Research, Publications & Creative Work   Faculty Scholarship & Creative Work

1-1-2021

An Examination of Post-Traumatic Stress Symptoms and Aggression Among Children with a History of Adverse Childhood Experiences

Elizabeth M. McRae
University of Alabama at Birmingham

Laura Stoppelbein
University of Alabama at Birmingham

Sarah E. O'Kelley
University of Alabama at Birmingham

Paula Fite
University of Kansas

Shana B. Smith
Jacksonville State University

Follow this and additional works at: https://digitalcommons.jsu.edu/fac_res

Part of the Child Psychology Commons

An Examination of Post-Traumatic Stress Symptoms and Aggression Among Children with a History of Adverse Childhood Experiences

Declarations

Abstract

Childhood aggression is associated with many deleterious outcomes and is a common reason for psychiatric referral (Card and Little 2006; Gurnani, Ivanov, and Newcorn 2016). One factor associated with childhood aggression is Adverse Childhood Experiences (ACEs; Felitti et al. 1998). However, existing research remains equivocal on which characteristics of ACEs (e.g., cumulative impact, typology, etc.) are significantly elated to aggression, especially when considering differential effects of ACEs on proactive aggression (PA) and reactive aggression (RA; Dodge and Coie, 1987). Post-traumatic stress symptoms (PTSS) are a common negative sequalae of ACEs and are characterized by disruptions in several cognitive, emotional, and behavioral processes similar to those associated with both RA and PA (e.g., Marsee 2008). As such, the examination of PTSS as an underlying mechanism of influence on the relation between ACEs, PA, and RA is warranted. The present study fills several gaps in the literature by examining ACE characteristics that might be related to PTSS, PA, and RA while also examining direct and indirect effects on the relation between ACEs, PTSS and PA and RA. Results indicated the *type* of ACE, specifically child maltreatment ACEs (CM-ACEs), was most strongly related to all outcome variables. Therefore, CM-ACEs were included in a path analysis with PTSS, PA, and RA. Results indicated a significant indirect effect for PTSS on the relation between CM-ACEs and RA ($\beta = .18$, $p < .01$) but not PA. Findings have several implications for future research and clinical practice, especially for children with an extensive history of CM-ACEs.

Keywords: Adverse Childhood Experiences, child maltreatment, proactive aggression, reactive aggression, PTSD

Childhood Aggression

Aggressive behavior in childhood is associated with concurrent negative effects in childhood and adolescence, such as poor academic, social, and emotional functioning (e.g., Bierman et al. 2013; Card and Little 2006; Walker and Bright 2009), and subsequent negative consequences across the lifespan. Long-term negative outcomes of childhood aggression include increased risk of experiencing mental health problems, relational difficulties, poor occupational attainment, and involvement with the criminal justice system (e.g., Althoff, Verhlust, Rettew, Hudziak, and van der Ende 2010; Mumford, Taylor, Berg, Lui, and Miesfeld 2019). The sequalae both directly and indirectly related to aggressive behavior in childhood and adolescence are extensive and have significant impacts not only on the aggressors but also on their families and victims (Brown, Fite, and Poquiz 2016; Brown, Fite, DiPierro and Bortolato 2017; Foster, Jones, and the Conduct Problems Prevention Research Group 2005). Society as a whole is negatively affected, as childhood aggression and its associated outcomes often translate into increased utilization of and expenditures in the healthcare, social services, criminal justice, and special education systems (e.g., Merikangas, Nakamura, and Kessler 2009).

Proactive and Reactive Aggression

Because of the high prevalence rates associated with clinical levels of childhood aggression (2-16%; e.g., Merikangas, et al., 2009; Polanczyk, Salum, Sugaya, Caye, and Rohde 2015), the extent of its impact, and the broad nature of aggression, researchers have emphasized a distinction between two main types of aggression: proactive and reactive aggression (Dodge and Coie, 1987). Although these two types of aggression often co-occur and have many similarities (e.g., Vitaro and Brendgen, 2005), they are also marked by distinctive etiological underpinnings, behavioral presentation, comorbid features, long-term outcomes, and neurobiological, genetic, and physiological features (e.g., Dodge, Lochman, Harnish, Bates, and Petit 1997; Hagenbeek et al. 2016; Moore et al. 2018; Porsch et al. 2016). Therefore, it is important to continue conceptualizing them as overlapping but separate constructs to account for these differences.

Proactive aggression is described as aggression that requires no provocation or anger and is often instrumental and offensive. It is commonly associated with callous/unemotional traits and a range of externalizing problems, such as substance abuse, conduct disorders, and delinquency (Card and Little, 2006; Fite, Raine, Stouthamer-Loeber, Loeber, and Pardini 2009; Scarpa, Haden, and Tanaka 2010). On the other hand, reactive aggression is described as affective, defensive, and often in response to a real or perceived threat that is typically

based on some external provocation (Pederson, Fite, and Bortlato 2017; Smeets et al. 2017). In further accordance with the affective nature of reactive aggression, it is most commonly associated with internalizing problems such as anxiety, depression, and suicidal thoughts and behaviors (Card and Little, 2006; Hartley, Pettit, and Castellanos 2018; Pederson, Rathert, Fite, Stoppelbein, and Greening 2016).

Adverse Childhood Experiences

In addition to the many personal factors that appear to influence childhood aggression, factors within the environment are implicated in the etiology of aggression, as well. Specifically, one of the most common etiological correlates of childhood aggression is the experience of stressful and potentially traumatic life events (e.g., Erwin, Newman, McMackin, Morrissey, and Kaloupek 2000; Ford, Chapman, Connor, and Cruise 2012). Certain stressful life events that occur during childhood and adolescence are referred to as Adverse Childhood Experiences (ACEs; Felitti et al., 1998). ACEs include experiences such as abuse, neglect, witnessing violence, and several types of household dysfunction (e.g., having a parent incarcerated or with a mental illness). Although some individuals might be more likely to experience higher levels of childhood adversity than others, ACEs are common across all sociodemographic characteristics (Merrick, Ports, Ford, Afifi, Gershoff, and Grogan-Kaylor 2017). Recent epidemiological studies examining the prevalence of ACEs in the United States suggest that approximately 46% of children and adolescents aged 17 or younger have experienced at least one ACE, and over 20% have experienced two or more ACEs (Bethell et al., 2017).

Ultimately, the profound effects of ACEs appear to influence neurological development, which is associated with alterations in emotional, behavioral, and attentional regulation processes (Anda et al. 2006; Cozolino 2014; Hambrick et al. 2019). These processes have also been associated with both proactive and reactive aggression (e.g., Hecht and Latzman 2018). These neurological changes associated with ACEs might therefore predispose a child with a history of ACEs to experience higher rates of proactive and reactive aggression. Other factors that have been associated with ACEs such as social problems, substance abuse, and neighborhood risk (Anda et al. 2006; Nurius, Green, Logan-Greene, and Borja 2016; Wang and Maguire-Jack 2018) also likely exacerbate the risk of aggressive behaviors in children and adolescents.

The Dose-Dependent Effect of ACEs

While ACEs appear to be consistently associated with a host of negative sequalae, experiencing ACEs is not always associated with deleterious outcomes. Instead, certain qualities or aspects of ACEs appear to be related to

the likelihood of experiencing negative outcomes. Specifically, the level of exposure to ACEs (i.e., directly experiencing, witnessing, or learning of a traumatic event; Brown, et al., 2016), acuteness versus chronicity of ACE exposure (Grey, Ford, Bellis, Lowey, and Wood 2019), and severity of adverse events (Schalinski et al. 2016) have been identified as having variable effects on the risk of negative outcomes. From a developmental perspective, the timing of ACEs is also an important factor in evaluating the potential for negative outcomes. Specifically, ACEs that occur during sensitive periods of development might be particularly harmful (Herzog and Schmahl 2018). Other aspects of ACEs such as the types or categories of ACEs (i.e., child maltreatment, household dysfunction, etc.; Campbell, Walker, and Egede 2016) and the overall cumulative effect (e.g., total number of ACEs; Agorastos et al. 2014; Radcliff, Crouch, Stompolis, and Srivastav 2019) have also been shown to influence proximal and distal outcomes.

Despite the many aspects of ACEs that have been associated with the risk of negative outcomes, it is the cumulative or total ACE score (i.e., the number of types of ACEs, regardless of frequency) that often emerges as the factor that is related to the broadest range and most severe forms of negative psychological and physical outcomes (Agorastos et al. 2014; Grey et al. 2019; Hughes et al. 2017). In further accordance with the notion that cumulative ACE scores are predictive of negative outcomes, a cutoff point of four or more different types of ACEs has been identified in the literature as the point at which the likelihood of negative outcomes is most likely to occur (Felitti et al. 1998). For example, experiencing four or more ACEs during childhood significantly increases the risk of homelessness, (Radcliff et al. 2019) and early death from avoidable or unnatural causes (Grey et al. 2019). People with four or more ACEs are also significantly more likely to engage in sexually risky behavior, substance abuse, and aggressive behaviors towards themselves and others when compared to individuals with fewer than four ACEs (Hughes et al. 2017).

