as a proxy for fear, helplessness, or horror and/or disorganized or agitated behavior is consistent with evidence that young children's emotional reactions tend to be expressed behaviorally and often with some delay reflecting their developing cognitive processing capacities (Bell and Wolfe 2004). The following hypotheses were examined:

1. Exposure to potentially psychologically traumatic events will be associated with socioemotional and behavioral problems among toddlers, as well as with specific symptoms consistent with PTSD.
2. Toddlers whose parents reported a dramatic change in their child following the event(s) will exhibit higher levels of social, emotional, and behavioral problems and PTSD-like symptoms, than those whose parents did not report a dramatic change in them following the potentially traumatic event(s).

Finally, if scores on the Modified CBCL PTSD and ITSEA-TRSS scales are significantly associated with exposure to potentially traumatic events and/or parental reports of change following the event, individual items comprising these scales will be examined in an exploratory fashion to gain insight into the types of symptoms evidenced in relation to exposure and any developmental patterns.

Method

Participants

The 917 participants included in this report were a representative sub-sample of children involved in the first wave of data collection in a representative birth cohort sample. Those comprising the larger, birth cohort sample were selected randomly from birth records at the State of Connecticut Department of Public Health for children living the Standard Metropolitan Statistical Area of the 1990 Census (see Briggs-Gowan et al. 2001). Children were ineligible for the larger birth cohort sample if they were likely to have developmental delays (e.g., due to low birth weight, premature birth, low APGAR scores, or birth complications such as anoxia, n=675; had a sibling who was sampled (n=277); were deceased (n=4); or were adopted. A random sample of 1,788 was drawn from 7,433 eligible children. Additional exclusion criteria were applied following sampling: parent able to participate in English; child in the custody of a biological parent; and family living in the State of Connecticut. One-hundred and eighty-three children did not meet these criteria (n=50 language; n=17 custody; n=116 moved out of state), 112 were excluded because they could not be located to verify eligibility, despite intensive searching, and two were excluded due to severe parental illness. Compared with the ineligible sample (n=297), the final eligible sample of 1,491 was significantly higher in birthweight, paternal and maternal age, maternal education, and years at the birth address, and less likely to be of minority ethnicity (t-values ranged from 2.84 to 6.26, p<0.01, with Cohen's D from 0.18 to 0.41, indicating small effect sizes), but not gestational age, paternal education, or child sex.

Within the full sample, 1,329 of the 1,491 randomly selected families completed and returned questionnaires for a response rate of 89%. Families who completed the questionnaire (n=1,329) were similar to non-completers (n=162) on all birth record variables, (e.g. birthweight, paternal and maternal age, maternal education, years at the birth address, minority ethnicity, gestational age, paternal education, and child sex), and thus were representative of the full sample. Participants were similar to families with young children living in the New Haven-Meriden SMSA of the 1990 Census in terms of race (73.9 versus 76.7% Caucasian, respectively), single parenting (20.2 versus 18.5%), and poverty status (18.9 versus 13.6%). To adjust for differences in sampling probability and non-response, statistical weights are applied in all analyses. Information from birth records concerning socio-demographic background (e.g., parental age, education and race) and infant birth status (e.g., birth weight and gestational age) were used to calculate sampling weights.

For purposes of this study, toddlers between 11 and 17 months of age or older than 36 months of age were excluded because they were, respectively, ineligible for the CBCL 1.5–5 or the ITSEA. After the aforementioned age-based exclusions, 917 of the 1,329 families who completed the questionnaires remained. This sub-sample of 917 toddlers included in this report comprised 460 girls and 457 boys. Additionally, 18.2% of the toddlers were Black/African American, 4.9% Hispanic/Latino, 7.3% Black/Hispanic, 2.0% Asian/Asian American, 65.9% White/Caucasian, and 1.7% identified as "Other". Lastly, 35.7% of families reported incomes bordering on or below the federal poverty line, (Dalaker and Proctor 2000), and 19.3% of toddlers were from single-parent households. This sample of 917 was representative of the original sample; there were no systematic differences in gender, race, family socioeconomic status, or maternal education.

Procedure

From June to September of 1998, the eligible participants were mailed a letter describing the study, followed 1 week later by a questionnaire that included all of the measures used in the study, and a children's book as a thank-you for participating. Staff members subsequently telephoned

parents and visited homes to address questions and/or concerns and encourage participation. Informed consent procedures were followed and parents received $25 for participating. All procedures were approved by the institutional review boards.

Measures

The *Infant-Toddler Social & Emotional Assessment* (ITSEA, Carter et al. 2003; Carter and Briggs-Gowan 2006) is a 166-item parent-report questionnaire designed to assess social–emotional problems and competencies in 12- to 36-month-olds. Items are rated on a 3-point scale (0=Not true/rarely, 1=Somewhat true/sometimes, and 2=Very true/often. The ITSEA includes three problem domains (Internalizing, Externalizing, and Dysregulation), and a social–emotional Competence domain. Higher scores on the problem domains indicate greater severity, whereas lower scores on the Competence domain indicate lower social–emotional competence. The ITSEA has adequate test–retest reliability (Intraclass Correlations from 0.82 to 0.90) and internal consistency (Cronbach's alpha=0.80 to 0.90). The ITSEA's validity has been supported through associations with other problem behavior checklists, observed child behavior, evaluator ratings of problem behaviors. Recent findings indicate validity in discriminating children diagnosed with mental health problems from matched controls (Carter and Briggs-Gowan 2006).

The *ITSEA Trauma Related Symptoms Scale* (ITSEA-TRSS, Briggs-Gowan and Carter 2007) comprises a global score and three sub-indices (Re-experiencing, Avoidance/Numbing and Arousal), each including items from the ITSEA that closely approximate PTSD symptoms. The individual indices have acceptable model-fit (CFIs from 0.935 to 0.975, RMSEA from 0.036 to 0.042). These indices have low to moderate internal consistency (Cronbach's alpha=0.49 to 0.79), as often occurs with measures that comprise rarely occurring, but clinically significant behaviors (Carter and Briggs-Gowan 2006). The TRSS indices have good to excellent 30-day test–retest reliability (*ICC*s from 0.67 to 0.84).

The *Child Life Events Scale* (Carter and Briggs-Gowan 1998) is a parent-report questionnaire in which parents indicate whether and at what age their child experienced specific life events and whether they noticed a dramatic change in their child following the event(s). Nine events that represent events that are included in standardized assessments of childhood traumatic events (Daviss et al. 2000; Ford et al. 2000) are included in analyses (been bitten by a dog, car accident, overnight hospital stay, witnessed violence in the neighborhood, saw someone use a weapon to hurt or threaten a family member, saw someone hit, push or kick a family member, serious physical injury, medical operation, and experienced some other potentially traumatic event.

