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## Childhood physical abuse, aggression, and suicide attempts among criminal offenders

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### Abstract

Childhood physical abuse (CPA) has numerous short and long-term negative effects. One of the most serious consequences of CPA is an increased risk for suicide attempts. Clarifying the mechanisms by which CPA increases risk for suicidal behavior may enhance preventative interventions. One potential mechanism is a tendency toward aggression. In a sample of 266 criminal offenders, ages 18–62, we examined the relationships among CPA, lifetime aggression, and suicide attempts and tested lifetime history of aggression as a mediator of the relationship between CPA and suicide attempts. Results indicated that CPA and aggression were associated with suicide attempts. Consistent with our hypothesis, lifetime aggression mediated the CPA-suicide attempt relationship. Findings suggest that aggression may be an important mediator of the relationship between CPA and suicide attempts among criminal offenders, and are consistent with the possibility that treating aggression may reduce risk for suicide attempts.

### Keywords

child abuse; aggression; suicide; violence; offenders

## 1. Introduction

Childhood physical abuse (CPA) is common and its negative effects are numerous (Briere and Elliot, 2005). The short-term effects of CPA include disruptions in interpersonal relationships and psychological problems including low self-efficacy, hopelessness, lack of positive task orientation, and social information processing deficits (Conaway and Hansen, 1989; Mrug et al., 2008; Taft et al., 2008). Moreover, CPA may interfere with the development of emotional self-regulation (Masten and Coatsworth, 1998), leaving children at risk for a number of negative outcomes. A large body of literature has documented long-term consequences associated with CPA, including personality pathology (Lang et al., 2002), psychotic symptoms (Kilcommons and Morrison, 2005), externalizing behavior, such as substance abuse and the perpetration of violence (Lansford et al., 1995; Widom et al.,

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1995), and internalizing symptoms such as depression and anxiety (Fergusson et al., 2008). Drawing from the United States Federal Child Abuse Prevention and Treatment Act (Child Welfare Information Gateway, 2008), we define CPA as an act on the part of a parent or caretaker that results in serious physical harm. In the present study we have operationalized “serious physical harm” as leaving marks or causing injury (Dube et al., 2001).

One of the most serious consequences of CPA is an increase in risk for suicidal behavior (Pompili et al., 2009). Early research comparing suicidal behavior among adult male alcoholics with and without a history of CPA demonstrated a higher incidence of serious suicide attempts in those who were abused (Kroll et al., 1985). A study of adult female psychiatric patients found that CPA accounted for significant variance in suicide attempts (Bryer et al., 1987). The association between CPA and suicide attempts has since been replicated in large community samples (Dube et al., 2001; Afifi et al., 2008), and in clinical and other at-risk samples, including adult male and female inpatients (Ystgaard et al., 2004), adolescent inpatients (Lipschitz et al., 1999), adult male cocaine-dependent patients (Roy, 2001), homeless and runaway adolescents (Yoder, 1999), and criminal offenders (Blaauw et al., 2002; Verona et al., 2005).

Evidence for an association between CPA and suicide attempts suggests the importance of intervening with individuals who have experienced CPA in order to prevent suicide attempts and suicide. Such intervention requires a greater understanding of the mechanisms by which CPA confers risk. In high-risk samples there is evidence that aggression is an important correlate of suicidal behavior (Roy, 2003; Dumais et al., 2005; Sarchiapone et al., 2009). Moreover, biological links have been established between aggression and suicide attempts. Serotonergic function is crucial for the regulation of emotional responses, impulsivity, and aggression (Gietl et al., 2007; Braquehais et al., 2010) and low serotonergic activity has been demonstrated to correlate with suicidal behavior across a number of studies (Mann et al., 1999; Kamali et al., 2001). Similarly, alterations in cholesterol homeostasis have been implicated in attempted suicide and suicide among individuals with low serum cholesterol (Kim and Myint, 2004; Gietl et al., 2007), and studies of aggressive individuals have shown decreased levels of serum cholesterol relative to non-aggressive individuals (Buydens-Branchey et al., 2000; Troisi and D’Argenio, 2006). The common biological underpinnings of aggressive/impulsive traits and suicide attempts are consistent with assertions that aggression is part of a trait-like diathesis for suicidal behavior (Mann and Currier, 2007). Given that a propensity toward aggression is a stable characteristic (Huesmann et al., 1984; Kokko et al., 2009) that is associated with CPA (Lansford et al., 1995), it is a potentially important mediator of the relationship between CPA and suicide attempts.