Most studies acknowledge the impact of the increased risk associated with cumulative ACEs. However, some criticize this additive ACE Index as overly simplistic by not only conceptualizing the effects of adversity as linear but also by denegating the inherent variability in distress levels associated with different types of adverse events (Barboza 2018; Gebauer, Moore, and Salas 2019). For example, a purely additive approach might assume that experiences of chronic sexual abuse and having a parent with a mental illness predispose a child to the same level of risk for negative outcomes (Gebauer, et al., 2019). Furthermore, ACEs are highly interrelated and often co-occur – thus, experiencing one type of ACE increases the likelihood of experiencing other types (e.g., Bethell,

Newacheck, Hawes, and Haflon 2014; Dong et al. 2004; Edwards, Dube, Felitti, and Anda 2007). As such, a purely cumulative approach to understanding ACE risk might be inadequate at capturing the true extent of risks associated with childhood adversity.

Child Maltreatment and Aggression

One factor that might contribute to a dose-response effect of ACEs is the type of ACEs to which one is exposed. Specifically, one type of ACE – child maltreatment – has emerged as a particularly strong indicator of negative outcomes that occur both concurrent to the maltreatment and across the lifespan (e.g., Atzl, Narayan, Rivera, and Lieberman 2019). The child maltreatment ACE category includes experiences of abuse (i.e., physical, sexual, and emotional) and neglect (i.e., physical and emotional), all of which are significantly associated with childhood aggression (e.g., Allen 2011; DiPierro, Fite, Cooley, and Poquiz 2016; Gilbert, Spatz Widom, Browne, Fergusson, Webb, and Janson 2009; Lee and Hoaken 2007; Rehan, Antfold, Johansson, Jern, and Santtila 2017; Richey, Brown, Fite, and Bortalato 2016). This is true especially when maltreatment is experienced chronically and over several developmental periods (e.g., Gilbert et al. 2009; Kolla, Malcolm, Attard, Arenovich, Blackwood, and Hodgins 2013; Rehan et al. 2017; Schalinski et al. 2016). Given that other ACEs, such as having a parent with substance abuse problems and witnessing domestic violence, significantly increases the likelihood of a child experiencing abuse or neglect (Goldman Salus, Wolcott, and Kennedy 2003) and that multiple forms of abuse and neglect often co-occur (e.g., Edwards et al. 2007; Turner, Finkelhor, and Ormrod 2010; Lamers-Winkelman, Willemen, and Visser 2012), it might be that the cumulative nature of these particular types of ACEs best predicts aggression. Thus, the dose-dependent effect of the cumulative number of these high-impact ACEs warrant further examination in understanding adverse outcomes associated with aggression.

Abuse and neglect in childhood have been linked with current and later aggression as a unitary construct (e.g., Kotch et al. 2008; Lee and Hoaken 2007), and several studies have found that certain experiences of child maltreatment are associated with both proactive and reactive aggression, such as physical and emotional abuse and neglect (e.g., Dodge et al. 1997; Richey et al. 2016). Of the research that has sought to delineate relations between child maltreatment and proactive and reactive aggression, the vast majority of findings indicate a stronger relation between child maltreatment and reactive aggression, with many of these studies specifically examining physical abuse (Dodge et al. 1997; Kolla et al. 2013; Richey et al. 2016; Shields and Cicchetti 1998).

Despite most researching suggesting a lack of relation between proactive aggression and child maltreatment (e.g., Fite et al. 2012) beyond witnessing stressful events, such as family violence (Connor, Steingard, Cunningham, and Anderson 2004; Brown, et al., 2016, Brown et al. 2017), some research has shown links between child maltreatment and proactive aggression. For example, Murray-Close and Rellini (2012) found that sexual abuse was associated with later proactive aggression, which was mediated by blunted physiological reactivity. Furthermore, testosterone levels were found to mediate the relation between the experience of harsh parental discipline and proactive aggression (Chen, Raine, and Granger 2018), while corporal punishment has been found to moderate the relation between exposure to neighborhood violence and proactive aggression (Fite, Poquiz, Cooley, Stoppelbein, Becker, Luebbe, and Greening, 2016). These findings are particularly important to consider in light of other findings that indicate that acts of proactive aggressive are more likely to be disciplined than reactive-aggressive behaviors (Fite et al. 2011). Taken together, it might be that both proactive and reactive aggression are related to child maltreatment, but the mechanisms that underlie the link between ACEs and each type of aggression might differ.

Post-Traumatic Stress

Not everyone who experiences child maltreatment engages in concurrent or later aggressive behaviors, suggesting the presence of underlying processes that might mediate this relation. In addition to cognitive, neurodevelopmental, and biological mechanisms that might help explain this relation (e.g., De Bellis and Zisk 2014), mental health factors have also been identified as potential factors of influence. One mental health concern often linked to ACEs is Post-Traumatic Stress Disorder (PTSD). PTSD is a mental health disorder that can follow a traumatic event and is marked by intrusive symptoms (e.g., flashbacks, nightmares, recurrent thoughts, etc.), avoidance of trauma-related thoughts, feelings, and external reminders, negative alterations in mood and cognition (e.g., guilt, shame, and/or negative, distorted beliefs), and altered arousal and reactivity (e.g., hypervigilance, problems with concentration, sleep disturbances, etc.; American Psychological Association [APA] 2013). However, PTSD is not often recognized as an influential factor in the development of aggression as externalizing symptoms often overshadow underlying PTSS. This may be especially true for males. For example, ACE exposure early in development significantly increases the odds of being placed in residential treatment and/or juvenile correction facilities during childhood/adolescence (Zettler, Wolf, Baglivio, Craig, and Epps, 2017). Additionally, research suggests that boys experience higher rates of overall ACE exposure when compared to girls, and they are over-represented in the juvenile justice system, often as a result of aggressive behaviors and conduct problems (e.g.,

Cunningham, Ford, Croft, Merrick, Rolle, and Giles 2014; Sedlack and Bruce 2010) . Yet, they are less likely than girls to receive a diagnosis of PTSD even within these types of high-risk populations (e.g., Breslau, Peterson, Poisson, Schultz, and Lucia 2004).

In the limited research to date examining ACEs, aggression, and PTSD, PTSD has emerged as related to both child maltreatment and aggression, particularly reactive aggression (e.g., Bubier, Drabick, and Breiner 2009; Stimmel, Cruise, Ford, and Weiss 2014). This relation may be due to underlying disruptions in the ability to appraise danger and the subsequent emotional and behavioral dysregulation observed in both PTSD and childhood aggression (Cicchetti and Toth 1995; van der Kolk 2005). It has also been hypothesized that associations between child maltreatment and PTSD might be related to disorganized parent-child attachment (Enlow, Eneland, Carlson, Blood, and Wright 2014), disruptions in the development of the prefrontal cortex and the amygdala (Aupperle, Melrose, Stein, and Paulus 2012; Garrett, Carrion, Kletter, and Karchemskiy 2012), cortisol levels (Shea, Welsh, Macmillan, and Steiner 2005), and overall emotional and behavioral dysregulation (e.g., Bennett Modrowski, Chaplo, and Kerig 2016; Cloitre, Khan, Mackintosh, and Garvert 2018), all of which have also been implicated in the development or maintenance of childhood aggression.

In addition to the ways in which PTSD has been associated specifically with child maltreatment and aggression, further research has shown that certain PTSD symptom categories mediate the relation between child maltreatment during childhood and later aggressive behavior in adulthood (e.g., Dyer et al. 2009; Swopes, Simonet, Jaffe, Tett, and Davis 2013). However, most of the research to date has examined relations among ACEs (especially child maltreatment), PTSD symptoms, and aggressive behaviors separately and/or retrospectively in adult populations. Considering the strong evidence supporting a shared conceptual foundation among these variables and the extent of their impact, it is crucial to examine them collectively to more fully understand the extent of their associations and possible mechanisms of influence.

The Present Study

While the existing body of literature provides a strong, yet preliminary, foundation for understanding the relations between aggression, ACEs, and PTSS, there are several gaps in the literature that the present study aims to fill. Despite the extensive research supporting a distinction between subtypes of aggression, there remain discrepancies in the literature regarding the association between proactive aggression and the experience of ACEs

that should be further evaluated. Furthermore, PTSD as it relates to ACEs and aggression has largely been studied retrospectively in adult samples, many of which have been limited to samples of participants who already had a diagnosis of PTSD. Thus, examining post-traumatic stress symptoms more broadly and doing so earlier in development when dysfunctional schemas and behaviors are emerging would be helpful in delineating the relations between ACEs and proactive and reactive aggression. Furthermore, the present study sought to examine relations among child maltreatment, post-traumatic stress, and aggression in male children/early adolescents given the research suggesting that they are over-represented in high-risk settings (e.g., residential treatment centers, juvenile justice system) and have higher levels of overall ACE exposure, but are less likely to receive a diagnosis of PTSD than girls (Cunningham, et al., 2014; Sedlack and Bruce 2010; Zettler, et al., 2017) .

Given the current status of the research, the purpose of the present study was to examine relations between ACEs, PTSS, and proactive and reactive aggression in a clinical sample of male children/early adolescents. More specifically, two primary goals for the study were identified. First, we sought to examine associations between the *type* of ACE and the dose-response of ACEs with proactive aggression, reactive aggression, and PTSS. It was hypothesized that child maltreatment ACEs (i.e., physical abuse, sexual abuse, and emotional abuse and physical and emotional neglect; CM-ACEs) would be more strongly associated with proactive aggression, reactive aggression, and PTSS than other types of ACEs (e.g., witnessing violence, household dysfunction, etc.) and that the cumulative number of ACEs would be positively associated with PTSS and both proactive and reactive aggression. The second goal of the study was to examine direct and indirect effects of the relations between CM-ACEs, PTSS, proactive aggression, and reactive aggression when all variables were estimated simultaneously. It was hypothesized the significant direct effects would emerge for the relations between CM-ACEs, PTSS, and reactive but not proactive aggression and that a significant indirect effect of PTSS on the relation between CM-ACEs and reactive aggression would also emerge.