"Dramatic Change" was measured with a single checkbox item, which read: "At any time after the event(s) did you notice a sudden or dramatic change in your child that you believe was not just because s/he was getting older?" There were a few additional questions to obtain information about the event to which the parent attributed the change, the age at which the change was observed and the duration of the change. If the child was younger than 6 months or the parent indicated an event that was clearly not traumatic (e.g., removal of pacifier), the parent response was recoded to no event and no dramatic change.

Reliability estimates available from a subsample of participants indicate acceptable test–retest reliability over a two to 4 week interval (MN=22.59 days, STD=5.11 days, N=88), with good reliability for the event exposure variable (Kappa=0.78, 88% overall agreement) and adequate reliability for the dramatic change variable (Kappa=0.5, 92% agreement). Mother–father agreement was modest for event exposure and (Kappa=0.40, 74% agreement) and dramatic change (Kappa=0.5, 88% agreement).

The *Child Behavior Checklist*/1.5–5 (CBCL, Achenbach and Rescorla 2001) is a 113-item parent-report questionnaire designed to assess competencies, and behavioral and emotional problems in children. The CBCL includes two problem domains (Internalizing, Externalizing) and a Total Problems score. Items are rated on a 3-point Likert Scale in which higher scores indicate greater symptom severity. Test–retest reliability coefficients range from r=0.68 to 0.92 (mean r=0.84). It also has good discriminant validity in that it successfully discriminates between clinically referred and non-referred children.

The *Modified CBCL PTSD Scale* (Dehon and Scheeringa 2006) comprises 15 trauma-related CBCL items (Table 2). The internal consistency, measured with Cronbach's alpha, of the CBCL PTSD scale was 0.67 in the analyzed sample; however, it demonstrated internal consistency of 0.83 in a clinical sample with known trauma exposure (Dehon and Scheeringa 2006). Scores on this measure have been shown to correlate highly with number of PTSD symptoms reported in a semi-structured interview for young children (Scheeringa et al. 2001). This measure also has been shown to be more predictive of PTSD symptoms in toddlers than scores on the internalizing or externalizing domains of the CBCL alone (Dehon and Scheeringa 2006).

Analytic Plan

Data were analyzed with the Statistical Package for the Social Sciences (SPSS), Version 15.0. As noted in the Methods section, to adjust for differences in sampling

probability and non-response, statistical weights are applied in all analyses to account for unequal selection probabilities and differential non-response. To guard against chance findings, multivariate, univariate and pairwise comparisons were examined sequentially (i.e., only if the preceding finding was statistically significant). The number of multiple tests was attended to through the use of multivariate ANCOVAs, reporting of effect sizes rather than just statistical significance, and conducting Bonferroni adjustments on all follow-up univariate and pair-wise comparisons as part of each multivariate analysis.

Results

Preliminary frequency analyses revealed that 23.4% (n=215) of children experienced at least one adverse/potentially traumatic event between the ages of 6 and 36-months. Among children who experienced at least one event, 19.5% (n=42) of parents reported a dramatic change in the children following the event, which constituted 4.6% of the entire sample.

Prior to formal hypothesis testing, the following sociodemographic characteristics were examined as possible covariates of being exposed to one or more adverse event compared with no event exposure: maternal age, child age, child sex, single parent status, poverty status, minority ethnicity and maternal education. Children who were living in single parent households (χ^2[1, N=815] = 22.27, p<0.0001), and/or living in households where the average annual income fell below the federal poverty line (χ^2[1, N=815] = 18.02, p<0.0001) were more likely to have experienced an adverse event than children living in dual-parent households and/or households with an average annual income above the federal poverty line. Additionally, children identified by their parents as members of a racial or ethnic minority group were more likely to have experienced an adverse event than children identified by their parents as white (χ^2[1, N=816] = 5.521, p<0.05). Lastly, children whose mothers were younger and who had completed fewer years of education were more likely to have experienced an adverse event than children whose mothers were older (F[1, 915]=19.55, p<0.0001) and/or had higher levels of education (χ^2[1, N=815] = 11.82, p<0.01).

These five variables therefore were included as covariates in a MANCOVA conducted with toddler adverse event exposure group (2 levels: no event versus any event) as the fixed factor. Dependent variables included scores on the ITSEA Internalizing, Externalizing, Dysregulation, Atypical, Maladaptive, and Competence scales, and the CBCL Internalizing and Externalizing scales. The Multivariate model was significant (Wilks' lambda=0.934, p<0.001, η^2=0.041). Consistent with Hypothesis 1, there was a main effect for toddler event exposure group (0 vs. 1 or more potentially traumatic events) for the ITSEA Internalizing, Externalizing, Dysregulation, Atypical and Maladaptive scales, as well as for the CBCL Internalizing and Externalizing scales (all p-values<0.05), with higher scores reported in children exposed to one or more potentially traumatic event (see Table 1). Although statistically significant, all effect sizes were small.

To examine whether exposure to potentially traumatic events was associated with symptoms consistent with PTSD, an additional MANCOVA analysis was conducted using the CBCL PTSD Scale and ITSEA TRSS total and subscale scores as the dependent variables and event exposure as the independent variable (Table 2). The Multivariate model was significant (Wilks' lambda=0.988, p<0.05, η^2=0.012). Consistent with hypothesis 1, exposure to potentially traumatic events was significantly associated with toddler scores on the Modified CBCL PTSD Scale, ITSEA TRSS Scale, and the ITSEA TRSS Arousal and Re-experiencing Indices, controlling for sociodemographic risk (all p-values<0.05). Exposure was not significantly associated with the ITSEA TRSS Avoidance Index. As shown in Table 3, examination of estimated marginal means for item-level responses revealed that, controlling for covariates, toddlers exposed to a potentially traumatic event scored significantly higher on the following six items on the Modified CBCL PTSD Scale than non-trauma-exposed toddlers: "cannot concentrate or pay attention for long", "nausea and feels sick (without medical cause)", "stomachaches and cramps (without medical cause)", "stubborn, sullen, or irritable", "sudden changes in mood or feeling", and "unhappy, sad or depressed" (all p-values<0.05). Toddlers exposed to a potentially traumatic event were rated significantly lower than non-exposed toddlers on one item: "withdrawn or does not get involved with others".

