HHS Public Access

Author manuscript

Psychiatry. Author manuscript; available in PMC 2016 January 08.

Published in final edited form as:

Psychiatry. 2015 ; 78(3): 251–264. doi:10.1080/00332747.2015.1069656.

Associations Between Childhood Abuse, Posttraumatic Stress Disorder, and implicit Emotion Regulation Deficits: Evidence From a Low-Income Inner City Population

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Abstract

Objective—Childhood abuse is associated with a wide range of negative outcomes, including increased risk for development of emotion dysregulation and psychopathology such as posttraumatic stress disorder (PTSD). The goal of the present study was to examine associations between child abuse, PTSD symptoms, and performance on an emotional conflict regulation task which assesses implicit emotion regulation abilities.

Method—The sample consisted of 67 (94% African-American) females recruited from a public, urban hospital. Childhood abuse was measured using the Childhood Trauma Questionnaire and PTSD was measured using the modified PTSD Symptom Scale. Task accuracy and implicit emotion regulation were measured through an emotional conflict regulation behavioral task.

Results—A multivariate analysis of covariance showed that exposure to moderate-to-severe childhood abuse was significantly related to worse emotional conflict regulation scores independent of current PTSD symptoms, depressive symptoms, and adult trauma exposure, suggesting a deficit in implicit emotion regulation. We also found an interaction between PTSD symptoms and abuse exposure in predicting accuracy on the behavioral task; high levels of PTSD symptoms were associated with poorer task accuracy among individuals who reported moderate-to-severe exposure to childhood abuse. However, no relationship between implicit emotion regulation abilities and overall PTSD symptom severity was found.

Conclusions—This study provides preliminary evidence of an implicit emotion regulation deficit for individuals exposed to significant childhood abuse and further supports the growing evidence that addressing various aspects of emotion dysregulation, such as awareness of emotions and strategies to manage strong emotions, in the context of treatment would be valuable.

Keywords

emotion; emotion regulation; childhood abuse; childhood maltreatment; PTSD

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Introduction

The detrimental effects of childhood abuse on healthy development and psychological functioning are well documented (e.g., Manley et al., 2001; Cicchetti & Toth, 2005). Exposure to child abuse is associated with many maladaptive outcomes including risk for the development of a range of psychiatric conditions (Heim & Nemeroff, 2001; Kessler, Davis, & Kendler, 1997; Westphal et al., 2013). Prospective studies of maltreated children have shown increased rates of depression, posttraumatic stress disorder (PTSD), and other trauma-related psychopathology (e.g., Horwitz, Widom, Mclaughlin, & White, 2001; Kaplow & Widom, 2007).

One important factor that may, at least in part, drive this relationship between exposure to childhood abuse and the development of psychopathology in adulthood is emotion dysregulation. Emotion regulation comprises the strategies we use to modulate or maintain the feelings, behaviors, and physiological responses that make up an emotion (Gross, 1998, 2002). The importance of effective emotion regulation in mental stability and functioning has been shown (for reviews see Gross, 2002; Gross & Munoz, 1995). Emotion dysregulation reflects deficits in the ability to regulate intense, negative, and shifting emotional states and many researchers now suggest that poor emotion regulation can be viewed as a transdiagnostic process that contributes to many types of psychopathology, including PTSD (Aldao et al., 2010; Bradley et al., 2011).

There are aspects of emotion regulation that are both explicit (or effortful) and implicit (unconscious or automatic). Explicit strategies, such as reappraisal or suppression, require some level of conscious effort and monitoring as they occur and because of this may be easier for individuals to identify or describe. However, studies suggest that implicit emotion regulation represents a very important, adaptive process and accounts for a significant proportion of normal regulation of emotional processing (Gyurak, Gross, & Etkin, 2011; Phillips et al., 2008). With implicit emotion regulation, the processes used to regulate occur outside of an individual's awareness and are done without explicit monitoring. Much of the research conducted does not focus on these two types of emotion regulation, but focuses instead on measuring the construct of emotion dysregulation more generally.

Developmental research suggests that exposure to childhood abuse may be a major risk factor for emotion regulation difficulties that persist into adulthood (Shields, Cicchetti, & Ryan, 1994; Pollak, 2008). Cross-sectional and longitudinal studies have shown that children exposed to child abuse are more likely to show impairment in emotional expression, recognition, and communication (see Southham-Gerow & Kendall, 2002 for a review), all of which play a critical role in affective emotion regulation. These emotion regulation difficulties also appear to effect behavioral outcomes across development. For example, a longitudinal study by Erickson, Egeland, and Pianta (1989) found that maltreated children followed from age two through kindergarten continued to show both emotion regulation and behavioral problems, such as more anger, lack of self control, and high levels of negative affect, when compared with children in a control group matched on demographic variables. Other research has shown that emotion regulation problems persist into adulthood

and may be an important mechanism in which childhood abuse leads to adult psychopathology (Alink et al., 2009; Kim & Cicchetti, 2010).