Method

Participants

Participants included male children/early adolescents between the ages of 6 and 14 who were recently admitted to a residential treatment program (*N* = 86). Most participants were in state custody and had a documented history of abuse and/or neglect. Inclusion criteria for participation in the study included being a male between the

ages of 6 and 14 and having a verbal IQ age equivalent of at least 6 years. Exclusion criteria included having active psychosis at the time of data collection.

Procedure

Data collected for this study was originally collected as part of a quality assurance program (QAP) at the residential treatment facility. Institutional Review Board approval was obtained to evaluate data collected as a part of the QAP program. The QAP was designed to evaluate the use of positive behavior supports on child outcomes. Participants were asked if they would be willing to complete a packet of self-report measures within the context of daily classroom procedures. If the child assented, he was given the option of completing the self-reports independently or with the help of a research assistant and to allow the data to be used for additional research purposes. Participants were also informed of the limits of confidentiality and that any reports of current abuse, homicidal, or suicidal ideation would be reported to their teacher and/or primary therapist. Research assistants remained available to help read or answer questions as needed. Data were collected within two weeks of the child's admission to the treatment facility in an effort to minimize the effects that treatment (e.g., positive behavior supports, medication therapy, individual therapy, and group therapy) and/or living in a safe, structured setting might have on the variables of interest.

Measures

Reactive and Proactive Aggression. Aggression was assessed using Dodge and Coie's (1987) proactive and reactive aggression measure. This 6-item measure includes two sets of questions, 3 of which comprise a proactive aggression subscale, and three of which comprise a reactive aggression subscale. Participants report on items using a 5-point Likert scale (1 = Never to 5 = Almost Always), indicating the extent to which they endorse engaging in a particular behavior. Items include statements such as, "When I have been teased or threatened, I get mad easily and strike back" (reactive aggression) and "I get other kids to gang up on somebody that I don't like" (proactive aggression). Mean scores for each subscale are computed. In studies in which children acted as self-reporters on this measure, internal consistencies ranged from adequate to high (α= 0.70-0.81; Fite, Stoppelbein, Greening, and Gaertner 2009). Previous research has also evidenced good concurrent, predictive, and criterion validity ($r = 0.68$-0.77), internal consistency (α=0.91), and test-retest reliability ($\eta^2 = 0.65$-0.80, ps < .001) for this measure (e.g., Dodge et al, 1997; Waschbusch, Willoughby, and Pelham 1998).

Adverse Childhood Experiences. The Adverse Childhood Experiences – Short Form (ACE-SF; Dube, Felitti, Dong, Chapman, Giles, and Anda 2003; Felitti et al. 1998) is a retrospective, self-report questionnaire that measures lifetime exposure to trauma-related events, including experiencing a natural disaster, being involved in a car accident, witnessing domestic or neighborhood violence, and experiencing neglect, physical, sexual, or emotional abuse. It also includes dimensions of household and familial dysfunction, including substance abuse in the home, divorce or separation, and having a family member incarcerated. This measure is scored as a total sum of items endorsed as "yes". Items are phrased as questions to be answered in a "yes" or "no" format, and include questions such as, "Have you been bullied?", "Has someone close to you died?", and "Were you hit, punched, or kicked very hard at home?". For the purposes of the present study, some of the language was modified from the original ACE-SF to be more age-appropriate for the present sample while maintaining the content of the original questions. Internal consistency for the ACE has been found to be "good to excellent" (Dube et al. 2003), with $\alpha=.88$ in a study conducted to examine psychometric properties of the ACE (Murphy et al. 2014). Furthermore, validity for the ACE has been validated when cross-tabulated with other retrospective self-report measures of adverse or traumatic experiences (Murphy et al. 2014).

Post-Traumatic Stress Symptoms (PTSS). The UCLA PTSD Reaction Index for DSM-5 (PTSD-RI-5; Elhai et al. 2013; Steinberg, Brymer, Decker, and Pynoos, 2004; Steinberg et al. 2013) is a measure designed to assess the presence of PTSS, including disturbances in thoughts, behaviors, and functioning. The current version of the UCLA PTSD Reaction Index is designed to reflect changes in diagnostic criteria for PTSD from the DSM-IV to the DSM-5 by including statements that assess the presence of re-experiencing, avoidance/numbing, negative or distorted cognitions, hyperarousal, and dissociative features (APA 2013). Respectively, the measure includes statements such as: "I feel like I am back at the time when the bad thing happened, like it is happening all over again", "I try not to think about or have feelings about what happened", "I have thoughts like, 'The world is really dangerous'", "I am on the lookout for danger or things that I am afraid of (like looking over my shoulder when there is nothing there", and "I feel not connected to my body, like I'm not really there inside". Respondents rate these statements on a 5-point scale (0 = None, 1 = Little, 2 = Some, 3 = Many, and 4 = Most) to indicate how much of the time in the past month they have experienced these symptoms. This measure is scored based on an algorithm that provides information about each symptom cluster as well as an overall PTSD score. It also provides information about whether the scores (total and within symptom clusters) would be clinically significant based on current diagnostic criteria.

Psychometric properties of the UCLA PTSD Reaction Index for DSM-5 are considered "good to excellent" with high internal consistency (α= .86-.91), convergent validity with other PTSD diagnostic measures, including the UCLA PTSD Reaction Index for *DSM-IV*, and high test-retest reliability (r = .75; Elhai et al. 2013; Modrowski Chaplo, Kerig, and Mozley 2019; Steinberg et al. 2013). In the present study, the PTSD-RI-5 had high internal consistency (α = .93).

Data Analytic Plan

First means and percentages were evaluated across demographic and study variables. Next, ACE items were categorized into 3 *types* of experiences that reflected the categories of child maltreatment, witnessing violence, and household dysfunction. Bivariate correlations were performed to evaluate potential intercorrelations among the *types* of ACEs, the cumulative number of ACEs (i.e., the total number ACEs endorsed), proactive aggression, reactive aggression, and total PTSS using SPSS Version 26.0 (IBM 2019). Finally, a path analysis using maximum likelihood estimation was performed to examine direct and indirect paths with MPLUS 8.4 software (Muthen and Muthen 2017). Proactive and reactive aggression were regressed simultaneously on the UCLA-PTSD Reaction Index Total Score and CM-ACEs. Both direct and indirect effects were evaluated. Covariance between proactive and reactive aggression was specified in the model, resulting in a fully saturated model that yielded standardized path coefficients rather than fit indices. A post-hoc analysis to examine overall model fit was conducted using Wald Chi-Squared Test of Parameter Constraints.

<div align="center">Results</div>

Sample Characteristics

Demographic Variables. The average age of participants was 10.44 (*SD* = 2.29), and the sample ranged from 6 to 14 years of age. The racial and ethnic distribution of the sample is representative of the area in which data were collected. Most of the participants were in state custody at the time of admission with a documented history of abuse and/or neglect (Table 1), 54.2% of whom had a documented history of more than one type of child maltreatment (*M* = 1.80; *SD* = 0.91). Upon admission, the average number of diagnoses was 3.14 (SD = 0.99), with the most common being Attention Deficit/Hyperactivity Disorder (ADHD) and more than half of the sample having a comorbid diagnosis of Disruptive, Impulse-Control, or Conduct Disorder.

Sample Means on Study Variables. As seen in Table 2, participants endorsed between 2 and 13 ACEs with an average of 6.95 ACEs (*SD* = 2.85) which exceeds the commonly accepted cutoff score of ≥4 indicating "high

adversity" and is comparable to levels observed in other inpatient child and adolescent populations (e.g., Shah et al., 2018) and juvenile offender populations (e.g., Baglivio and Epps 2015). Participants endorsed an average of 2.16 (SD = 1.06) child maltreatment ACE items (CM-ACEs). On the PTSD-RI-5, participants endorsed high level of both Total and symptom cluster levels of PTSS compared to clinical child/adolescent populations at-risk for PTSS on which the measure was validated (Kaplow et al. 2020). Similarly, higher levels of both proactive and reactive aggression were endorsed in the present sample compared to other clinical inpatient samples (Fite, Stoppelbein, and Greening 2009).

Bivariate Correlations

Results of bivariate correlations indicated that the Total ACE score (i.e., cumulative ACE score) was associated with PTSS but not aggression (Table 3). To examine associations between types of ACE and other study variables, ACE categories of child maltreatment (i.e., physical, sexual, and/or emotional abuse and physical and/or emotional neglect), witnessing violence (e.g., witnessing an assault), and household dysfunction (e.g., having an incarcerated parent, substance abuse problems in the home, etc.) were created and measured as dichotomous variables, indicating whether or not any item in the category was endorsed. Results indicated that the only ACE category to be significantly associated with PTSS and reactive aggression was child maltreatment. The ACE category of witnessing violence was also positively related with PTSS. PTSS were significantly associated with both proactive and reactive aggression. In follow-up analyses, CM-ACEs was analyzed as a continuous summed variable to examine a potential dose-response effect of multiple or cumulative exposures within this type of ACE category. As seen in Table 4, results indicated that a higher score within this ACE category was positively associated with PTSS, proactive aggression, and reactive aggression.

