

Does Attentional Control Mediate the Association Between Adverse Early Experiences and Child Physical Abuse Risk?

Julie L. Crouch · Christopher R. Shelton · Joseph R. Bardeen · Regina Hiraoka · Joel S. Milner · John J. Skowronski

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Abstract The present study examined the extent to which attentional control mediates the relationship between adverse early life experiences (e.g., harsh discipline, low perceived support) and child physical abuse (CPA) risk in adulthood. Participants included 138 general population parents (30.4% fathers and 69.6% mothers) who completed self-report measures of early life experiences, attentional control, and CPA risk. Results revealed that attentional control partially mediated the association between adverse early environment and CPA risk scores, Sobel test=2.65, $SE=0.86$, $p=.007$. More specifically, individuals exposed to adverse early environments (characterized by harsh discipline and/or low perceived support) reported lower levels of attentional control, which in turn was associated with increased risk of hostile, aggressive, and abusive parenting.

Keywords Attention · Child abuse potential · Parenting · Intergenerational transmission

Current theories of attention include both automatic (bottom-up) and controlled (top-down) components. For example, attentional alerting is a stimulus-driven

(bottom-up) process in which attention is involuntarily captured by stimulus characteristics (Corbetta and Shulman 2002). In contrast, attentional control is a top-down process that allows one to voluntarily shift and focus attention (e.g., Corbetta and Shulman 2002; Eysenck et al. 2007). Attentional control is thought to be part of the broader construct of effortful control, which allows one to inhibit dominant responses to stimuli (Posner and Rothbart 2007). More specifically, attentional control may enable individuals to regulate emotion and behavior by allowing them to shift from dominant reflexive reactions to more intentional, controlled processes.

Indeed, it has been theorized that attentional control plays a central role in one's ability to adaptively regulate cognition, emotion, and behavior (Derryberry and Rothbart 1988; Posner and Rothbart 2007). Supporting this view are data showing that deficits in attentional control are associated with a variety of problems in functioning. For example, lack of attentional control is associated with various personality disorders, as well as high levels of fear, frustration, anxiety, and depression (Bishop et al. 2007; Claes et al. 2009; Derryberry and Rothbart 1988; Reinholdt-Dunne et al. 2009).

Variations in attentional control are the result of genetic, developmental, and environmental factors (Gonzalez et al. 2003; Liston et al. 2009; Posner and Rothbart 2007). For example, high levels of stress in one's environment have been found to negatively impact attentional control (Liston et al. 2009). Capacity for attentional control typically develops throughout the first decade of life and is influenced by qualities of early caregiving (Rothbart and Rueda 2005). For example, mothers' efforts to help their infants focus their attention (e.g., pointing to or tapping on an object) are associated with increased attentional control in children younger than 2 years of age (Belsky et al. 1980; Parinello

Julie L. Crouch, Ph.D., Director; Christopher R. Shelton, B.A., Research Assistant; Joseph R. Bardeen, M.A., Research Assistant; Regina Hiraoka, M.A., Research Assistant; Joel S. Milner, Ph.D., Distinguished Research Professor; and John J. Skowronski, Ph.D., Distinguished Research Professor, are all with the Center for the Study of Family Violence and Sexual Assault, Northern Illinois University, DeKalb, IL.

J. L. Crouch (✉) · C. R. Shelton · J. R. Bardeen · R. Hiraoka · J. S. Milner · J. J. Skowronski
Center for the Study of Family Violence and Sexual Assault,
Northern Illinois University,
DeKalb, IL 60115, USA
e-mail: jcrouch@niu.edu

and Ruff 1988). Quality of the family environment during preschool years is associated with the ability to sustain attention and inhibit impulsive responding among 4-year-olds (NICHD Early Child Care Network 2003). Moreover, among school aged children, attentional control is inversely associated with measures of aggression, anxiety, and neuroticism (Meester et al. 2007). As these studies suggest, characteristics of early caregiving environments are associated with variations in attentional control in children, which in turn are associated with social and emotional adjustment.