PTSD is of particular interest because it is strongly associated with both child abuse and emotion dysregulation. Although “emotion dysregulation” is not a specific symptom of PTSD, a number of symptoms represent failures to effectively regulate the experience and expression of emotions (e.g., negative affect and anger/irritability) and others reflect efforts to regulate emotions that impair adaptive functioning (e.g., avoidance behaviors). PTSD is also marked by over-engagement (e.g., intrusion symptoms) and maladaptive efforts to control over-engagement (e.g., avoidance) with environmental stimuli. This inability to effectively and flexibly respond to emotionally charged environmental stimuli represents another form of problematic emotional regulation. Research on PTSD treatment among survivors of childhood sexual abuse suggests that deficits in emotion regulation are particularly salient in this group of individuals and addressing the emotion regulation difficulties (e.g., teaching distress tolerance, emotional labeling and acceptance of strong emotions) makes treatment success more likely (Cloitre et al., 2002).

To date, there has been only limited effort to study emotion regulation difficulties using more objective measures or studying the construct of implicit emotion regulation specifically. Instead, researchers have relied primarily on self-report measures which assess individuals’ perceived emotion regulation abilities and difficulties. Some aspects of emotion regulation that are implicit may not be reflected in this self-report data since individuals may be unaware such processes are occurring, and we may therefore be missing valuable information regarding emotion regulation in the context of psychopathology.

Recent research conducted in normal controls and anxiety disorder patient populations supports the use of a computerized behavioral task to measure implicit emotion regulation deficits (Egner and Hirsch, 2005a, 2005b; Etkin et al., 2006, 2010; Etkin & Wager, 2007). This experimental paradigm tracks emotion regulation from trial to trial through a facial affect identification emotional conflict task using reaction time. Subjects are asked to identify the expression of a face (fearful or happy) while ignoring an overlying emotion word (“fear” or “happy”) that is either matched (congruent) or conflicted (incongruent) with the facial expression. In two studies conducted with healthy volunteers, reaction time interference by emotionally incongruent stimuli was seen almost universally (Egner et al., 2008; Etkin et al., 2006). However, there was less conflict (faster reaction times) for incongruent trials if they were preceded by an incongruent trial than if they were preceded by a congruent trial. This finding suggested that emotional conflict generated by incongruency on the previous trial activates a regulatory mechanism that leads to improved emotional conflict regulation on the current incongruent trial. The researchers termed this across-trial effect “emotional conflict regulation” and using fMRI to evaluate differential brain activation have shown this is a useful measure of implicit emotion regulation (see Egner et al., 2008; Etkin et al., 2006 for additional details).

Preliminary research suggests impaired implicit emotion regulation can be shown in anxiety disorder patient populations (Etkin & Schatzberg, 2011; Etkin et al., 2010). For example, in a sample of adults with a primary diagnosis of generalized anxiety disorder and matched

controls, Etkin et al. (2010) found that patients with generalized anxiety disorder showed a marked implicit emotion regulatory deficit. More specifically, these patients did not show emotional conflict regulation. Interestingly, the implicit emotion regulatory deficit was related to symptom severity in this group, suggesting that implicit emotion regulation may be associated with important outcomes such as general functioning and ability to manage anxiety symptoms.

Despite the clear relationship between early trauma exposure, emotion regulation difficulties, and adult psychopathology, there is still little known about how these associations might relate to implicit emotion regulation deficits. One population at particularly high risk for exposure to childhood abuse, multiple traumatic events, and PTSD is individuals living in low income, inner-city environments, who show PTSD rates close to 40% (Gillespie et al., 2009). The high rates of trauma exposure and PTSD in this population makes it a particularly useful group to study when trying to understand the detrimental effects of trauma on outcomes, like emotion regulation. The goal of the present study was to determine whether exposure to childhood abuse and PTSD symptoms were related to 1) task accuracy and 2) deficits in implicit emotion regulation as measured by a computerized emotional conflict regulation task in a sample with low income and high rates of trauma.

Method

Procedure

Participants were drawn from an NIMH-funded study of risk factors for the development of PTSD in a low socioeconomic, primarily African American urban population. Participants were recruited from waiting rooms in the gynecology and primary care medical (non-psychiatric)clinics at Grady Memorial Hospital, a publicly funded hospital in Atlanta, Georgia. We did not narrow our recruitment to specific selection criteria, but approached any individual in the waiting room. To be eligible for participation, subjects had to be at least 18 years old, not actively psychotic, and able to give informed consent. After signing the informed consent approved by the Emory Institutional Review Board, an initial interview was administered with questionnaires regarding trauma history and psychological variables. All questionnaires were self report but were read verbally to participants to avoid any issues with participant variability in reading ability. Interviewers were research assistants that had been trained to administer these self report questionnaires by research staff via a combination of laboratory practice and observation of real participants. A subset of these participants completed the emotional conflict behavioral task during an associated study (see Gillespie et al., 2009 for full details regarding study procedures). There were no specific criteria for the participants chosen to complete the emotional conflict task except that these individuals were brought back for participation in other studies offered by our research group for female participants.