Path Analysis

A path analysis model that included simultaneous estimation of CM-ACEs (measured as a continuous variable), PTSS, proactive aggression, and reactive aggression was performed (Figure 1). Paths were specified between each variable resulting in a fully saturated model. Significant direct effects emerged for the relations between CM-ACEs and PTSS (b = .31, SE = .06, β = .18, p < .01), CM-ACEs and reactive aggression (b = .21, SE = .10, β = .20, p = .04), and PTSS and reactive aggression (b = .63, SE = .18, β = .41, p < .01). A significant indirect effect also emerged, with PTSS acting a partial mediator of the relation between child maltreatment and reactive aggression (b = .20, SE = .06, β = .18, p < .01). PTSS was significantly related to proactive aggression in the model

($b = .35$, $SE = .18$, $\beta = .23$, $p < .05$). The relation between CM-ACEs and proactive aggression was marginally significant ($b = .23$, $SE = .14$, $\beta = .21$, $p = .10$), thus no further indirect effects were interpreted. Results of a Wald Chi-Squared test (χ^2 [5, 81] = 34.14, $p < .01$) indicated that the combined direct and indirect effects in the overall model were significantly associated with the outcome variables, thus supporting the fit of the model to the data.

Discussion

The goal of the present study was to examine relations between ACEs, PTSS, and proactive and reactive aggression in a sample of male children/early adolescents. Specifically, we sought to delineate the effects of cumulative ACEs versus types of ACEs on PTSS and aggression. We also sought to examine whether ACEs and PTSS were differentially related to proactive and reactive aggression and to examine PTSS as a possible mediator of the relation between ACEs and aggression. To date, existing literature has examined some of these variables retrospectively in adult samples; however, it is important to understand relations among these variables during development to potentially mitigate the negative outcomes associated with ACEs, PTSS, and aggression. Therefore, the present study adds to the literature by examining relations between these variables in children and adolescents who are at-risk for experiencing significant short- and long-term negative outcomes related to the presence of ACEs, PTSS, and aggression.

We first sought to examine associations between the cumulative number of ACEs the type of ACEs endorsed (i.e., child maltreatment, household dysfunction, or witnessing violence) and each outcome variable. We hypothesized that a higher cumulative number of ACEs would be positively associated with PTSS and both aggression subtypes. In partial support of this hypothesis, cumulative number of ACEs experienced was positively associated with PTSS but not with either type of aggression. With regard to ACE types, we hypothesized that child maltreatment ACEs would be more strongly associated with PTSS and aggression than would household dysfunction or witnessing violence. Results supported this hypothesis, with child maltreatment but not witnessing violence or household dysfunction ACEs emerging as significantly associated with PTSS, proactive aggression, and reactive aggression. Thus, it might be that simply experiencing ACEs in childhood does not influence aggressive behavior; instead, the type of ACEs experienced might have a stronger impact on the development of negative outcomes than the number of ACEs experienced.

Together, findings suggest that a specific type of ACEs – child maltreatment – is more strongly associated with negative outcomes among children when compared to other types of ACEs or than the overall cumulative number of ACEs. This is consistent with existing research that suggests (a) children who experience maltreatment are at a higher risk of developing PTSD compared to those who experience other types of stressful or traumatic events (e.g., natural disasters, bad accidents, etc.; Dong et al. 2004; Lamers-Winkelman, et al. 2012) and (b) research that implicates experiences of abuse and/or neglect in the development of both proactive and reactive aggression (Dodge et al. 1997). Furthermore, the cumulative number of ACEs was associated with PTSS but not aggression, suggesting that cumulative ACE exposure might have more of an effect on emotional rather than behavioral regulation processes. It might also be that true effects of the cumulative number of ACEs were "washed out" in the present sample due to the high number of ACEs endorsed ($M = 6.95$; $SD = 2.85$), which exceeded the commonly cited cutoff score of 4 or more ACEs that has been identified in the literature as the point at which most people experience a high risk for adverse outcomes (Felitti et al. 1998). Based on these early findings, a continuous child maltreatment variable (CM-ACEs) was used in further analyses to evaluate a "dose-dependent effect" of the cumulative number of the types of ACEs, since they appeared to be most strongly associated with adverse outcomes in the present sample.

In a path analysis model, relations between CM-ACEs, PTSS, proactive aggression, and reactive aggression were estimated simultaneously. Results supported our hypothesis that CM-ACEs would be significantly related to reactive but not proactive aggression. Although there is some support in the literature for the association between child maltreatment and both proactive and reactive aggression (e.g., Conner et al. 2004), results from the present study are consistent with most existing literature suggesting that reactive aggression is more commonly associated with abuse and/or neglect than is proactive aggression (e.g., Richey et al. 2016). This finding is perhaps due to patterns of emotional, behavioral, and physiological dysregulation commonly observed in the aftermath of child maltreatment (e.g., Dvir, Ford, Hill, and Frazier 2014) that appear to overlap with the patterns observed for reactive but not proactive aggression. Specifically, reactive aggression has been associated with increased autonomic nervous system arousal, poor behavioral inhibition, and higher levels of emotional and internalizing problems (e.g., Card and Little 2006; Pederson, et al. 2017), whereas proactive aggression is considered more controlled and goal-directed and is associated with minimal autonomic nervous system arousal and blunted affectivity (e.g., Card and Little 2006; Hubbard, Dodge, Cillessen, and Coie 2001; Wagner and Abaied 2015). Given that children who have experienced

abuse and/or neglect often exhibit associated symptoms such as high levels of internalizing problems and emotional reactivity and poor impulse control (e.g., Dvir et al. 2014), it is not surprising that the experience of child maltreatment might lend itself more readily to the development and maintenance of reactive than proactive aggression.

In addition to examining direct effects of these relations, we also observed a significant indirect effect of PTSS on the relation between child maltreatment and reactive aggression. Results support this hypothesis, as well. Although PTSS was significantly associated with both types of aggression, only the indirect effect for the relation between CM-ACEs and reactive, but not proactive aggression, was significant. It might be that one way to conceptualize the disruptions in emotional, behavioral, and physiological processes underlying child maltreatment and reactive aggression is through PTSS. Post-Traumatic Stress Disorder is comprised of four distinct symptom clusters (i.e., intrusion, altered arousal and reactivity, negative mood and cognitions, and avoidance). Together, these symptom clusters collectively represent alterations in emotional, cognition, behavioral, and physiological regulation following a traumatic stressor. These same processes overlap with those associated with both the experience of child maltreatment and reactive aggression. As such, it is easy to understand how PTSS might partially explain the relation between child maltreatment and reactive aggression. For example, the increased sympathetic nervous system arousal often associated with reactive aggression and child maltreatment (McLaughlin, Sheridan, Alves, and Mendes 2015) might be best understood as PTSS-related hyperarousal, at least for children with a history of CM-ACEs. Similarly, hostile attribution biases have been shown to mediate the relation between child maltreatment and reactive aggression (Richey et al. 2016). It could be that these biases might be understood as PTSS-related negative alterations in cognition. Taken together, existing research has built a strong foundation for our understanding of several mechanisms of influence that might explain the relation between child maltreatment and reactive aggression. The present study adds to this literature by not only including PTSS as another mechanism of influence in and of itself but also by possibly providing a lens through which other findings might be viewed and applied in clinical settings.

Clinical Implications

Despite the clear overlap in the features that appear to underlie the effects of child maltreatment, PTSS, and reactive aggression, most research to date has been limited to examining these relations retrospectively among adult populations and/or clinical samples of individuals with a confirmed diagnosis of PTSD. It is important, however, to

extend our conceptualization of the role of post-traumatic stress beyond the constraints of symptoms that meet a certain set of diagnostic criteria. For example, a diagnosis of PTSD requires the presence of clinically significant levels of symptoms present in all four symptom clusters (APA 2013). However, it is conceivable that a child might experience significant impairment associated with symptoms present in just one or two clusters, thus precluding a diagnosis of PTSD, while continuing to experience distress and negative outcomes associated with the presence of PTSS. For example, some studies have shown that child abuse is associated with chronic hyperarousal (e.g., Kendall-Tackett 2000). However, high levels of hyperarousal alone would not warrant a diagnosis of PTSD despite the fact that these behavioral and emotional experiences might be best conceptualized as a post-traumatic stress response to maltreatment. Furthermore, given the research linking increased autonomic nervous system arousal and reactive aggression, it could be that these symptoms of hypervigilance and physiological arousal experienced as a PTSS response following child maltreatment might be expressed by children as reactively aggressive behaviors.

The risk of experiencing child maltreatment appears to be highest for groups of children who are also most likely to experience disparities in access to mental health services (e.g., Dakil, Cox, Lin, and Flores 2011; Maguire-Jack, Cao, and Yoon 2018), thus further decreasing the likelihood of a child receiving a diagnosis of PTSD. In the present sample, the participants average levels of PTSS exceeded average levels reported in other child/adolescent clinical samples (Kaplow et al. 2020); however, only 27% of the present sample had a diagnosis of PTSD or any trauma- or stressor-related disorder. This is not to say that participants were misdiagnosed. In fact, despite reporting high levels of PTSS, only 46.5% of the sample met criteria for clinically significant PTSD on the PTSD-RI-5. Instead, these findings suggest the utility of examining PTSS, even at sub-diagnostic levels, as a constellation of symptoms that might cause impairment outside the context of a clinical diagnosis to inform both future research and clinical practice.