Examination of estimated marginal means for item-level responses (Table 4) revealed that, controlling for covariates, within the Re-experiencing Subscale, toddlers exposed to a potentially traumatic event scored significantly higher than non-exposed toddlers on the following three items: "Puts things in a special order over and over", "Repeats the same action or phrase over and over", and "Talks about things that are strange, scary or disgusting" (all p-values<0.05). Within the Arousal Subscale, toddlers exposed to a potentially traumatic event scored significantly higher than non-exposed toddlers on the following six items: "Cries a lot", "Gets very wound up or silly when playing", "Has temper tantrums", "Has trouble falling asleep or staying asleep", "Is irritable or grouchy", and "Worries about own body" (all p-values<0.05). Though the Avoidance/Numbing Subscale as a whole was not significantly associated with event exposure, item-level analyses were conducted in

Table 1 Social and Emotional Functioning in Toddlers by Adverse Event vs. No Event and Change vs. No Change

	Hypothesis 1 analyses				Hypothesis 2 analyses				3-Group comparisons				
	No Event *N*=702 (1)	Event *N*=215 (2+3)	F (1 vs. 2+3)	η2	No Change *N*=161 (2)	Change *N*=42 (3)	F (2 vs. 3)	η2	F (1 vs. 2 vs.3)	η2	Means 1	2	3
ITSEA internalizing	0.523 [0.008]	0.576 [0.014]	**10.235**	0.011	0.576 [0.017]	0.631 [0.033]	2.131	0.011	**5.188**	0.011	a	b	b
ITSEA vexternalizing	0.494 [0.010]	0.556 [0.018]	**8.730**	0.010	0.556 [0.022]	0.678 [0.042]	**6.579**	0.032	**7.979**	0.017	a	b	b
ITSEA dysregulation	0.452 [0.009]	0.518 [0.016]	**12.891**	0.014	0.498 [0.019]	0.612 [0.036]	**8.220**	0.039	**8.528**	0.019	a	b	c
ITSEA atypical	0.328 [0.010]	0.409 [0.017]	**16.676**	0.018	0.388 [0.024]	0.533 [0.047]	**7.655**	0.037	**12.496**	0.027	a	b	c
ITSEA maladaptive	0.114 [0.005]	0.135 [0.009]	**3.890**	0.004	0.122 [0.012]	0.221 [0.023]	**15.092**	0.070	**9.740**	0.021	a	a	b
ITSEA competence	1.450 [0.009]	1.484 [0.016]	3.554	0.004	1.480 [0.016]	1.449 [0.032]	0.744	0.004	1.820	0.004	a	a	a
CBCL internalizing	4.605 [0.173]	6.011 [0.299]	**16.279**	0.018	5.871 [0.408]	7.563 [0.782]	3.676	0.018	**10.245**	0.022	a	b	b
CBCL externalizing	8.641 [0.267]	10.090 [0.460]	**7.271**	0.008	9.431 [0.594]	13.617 [1.139]	**10.603**	0.050	**10.527**	0.023	a	a	b

Means reported are estimated marginal means, and boldface F values signify difference of statistical significance between means ($p<0.05$). Standard errors are reported in [ ] below means. Different lowercase letters in final column reflect significant mean level differences between the no event (1), change (2) and no change (3) groups

an exploratory fashion to gain insight into the types of symptoms evidenced in relation to exposure and any developmental patterns. Toddlers exposed to potentially traumatic events scored higher on two avoidance/numbing items: "Avoids physical contact" and "Looks unhappy or sad without any reason" (all p-values<0.05).

Prior to formal hypothesis testing of Hypothesis 2, the following sociodemographic characteristics were examined as possible covariates of parental report of a dramatic change in the toddler following the event vs. no change: maternal age, child age, child sex, single parent status, poverty status, minority ethnicity and maternal education.

Table 2 CBCL PTSD and ITSEA TRSS Scores by Adverse Event vs. No Event and Change vs. No Change

	Hypothesis 1 analyses				Hypothesis 2 analyses				3-Group comparisons				
	No event *N*=702 (1)	Event *N*=215 (2+3)	F (1 vs. 2+3)	η2	No change *N*=161 (2)	Change *N*=42 (3)	F (2 vs. 3)	η2	F (1 vs. 2 vs. 3)	η2	Means 1	2	3
CBCL PTSD scale score	0.187	0.224	**7.103**	0.008	0.209	0.295	**5.946**	0.029	7.737	0.017	a	a	b
ITSEA TRSS summary score	0.306	0.365	**8.528**	0.009	0.347	0.426	**9.702**	0.046	8.772	0.019	a	a	b
Re-experiencing subscale	0.311	0.372	**6.449**	0.007	0.350	0.457	**6.656**	0.032	5.918	0.013	a	a	b
Avoidance/Numbing subscale	0.136	0.176	0.251	0.000	0.179	0.169	0.000	0.000	0.230	0.001	a	a	a
Arousal subscale score	0.470	0.545	**7.249**	0.008	0.513	0.651	**13.685**	0.064	9.182	0.020	a	a	b

Means reported are estimated marginal means, and boldface F values signify difference of statistical significance between means ($p<0.05$). Different lowercase letters in final column reflect significant mean level differences between the no event (1), change (2) and no change (3) groups

Table 3 CBCL PTSD Items by Adverse Event vs. No Event and Change vs. No Change

	Hypothesis 1 analyses				Hypothesis 2 analyses				3-Group comparisons				
	No Event *N*=702 (1)	Event *N*=215 (2+3)	F (1 vs. 2+3)	η2	No change *N*=161 (2)	Change *N*=42 (3)	F (2 vs. 3)	η2	F (1 vs. 2 vs. 3)	η2	Means		
											1	2	3
Defiant	0.457	0.439	0.168	0.000	0.368	0.657	**8.539**	0.042	**5.039**	0.011	a	a	b
Cannot concentrate or pay attention for long	0.223	0.357	**12.196**	0.013	0.400	0.220	3.071	0.015	**7.827**	0.017	a	b	a
Clings to adults or too dependent	0.390	0.451	1.822	0.002	0.477	0.485	0.006	0.000	0.817	0.002	a	a	a
Fears certain animals, situations or places	0.542	0.565	0.194	0.000	0.520	0.751	3.603	0.018	1.364	0.003	a	a	a
Nervous, high strung or tense	0.035	0.057	1.602	0.002	0.043	0.125	3.526	0.017	**4.133**	0.009	a	a	b
Nightmares	0.176	0.166	0.103	0.000	0.144	0.241	2.156	0.011	1.054	0.002	a	a	a
Too fearful or anxious	0.045	0.050	0.071	0.000	0.058	0.051	0.025	0.000	0.202	0.000	a	a	a
Nausea and feels sick (no medical cause)	0.016	0.074	**15.842**	0.017	0.094	0.021	2.170	0.011	**11.179**	0.024	a	b	a
Stomachaches and cramps (no medical cause)	0.031	0.061	**3.988**	0.004	0.066	0.046	0.227	0.001	2.230	0.005	a	a	a
Vomiting and throwing up (no medical cause)	0.039	0.033	0.150	0.000	0.038	0.024	0.144	0.001	0.057	0.000	a	a	a
Stubborn, sullen, or irritable	0.381	0.550	**14.663**	0.016	0.431	1.011	**29.137**	0.127	**25.753**	0.054	a	a	b
Sudden changes in mood or feeling	0.135	0.203	**4.749**	0.005	0.212	0.241	0.131	0.001	3.317	0.007	a	a	a
Wakes up often at night	0.285	0.299	0.110	0.000	0.235	0.411	3.380	0.017	2.287	0.005	a	a	a
Unhappy, sad or depressed	0.006	0.036	**7.699**	0.008	0.022	0.073	1.775	0.009	**5.962**	0.013	a	a	b
Withdrawn or does not get involved w/ others	0.052	0.019	**3.938**	0.004	0.014	0.070	**4.189**	0.021	**3.470**	0.008	a	b	a

Means reported are estimated marginal means, and boldface F values signify difference of statistical significance between means ($p<0.05$). Different lowercase letters in final column reflect significant mean level differences between the no event (1), change (2) and no change (3) groups

Of these, only maternal education ($\chi^2[3, N= 183] = 8.24$, $p<0.05$), was significantly associated with the change variable.