Participants

The sample consisted of 67 females[1]. The subjects were all adult (≥18 years; median age of 40) and primarily African American (94.0%). See Table 1 for detailed demographic details

on participants. All participants in the study met criteria for at least one criterion A traumatic event.

Measures

Traumatic Events Inventory (TEI)—The TEI is a 14-item screening instrument for lifetime history of traumatic events. It was administered by trained research interviewers to detail frequency and type of trauma(s) experienced; consistent with prior research (Gillespie et al, 2009), total level of trauma exposure was measured by a sum score reflecting the total number of different types of trauma (e.g., car accident, sexual assault, and natural disaster) to which a participant had been exposed over the course of their life. For this study, the TEI was used to measure overall trauma type exposure excluding child abuse.

Childhood Trauma Questionnaire (CTQ)—The CTQ (Bernstein et al., 2003) is a 25-item, reliable and valid self-report instrument assessing sexual, physical, emotional abuse, and neglect in childhood (α=0.94 in current study). Bernstein and Fink (1998) established scores for none, mild, moderate, and severe for each type of abuse. The data from the CTQ were used to create a categorical variable to account for the presence or absence of moderate-to-severe reported exposure to emotional (score ≥ 13), physical (score ≥ 10), and sexual (score ≥ 8) abuse in childhood (0 = none or mild abuse; 1 = the presence of moderate or severe abuse scores for at least one of the three types of abuse). This classification has been shown to be a strong predictor of other psychological variables, including depression and PTSD, in prior studies with this population.

Modified Posttraumatic Stress Disorder Symptom Scale (mPSS)—The mPSS (Falsetti, Resnick, Resick, & Kilpatrick, 1993) is a psychometrically valid, 18-item self-report measure assessing PTSD symptoms and overall duration of symptoms (α=0.92 in current study). For the present study, summed scores were calculated for total PTSD symptom severity and four PTSD clusters: intrusions (5 symptoms), avoidance (2 symptoms), numbing (5 symptoms), and hyperarousal (5 symptoms). The mPSS is based on DSM-IV-TR (APA, 2000) criteria. However, with the changes to PTSD criteria included in DSM-5 (APA, 2013), we separated avoidance and numbing symptoms into their own clusters to more closely align with the new diagnostic system. PTSD diagnosis (0, 1) was determined based on if participants met for at least 1 re-experiencing symptom, 3 avoidance and/or numbing symptoms, 2 hyperarousal symptoms, and if the duration of symptoms was greater than one month.

***Beck Depression Inventory-II* (BDI-II)—**The BDI-II (Beck et al., 1996) is a psychometrically validated, 21-item self-report measurement of depressive symptoms (α=0.93 in current study).

Emotional Conflict Regulation Behavioral Task—The emotional conflict task (Etkin et al., 2006) consisted of 148 presentations of happy or fearful facial expression photographs. Faces were cropped and the words “FEAR” or “HAPPY” were presented in

[1]A priori power analyses were run using G*Power 3.1.5 based on effect sizes found by Etkin et al. (2010) to ensure adequate power for finding moderate effect sizes in this sample.

prominent red letters across the face, such that word and expression were either congruent or incongruent (e.g., a fearful expression with the word “happy”). Stimuli were presented with the Presentation software package (Neurobehavioral Systems, http://nbs.neuro-bs.com) for 1,000 msec, with a varying interstimulus interval of 3000–5000 msec (mean=4,000 msec), in a pseudorandom order, counterbalanced across trial types for expression, word, response button, and gender. For the present study, accuracy and emotional conflict regulation scores (based on reaction time) were used.

Participants had to show at least 75% overall accuracy to be included in the study. Ten cases were removed due to overall accuracy falling below 75%. Participants and those excluded did not differ significantly on mean age, conflict adaptation, child abuse, lifetime trauma exposure, or PTSD intrusive, avoidance, and numbing symptoms. There was a statistically significant mean difference in hyperarousal symptoms, with those excluded showing a higher level of hyperarousal symptoms ($p<.05$).

Four types of trials are assessed: postincongruent incongruent trials (iI), postincongruent congruent trials (iC), postcongruent incongruent trials (cI), and postcongruent congruent trials (cC). The trial-to-trial emotional conflict regulation index of emotion regulation **(iI-cI)** is a variant of the full Gratton effect, which describes the observation that congruency effects are larger following a congruent relative to an incongruent trial: **(iI - cI) - (iC – cC)** (Gratton, Coles, & Donchin, 1992).