One clear clinical implication of the current findings is the importance of recognizing trauma-informed and sensitive treatment approaches even when the primary concern for a child is identified as a disruptive or aggressive behavior. Often times, aggressive behaviors in children are more easily observed/defined than underlying PTSS might be; thus, these observable behaviors often become the targets of intervention and treated using behavioral therapy approaches. However, a behavioral approach founded only in evidenced-based practice for disruptive/conduct-related behaviors might yield limited efficacy if the emotional, behavioral, cognitive, and physiological mechanisms underlying the aggression are not also addressed. Therefore, it might be helpful to

incorporate trauma-sensitive components to behavioral interventions for disruptive behavior that can also address any underlying PTSS, such as biofeedback training, cognitive processing, and emotion regulation skills training. It might also be advantageous to expand the use of trauma-specific interventions such as Trauma-Focused Cognitive Behavior Therapy (TF-CBT; Cohen, Mannarion, and Deblinger 2012) to include individuals with a history of maltreatment who exhibit high levels of aggressive behavior, even in the absence of a diagnosis of PTSD. In residential treatment facilities, including those housing adjudicated youth, it might even be advantageous for these types of treatment approaches to become the standard of care.

Another clinical implication of the present study is the importance of adopting a trauma-sensitive understanding of aggression in children and adolescents. Previous research has largely focused on relations between PTSD and aggression in adults with a history of child maltreatment. However, results of the present study indicate that relations between these variables appear to exist early in development. As such, it is important to use this knowledge to inform child and adolescent treatment so that it might mitigate the long-term effects of child maltreatment and aggression during a period of development when children might be most able to benefit from the effects of intervention.

Limitations

The present study provides important information about the role of PTSS as a potential mediator of the relation between the experience of child maltreatment and the presence of reactive aggression in children and adolescents. However, some limitations should be considered when interpreting these findings and used for guiding future research in this area. First, the sample is small and limited to a highly clinical sample of male children/early adolescents with significant ACE exposure and high levels of aggression. Although findings have important clinical implications for children and adolescents with this high level of need, results might be less applicable to children and adolescents across a wider range of ACE history, PTSS level, and/or aggression. Therefore, future studies might seek to extend this research to include a larger sample of outpatient and non-clinical samples, as well. Furthermore, the effects of child maltreatment on outcomes have been shown to differ between girls and boys (Asscher, Van der Put, and Stams 2015). Therefore, results of the present study might have limited implications for girls, and future research should seek to examine possible differential effects of sex on these study variables. Finally, although results are consistent with extant research that supports the mediating role of PTSS in longitudinal studies (e.g., Taft,

Schumm, Marshall, Panuzio, and Holtzworth-Munroe 2008), the data in the present study are cross-sectional; thus, significant indirect effects should not be interpreted as casual relations.

Conclusions

Despite these limitations, results of the present study add to existing literature in a way that enhances our understanding of the relation between child maltreatment and the development and maintenance of reactive aggression. Specifically, PTSS appear to partially explain this relation, perhaps as a construct in and of itself or perhaps in the way that PTSS provide a framework to understand the emotional, behavioral, and physiological dysregulation that often appear to underlie the link between abuse and/or neglect in childhood, and the development of negative outcomes. By adopting this framework, we might be better able to implement trauma-informed and trauma-sensitive interventions for children and adolescents with a history of maltreatment who experience specific negative outcomes in a way that could help mitigate the development or exacerbation of long-term negative consequences.

References

Agorastos, A., Pittman, J. O., Angkaw, A. C., Nievergelt, C. M., Hansen, C. J., Aversa, L. H., Parisi, S. A., Barkuaskas, D. A., the Marine Resilience Study Team, & Baker, D. G. (2014). The cumulative effect of different childhood trauma types on self-reported symptoms of adult male depression and PTSD, substance abuse and health-related quality of life in a large active-duty military cohort. *Journal of Psychiatric Research, 58,* 46-54. doi: 10.1016/j.jpsychires.2014.07.014.

Allen, B. (2011). Childhood psychological abuse and adult aggression: The mediating role of self-capacities. *Journal of Interpersonal Violence, 26,* 2093-2110. doi: 10.1177/0886260510383035.

Althoff, R. R., Verhulst, F., Rettew, D. C., Hudziak, J. J., & van der Ende, J. (2010). Adult outcomes of childhood dysregulation: A 14-year follow-up study. *Journal of the American Academy of Child and Adolescent Psychiatry, 49,* 1105-1116. doi: 10.1016/j.jaac.2010.08.006.

Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., Perry, B. D., Dube, S. R., & Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood. A convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry and Clinical Neuroscience, 256,* 174-186. doi: 10.1007/s00406-005-0624-4.

American Psychological Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Asscher, J. J., Van der Put, C. E., & Stams, G. J. J. M. (2015). Gender differences in the impact of abuse and neglect victimization on adolescent offending behavior. *Journal of Family Violence, 30, 215-225.*

Atzl, V. M., Narayan, A. J., Rivera, L. M., & Lieberman, A. F. (2019). Adverse childhood experiences and prenatal mental health: Type of ACEs and age of maltreatment onset. *Journal of Family Psychology, 33,* 304–314. doi: 10.1037/fam0000510.

Aupperle, R. L., Melrose, A. J., Stein, M. B., & Paulus, M. P. (2012). Executive function and PTSD: Disengaging from trauma. *Neuropharmacology, 62,* 686-694. doi: 10.1016/j.neuropharm.2011.02.008.

Baglivio, M. T. & Epps, N. (2015). The interrelatedness of adverse childhood experiences among high-risk juvenile offenders. *Youth Violence and Juvenile Justice, 14,* 179-198. doi: 10.1177/1541204014566286.

Barboza, G. E. (2018). Latent classes and cumulative impacts of adverse childhood experiences. *Child Maltreatment, 23,* 111-125. doi: 10.1177/1077559517736628.

Bennett, D. C., Modrowski, C. A., Chaplo, S. D., & Kerig, P. K. (2016). Facets of emotion dysregulation as mediators of the association between trauma exposure and posttraumatic stress symptoms in justice-involved adolescents. *Traumatology, 22,* 174-183. doi: 10.1037/trm0000085.

Bethell, C. D., Carle, A., Hudziak, J., Gombojav, N., Powers, K., Wade, R., & Braveman, P. (2017). Methods to assess adverse childhood experiences of children and families: Toward approaches to promote child well-being in policy and practice. *Academy of Pediatrics, 17,* S51-S69. doi: 10.1016/j.acap.2017.04.161.

Bethell, C. D., Newacheck, P., Hawes, E., & Haflon, N. (2014). Adverse childhood experiences: assessing the impact on health and school engagement and the mitigating role of resilience. *Health Affairs, 33,* 2106-2115. doi: 10.1377/hlthaff.2014.0914.

Berkowitz, L. (1989). Frustration-aggression hypothesis: Examination and reformulation. *Psychological Bulletin, 106*, 59-73. doi: 10.1037/0033-2909.106.1.59.

Bierman, K. L., Cole, J., Dodge, K., Greenberg, M., Lochman, J., McMohan, R., Pinderhughes, E., & Conduct Problems Prevention Research Group. (2013). School outcomes of aggressive-disruptive children: prediction from kindergarten risk factors and impact of the Fast Track Prevention Program. *Aggressive Behavior, 39.* doi:10.1002/ab.21467.

Breslau, N., Peterson, E. L., Poisson, L. M., Schultz, L. M., & Lucia, V. C. (2004). Estimating post-traumatic stress disorder in the community: Lifetime perspective and the impact of typical traumatic events. *Psychological Medicine, 34,* 889-898. doi: 10.1017/s0033291703001612.

Brown, S., Fite, P. J., & Poquiz, J. (2016). Moderating effect of gender on outcomes associated with stressful life events among elementary school-age youth. *Child Psychiatry and Human Development, 47,* 593-602. doi: 10.1007/s10578-015-0592-5.

Brown, S., Fite, P. J., DiPierro, M., & Bortolato, M. (2017). Links between stressful life events and proactive and reactive functions of aggression. *Journal of Aggression, Maltreatment & Trauma, 26,* 691-699. doi: 10.1080/10926771.2017.1322658.

Bubier, J. L., Drabick, D. A. G., & Breiner, T. (2009). Autonomic functioning moderates the relations between contextual factors and externalizing behaviors among inner-city children. *Journal of Family Psychology, 23,* 500–510. https://doi.org/10.1037/a0015555.

Campbell, J. A., Walker, R. J., & Egede, L. E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventative Medicine, 50,* 344-352. doi: 10.1016/j.amepre.2015.07.022.

Card, N. A. & Little, T. D. (2006). Proactive and reactive aggression in childhood and adolescence: A meta-analysis of differential relations with psychosocial adjustment. *International Journal of Behavioral Development, 30*, 466-480. doi: 10.1177/0165025406071904.

Chen, F. R., Raine, A., & Granger, D. A. (2018). Testosterone and proactive-reactive aggression and the moderating role of harsh discipline. *Journal of Abnormal Child Psychology, 46,* 1599-1612. doi: 10.1007/s10802-018-0399-5.

Cicchetti, D., & Toth, S. L. (1995). A developmental psychopathology perspective on child abuse and neglect. *Journal of the American Academy of Child & Adolescent Psychiatry, 34,* 541–565. doi: 10.1097/00004583-199505000-00008.

Cloitre, M., Khan, C., Mackintosh, M. A., & Garvert, D. W. (2018). Emotion regulation mediates the relationship between aces and physical and mental health. *Psychological Trauma: Theory Research Practice and Policy.* doi: 10.1037/tra0000374.

Cohen, J. A., Mannarino, A. P., & Deblinger, E. (Eds.). (2012). *Trauma-focused CBT for children and adolescents: Treatment applications*. Guilford Press.