A recent study (Bacsikai et al., 2009) tested this model among inpatients seeking help for symptoms of alcohol dependence. Although results indicated relationships between CPA and suicide attempts, and aggression and suicide attempts, there was no evidence that aggression mediated the relationship between CPA and suicide attempts. However, this important study was limited by the use of a question to identify CPA that contained the word “abused” - a practice that decreases sensitivity in the identification of childhood maltreatment (Thombs et al., 2006). Further, it is unclear whether results with inpatient alcoholics generalize to criminal offender populations. Criminal offenders have high rates of CPA (Malinosky-Rummell and Hanson, 1993) and suicide attempts (Fazel et al., 2008), making this an important population in which to study mediators of the CPA-suicidal behavior relationship. Indeed, Verona et al. (2005) found that poor behavioral constraint, a personality construct inversely associated with aggression, mediates the relationship between CPA and suicide attempts in female criminal offenders. However, we are aware of no prior studies that have examined aggression as a mediator of the relationship between CPA and suicide attempts among offenders.

## Aims of the Study

We examined the relationship between CPA and suicide attempts among criminal offenders in a jail diversion program. We hypothesized that both CPA and lifetime aggression would be associated with suicide attempts. We also hypothesized that lifetime aggression would mediate the relationship between CPA and later suicide attempts. Informed by prior research on risk factors for suicide attempts, we incorporated several covariates in our analyses, including ethnicity, gender, age, and education levels.

## 2. Methods

### 2.1 Subjects

Participants were 199 males and 67 females ( $N = 266$ ), ages 18–62 ( $M = 33.7$ ;  $SD = 11.0$ ), participating in a pretrial supervision program in the Northeastern United States subsequent to receiving criminal charges. The sample was 51.5 % African American ( $N = 137$ ), 29.3 % European American ( $N = 78$ ), 11.3 % Hispanic ( $N = 30$ ), and 7.9 % other ( $N = 21$ ). Mean education level (i.e., highest grade completed) was 11.4 ( $SD = 1.9$ ). The mean number of lifetime violent charges (including robbery, assault, murder, weapons charges, kidnapping, arson, criminal damage to property, and sex crimes; Walsh et al., 2004) was 2.1 ( $SD = 3.4$ ).

### 2.2 Procedures

Following a brief announcement about the study, individuals who stepped forward to participate and provided consent completed a number of self-report measures. All forms were checked for missing data and errors prior to ending the session. Participants were compensated with a \$20 gift card. Among those who heard the announcement, 73.8% participated.

### 2.3 Measures

**Childhood Physical Abuse**—We asked participants to report frequency of physical abuse before age 18 on a 1-to-5 scale from “never” to “very often.” Following Dube et al. (2001), we used the following question: “How often did a parent, step-parent, or adult living in your home hit you so hard that you had marks or were injured?” Forty-four percent of the sample ( $n = 116$ ) reported at least one instance of CPA (Mean score = 1.89,  $SD = 1.25$ ).<sup>1</sup>

**Aggression**—Frequency of aggressive behavior since age 13 was assessed using the 5-item aggression subscale of the Life History of Aggression Questionnaire (LHAQ), a reliable and valid measure of overt verbal and physical aggression that yields a continuous score (Coccaro et al., 1997). The LHAQ uses 0–4 scales to assess the frequency of different types of aggression from “none” to “more events than can be counted.” In the present sample, internal consistency for the aggression subscale was adequate ( $\alpha = 0.87$ ; mean score = 11.55,  $SD = 6.78$ ).