Data Analysis

All statistical analyses were run using SPSS Version 18.0. Descriptive statistics were computed for overall sample and by abuse groups. Differences between groups on demographic and psychological variables were assessed using chi-square tests of independence (for categorical or rank order variables) and analysis of variance (for continuous variables). Then, a multivariate analysis of covariance (MANCOVA) was used to determine the nature of the relationship between childhood abuse, overall task accuracy, and emotional conflict regulation score on the behavioral task. A separate MANCOVA was run with accuracy across the four types of trials as well. Lifetime trauma exposure, current PTSD symptom severity, and current depressive symptoms were included as covariates in these analyses because of the statistically significant differences across abuse groups (see Table 1). To better understand the associations between PTSD symptoms and our outcome variables of interest (emotional conflict regulation score, task accuracy), bivariate correlations between PTSD symptoms and the behavioral task variables were also assessed. This was done for overall sample as well as by abuse group since there were significant differences in PTSD symptoms across abuse groups. Finally, based on the results of the correlational analyses, a MODPROBE analysis (Hayes & Matthes, 2009) was used to examine the association between current PTSD symptom severity and overall task accuracy and whether abuse type moderated that association. This macro is used for probing categorical interactions in linear regression models (see Hayes & Matthes, 2009 for more details). Because correlational analyses suggested a particularly strong association with avoidance PTSD symptoms, an additional MODPROBE analysis was run using avoidance PTSD symptom severity as the predictor variable.

Results

The rate of childhood abuse within our sample was high, with 46.3% (N=31) of participants reporting moderate-to-severe child abuse. The average number of lifetime trauma types experienced by participants (excluding child abuse) across the whole sample was 4.63 (SD=2.68), demonstrating the magnitude of trauma exposure in this population. Approximately 30% of this sample also met diagnostic criteria for PTSD (N=19). Rates of trauma and PTSD symptoms were elevated further in participants who had been exposed to moderate-to-severe childhood abuse compared with those with no-to-low levels of reported abuse (see Table 1 for descriptive statistics across the two groups). Table 2 provides descriptive statistics for the emotional conflict regulation behavioral task by group.

Associations between Childhood Abuse and Emotional Conflict Task

As shown in Figure 1, MANCOVA results showed a statistically significant difference in emotional conflict regulation scores based on reported exposure to childhood abuse, ($F(1, 66) = 9.09$; $p<.01$; partial $\eta^2 = 0.13$), even when controlling for the effects of lifetime trauma exposure, current depressive symptoms, and current PTSD symptoms. There was not a significant difference in overall task accuracy by abuse group ($F(1, 66) = 0.53$; $p=.47$). None of the covariates were significantly related to emotional conflict regulation. Only PTSD symptom severity was significantly associated with task accuracy ($F(1, 66) = 10.73$; $p<.01$; partial $\eta^2 = 0.15$). A second MANCOVA run to examine the accuracy across the four different types of trials also showed no significant associations between abuse type and reaction time accuracy on the trials, independent of lifetime trauma exposure, current depressive symptoms, and current PTSD symptoms.

Associations between PTSD Symptoms and Emotional Conflict Task

Associations of overall PTSD symptom severity and the 4 PTSD symptom clusters with accuracy and emotional conflict regulation were first examined using bivariate correlation analyses. As shown in Table 3, significant negative associations between PTSD symptoms and accuracy were present in the overall sample for overall accuracy, postincongruent-congruent accuracy, and postcongruent incongruent accuracy ($p<.05$). When looking at associations separately by abuse groups, there were no longer significant associations between PTSD symptoms and task accuracy for those in the low-to-no abuse group. In the moderate-to-severe childhood abuse group, again overall PTSD symptom severity was negatively correlated with overall accuracy, postincongruent congruent accuracy, and postcongruent incongruent accuracy ($p<.05$). Avoidance symptoms showed the strongest negative associations with task accuracy across all trials ($p<.01$) except the postincongruent incongruent trial. See Table 3 for differences between all PTSD clusters and accuracy on trial types. PTSD symptoms (overall severity and severity by PTSD symptom clusters) were not significantly associated with emotional conflict regulation in the overall sample or when separated by abuse type.

To examine the association between accuracy and PTSD symptom severity further, the macro MODPROBE was used which enabled analysis of the potential moderating effect of abuse type on the relationship between PTSD symptom severity and task accuracy with

linear regression, while controlling for lifetime trauma exposure and current depressive symptoms. The model predicting overall accuracy on trials by current PTSD symptoms and child abuse group was significant (F=3.51, $p<.01$). The overall model explained 22% of variance in accuracy score. As shown in Figure 2, a significant interaction between current PTSD symptom severity and abuse was found (F=3.92, $p\leq.05$, R^2 change=0.05), showing that individuals exposed to moderate-to-severe abuse were significantly less accurate on the behavioral task when also high on current PTSD symptoms. Because of the significant correlations between avoidance PTSD symptom severity and task accuracy in the moderate-to-severe abuse group, a separate MODPROBE linear regression was run using avoidance symptoms as the predictor of overall task accuracy. Very similar results emerged with an even stronger effect showing a significant interaction between current avoidance PTSD symptoms and abuse (F=8.73, $p<.01$, R^2 change=0.11). Again, individuals high on avoidance symptoms and reporting exposure to moderate-to-severe abuse were significantly less accurate on the behavioral task.