Coie, J. D., & Dodge, K. A. (1998). Aggression and antisocial behavior. In W. Damon & N. Eisenberg (Eds.), Handbook of child psychology: Social, emotional, and personality development (Vol. 3, pp. 779–862).

Connor, D. F., Steingard, R. J., Cunningham, J. A., & Anderson, A. A. (2004). Proactive and reactive aggression in referred children and adolescents. *American Journal of Orthopsychiatry, 74,* 129-136. doi: 10.1037/0002-9432.74.2.129.

Cozolino, L. (2014). The Norton series on interpersonal neurobiology. The neuroscience of human relationships: Attachment and the developing social brain (2nd ed.). W. W. Norton & Co.

Cunningham, T. J., Ford, E. S., Croft, J. B., Merrick, M. T., Rolle, I. V., & Giles, W. H. (2014). Sex-specific

relationships between adverse childhood experiences and chronic obstructive pulmonary disease in five

states. *International Journal of Chronic Obstructive Pulmonary Disease, 9,* 1033-1043.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4186575/.

Dakil, S. R., Cox, M., Lin, H., & Flores, G. (2011). Racial and ethnic disparities in physical abuse reporting and

child protective services interventions in the United States. *Journal of the National Medicine Association,*

103, 926-931. doi: 10.1016/S0027-9684(15)30449-1.

De Bellis, M. D., & Zisk, A. A. B. (2014). The biological effects of childhood trauma. *Child and Adolescent*

Psychiatric Clinics of North America, 23, 185-222. doi: 10.1016/j.chc.2014.01.002.

DiPierro, M., Fite, P. J., Cooley, J. L., & Poquiz, J. L. (2016). Academic aspirations as a moderator of the link

between negative life events and delinquency in a sample of Latino youth. *Child & Youth Care Forum, 45*,

505–523. http://hdl.handle.net/1808/18679.

Dodge, K. A., & Coie, J. D. (1987). Social information-processing factors in reactive and proactive aggression in

children's peer groups. *Journal of Personality and Social Psychology, 53*, 389- 409. doi: 10.1037/0022-

3514.53.6.1146.

Dodge, K.A., Lochman, J. E., Harnish, J. D., Bates, J. E., & Petit, G. S. (1997). Reactive and proactive aggression in

school children and psychiatrically impaired chronically assaultive youth. *Journal of Abnormal*

Psychology, 106, 37-51. doi: 10.1037//0021-843x.106.1.37.

Dong, M., Anda, R. F., Felitti, V. J., Dube, S. A., Williamson, D. F., Thompson, T. J., Loo, C. M., & Giles, W. H.

(2004). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction.

Child Abuse and Neglect, 28, 771-784. doi: 10.1016/j.chiabu.2004.01.008.

Dube, S. R., Felitti, V. J., Dong, M., Chapman, D. P., Giles, W., Anda, R. F. (2003). Childhood abuse and neglect

and household dysfunction and the risk of illicit drug use: The Adverse Childhood Experiences Study.

Pediatrics, 111, 564-572. doi: 10.1542/peds.111.3.564.

Dvir, Y., Ford, J. D., Hill, M., & Frazier, J. A.(2014). Childhood maltreatment, emotional dysregulation, and

psychiatric comorbidities. *Harvard Review of Psychiatry, 22,* 149-161. doi:

10.1097/HRP.0000000000000014.

Dyer, K. W., Dorahy, M. J., Hamilton, G., Corry, M., Shannon, M., MacSherry, A., McRobert, G., Elder, R. & McElhill, B. (2009). Anger, aggression, and self-harm in PTSD and complex PTSD. *Journal of Clinical Psychology, 65,* 1099-1114. doi: 10.1002/jclp.20619.

Edwards, V. J., Dube, S. R., Felitti, V. J., & Anda, R. F. (2007). It's OK to ask about past abuse. *American Psychologist, 62,* 327-328. doi: 10.1037/0003-066X62.4.327.

Elhai, J. D., Layne, C. M., Steinberg, A. S., Vrymer, M. J., Briggs, E. C., Ostrowski, S. A., Pynoos, R. S. (2013). Psychometric properties of the UCLA PTSD Reaction Index. Part 2: Investigating factor structure findings in a national clinic-referred youth sample. *Journal of Traumatic Stress, 26,* 10-18. doi: 10.1002/jts.21755.

Enlow, M. B., Eneland, B., Carlson, E., Blood, E., & Wright, R. J. (2014). Mother-infant attachment and the intergenerational transmission of posttraumatic stress disorder. *Development and Psychopathology, 26,* 41-65. doi: 10.1017/S0954579413000515.

Erwin, B. A., Newman, E., McMackin, R. A., Morrissey, C., & Kaloupek, D. G. (2000). PTSD, malevolent environment, and criminality among criminally involved male adolescents. *Criminal Justice and Behavior, 27,* 196-215. doi: 10.1177/0093854800027002004.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz A. M., Edwards, V. K., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventative Medicine, 14*, 245-258. doi: 10.1016/S0749-3797(98)00017-8.

Fite, P. J., Poquiz, J., Cooley, J. L., Stoppelbein, L., Becker, S. P., Luebbe, A. M., & Greening, L. (2016). Risk factors associated with proactive and reactive aggression in a child psychiatric inpatient sample. *Journal of Psychopathology and Behavioral Assessment, 38,* 56-65. doi: 10.1007/s10862-015-9503-0.

Fite, P. J., Raine, A., Stouthamer-Loeber, M., Loeber, R., & Pardini, D. A. (2009). Reactive and proactive aggression in adolescent males. *Criminal Justice and Behavior, 37,* 141-157. doi: 10.1177/0093854809353051.

Fite, P. J., Stoppelbein, L., & Greening, L. (2009). Proactive and reactive aggression in a child psychiatric inpatient population: relations to psychopathic characteristics. *Criminal Justice and Behavior, 36,* 481–493. doi: 10.1177/0093854809332706.

Fite, P.J., Stoppelbein, L., Greening, L., & Gaertner, A. E. (2009). Further validation of a measure of proactive and reactive aggression within a clinical child population. *Child Psychiatry and Human Development, 40,* 367–382. doi: 10.1007/s10578-009-0132-2.

Ford, J. D., Chapman, J., Connor, D. F., & Cruise, K. R. (2012). Complex trauma and aggression in secure juvenile justice settings. *Criminal Justice and Behavior, 39,* 694. doi: 10.1177/0093854812436957.

Foster, E. M., Jones, D. E., & the Conduct Problems Prevention Research Group (2005). The high costs of aggression: Public expenditures resulting from conduct disorder. *American Journal of Public Health, 95,* 1767-1772. doi: 10.2105/AJPH.2004.061424.

Garno, J. L., Goldberg, J. F., Ramirez, P. M., & Ritzler, B. A. (2005). Impact of childhood abuse on the clinical course of bipolar disorder. *British Journal of Psychiatry, 186,* 121-125. doi: 10.1192/bjp.186.2.121.

Garrett, A. S., Carrion, V., Kletter, H., & Karchemskiy, A. (2012). Brain activation to facial expressions in youth with PTSD symptoms. *Depression and Anxiety, 29,* 449-459. doi: 10.1002/da.21892.

Gebauer, S., Moore, R., & Salas, J. (2019). All traumas are not created equal. *JAMA Pediatrics, 173,* 398-399. doi: 10.1001/jamapediatrics.2018.5556.

Gilbert, R., Spatz Widom, C., Browne, K., Fergusson, D., Webb, E., & Janson, J. (2009). Burden and consequences of child maltreatment in high-income countries. *Lancet, 373*, 68-81. doi: 10.1016/S0140-6736(08)61706-7.

Goldman, J., Salus, M. K., Wolcott, D., & Kennedy, K. Y. (2003). A coordinated response to child abuse and neglect: The foundation for practice. Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children - Youth and Families, Children's Bureau, Office on Child Abuse and Neglect. http://centerforchildwelfare.fmhi.usf.edu/kb/trprev/a%20coordinated%20response%20to%20child%20abuse%20and%20neglect-the%20foundation%20for%20practice.pdf.

Grey, H. R., Ford, K., Bellis, M. A., Lowey, H., & Wood, S. (2019). Associations between childhood deaths and adverse childhood experiences: An audit of data from a child death overview panel. *Child Abuse and Neglect, 90,* 22-31. doi: 10.1016/j.chiabu.2019.01.020.

Gurnani, T., Ivanov, I., & Newcorn, J. H. (2016). Pharmacotherapy of aggression in child and adolescent psychiatric disorders. *Journal of Child and Adolescent Psychopharmacology, 26,* 65-73. doi: 10.1089/cap.2015.0167.

Hambrick, E. P., Brawner, T. W., Perry, B. D., Brandt, K., Hofmeister, K., & Collins, J. O. (2019). Beyond the ACE score: Examining relationships between timing of developmental adversity, relational health and developmental outcomes in children. *Archives of Psychiatric Nursing, 33,* 238-247. doi: 10.1016/j.apnu.2018.11.001

Hartley, C. H., Pettit, J. W., & Castellanos, D. (2018). Reactive aggression and suicide-related behaviors in children and adolescents: A review and preliminary meta-analysis. *Suicide and Life-Threatening Behavior, 48,* 38-51. doi: 10.1111/sltb.12325.

Hecht, L. K. & Latzman, R. D. (2018). Exploring the differential associations between components of executive functioning and reactive and proactive aggression. *Journal of Clinical and Experimental Neuropsychology, 40,* 62-74. doi: 10.1080/13803395.2017.1314450.