A MANCOVA was conducted with toddler change group as the fixed factor (dramatic change vs. no change) and maternal education included as a covariate. The No Change group ($n=161$) was comprised of toddlers whose parents did not report a dramatic change in their child following the potentially traumatic event(s) and the Dramatic Change group ($n=42$) was comprised of toddlers whose parents reported a dramatic change in their child following the potentially traumatic event(s). The Multivariate model was significant (Wilks' lambda=0.895, $p<0.01$, $\eta^2=0.105$). Consistent with Hypothesis 2, there was a main effect for toddler post-traumatic change group (dramatic change vs. no change) for the ITSEA Externalizing, Dysregulation, Atypical, and Maladaptive scales, as well as for the CBCL Externalizing scale (all p-values<0.05) (see Table 1). Effect sizes were small to moderate, with medium size effects for the CBCL Externalizing Domain and ITSEA Maladaptive Index. Contrary to expectations, there was no main effect for toddler post-traumatic change group for the ITSEA or CBCL Internalizing scales.

An additional MANCOVA analysis was conducted using the CBCL PTSD Scale and ITSEA TRSS total and subscale scores as the dependent variables and post-traumatic change as the independent variable (Table 2). The Multivariate model was significant (Wilks' lambda=0.921, $p<0.01$, $\eta^2=0.079$). Consistent with hypothesis 2, parental report of a dramatic change in the toddler following a potentially traumatic event was significantly associated with toddler scores on the Modified CBCL PTSD Scale and the ITSEA TRSS (all p-values<0.05). Examination of estimated marginal means for item-level responses revealed that, controlling for covariates, toddlers whose parents reported a dramatic change in them following exposure to a potentially traumatic event scored significantly higher than toddlers whose parents did not report a change on the following three items on the Modified CBCL PTSD Scale: "defiant", "stubborn, sullen, or irritable", and

Table 4 ITSEA TRSS Items by Adverse Event vs. No Event and Change vs. No Change

	Hypothesis 1 analyses				Hypothesis 2 analyses				3-Group comparisons				
	No event *N*=702 (1)	Event *N*=215 (2+3)	F (1 vs. 2+3)	η2	No change *N*=161 (2)	Change *N*=42 (3)	F (2 vs. 3)	η2	F (1 vs. 2 vs. 3)	η2	1	2	3
Re-experiencing subscale													
Acts out same pretend theme over and over	0.298	0.373	2.237	0.003	0.271	0.788	**20.987**	0.097	**13.026**	0.029	a	a	b
Started doing something he/she had outgrown	0.179	0.201	0.327	0.000	0.180	0.295	1.786	0.009	0.811	0.002	a	a	a
Is afraid of certain animals, places, or things	0.941	0.882	1.126	0.001	0.864	0.969	0.657	0.003	0.531	0.001	a	a	a
Puts things in a special order over and over	0.262	0.364	**6.053**	0.007	0.371	0.438	0.445	0.002	3.346	0.007	a	a	a
Repeats same action or phrase over and over	0.387	0.558	**11.085**	0.012	0.468	0.934	**13.481**	0.063	**11.452**	0.025	a	a	b
Spaces out. Unaware of what is happening	0.056	0.046	0.304	0.000	0.048	0.041	0.027	0.000	0.256	0.001	a	a	a
Talks about strange, scary or disgusting things	0.143	0.296	**18.229**	0.023	0.380	0.139	**6.009**	0.034	**15.125**	0.038	a	b	a
Wakes up from scary dreams or nightmares	0.388	0.325	2.067	0.002	0.315	0.306	0.011	0.000	1.478	0.003	a	a	a
When upset stills, freezes doesn't move	0.148	0.207	3.511	0.004	0.255	0.204	0.389	0.002	2.456	0.005	a	a	a
Avoidance/Numbing subscale													
Avoids physical contact	0.106	0.191	**8.269**	0.009	0.290	0.088	**3.982**	0.020	**7.476**	0.016	a	b	a
Does not make eye contact	0.115	0.128	0.212	0.000	0.149	0.219	0.891	0.004	0.623	0.001	a	a	a
Has less fun than other children	0.085	0.039	3.324	0.004	0.055	0.083	0.371	0.002	1.270	0.003	a	a	a
Is affection ate with loved ones (rev)	0.130	0.078	3.775	0.004	0.115	0.024	2.958	0.015	**3.912**	0.009	a	a	b
Interested in other babies or children (rev)	0.235	0.209	0.616	0.001	0.233	0.166	0.838	0.004	0.730	0.002	a	a	a
Laughs and smiles less than other children	0.060	0.098	2.526	0.003	0.123	0.076	0.414	0.002	1.925	0.004	a	a	a
Likes being cuddled, hugged or kissed (rev)	0.176	0.201	0.633	0.001	0.177	0.332	**4.554**	0.022	2.485	0.006	a	a	a
Looks unhappy or sad without any reason	0.083	0.180	**17.191**	0.019	0.236	0.190	0.399	0.002	**10.777**	0.023	a	b	b
Seems to have no energy	0.032	0.057	1.723	0.002	0.059	0.090	0.304	0.002	1.198	0.003	a	a	a
Seems withdrawn	0.053	0.044	0.249	0.000	0.046	0.112	2.316	0.012	0.829	0.002	a	a	a
Arousal subscale													
Can pay attention for a long time(rev)	0.697	0.710	0.078	0.000	0.687	0.849	2.462	0.012	1.658	0.004	a	a	a
Cries a lot	0.301	0.389	**4.555**	0.005	0.367	0.645	**7.736**	0.037	**8.707**	0.019	a	a	b
Gets angry or pouts	0.672	0.741	2.388	0.003	0.703	1.029	**13.210**	0.063	**5.708**	0.013	a	a	b
Gets very wound up or silly when playing	0.973	1.116	**7.984**	0.009	1.193	1.191	0.000	0.000	**3.517**	0.008	a	b	b
Goes from toy to toy faster than other children	0.401	0.423	0.256	0.000	0.460	0.396	0.362	0.002	1.287	0.003	a	a	a
Has temper tantrums	0.685	0.847	**10.604**	0.012	0.782	1.135	**8.971**	0.043	**10.497**	0.023	a	a	b
Has trouble adjusting to changes	0.416	0.469	1.502	0.002	0.520	0.457	0.436	0.002	0.789	0.002	a	a	a
Has trouble calming down when upset	0.406	0.415	0.038	0.000	0.384	0.507	1.769	0.009	0.508	0.001	a	a	a