Attentional Control and Child Physical Abuse Risk

As noted above, low levels of attentional control are associated with negative affective states and socio-emotional difficulties. Although considerable research indicates that negative affective states (e.g., distress, unhappiness, anger) are associated with increased risk for problems in caregiving, particularly adult child physical abuse (CPA) risk (e.g., Mammen et al. 2002; Milner and Crouch 1999), a possible link between attentional control and adult CPA risk has received only limited examination.

Two studies have used the Stroop color word task to examine attentional abilities among mothers who varied in CPA risk (Lohr 2001; Nayak and Milner 1998). The Stroop color word task assesses the ability to direct attention, and requires a strong reflexive response (e.g., reading a color word) to be inhibited so that a non-reflexive, more effortful, response (i.e., naming the color of the ink in which the word is printed) can be performed. In both the Lohr (2001) and Nayak and Milner (1998) studies, high (compared to low) CPA risk mothers had greater difficulty inhibiting the strong reflexive reading response and naming the color in which a word was printed. In other words, high CPA risk mothers had greater difficulty directing their attention to perform the more effortful task and they more often engaged in the competing reflexive response.

To extend our understanding of the role of attentional control in CPA risk, the present study examined the extent to which self-reported attentional control abilities are associated with CPA risk in a sample of general population parents. More specifically, the present study sought to examine whether higher CPA risk was associated with perceptions of oneself as having difficulty with attentional control in daily life (e.g., difficulty focusing attention when trying to solve a problem). Further, given that the quality of one's early caregiving environment appears to be correlated with both attentional control (Belsky et al. 1980; NICHD Early Child Care Research Network 2003) and CPA risk in adulthood (e.g., Coohy and Braun 1997; Crouch et al. 2001), the possibility that attentional control may serve as a mediator through which early life experiences (e.g., harsh discipline,

low perceived support) influence CPA risk in adulthood also was examined.

To test whether attentional control partially mediates the influence of adverse childhood experiences on adult CPA risk, we followed the four-step approach to testing mediation recommended by Baron and Kenny (1986). More specifically, we hypothesized that: (a) adverse early environments (characterized by more harsh discipline and lower levels of perceived support) would be associated with higher adult CPA risk; (b) adverse early environments would be associated with lower levels of attentional control; (c) attentional control would be inversely associated with adult CPA risk; and (d) the association between adverse early environments and adult CPA risk would be reduced but not eliminated when attentional control was taken into account. Given that adverse early environments likely influence adult CPA risk through multiple factors, we predicted that attentional control would only partially mediate the association between adverse early environments and adult CPA risk.

Methods

Participants

An initial pool of 217 general population parents was recruited to participate in this study. Of these, 17 (7.8%) parents were excluded due to excessive missing data (more than 10% of responses missing on one or more of the study measures), 4 (1.8%) were excluded because they appeared to engage in random responding, and 58 (26.7%) were excluded due to response distortion (i.e., faking good) on the Child Abuse Potential (CAP) Inventory (Milner 1986; described below).

Thus, the final sample consisted of 138 parents (30.4% fathers and 69.6% mothers) with a mean age of 32.7 years ($SD=9.9$). The mean highest grade completed by participants in the final sample was 14.2 years ($SD=3.0$). With respect to marital status, 36.3% of respondents in the final sample were single, 34.8% were married, 15.6% cohabitating, 12.6% separate/divorced, and .7% endorsed "other." All parents in the final sample had one or more children living with them; however, no restriction was placed on the age of the child(ren) living in the home. The mean number of children was 2.1 ($SD=1.2$). Of the 138 respondents, 11.6% of the sample indicated that they were of Hispanic origin. With regard to racial composition of the final sample, 51.4% of the parents indicated they were White/Caucasian, 39.9% Black/African American, 5.1% indicated that they belonged to more than one racial category, and 3.6% did not answer this question.

Participants who were excluded from the final sample were comparable to those who were included with respect to

age, marital status (coded married, cohabitating, single, or other), and number of children (p 's > .05). Excluded participants tended to have fewer years of education than included participants (excluded, $M=13.2$ years, $SD=3.7$; included, $M=14.2$ years, $SD=3.0$), $F(1, 209)=3.90$, $p=.05$. Black/African American participants were excluded at a higher rate than non-Black/African American participants, $\chi^2(217)=11.04$, $p<.01$; whereas White/Caucasian participants were included at a higher rate than non-White/Caucasian participants, $\chi^2(217)=12.72$, $p<.01$. Despite differential inclusion/exclusion rates across Black/African American and White/Caucasian participants, the final sample was relatively diverse with respect to race/ethnicity (51.4% White/Caucasian, 39.9% Black/African American, 8.7% other/unknown).