Discussion

This study examined emotional conflict regulation using a paradigm in which emotional processing is regulated implicitly. There has already been extensive research that has shown strong relationships between both child abuse exposure and PTSD with emotion dysregulation (e.g., Aldao et al., 2010; Berenbaum et al., 2003; Bradley et al., 2011; Kim & Cichetti, 2010). To our knowledge, this is the first study to investigate the associations of childhood abuse and PTSD symptoms with reactions times on an implicit emotion regulation task. We found that individuals who reported exposure to moderate-to-severe childhood abuse showed significantly poorer emotional conflict regulation to tasks with an emotional incompatibility between task-relevant and task-irrelevant stimulus dimensions compared with individuals who did not report exposure to childhood abuse. More specifically, these individuals appeared to have more difficulty identifying a correct facial expression (either fearful or happy) when it was shown with the distracter word (either FEAR or HAPPY) both when the incongruent stimulus was presented after a congruent stimulus and when it was presented after an incongruent stimulus. This significant difference was present even after controlling for any effects of lifetime trauma exposure, current PTSD symptoms, and current depressive symptoms, suggesting that there may be something particularly important about the experience of child abuse that affects implicit emotion regulation processing.

A growing body of evidence suggests that trauma exposure may alter patterns of attention toward and interpretation of threat (Fani et al., 2012; Pollak, Vardi, Bechner, & Curtin, 2005; Shackman, Shackman, & Pollak, 2007; Vasterling et al., 1998). It is suggested that after trauma some individuals develop “fear structures” or pathological cognitive frameworks that lead them to perceive benign stimuli as threatening (Foa & Kozak, 1986). This results in exaggerated responses both behaviorally and cognitively, and over time, these selective attentional patterns become maladaptive, disrupt appropriate information processing, and perpetuate anxious symptoms. There is some evidence that biased attention occurs in children that have been abused. For example, in a study with 8 – 11 year-old physically abused children, Pollak et al. (2003) found that abused children showed an

inability to disengage from angry facial cues on a selective attention task using emotional faces as cues. This automatic attention to threatening cues takes attentional resources that may otherwise be used for other things, such as to attenuate emotional reactivity. This research on biased attentional patterns may provide some explanation for the pattern of emotion regulation deficits we observed with individuals exposed to child abuse in this sample. It is possible, for example, that the word FEAR triggered these individuals' attention so strongly that it was impossible to ignore and complete the task at hand, therefore providing a clear example of how emotion regulation may be negatively impacted in such individuals. Examining differences in findings across the valence of faces was outside the scope of the present study; however, it would be beneficial to examine whether the valence of faces does impact emotion regulation deficits in future research.

There was also a significant interaction between PTSD symptom severity and childhood abuse in predicting level of accuracy on the emotional conflict task. Individuals with high levels of PTSD symptoms showed poorer accuracy on the emotional conflict task only among the individuals who reported moderate-to-severe exposure to childhood abuse. This was shown independent of any effects of lifetime trauma exposure and current depressive symptoms. When looking at correlational associations across the PTSD symptom clusters, avoidance symptoms, in particular, were associated with poorer accuracy on almost all types of trials among individuals with moderate-to-severe childhood abuse exposure. Not surprisingly based on these correlations, we found a similar interaction effect between avoidance symptoms and childhood abuse in predicting task accuracy. Breaking associations with accuracy down by trial type in the correlational analyses, we found the strongest association with avoidance symptoms to be with the most difficult trial type (a congruent trial followed directly by an incongruent trial). Interestingly, avoidance symptoms were also associated with postcongruent congruent trials, which are considered the easiest trial. Avoidance behavior in PTSD is seen as a maladaptive effort to regulate emotions and reduce distress and it is possible that such symptoms were making it difficult for these individuals to stay engaged in the task regardless of trial type although it is impossible to know if that is the case in the present study. Surprisingly, we did not find a relationship between PTSD symptom severity and emotional conflict regulation. It is possible that the significant limitation in accuracy on the most difficult types of trials prevented us from seeing any association between PTSD symptoms and implicit emotion regulation deficits but it is difficult to determine based on these preliminary results. Additional studies with larger samples are needed to evaluate whether or not implicit emotion regulation deficits can also be shown in individuals with PTSD and whether an interaction with childhood abuse in that relationship may occur.