**Suicide Attempts**—Participants were asked to respond yes or no to the question “have you ever tried to kill yourself or attempted suicide?” The item is a modification of the suicide attempt question from the National Comorbidity Survey (Kessler et al., 1999) and shows good test-retest reliability (Conner et al., 2007). In the current sample, 15.4% ( $n = 41$ ) of participants reported a history of a suicide attempt.

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<sup>1</sup>Because CPA continuous scores exhibited non-normal distributions, we conducted all analyses two additional times. First we used a categorical variable (abuse vs. none). Then we used a variable that was transformed to improve the distribution of the continuous score. These analyses yielded results that were equivalent results to those reported.

## 2.4 Data Analysis

Based on the procedure developed by Baron and Kenny (Baron and Kenny, 1986), the hypothesis that a propensity toward aggression mediates the relationship between CPA and later suicide attempts was tested using four steps: (1) A logistic regression analysis to examine whether there was a relationship between the predictor (CPA) and the outcome (lifetime suicide attempt); (2) a linear regression analysis to examine whether there was a relationship between the predictor (CPA) and the mediator (lifetime frequency of aggression); (3) a logistic regression analysis to examine if there was a relationship between the mediator (lifetime frequency of aggression) and the outcome (lifetime suicide attempt); and (4) a logistic regression analysis to examine whether the strength of the relationship between the predictor (CPA) and the outcome (lifetime suicide attempts) would be reduced if the mediator (lifetime frequency of aggression) was included in the model. We then conducted a Sobel test (Sobel, 1982) to determine whether the reduction in the relationship between CPA and suicide attempts was significant, indicating mediation. All analyses were conducted after adjusting for age (continuous), gender, marital status (dichotomous; married/living with a partner or other status), and education (dichotomous; less than 12 years of education or other). Additionally, we conducted two supplementary mediation analyses. In the first, we repeated the above analysis, including the centered CPA by aggression interaction term as recommended by Kraemer et al. to decrease the likelihood of Type I or Type II error (Kraemer et al., 2008). The second supplementary analysis was conducted to decrease the likelihood of specification error in the above model. Because there was temporal overlap between the aggression measure (“since age 13”) and CPA measure (“prior to age 18”), this analysis was designed to rule out the possibility that CPA accounted for the relationship between lifetime frequency of aggression and lifetime suicide attempts.

## 3. Results

### 3.1 Preliminary Analyses

A comparison of demographic characteristics by suicide attempt status is presented in Table 1. Criminal offenders who reported lifetime suicide attempts were older,  $t = -2.34$ ,  $p < 0.01$ , than those who did not. A higher percentage of women (28.4%) than men (11.1%) reported lifetime suicide attempts,  $\chi^2 = 11.5$ ,  $p < 0.01$ . No group differences were found across race, marital status, or education.

### 3.2 The relationship of CPA and Aggression to Suicide Attempts

After controlling for age, gender, marital status, and education, CPA was associated with lifetime suicide attempts,  $B = 0.34$ ,  $Wald = 6.89$ ,  $p < 0.01$ ,  $OR (95\% CI) = 1.41 (1.09, 1.82)$ , and frequency of aggression,  $B = 2.27$ ,  $p < 0.001$ ,  $R^2 = .10$ . Frequency of aggression was also associated with lifetime suicide attempts,  $B = 0.09$ ,  $Wald = 11.47$ ,  $p < 0.01$ ,  $OR (95\% CI) = 1.10 (1.04, 1.16)$ .<sup>2</sup> When aggression was entered into the regression model the association between CPA and lifetime suicide attempts became non-significant,  $B = 0.18$ ,  $Wald = 1.45$ ,  $p = 0.23$ ,  $OR (95\% CI) = 1.19 (0.89, 1.60)$ , supporting the mediation hypothesis (see Figure 1). Results of a Sobel test indicated significant mediation,  $z = 3.05$ ,  $p < 0.01$ .

<sup>2</sup>In order to ensure homogeneity of regression, we tested all covariate by predictor interactions. All interaction terms were non-significant.