Table 4 (continued)

	Hypothesis 1 analyses				Hypothesis 2 analyses				3-Group comparisons				
	No event *N*=702 (1)	Event *N*=215 (2+3)	F (1 vs. 2+3)	η2	No change *N*=161 (2)	Change *N*=42 (3)	F (2 vs. 3)	η2	F (1 vs. 2 vs. 3)	η2			
Has trouble falling asleep or staying asleep	0.320	0.444	**7.999**	0.009	0.369	0.638	**7.194**	0.035	**7.428**	0.016	a	a	b
Is bothered by loud noises or bright lights	0.523	0.545	0.206	0.000	0.490	0.755	**7.175**	0.035	**4.427**	0.010	a	a	b
Is easily startled	0.299	0.345	1.352	0.001	0.308	0.294	0.025	0.000	0.701	0.002	a	a	a
Is hard to soothe when upset	0.333	0.411	3.530	0.004	0.404	0.508	1.107	0.006	2.082	0.005	a	a	a
Is irritable or grouchy	0.474	0.573	**5.198**	0.006	0.603	0.579	0.067	0.000	2.309	0.005	a	a	a
Is stubborn	1.146	1.242	3.842	0.004	1.142	1.534	**12.115**	0.058	**9.015**	0.020	a	a	b
Often gets very upset	0.370	0.345	0.362	0.000	0.343	0.446	1.252	0.006	0.727	0.002	a	a	a
Seems nervous, tense or fearful	0.123	0.117	0.055	0.000	0.109	0.235	**4.027**	0.020	1.654	0.004	a	a	a
Wakes up grouchy or in a bad mood	0.408	0.417	0.039	0.000	0.407	0.445	0.149	0.001	0.062	0.000	a	a	a
Wakes up and needs help to fall asleep again	0.491	0.527	0.494	0.001	0.425	0.749	**9.155**	0.044	**4.929**	0.011	a	a	b
Worries a lot or is very serious	0.147	0.114	1.309	0.001	0.107	0.261	**5.514**	0.027	**3.583**	0.008	a	a	b
Worries about own body	0.288	0.404	**7.853**	0.009	0.390	0.556	2.765	0.014	**4.102**	0.009	a	a	b

Means reported are estimated marginal means, and boldface F values signify difference of statistical significance between means ($p<0.05$). Different lowercase letters in final column reflect significant mean level differences between the no event (1), change (2) and no change (3) groups. Standard errors are not listed for each individual item, but are available as an appendix upon request. All items followed by the abbreviation (rev) are reverse coded

"withdrawn or does not get involved with others" (all p-values<0.05) (see Table 3).

As shown in Table 2, toddlers whose parents reported a dramatic change following the potentially traumatic event scored significantly higher than toddlers whose parents did not report a change on the Re-experiencing and Arousal Subscales of the ITSEA TRSS scale (all p-values<0.05), with a medium effect size for scores on the ITSEA TRSS Arousal Index. There was no significant effect on the Avoidance/Numbing scale. Also as detailed in Table 4, examination of estimated marginal means for item-level responses revealed that, controlling for covariates, within the Re-experiencing Subscale, toddlers exposed to a potentially traumatic event scored significantly higher than non-exposed toddlers on the following two items: "Acts out same pretend theme over and over", and "Repeats the same action or phrase over and over" (all p-values<0.05). Within the Arousal Subscale, toddlers exposed to a potentially traumatic event scored significantly higher than non-exposed toddlers on the following nine items: "Cries a lot", "Gets angry or pouts", "Has temper tantrums", "Has trouble falling asleep or staying asleep", "Is bothered by loud noises or bright lights", "Is stubborn", "Seems nervous, tense or fearful", "Wakes up at night and needs help to fall asleep again", and "Worries a lot or is very serious" (all p-values<0.05). Though the Avoidance/Numbing Subscale as a whole was not significantly associated with event exposure, item-level analyses were conducted in an exploratory fashion to gain insight into the types of symptoms evidenced in relation to exposure and any developmental patterns. Toddlers exposed to potentially traumatic events scored higher on one avoidance/numbing item: "Likes being cuddled, hugged or kissed by loved ones" (reverse-coded) ($p<0.05$). The item "Avoids physical contact" differed in a counterintuitive direction, with toddlers who experienced a post-traumatic change scoring significantly lower on this item than toddlers who did not experience a change ($p<0.05$).

Post-hoc, Bonferroni adjusted, pairwise comparisons across the following three groups: (1)No Exposure, (2) Exposure but No Change, and (3) Exposure + Change, were also conducted. Group differences on the ITSEA Externalizing, Dysregulation, Atypical, and Maladaptive scales and CBCL Internalizing and Externalizing scales were statistically significant (all p's<0.0001), as were post-hoc analyses of linear trend. The 3-group variable was also

significantly associated with toddler scores on the Modified CBCL PTSD Scale and the ITSEA TRSS (p's<0.0001). F-values and effect size (η^2) for the 3-group comparisons are reported in the final column of Tables 1–4 and significant mean level differences between the No Event (1), Change (2) and No Change (3) groups are indicated in the final column with lowercase letters. Post-hoc analyses also revealed that the reduction in effect size when covariates were included in models ranged from a 0.003 to 0.01 reduction in eta.

Discussion

Nearly one-fourth (23.4%) of 18- to 36-month-old toddlers in this community sample were reported by a parent to have experienced at least one potentially traumatic event between the ages of 6 and 36 months. This figure is consistent with rates of exposure reported for older children and adolescents (Costello et al. 2002). As predicted, toddlers who experienced a potentially traumatic event evidenced greater severity of internalizing, externalizing, dysregulation, maladaptive and atypical behavior problems than toddlers who did not experience a potentially traumatic event. These results are consistent with prior evidence indicating higher levels of internalizing and externalizing symptoms among very young children who were exposed to psychological trauma than for a non-trauma-exposed healthy control group (Scheeringa et al. 2003), as well as with recent evidence of heightened symptoms among children exposed to terrorism and other traumatic events (e.g., Chemtob et al. 2008; Wang et al. 2006). Thus, there is mounting evidence that among even very young children, ages 18 to 36 months, exposure to potentially traumatic events is associated with a range of socioemotional and behavioral problems that may compromise healthy development and place them at risk for persistent serious psychological problems later in childhood and in adulthood.

Moreover, for some children, parents reported manifestations of trauma response that may be construed as re-experiencing, (e.g. repetitive behaviors in play, repetitive verbalizations or actions), avoidance/numbing, (e.g. avoidance of physical contact or social interaction), increased arousal, (e.g., poorer emotion regulation as evidenced by increased tantrums, crying, and irritability, sleep problems, worries, difficulty concentrating and behavioral arousal), and somatization (e.g. nausea and stomachaches) than toddlers who did not experience a potentially traumatic event. Consistent with Scheeringa et al.'s (1995, 2003) findings, while the presence of specific symptoms in each of these domains of PTSD was variable across the sub-group of potentially trauma-exposed children, most of these children had too few avoidance/numbing symptoms to meet the DSM-IV criteria for PTSD, even before inquiring about the quality and duration of these behaviors, which would be required to assess symptom presence to assign a PTSD diagnosis.