Several study limitations are worth noting. First, given the cross-sectional nature of this study and the use of retrospective reports, we cannot make assertions about causality or time of onset for child abuse, PTSD symptoms and the performance on the implicit emotion regulation measure. Prospective, longitudinal studies are required to examine the temporal onset of child abuse, PTSD symptomatology and the implicit emotion regulation difficulties observed. However, developmental research has shown that exposure to child abuse is associated with the later development of emotion regulation difficulties and psychiatric conditions, such as PTSD (e.g., Alink et al., 2009; Kim & Cicchetti, 2010). This is

preliminary evidence that needs to be followed up with longitudinal research, and we are currently conducting a longitudinal study of children and their mothers in this traumatized population with the hope of answering such temporal and developmental questions.

We also focused on self report measures of both child abuse and current PTSD symptoms, which may have affected the accuracy of our classification of individuals into abuse groups. Additionally, our sample size was small for each group and it is possible that we did not find significant results in some cases due to low power. We also cannot make clear assertions about the behavioral outcomes in this study without corresponding imaging data. Although there is evidence from other studies regarding what brain mechanisms are (or are not) activated during this task, behavioral and imaging data sometimes show different patterns and this cannot be disentangled in the present study. Finally, our sample was largely low income, female, and African American. However, this weakness is balanced by the public health importance of studying these variables in an often under-researched and under-served population with such high rates of trauma exposure as well as mental and physical health problems. There are very limited mental health resources available for individuals in this population, despite the strong need for treatment options given the high rates of trauma and trauma-related psychopathology. Therefore, it is even more critical that we continue to study factors that might influence symptom severity of a given disorder and thus affect how successful current evidence-based treatments are for such groups.

Our findings provide further evidence of the detrimental effects of exposure to childhood abuse on outcomes in adulthood. More specifically, this study provided preliminary evidence of an implicit emotion regulation deficit for individuals exposed to significant childhood abuse. Because emotion dysregulation has been found to be a component of a wide range of psychiatric conditions, this adds to the evidence that addressing emotion dysregulation in the context of treatment would be valuable across trauma-related psychopathology and could likely benefit overall treatment success. This has already been shown through initial research in the context of PTSD treatment with child abuse survivors; more specifically, the treatment incorporated a separate emotion regulation training component to the therapy protocol prior to the introduction of exposure therapy (Cloitre et al., 2002). This suggests that specific treatment focused at emotion regulation may be useful in addition to trauma therapy protocols that already address maladaptive symptoms related to emotion dysregulation (e.g., avoidance targeted through exposure therapy). It is possible that behavioral tasks or computerized training might be of use in enhancing emotion regulation in combination with therapy as well, and there is some initial evidence to suggest that repeated attentional training could be one way that this could be implemented (Wadlinger & Isaacowitz, 2011). Continued research on what types of emotion regulation may best be targeted and how individuals' perceptions of their own emotion regulation relate to more implicit measures of emotion regulation will be beneficial.

ACKNOWLEDGMENT

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. Additionally, the contents of this report do not represent the views of the Department of Veterans Affairs or the United States Government.

FUNDING

This work was primarily supported by the National Institute of Mental Health (MH071537; MH100122; MH102890) and the National Institute of Child Health and Human Development (HD071982). Support also included Emory and Grady Memorial Hospital General Clinical Research Center, NIH National Centers for Research Resources (M01 RR00039), and the Burroughs Welcome Fund.

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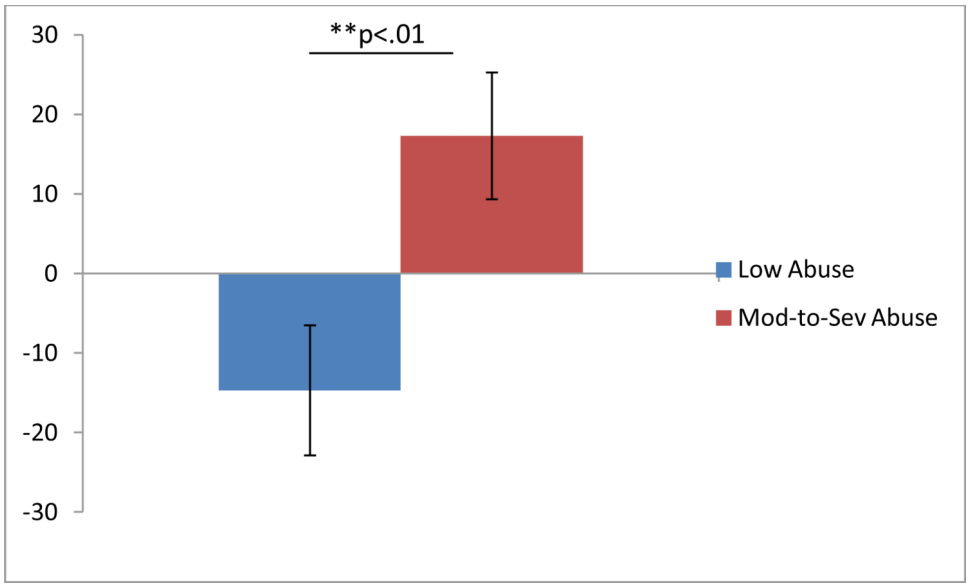

Figure 1.