### 3.3 Supplementary Analyses

We ran the above analyses a second time, including the CPA by aggression interaction term as recommended by Kraemer et al. (2008). With the interaction term included, the previously significant association between CPA and lifetime suicide attempt became non-significant,  $B = 0.21$ ,  $Wald = 1.92$ ,  $p = 0.17$ ,  $OR (95\% CI) = 1.24 (0.92, 1.68)$ , as in the primary analysis. In the second supplementary analysis, we reversed CPA and aggression in the model in order to rule out the possibility that CPA mediated the relationship between aggression and suicide attempts. The association between aggression and lifetime suicide attempts remained significant after CPA was taken into account in the regression model,  $B = 0.78$ ,  $Wald = 6.60$ ,  $p < 0.05$ ,  $OR (95\% CI) = 1.18 (1.02, 1.15)$ , not supporting the alternative mediation model.

## 4. Discussion

Our results are consistent with studies that have identified CPA as a distal risk factor for a variety of negative outcomes. In a sample of criminal offenders, we found that CPA was associated with both lifetime frequency of aggression and lifetime history of a suicide attempt. Our finding of an association between aggression and lifetime suicide attempts is also consistent with prior studies (Brezo et al., 2006), but constitutes, to our knowledge, the first demonstration of this relationship among criminal offenders. Notably, we found that lifetime aggression is a mediator of the relationship between CPA and lifetime suicide attempts. With the finding that frequency of aggression, in part, accounts for this relationship, we have begun to clarify one of the mechanisms by which CPA can influence suicidal behavior in criminal offenders.

The results of our mediation analysis are consistent with a model whereby the experience of CPA leads to a vulnerability to aggression that confers risk for a suicide attempt. These findings fit with prior neurobiological research. There is evidence that a positive pattern of early experiences is fundamental for healthy brain development (Perry and Pollard, 1998). Conversely, animal and human research suggests that early traumatic experiences and parent-child negativity may compound genetic vulnerability to impaired serotonergic functioning (Matsumoto et al., 2005; Brent and Mann, 2006; Macri et al., 2007; Crowell et al., 2008). Attenuated serotonergic activity may underlie impulsivity (Braquehais et al., 2010) which, in turn, leads to a greater propensity toward acting on aggressive impulses (Mann, 2003) that are directed toward the self or others. Our findings provide additional evidence that a tendency toward aggression is one key link between CPA and suicide attempts.

Among abused individuals, the presence or absence of certain psychosocial variables (e.g., hopelessness, family cohesion) may determine whether underlying aggressive impulses are directed toward the self, in the form of suicidal behavior, or toward others (Plutchik et al., 1989). Yet, other-directed aggression itself has serious consequences at the social level that may also contribute to suicidal behavior. Aggressive children and adolescents may experience higher levels of peer rejection than their non-aggressive peers (Kerestes and Milanovic, 2006), potentially leading to increased levels of psychopathology (Masten, 2005). Similarly, in adulthood aggression may contribute to continued social difficulties and may disrupt romantic relationships, leading to an increased likelihood of suicidal behavior (Yen et al., 2005). Moreover, aggression may result in legal difficulties, adding to overall levels of stress and creating additional risk (Yen et al., 2005). Future studies of CPA, aggression, and suicidal behavior would benefit from the incorporation of variables related to stressful life events, social functioning, and psychopathology in order to more comprehensively map the network of relationships that contribute to the CPA-suicidal behavior relationship.

Our results underscore the importance of routinely assessing suicide risk among individuals who exhibit aggression. Moreover, our findings raise the possibility that successful treatment of aggressive behavior among offenders with histories of CPA may also have a positive impact on suicide attempt risk. Pharmacological agents used to treat aggression and impulsivity (e.g., selective serotonin reuptake inhibitors, mood stabilizers) also impact suicide risk (Siever, 2008). Moreover, adaptations of Dialectical Behavior Therapy (Linehan, 1993) have been used to treat impulsivity, suicidal behavior, and aggressive behavior in forensic settings with some success (Berzins & Trestman, 2004; Evershed et al., 2006). More research is necessary in this area in order to better understand whether decreasing aggression among offenders reduces suicide risk, and to elaborate the mechanisms by which this might occur. One possibility is that reductions in impulsivity that result from treatment reduce the propensity to act on aggressive impulses toward the self or others.