Consistent with the psychological trauma literature on older children, adolescents and adults, not all toddlers exposed to a potentially traumatic event experienced a dramatic change (American Psychological Association 2000; Fletcher 1996). Among toddlers with an exposure to a potentially traumatic event, approximately 20% (or just less than 5% of the overall sample) were reported by a parent to have experienced a dramatic change following the event(s). As described previously, parental observations of a dramatic change were used as a proxy for the child's experience of fear, helplessness, or horror because of evidence that young children's emotional reactions tend to be expressed behaviorally and often with some delay reflecting their developing cognitive processing capacities (Bell and Wolfe 2004). As predicted, among toddlers who experienced one or more potentially traumatic life events, those whose parents reported a dramatic change in their functioning following the event(s) exhibited greater symptom severity on measures of social and emotional functioning than those whose parents did not report a change. Specifically, toddlers who experienced an event-related change in functioning were reported to display higher levels of externalizing, dysregulation, atypical, and maladaptive behaviors. This pattern of behavioral changes is consistent with Perry's (2000) hypothesis that psychological trauma experienced in the first year of life may interfere with neurobiological development associated with stress modulation and emotion regulation. Somewhat unexpectedly, although internalizing problems were elevated among children who had experienced any event as compared with children without such experiences, they were not associated with a perceived change in the child's behavior. This finding may mean that internalizing problems onset more gradually, perhaps as an exacerbation of already existing temperament risk. It also is possible that internalizing problems, because of their very nature, are less readily identifiable (especially in the less verbal child) and thus less likely to be noted as part of a marked change in the child's behavior. Multi-method assessments in which parent reports are supplemented with observational and clinical assessments are essential for clarifying the symptom patterns that manifest in young children following trauma exposure.

The discrepancy between the present findings and those of Scheeringa et al. (2003) regarding externalizing symptoms among toddlers who experienced a post-traumatic change may be due to the fact that Scheeringa et al. (2003) used a clinical sample where externalizing problems may have already been elevated, while the present study used a more normative sample in which small differences in externalizing may have been more easily discernable.

The present findings add support to the view that toddlers may experience post-traumatic impairment. Moreover, they suggest the need for further research to determine when and for whom such post-traumatic reactions may become sufficiently severe and persistent to constitute chronic or complex PTSD. Consideration of the role that genetic factors may play in the developmental course of responses to trauma also is important, given evidence of gene by environment interactions in which exposure to negative life events interacts with genotype to increase risk of psychopathology (e.g., Caspi et al. 2003; Kaufman et al. 2006; Kim-Cohen et al. 2006).

When individual symptoms were examined, toddlers whose parents reported a dramatic change in them following the potentially traumatic event(s) also were reported to more often (compared to all other children) experience symptoms that could be construed as re-experiencing, arousal, and to a lesser extent, avoidance/numbing. However, toddlers who experienced a change did not experience any more somatization symptoms than toddlers who did not experience a change. The preponderance of the potentially post-traumatic symptoms associated with parent report of post-event change involved manifestations of increased arousal, including both behavioral and emotional dysregulation symptoms (i.e., crying, anger, temper problems, sleep disturbance), as well as additional anxiety-related symptoms (i.e., worry, fear). Social avoidance was the only a priori avoidance/numbing symptom associated with dramatic post-incident change, but the lower level of endorsement of the item "talks about things that are strange scary or disgusting" may reflect avoidance, suggesting that this item (reverse scored) may be more useful as an index of avoidance than re-experiencing in this age group. The re-experiencing items that differed in the expected direction between the post-traumatic change versus no change sub-groups reflected re-enactment in play and speech.

These findings support Scheeringa et al.'s (2003) conclusion that very young children experience symptoms of PTSD, but that the range and number of symptoms may be different than in adults. The relative scarcity of avoidance/numbing symptoms in comparison with arousal or re-experiencing symptoms among toddlers whose parents reported a dramatic change in them following adverse event exposure are consistent with the need for developmental modification for evaluating PTSD in very young children, which involves reduced requirements for avoidance/numbing symptoms (Scheeringa et al. 2003). Since many avoidance symptoms are more cognitive in nature, it is not surprising that these types of symptoms would be less prevalent among very young children. This may be because children are experiencing avoidance symptoms, but do not have the understanding and language skills to report or explain them, or because the adult criteria for avoidance and emotional numbing are age-inappropriate for toddlers (Scheeringa et al. 2003). It may also be that symptoms associated with avoidance/numbing are more subtle and/or harder to detect behaviorally or through parent report (Scheeringa et al. 2006), whereas symptoms associated with heightened arousal are more obvious and/or easily observable by parents. Alternatively, children who evidence a change may be those who were most aroused by the event and/or those who continue to show heightened physiological reactivity in the aftermath. Future studies measuring biological indicators of arousal in toddlers with and without a dramatic change may be useful in determining whether parental reports of dramatic change correspond to increased levels of physiological arousal in their toddlers.

Strengths and Limitations

A major limitation of this study was that information was provided by a single informant. It is possible that the toddlers may have been experiencing additional symptoms that were not readily observable to their parents, or that parents did not associate with event exposure. In this sample, parents seemed more attuned to changes within the externalizing, dysregulation, atypical and maladaptive domains, areas of functioning that may simply be more outwardly visible and/or disruptive to the parent. Though the data suggest that children exposed to potentially traumatic events are experiencing more internalizing relative to non-exposed peers, parents do not seem to be attributing these internalizing symptoms to event exposure. Examining the relative contribution of parental distress, trauma history and psychopathology as potential correlates of both the caregiver's perception of significant change and the child's symptoms and functional status is an important area for future research, though beyond the scope of the current study.

Second, there was little information available about the children's actual experiences of the potentially traumatic events, such as details about event duration and severity, factors that have been reported to impact post-traumatic response (American Psychological Association 2000). More severely exposed children may be more likely to be reported as having experienced a dramatic change; however, as exposure severity was not assessed, it was not possible to evaluate this question within this study. Additionally, the small numbers of children who experienced specific events precluded event-level analyses. The effects of specific features of psychological trauma that may exacerbate its adverse effects were not investigated in the present study. Further research is needed to investigate the effects that different types of events (e.g., interpersonal loss, violence, or non-interpersonal events), severity of the exposure, and chronicity (e.g., ongoing or recurrent re-

exposure versus single incidents) may have on young children's social-emotional functioning and development.