Mean scores on reaction time differences for emotional conflict regulation (iI - cI) to tasks with conflict across abuse groups.

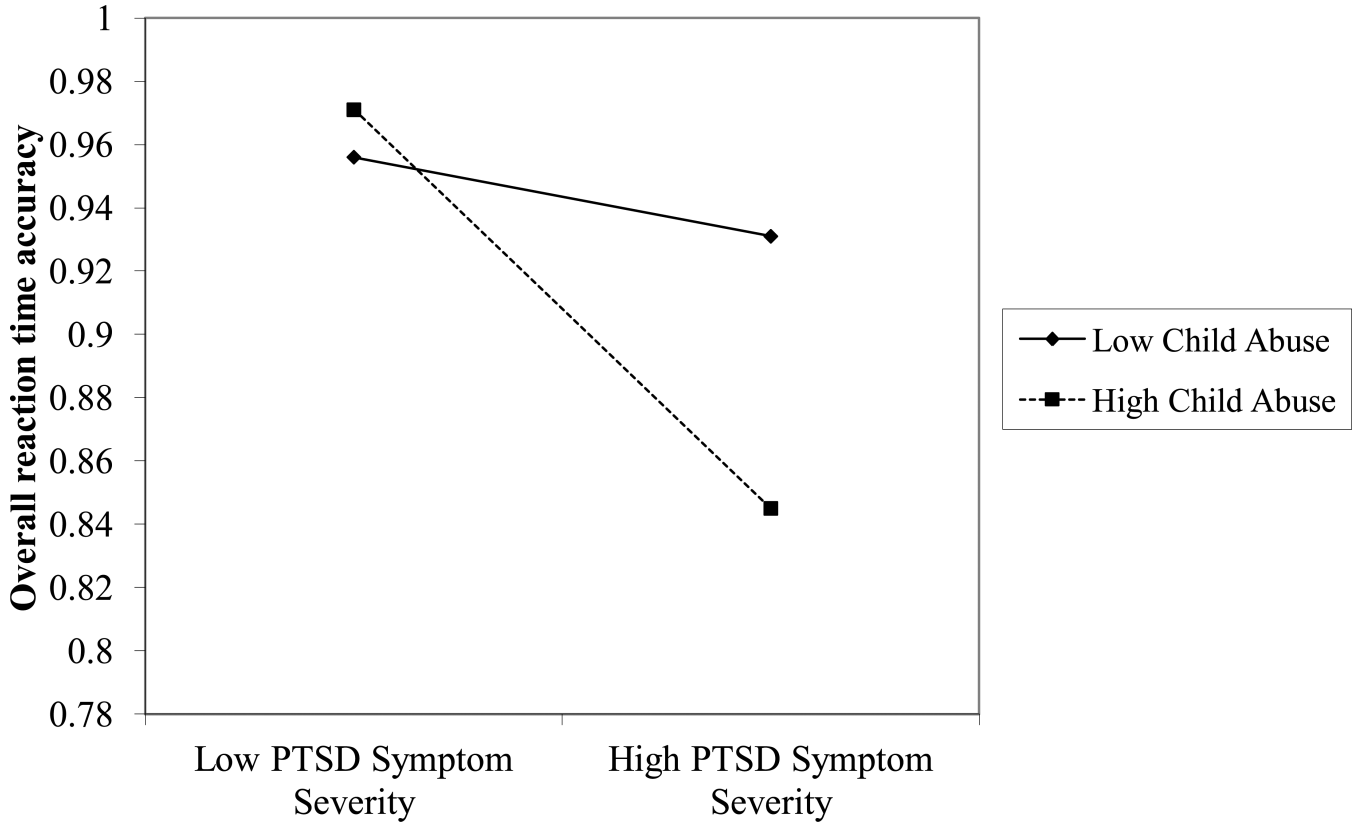

Figure 2.
Interaction between PTSD symptom severity and abuse type in predicting accuracy on behavioral task.

Table 1

Descriptive statistics of demographic variables, trauma exposure, PTSD symptoms, and depressive symptoms across moderate-to severe child abuse exposed and low/no abuse groups. Differences between abuse groups are indicated in p-value column.