Herzog, J. I. & Schmalz, C. (2018). Adverse childhood experiences and the consequences on neurobiological, psychosocial, and somatic conditions across the lifespan. *Frontiers in Psychiatry, 9,* 420. doi: 10.3389/fpsyt.2018.00420

Hubbard, J. A., Dodge, K. A., Cillessen, A. H. N., & Coie, J. D. (2001). The dyadic nature of social information processing in boys' reactive and proactive aggression. *Journal of Personality and Social Psychology, 80,* 268-280. doi: 10.1037//0022-3514.80.2.268.

Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., Jones, L., & Dunne, M. P. (2017). The effect of multiple adverse childhood experiences on health: A systematic review and meta-analysis. *Lancet Public Health, 2,* 356-366. doi: 10.1016/S2468-2667(17)30118-4.

IBM Corp. Released 2019. IBM SPSS Statistics for Mac OS, Version 26.0. Armonk, NY: IBM Corp.

Kaplow, J. B., Rolon-Arroyo, B., Layne, C. M., Rooney, E., Oosterhoof, B., Hill, R., Steinberg, A. M., Lotterman, J., Gallagher, K. A. S., & Pynoose, R. S. (2020). Validation of the UCLA PTSD Reaction Index for DSM-5: A developmentally informed assessment tool for youth. *Journal of the American Academy of Child and Adolescent Psychiatry, 59,* 186-194. doi: 0.1016/j.jaac.2018.10.019.

Kendall-Thackett, K. A. (2000). Physiological correlates of childhood abuse: chronic hyperarousal in PTSD, depression, and irritable bowel syndrome. *Child Abuse & Neglect, 24,* 799-810. doi: 10.1016/s0145-2134(00)00136-8.

Kolla, N. J., Malcolm, C., Attard, S., Arenovich, T., Blackwood, N., & Hodgins, S. (2013). Childhood maltreatment and aggressive behavior in violent offenders with psychopathy. *The Canadian Journal of Psychiatry, 58,* 487–494. doi: 10.1177/070674371305800808.

Kotch, J. B., Lewis, T., Hussey, J. M., English, D., Thompson, R., Litrownik, A. J., Runyan, D. K., Bangdiwala, S. I., Margolis, B., & Dubowitz, H. Importance of early neglect for childhood aggression. *Pediatrics, 121,* 725-731. doi: 10.1542/peds.2006-3622.

Lamers-Winkelman, F., Willemen, A. M., & Visser, M. (2012). Adverse childhood experiences of referred children exposed to intimate partner violence: consequences for their wellbeing. *Child Abuse and Neglect, 36,* 166-179. doi: 10.1016/j.chiabu.2011.07.006.

Lee, V. & Hoaken, P. N. (2007). Cognition, emotion, and neurobiological development: Mediating the relation between maltreatment and aggression. *Child Maltreatment, 12,* 281-298. doi: 10.1177/1077559507303778.

Maguire-Jack, K., Cao, Y., & Yoon, S. (2018). Racial disparities in child maltreatment: The role of social service availability. *Children and Youth Services Review, 86,* 49-55. doi: 10.1016/j.childyouth.2018.01.014.

Marsee, M. A. (2008). Reactive aggression and posttraumatic stress in adolescents affected by Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology, 37,* 519–529. doi: 10.1080/15374410802148152.

McLaughlin, K. A., Sheridan, M. A., Alves, S. A., & Mendes, W. B. (2015). Child maltreatment and autonomic nervous system reactivity: Identifying dysregulated stress reactivity patterns using the biopsychosocial model of challenge and threat. *Psychosomatic Medicine, 76,* 538-546. doi: 10.1097/PSY.0000000000000098.

Merikangas, K. R., Nakamura, E. F., & Kessler, R. C. (2009). Epidemiology of mental disorders in children and adolescents. *Dialogues in Clinical Neuroscience, 11,* 7-20. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2807642/pdf/DialoguesClinNeurosci-11-7.pdf.

Merrick, M. T., Ports, K. A., Ford, D. C., Afifi, T. O., Gershoff, E. T., & Grogan-Kaylor, A. (2017). Unpacking the impact of adverse childhood experiences on adult mental health. *Child Abuse & Neglect, 69,* 10-19. doi: 10.1016/j.chiabu.2017.03.016.

Modrowski, C. A., Chaplo, S. D., Kerig, P. K., & Mozley, M. M. (2019). Trauma exposure, posttraumatic overmodulation and undermodulation, and nonsuicidal self-injury in traumatized justice-involved

adolescents. *Psychological Trauma: Theory, Research, Practice, and Policy, 11,* 743-750. doi:

10.1037/tra0000469.

Moore, C. C., Hubbard, J., Morrow, M. T., Barhight, L. R., Lines, M. M., Sallee, M., & Hyde, C. T. (2018). The

simultaneous assessment of and relations between children's sympathetic and parasympathetic

psychophysiology and their reactive and proactive aggression. *Aggressive Behavior, 44,* 614–623. doi:

10.1002/ab.21786.

Mumford, E. A., Taylor, B. G., Berg, M., Liu, W., & Miesfeld, N. (2019). The social anatomy of adverse childhood

experiences and aggression in a representative sample of young adults in the U.S. *Child Abuse & Neglect,

88,* 15-27. doi: 10.1016/j.chiabu.2018.10.016.

Murphy, A., Steele, M., Dube, S. R., Bate, J., Bonuck, K., Meissner, P., Goldman, H., & Steele, H. (2014). Adverse

Childhood Experiences (ACEs) questionnaire and Adult Attachment Interview (AAI): Implications for

parent child relationships. *Child Abuse and Neglect, 38,* 224-233. doi: 10.1016/j.chiabu.2013.09.004.

Murray-Close, D. & Rellini, A. (2012). Cardiovascular reactivity and proactive and reactive relational aggression

among women with and without a history of sexual abuse. *Biological Psychology, 89,* 54-62. doi:

10.1016/j.biopsycho.2011.09.008.

Muthén, L.K. and Muthén, B.O. (1998-2017). Mplus User's Guide. Eighth Edition. Los Angeles, CA: Muthén &

Muthén.

Nurius, P. S., Green, S., Logan-Greene, P., & Borja, S. (2016). Life course pathways of adverse childhood

experiences toward adult psychological well-being: A stress process analysis. *Child Abuse & Neglect, 45,*

143-153. doi: 10.1016/j.chiabu.2015.03.008.

Pederson, C. A., Fite, P. J., & Bortlato, M. (2017). The role of functions of aggression in associations between

behavioral inhibition and activation and mental health outcomes. *Journal of Aggression, Maltreatment, and

Trauma, 8,* 811-830. doi: 10.1080/10926771.2017.1370053.

Pederson, C. A., Rathert, J. L., Fite, P. J., Stoppelbein, L., & Greening, L. (2016). The role of parenting styles in the

relation between functions of aggression and internalizing symptoms in a child psychiatric inpatient

population. *Child Psychiatry and Human Development, 47,* 819-829. doi: 10.1007/s10578-015-0614-3.

Polanczyk, G. V., Salum, G.A. Sugaya, L. S., Caye, A., & Rohde, L. A. (2015). Annual research review: A meta-

    analysis of the worldwide prevalence of mental disorders in children and adolescents. *Journal of Child*

    Psychology and Psychiatry and Allied Disciplines, 56, 345-365. doi: 10.1111/jcpp.12381.

Radcliff, E., Crouch, E., Stompolis, M., & Srivastav, A. (2019). Homelessness in childhood and adverse childhood

    experiences (ACEs). *Maternal and Child Health Journal, 23,* 811-820. doi: 10.1007/s10995-018-02698-w.

Rehan, W., Antfolk, J., Johansson, A., Jern, P., & Santtila, P. (2017). Experiences of severe childhood maltreatment,

    depression, anxiety and alcohol abuse among adults in Finland. *PLOS ONE, 12*. doi:

    10.1371/journal.pone.0177252.

Richey, A., Brown, S., Fite, P. J., & Bortolato, M. (2016). The role of hostile attributions in the associations between

    child maltreatment and reactive and proactive aggression. *Journal of Aggression and Maltreatment*

    Trauma, 25, 1043-1057. doi: 10.1080/10926771.2016.1231148.

Scarpa, A., Haden, S. C., & Tanaka, A. (2010). Being hot-tempered: autonomic, emotional, and behavioral

    distinctions between childhood reactive and proactive aggression. *Biological Psychology, 84,* 488-496. doi:

    10.1016/j.biopsycho.2009.11.006.

Schalinski, I., Weicher, M. H., Nischk, D., Hinderer, E., Muller, O., & Rockstroh, B. (2016). Type and timing of

    adverse childhood experiences differentially affect severity of PTSD, dissociative and depressive

    symptoms in adult inpatients. *BMC Psychiatry, 16*. doi: 10.1186/s12888-016-1004-5.

Sedlack, A. J. & Bruce, C. (2010). Youth's characteristics and backgrounds. *Office of Juvenile Justice and*

    Delinquency Prevention. https://www.ncjrs.gov/pdffiles1/ojjdp/227730.pdf.

Shah, A. N., Beck, A. F., Sucharew, H. J., Litman, S., Pfefferman, C., Haney, J., Shah, S. S., Simmons, J. M., &

    Auger, K. A. (2018). Parental adverse experiences and resilience on coping after discharge. *Pediatrics, 141*.

    doi: 10.1542/peds.2017-2127

Shea, A., Welsh, C., Macmillan, H., & Steiner, M. (2005). Child maltreatment and HPA axis dysregulation:

    Relationship to major depressive disorder and posttraumatic stress disorder in females.