Fourth, the findings were cross-sectional, with retrospective reports of exposure, limiting the study's conclusions about the independent prospective effect of psychological trauma on subsequent psychosocial development and adjustment. Lastly, though significant differences were detected between groups, effect sizes were typically small to moderate. Future research could address these limitations by obtaining multiple-source data (e.g., independent caregiver reports; direct behavioral observation) with more detailed description (e.g., specific standard descriptions; exact onset, frequency and duration) of the potentially traumatic events with larger epidemiological (e.g., Kessler et al. 1995) community samples beginning in early childhood and continuing prospectively in childhood and adulthood.

Major strengths of this study included the following: First, the sample was large and representative, so that small, but potentially meaningful, effects were identified, even when sociodemographic risk factors were controlled for in models. Since single parent status, poverty status, minority ethnicity, maternal education and age were included as covariates in analyses comparing exposed and non exposed children, these results show that beyond the contribution of demographic factors, exposure to adverse/traumatic events is associated with greater symptomatology. Second, the questionnaires employed in this study were designed specifically for use with parents of very young children and events were assessed in early childhood rather than retrospectively. Consequently, their use allowed parents to provide rich, age-appropriate symptom level information about their children's social-emotional and behavioral problems and competencies. Third, a range of potentially traumatic experiences was surveyed and the question about dramatic change provided an age-appropriate proxy for the DSM-IV A2 criterion of a subjective reaction to the event (s). Further research can clarify whether the dramatic change question is sufficiently accurate (e.g., using independent informants to ensure that dramatic change is reliably identified) and specific (e.g., compared to more detailed items in standardized trauma history interviews that assess criterion A2, Daviss et al. 2000; Ford et al. 2000) to provide a basis for identifying toddlers who can be considered trauma-exposed.

Clinical Implications and Future Directions

The fact that potentially post-traumatic change, symptoms, and impairment were found to occur among toddlers in a diverse community sample suggest that psychological trauma warrants attention as a possible adverse influence on the adjustment and development of very young children from diverse socioeconomic backgrounds. Given that approximately one quarter of this representative birth cohort sample experienced a potentially traumatic event, and one-fifth of those exposed were observed to have shown a dramatic change in behavior or adjustment following the event(s), it may be beneficial for subsequent research to focus on developing guidelines to help pediatricians to routinely screen for the presence of potential psychological trauma (including dramatic post-event change) and trauma-related symptoms and impairments. Further research is needed to determine what is the most useful way of organizing post-traumatic symptoms in very young children, and which symptoms best reflect specifically posttraumatic impairment versus more global distress and/or other types of problems.

Acknowledgements Support for this research came from a grant to the last author from the National Institute of Mental Health (R01MH55278). Support for this research came from grants to the last and second authors from the National Institute of Mental Health (R01MH55278 and R01MH66645). We wish to thank Kimberly McCarthy for her assistance with data management and statistical analyses. We also wish to thank all of the children and families who participated in the CT Early Development Project.

References

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the Achenbach System of Empirically Based Assessment (ASEBA) school-age forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.

American Psychological Association (2000). *Diagnostic and statistical manual of mental disorders, text revision* (4th ed.). Washington D. C.: American Psychiatric Association.

Bell, M., & Wolfe, C. (2004). Emotion and cognition: an intricately bound developmental process. *Child Development*, *75*, 366–370. doi:10.1111/j.1467-8624.2004.00679.x.

Briggs-Gowan, M. J., & Carter, A. S. (2007). *Infant-Toddler Social and Emotional Assessment – Trauma Related Symptom Scales (ITSEA-TRSS)*. University of Connecticut Health Center. Farmington, CT.

Briggs-Gowan, M., Carter, A. S., Skuban, E. M., & Horwitz, S. M. (2001). Prevalence of social–emotional and behavioral problems in a community sample of 1- and 2-Year-Old Children. *Journal of the American Academy of Child and Adolescent Psychiatry*, *46* (7), 811–819. doi:10.1097/00004583-200107000-00016.

Bogat, G. A., DeJonghe, E., Levendosky, A. A., Davidson, W. S., & von Eye, A. (2006). Trauma symptoms among infants exposed to intimate partner violence. *Child Abuse & Neglect*, *30*(2), 109–125. doi:10.1016/j.chiabu.2005.09.002.

Carrion, V. G., Weems, C. F., Eliez, S., Patwardhan, A., Brown, W., Ray, R. D., et al. (2001). Attenuation of frontal asymmetry in pediatric posttraumatic stress disorder. *Biological Psychiatry*, *50* (12), 943–951. doi:10.1016/S0006-3223(01)01218-5.

Carter, A. S., & Briggs-Gowan, M. J. (1998). *Child Life Events Screener*. Yale University. New Haven, CT.

Carter, A. S., & Briggs-Gowan, M. J. (2006). *The Infant-Toddler Social & Emotional Assessment (ITSEA)*. San Antonio, Texas: Psychological Corporation, Harcourt Assessment.

Carter, A. S., Briggs-Gowan, M., Jones, S. M., & Little, T. (2003). The Infant-Toddler Social and Emotional Assessment (ITSEA): factor structure, reliability, and validity. *Journal of Abnormal Child Psychology*, *31*(5), 495–514. doi:10.1023/A:1025449031360.

Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., et al. (2003). Influence of life stress on depression: moderation by a polymorphism in the 5-HTT gene. *Science*, *301*, 291–293. doi:10.1126/science.1083968.

Chemtob, C. M., Nomura, Y., & Abramovitz, R. A. (2008). Impact of conjoined exposure to the world trade center attacks and to other traumatic events on the behavioral problems of preschool children. *Archives of Pediatrics & Adolescent Medicine*, *162*(2), 126–133. doi:10.1001/archpediatrics.2007.36.

Costello, E., Erkanli, A., Fairbank, J. A., & Angold, A. (2002). The prevalence of potentially traumatic events in childhood and adolescence. *Journal of Traumatic Stress*, *15*, 99–112. doi:10.1023/A:1014851823163.

Dalaker, J., & Proctor, B. D. (2000). *Poverty in the United States: 1999 U.S. Census Bureau, Current Population Reports Series* pp. 60–210. Washington, DC: Government Printing Office.

Daviss, W. B., Mooney, D., Racusin, R., Ford, J. D., Fleischer, A., & McHugo, G. (2000). Predicting post-traumatic stress after hospitalization for pediatric injury. *Journal of the American Academy of Child and Adolescent Psychiatry*, *39*, 576–583. doi:10.1097/00004583-200005000-00011.

De Bellis, M. D., Keshavan, M. S., Shifflett, H., Ivengar, S., Beers, S. R., Hall, J., et al. (2002). Brain structures in pediatric maltreatment-related posttraumatic stress disorder: a sociodemographically matched study. *Biological Psychiatry*, *52*(11), 1066–1078. doi:10.1016/S0006-3223(02)01459-2.

Dehon, C., & Scheeringa, M. (2006). Screening for preschool posttraumatic stress disorder with the child behavior checklist. *Journal of Pediatric Psychology*, *31*(4), 431–435. doi:10.1093/jpepsy/jsj006.