While our findings indicate that aggression is one mechanism by which CPA influences suicide attempt risk, a next step is to clarify the type of aggression that mediates this relationship. The above discussion applies primarily to impulsive aggression, which occurs in response to a perceived threat or provocation and involves affective arousal and rash responding (Berkowitz, 1993). However, a significant amount of research has been conducted on proactive aggression, which is premeditated and is used as a means to obtain a subsidiary goal (Berkowitz, 1993). Childhood abuse is more highly associated with impulsive aggression than proactive aggression (Connor et al., 2004; Murray-Close, 2010), and most research on the link between aggression and suicidal behavior has focused on impulsive aggression (Turecki, 2005). However, a limitation of our study is that our measure of lifetime aggression did not distinguish between impulsive and proactive aggression. Whereas impulsive aggression is the modal form of aggression in both non-forensic and forensic populations (Stanford et al., 2003; Kockler et al., 2006), offender samples may contain relatively high proportions of proactively aggressive individuals (Kockler et al., 2006; Swogger et al., 2010). Thus, we cannot rule out that tendencies toward proactive aggression played a role in our findings. This possibility is underscored by a recent study of substance dependent individuals that found a relationship between proactive aggression and suicide attempts (Conner et al., 2009), indicating that the link between aggression and suicide attempts may not be limited to impulsive aggression. Future research examining the link between CPA and suicide attempts should take into account heterogeneity in aggression. Such a distinction has the potential to further increase the specificity of suicide risk assessments and further elucidate mechanisms that link CPA to suicidal behavior.

Several additional limitations of our study are noteworthy. First, CPA was assessed using a single question, potentially limiting reliability. Notably, however, the use of a small number of questions rather than a large protocol has been recommended to maximize specificity in childhood maltreatment research (Fang and Corso, 2008), and single-item screens similar to that used in the present study have demonstrated adequate sensitivity (Thombs et al., 2006). Second, the retrospective assessment of childhood abuse is not optimal given the potential for underreporting due to memory or social desirability biases (Fang and Corso, 2008). Although there is evidence that CPA can be assessed retrospectively by self-report with reasonable accuracy (Widom and Shepard, 1996), longitudinal studies would enable greater confidence with regard to the accuracy of data on CPA. Moreover, the incorporation of objective measures of CPA, along with self-report measures, in future studies would further enhance coverage of the construct. Finally, whereas we examined differences between suicide attempters and non-attempters, additional information might be gleaned from the use of frequency of suicide attempts as an outcome variable in future studies in order to further delineate those most at risk for suicide attempts.

In summary, we found that lifetime aggression is a mediator of the relationship between CPA and suicide attempts in a sample of criminal offenders. This suggests that the assessment of trait aggression, and intervention to reduce aggression among offenders with histories of CPA, may be important in the prevention of suicide attempts. Future studies using offender and non-offender samples will help to clarify the robustness of our findings and their generalizability to other high-risk populations.