    Psychoneuroendocrinology, 30, 162-178. doi: 10.1016/j.psyneuen.2004.07.001.

Shields, A., & Cicchetti, D. (1998). Reactive aggression among maltreated children: the contributions of attention

    and emotion dysregulation. *Journal of Clinical Child Psychology, 27,* 381-395. doi:

    10.1207/s15374424jccp2704_2.

Smeets, K. C., Oostermeijer, S., Lappenschaar, M., Cohn, M., van der Meer, J. M. J., Popma, A., Jansen, L. M. C., Rommelse, N. N. J., Scheepers, F. E., & Buitelaar, J. K. (2017). Are proactive and reactive aggression meaningful distinctions in adolescents? A variable- and person-based approach. *Journal of Abnormal Child Psychology, 45,* 1-14. doi: 10.1007/s10802-016-0149-5.

Steinberg, A. M., Brymer, M., Decker, K., Pynoos, R. S. (2004). The University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index. *Current Psychiatry Reports, 6,* 96-100. doi: 10.1007/s11920-004-0048-2.

Steinberg, A. M., Brymer, M. J., Kim, S., Ghosh, C., Ostrowski, S. A., Gulley, K., Briggs, E. C., Pynoos, R. S. (2013). Psychometric properties of the UCLA PTSD Reaction Index: Part I. *Journal of Traumatic Stress, 26,* 1-9. doi: 10.1002/jts.21780.

Stimmel, M. A., Cruise, K. R., Ford, J. D., & Weiss, R. A. (2014). Trauma exposure, posttraumatic stress disorder symptomatology, and aggression in male juvenile offenders. *Psychological Trauma: Theory, Research, Practice, and Policy, 6,* 184-191. doi: 10.1037/a0032509.

Swopes, R. M., Simonet, D. V., Jaffe, A. E., Tett, R. P., & Davis, J. L. (2013). Adverse childhood experiences, posttraumatic stress disorder symptoms, and emotional intelligence in partner aggression. *Violence and Victims, 28,* 513–530. doi: 10.1891/0886-6708.vv-d-12-00026.

Taft, C. T., Schumm, J. A., Marshall, A. D., Panuzio, J., & Holtzworth-Munroe, A. (2008). Family-of-origin maltreatment, posttraumatic stress disorder symptoms, social information processing deficits, and relationship abuse perpetration. *Journal of Abnormal Psychology, 117,* 637-646. doi: 10.1037/0021-843X.117.3.637.

Turner, H. A., Finkelhor, D., & Ormrod, R. (2010). Poly-victimization in a national sample of children and youth. *American Journal of Preventative Medicine, 38,* 323-330. doi: 10.1016/j.amepre.2009.11.012.

van der Kolk, B. A. (2005). Developmental Trauma Disorder: Toward a rational diagnosis for children with complex trauma histories. *Psychiatric Annals, 35,* 401-408. doi: 10.3928/00485713-20050501-06.

Vitaro, F. & Brendgen, M. (2005). Proactive and reactive aggression: A developmental perspective. In: Trembly, R. E., Hartup, W. M., Archer, J. editors. Developmental origins of aggression. New York: Guilford Press.

Wagner, C. R. & Abaied, J. L. (2015). Relational victimization and proactive versus reactive relational aggression: The moderating effects of respiratory sinus arrhythmia and skin conductance. *Aggressive Behavior, 41.* doi: 10.1002/ab.21596.

Walker, J. S. & Bright, J. A. (2009). False inflated self-esteem and violence: A systematic review and cognitive model. *The Journal of Forensic Psychiatry and Psychology, 1,* 1-32. doi: 10.1080/14789940701656808.

Wang, X., & Maguire-Jack, K. (2018). Family and environmental influences on child behavioral health: The role of neighborhood disorder and adverse childhood experiences. *Journal of Developmental and Behavioral Pediatrics, 39.* doi: 10.1097/DBP.0000000000000506

Waschbusch, D. A., Willoughby, M. T., & Pelham, W. E. (1998). Criterion validity and the utility of reactive and proactive aggression: comparisons to attention deficit hyperactivity disorder, oppositional defiant disorder, and other measures of functioning. *Journal of Clinical Child Psychology, 27*, 396–405. doi: 10.1207/s15374424jccp2704_3.

Zettler, H., Wolf, K. T., Baglivio, M. T., Craig, J. M., & Epps, N. (2017). The racial and gender differences in the impact of adverse childhood experiences on juvenile residential placement. *Youth Violence and Juvenile Justice, 16*. doi: 10.1177/1541204017698213.

Table 1

Sample Demographics

Variables	*n*	%
Race/ethnicity		
Caucasian	51	59.3
African American	30	34.9
Other	5	5.8
Documented history of abuse and/or neglect	59	68.6
Physical abuse	34	46.6
Psychological abuse	8	11.0
Sexual abuse	22	20.1
Neglect	42	57.5
State custody at time of admission	58	69.0
Diagnoses at time of admission		
ADHD	69	81.2
Other neurodevelopmental disorder	35	41.2
Mood disorder	36	42.4
Anxiety disorder	11	12.9
Trauma- or stress-related disorder	23	27.4
Disruptive, impulse-control, and conduct disorder	59	69.4

Notes: ADHD = Attention Deficit Hyperactivity Disorder

Table 2

Sample Means and Frequencies on Study Variables

Variables	*Mean* (*SD*)	%[*]
Total ACE score	6.95 (2.85)	–
Child maltreatment	–	73.3
Household dysfunction	–	88.4
Witnessing violence	–	80.2
PTSS (*PTSD-RI-5* total score)	39.20 (18.39)	–
Proactive aggression	2.20 (1.15)	–
Reactive aggression	3.27 (1.16)	–

Notes:*Percent of sample that endorsed at least one item in that category of ACEs; PTSD-RI-5 = *Post-Traumatic Stress Disorder Reaction Index for DSM-5*; PTSS = Post-Traumatic Stress Symptoms

Table 3

Bivariate Correlations Among Study Variables

Variables	1	2	3	4	5	6
1. Total ACE score	-					
2. Child maltreatment	.52**	-				
3. Witnessing violence	.48**	.23*	-			
4. Household dysfunction	.21*	.11	-.09	-		
5. PTSS	.38**	.34**	.22*	-.01	-	
6. Proactive aggression	.17	.17	.04	-.03	.41**	-
7. Reactive aggression	.17	.24*	.06	.16	.55**	.50**

*p < .05 ** p < .01
Notes: ACE = Adverse Childhood Experiences; PTSS = Post-Traumatic Stress Symptoms
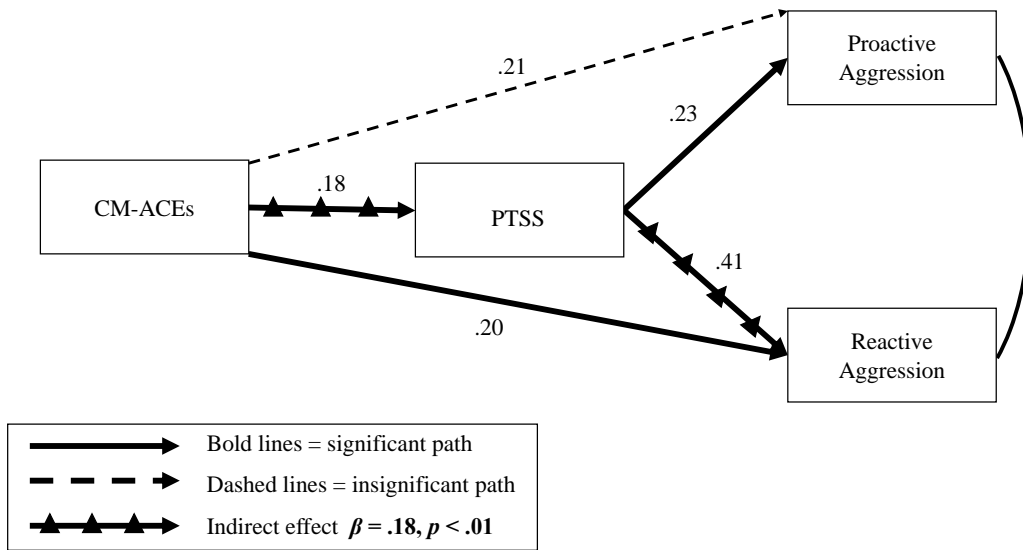
Table 4

Associations between Child Maltreatment and Outcome Variables

Variables	1	2	3	4
1. CM-ACEs [+]	-			
2. PTSS	.46[**]	-		
3. Proactive aggression	.31[**]	.41[**]	-	
4. Reactive aggression	.39[**]	.55[**]	.50[**]	-

*p < .05 ** p < .01*
Notes: [+]Continuous variable; CM-ACEs = Child maltreatment – Adverse Childhood
Experiences; PTSS = Post-Traumatic Stress Symptoms

Figure 1. Path analysis model with standardized path coefficients

.21

CM-ACEs

.18

PTSS

Proactive
Aggression

.23

.41

.20

Reactive
Aggression

Bold lines = significant path

Dashed lines = insignificant path

Indirect effect $\beta = .18, p < .01$

Note: CM-ACEs = Child maltreatment – Adverse Childhood Experiences; PTSS = Post-traumatic stress symptoms