Driessen, M., Herrmann, J., Stahl, K., Zwaan, M., Meier, S., Hill, A., et al. (2000). Magnetic resonance imaging volumes of the hippocampus and the amygdala in women with borderline personality disorder and early traumatization. *Archives of General Psychiatry*, *57*(12), 1115–1122. doi:10.1001/archpsyc.57.12.1115.

Evans, D. W., Gray, F. L., & Leckman, J. F. (1999). The rituals, fears and phobias of young children: insights from development, psychopathology and neurobiology. *Child Psychiatry and Human Development*, *29*(4), 261–276. doi:10.1023/A:1021392931450.

Famularo, R., Fenton, T., Kinscherff, R., Ayoub, C., et al. (1994). Maternal and child posttraumatic stress disorder in cases of child maltreatment. *Child Abuse & Neglect*, *18*(1), 27–36. doi:10.1016/0145-2134(94)90093-0.

Fletcher, K. E. (1996). Childhood posttraumaic stress disorder. In E. J. Mash & R. A. Barkley (Eds.), *Child psychopathology* pp. 242–276. Guilford.

Ford, J. D. (2005). Treatment implications of altered neurobiology, affect regulation and information processing following child maltreatment. *Psychiatric Annals*, *35*, 410–419.

Ford, J. D., Racusin, R., Ellis, C., Daviss, W. B., Reiser, J., Fleischer, A., et al. (2000). Child maltreatment, other trauma exposure, and posttraumatic symptomatology among children with oppositional defiant and attention deficit hyperactivity disorders. *Child Maltreatment*, *5*, 205–217. doi:10.1177/1077559500005003001.

Glod, C. A., & Teicher, M. H. (1996). Relationship between early abuse, posttraumatic stress disorder, and activity levels in prepubertal children. *Journal of the American Academy of Child and Adolescent Psychiatry*, *35*(10), 1384–1393. doi:10.1097/00004583-199610000-00026.

Kaufman, J., Yang, B. Z., Douglas-Palumberi, H., Grasso, D., Lipschitz, D., Houshyar, S., et al. (2006). Brain-derived neurotrophic factor-5-HTTLPR gene interactions and environmental modifiers of depression in children. *Biological Psychiatry*, *15*, 673–680. doi:10.1016/j.biopsych.2005.10.026.

Kessler, R. C., Sonnega, A., Bromet, E., & Hughes, M. (1995). Posttraumatic stress disorder in the national comorbidity survey. *Archives of General Psychiatry*, *52*(12), 1048–1060.

Kim-Cohen, J., Caspi, A., Taylor, A., Williams, B., Newcombe, R., Craig, I. W., et al. (2006). MAOA, maltreatment, and gene-environment interaction predicting children's mental health: new evidence and a meta-analysis. *Molecular Psychiatry*, *11*, 903–913. doi:10.1038/sj.mp.4001851.

Levendosky, A. A., Leahy, K. L., Bogat, G. A., Davidson, W. S., & von Eye, A. (2006). Domestic violence, maternal parenting, maternal mental health, and infant externalizing behavior. *Journal of Family Psychology*, *20*(4), 544–552. doi:10.1037/0893-3200.20.4.544.

McDonald, R., Jouriles, E. N., Briggs-Gowan, M. J., Rosenfield, D., & Carter, A. S. (2007). Violence toward a family member, angry adult conflict, and child adjustment difficulties: relations in families with 1- to 3- year-old children. *Journal of Family Psychology*, *21*(2), 176–184. doi:10.1037/0893-3200.21.2.176.

Meyer 3rd, W. J., Robert, R., Murphy, L., & Blakeney, P. E. (2000). Evaluating the psychosocial adjustment of 2- and 3-year-old pediatric burn survivors. *The Journal of Burn Care & Rehabilitation*, *21*(2), 178 discussion 179–184.

Perry, B. D. (2000). The neuroarcheology of childhood maltreatment: The neurodevelopmental costs of adverse childhood events. In K. Franey, B. Geffner, & R. Falconer (Eds.), *The cost of child maltreatment: Who pays? we all do*. San Diego, CA: Family Violence and Sexual Assault Institute.

Pfefferbaum, B. (1997). Posttraumatic stress disorder in children: a review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*, 1503–1511.

Putnam, F. W. (2003). Ten-year research update review: child sexual abuse. *Journal of the American Academy of Child and Adolescent Psychiatry*, *42*(3), 269–278. doi:10.1097/00004583-200303000-00006.

Scheeringa, M. S., & Zeanah, C. H. (1995). Symptom expression and trauma variables in children under 48 months of age. *Infant Mental Health Journal*, *16*, 259–270 doi:10.1002/1097-0355(199524)16:4<259::AID-IMHJ2280160403>3.0.CO;2-T.

Scheeringa, M. S., Zeanah, C. H., Drell, M. J., & Larrieu, J. A. (1995). Two approaches to the diagnosis of posttraumatic stress disorder in infancy and early childhood. *Journal of the American Academy of Child and Adolescent Psychiatry*, *34*, 191–200. doi:10.1097/00004583-199502000-00014.

Scheeringa, M. S., Peebles, C. D., Cook, C. A., & Zeanah, C. H. (2001). Toward establishing procedural, criterion, and discriminant validity for PTSD in early childhood. *Journal of the American Academy of Child & Adolescent Psychiatry*, *40*, 52–60.

Scheeringa, M. S., Zeanah, C. H., Myers, L., & Putnam, F. W. (2003). New findings on alternative criteria for PTSD in preschool children. *Journal of the American Academy of Child and Adolescent Psychiatry*, *42*(5), 561–570. doi:10.1097/01.CHI.0000046822.95464.14.

Scheeringa, M. S., Wright, M., Hunt, J., & Zeanah, C. H. (2006). Factors affecting the diagnosis and prediction of PTSD symptomatology in children and adolescents. *The American Journal of Psychiatry*, *163*, 644–651. doi:10.1176/appi.ajp.163.4.644.

Stoddard, F. J., Ronfeldt, H., Kagan, J., Drake, J. E., Snidman, N., Murphy, J. M., et al. (2006). Young burned children: the course of acute stress and physiological and behavioral responses. *The American Journal of Psychiatry*, *163*(6), 1084–1090. doi:10.1176/appi.ajp.163.6.1084.

Vila, G., Witowski, P., Tondini, M. -C., Perez-Diaz, F., Mouren-Simeoni, M. -C., & Jouvent, R. (2001). A study of posttraumatic disorders in children who experienced an industrial disaster in the Briey region. *European Child & Adolescent Psychiatry*, *10*(1), 10–18. doi:10.1007/s007870170042.

Wang, Y., Nomura, Y., Pat-Horenczyk, R., Doppelt, O., Abramovitz, R., Brom, D., et al. (2006). Association of direct exposure to terrorism, media exposure to terrorism, and other trauma with emotional and behavioral problems in preschool children. *Annals of the New York Academy of Science*, *1094*, 363–368.