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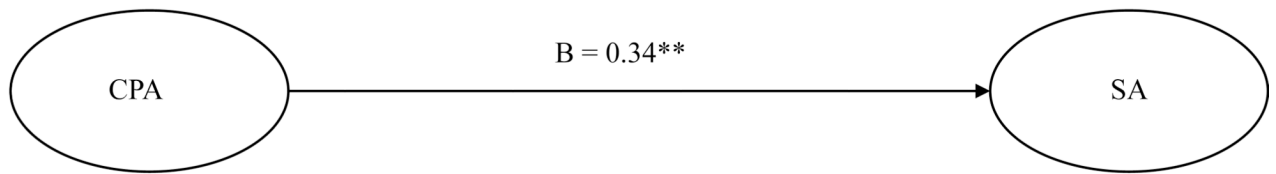
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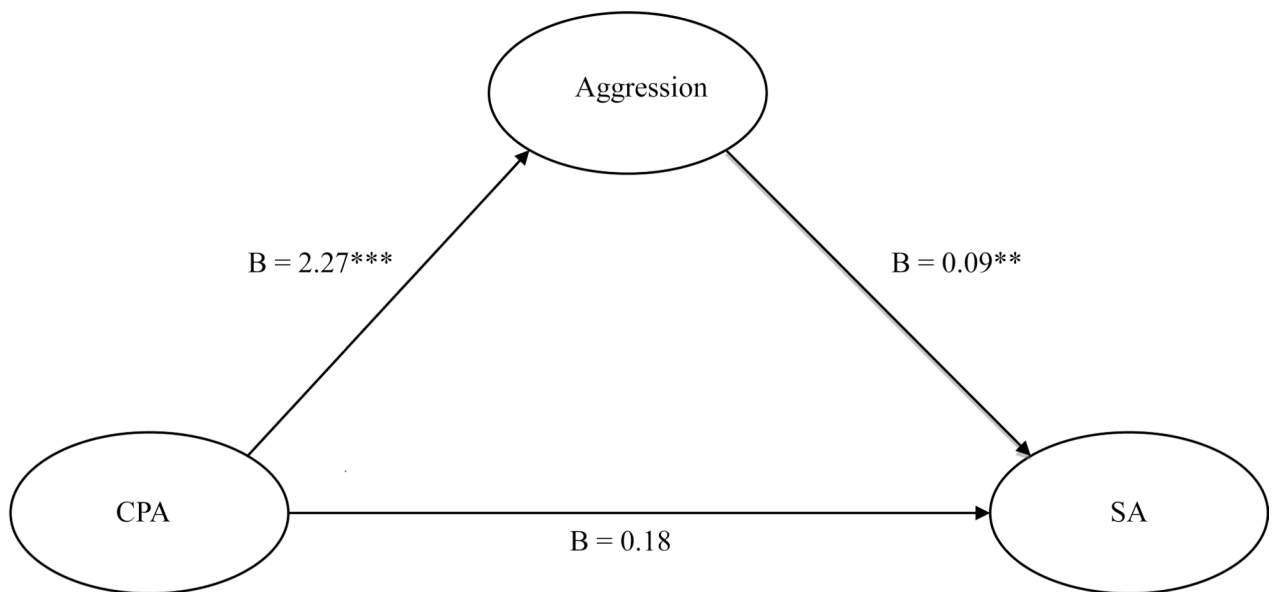
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Direct Effect



Mediation Effect



**Fig. 1.** Relationship of childhood physical abuse and suicide attempts: direct and mediation effects.

**Table 1**

Descriptive data and univariate comparisons of subjects with and without lifetime SA

Demographic Variables	Total (N=266)		SA (N=41)		No SA (N=225)		Test	P-value
	N	%	N	%	N	%		
Age ( <i>M, SD</i> )	33.7	11.0	36.8	8.7	33.2	11.3	$t = -2.34$	0.001
Gender							$\chi^2 = 11.51$	0.001
Men	199	74.8	22	11.1	117	88.9		
Women	67	25.2	19	28.4	48	71.6		
Race							$\chi^2 = 1.72$	0.633
White	78	29.3	15	19.2	63	80.8		
Black	137	51.5	19	13.9	118	86.1		
Hispanic	30	11.3	5	16.7	25	83.3		
Other race	21	7.9	2	9.5	19	90.5		
Marital Status							$\chi^2 = 0.00$	0.980
Married/living with a partner	58	21.8	9	15.5	49	84.5		
Single/separated/divorced/widowed	208	78.2	32	15.4	176	84.6		
Education							$\chi^2 = 0.32$	0.571
Education < 12 years	147	55.3	21	14.3	126	85.7		
Education ≥ 12 years	119	44.7	20	16.8	99	83.2		