	No-to-low Abuse	*Mod-to-Sev Abuse*		
	N (%)	**N (%)**	***Pearson Chi-Square***	***P-value***
Race			4.43	0.22
African America/Black	35 (97.20)	28 (90.30)		
Hispanic	1 (2.80)	0 (0.00)		
Caucasian or White	0 (0.00)	2 (6.50)		
Other	0 (0.00)	1 (3.20)		
Employment			0.65	0.42
Unemployed	24 (68.60)	24 (77.40)		
Income			1.93	0.75
$0 – 249	4 (11.10)	4 (12.90)		
$250 – 499	1 (2.80)	3 (9.70)		
$500 – 999	14 (38.90)	9 (29.00)		
$1000 – 1999	11 (30.60)	9 (29.00)		
$2000 or more	6 (16.70)	6 (19.40)		

	Mean (SD)	**Mean (SD)**	**F**	***P-value***
Age	39.94 (11.96)	37.45 (11.18)	0.77	0.38
Lifetime Trauma Exposure (Total types excluding abuse)	3.93 (2.53)	5.43 (2.66)	5.59	0.02*
PTSD Symptom Severity	8.00 (7.96)	16.41 (13.07)	10.45	0.002**
Re-experiencing PTSD Symptom Severity	1.61 (2.37)	4.03 (4.29)	8.47	0.005**
Avoidance PTSD Symptom Severity	1.44 (2.14)	2.29 (2.23)	2.49	0.12
Numbing PTSD Symptom Severity	1.69 (2.94)	4.10 (4.78)	6.34	0.01*
Hyperarousal PTSD Symptom Severity	3.24 (3.12)	6.00 (4.21)	9.39	0.003**
Depressive Symptoms	11.03 (9.55)	19.87 (13.11)	10.14	0.002**

* p<.05

** p<.01

Table 2

Descriptive statistics for the emotional conflict regulation task.

	Overall Accuracy	Postincongruent Incongruent trials	Postincongruent Congruent trials	Postcongruent Incongruent trials	Postcongruent Congruent trials	Emotional conflict regulation
Total Sample						
Mean (SE)	94% (1%)	94% (1%)	96% (1%)	92% (1%)	94% (1%)	0.10 (6.01)
Range	77 – 100%	76 -100%	78 – 100%	72 – 100%	77 – 100%	−143.92 – 130.12
No-to-Low Abuse						
Mean (SE)	95% (1%)	94% (1%)	97% (1%)	92% (1%)	96% (1%)	−14.70 (49.11)
Range	89 – 99%	78 -100%	92 – 100%	81 – 100%	86 – 100%	−143.92 – 130.12
Mod-to-Sev Abuse						
Mean (SE)	93% (1%)	93% (1%)	94% (1%)	91% (1%)	95% (1%)	17.29 (44.08)
Range	77 – 100%	76 -100%	78 – 100%	72 – 100%	77 – 100%	−77.27 – 96.61

Table 3

Bivariate correlations between PTSD symptom severity scores and accuracy and emotional conflict regulation on emotional conflict task.

	Overall PTSD symptom severity	Re-experiencing symptom severity	Avoidance symptom severity	Numbing symptom severity	Hyperarousal symptom severity
Accuracy on Overall Task					
Full Sample	−0.30*	−0.27*	−0.28*	−0.19	−0.25*
No/Low Abuse	0.10	−0.07	0.07	0.15	0.11
Mod-to-Sev Abuse	−0.40*	−0.30	−0.47**	−0.28	−0.36*
Accuracy on Inc-Inc					
Full Sample	−0.13	−0.12	−0.18	−0.06	−0.11
No/Low Abuse	0.15	0.08	0.01	0.16	0.18
Mod-to-Sev Abuse	−0.27	−0.19	−0.33	−0.15	−0.28
Accuracy on Inc-Con					
Full Sample	−0.31*	−0.27*	−0.22	−0.22	−0.32*
No/Low Abuse	0.14	0.07	0.30	0.11	−0.02
Mod-to-Sev Abuse	−0.36*	−0.28	−0.43*	−0.23	−0.34
Accuracy on Con-Inc					
Full Sample	−0.30*	−0.30*	−0.31*	−0.19	−0.22
No/Low Abuse	−0.07	−0.26	−0.10	0.11	−0.01
Mod-to-Sev Abuse	−0.40*	−0.32	−0.46**	−0.31	−0.33
Accuracy on Con-Con					
Full Sample	−0.20	−0.16	−0.24	−0.16	−0.15
No/Low Abuse	0.13	0.11	0.07	0.10	0.10
Mod-to-Sev Abuse	−0.31	−0.22	−0.42*	−0.24	−0.25
Emotional conflict regulation					
Full Sample	0.02	−0.05	−0.01	0.13	−0.03
No/Low Abuse	−0.22	−0.27	−0.14	−0.08	−0.19
Mod-to-Sev Abuse	−0.04	−0.14	0.01	0.14	−0.15

No or low child abuse = 0, moderate-to-severe child abuse = 1

* $p<.05$

** $p<.01$