Materials

Attentional Control Scale (ACS) The ACS was designed to measure self-reported attentional control abilities (Derryberry and Reed 2002). The ACS total scale consists of 20 questions that are responded to on a 4-point ordered category scale ranging from 1 (*almost never*) to 4 (*always*). The scale was designed to capture the respondent's perceived ability to focus attention (e.g., "When I need to concentrate and solve a problem, I have trouble focusing my attention"), shift attention between tasks (e.g., "When concentrating I ignore feelings of hunger or thirst"), and to flexibly control thought (e.g., "I can become interested in a new topic very quickly when I need to"). Derryberry and Reed (2002) reported that the internal consistency for the ACS total score was .88. In the present study, the internal consistency (Cronbach's alpha) of the ACS total score was .86.

With respect to construct validity, higher ACS total scores are predictive of greater ability to disengage from threatening stimuli in highly anxious individuals (Derryberry and Reed 2002). Moreover, Matthews et al. (2004) found that higher ACS scores were associated with higher levels of activation in brain areas related to regulation of emotion. Finally, Bardeen and Read (2010) found that, among trauma victims, higher ACS scores predicted quicker recovery from negative mood after victims provided a detailed description of their prior traumatic experiences.

CPA Risk Status CPA risk status was determined using the CAP Inventory (Milner 1986), which is a 160-item, agree-disagree, self-report questionnaire. Scores on the physical abuse scale range from 0 to 486. The signal detection theory cut-score for the CAP is 166; whereas the clinical cut score is 215 (Milner 1986). In addition to the abuse scale, the CAP Inventory also contains three validity scales (i.e., random responding, faking good, and faking bad) that were used to

detect response distortion. Participants who were identified as engaging in any form of response distortion were excluded from the final sample, with one exception. According to Milner (1986), parents identified as faking good but who still obtain CAP abuse scores above 166 may be classified as high CPA risk cases; therefore, these individuals were included in the final sample.

Research has documented internal consistency estimates ranging from .92 to .95 for general population and maltreating parents, and test-retest reliabilities in general population samples of .91 for 1-day, .90 for 1-week, .83 for 1-month, and .75 for 3-month intervals (Milner 1986). Internal consistency of the CAP abuse scale as completed by the present sample was .89.

Numerous studies have reported construct validity data for the CAP abuse scale (see Milner 1986, 1994, 2003). CAP Inventory abuse risk scores are significantly associated with measures of aggression and with the use of harsh discipline strategies in parents. Classification rates based on discriminant analysis of child physical abusers and comparison parents are in the mid-80% to low-90% range. Studies examining the CAP's specificity indicate 100% correct classification of nurturing foster parents, low-risk mothers, and nurturing mothers. Prospective research revealed a significant association between CAP abuse scores and subsequent child physical abuse.

Adverse Early Environment The Childhood History Questionnaire (CHQ; Milner et al. 1990), a self-report questionnaire, was used to gather information about the respondent's: (a) history of receipt of harsh discipline and (b) perceptions of early support. For harsh discipline, the version of the CHQ used in the present study contained three questions assessing various forms of harsh discipline (i.e., slapping/kicking, punching/poking, hair pulling) inflicted on the respondent by a parent or other caregiver prior to age 14. The responses to the harsh discipline items were all made on a 5-point ordered category scale ranging from 1 (*never*) to 5 (*very often*). Higher scores reflect more frequent receipt of harsh discipline.

For perceived support, respondents were asked to indicate the extent to which they as a child: (a) had an adult who really cared about them, and/or (b) had a friend who really cared about them. Responses to the two support items were made on a 5-point ordered category scale ranging from 1 (*never*) to 5 (*very often*). The support items were reflected such that higher scores represented lower levels of perceived support.

Responses to the three harsh discipline items and the two early support items were summed to compute an Adverse Early Environment index. Higher scores on the Adverse Early Environment index reflect perceptions of more frequent receipt of harsh discipline and lower levels of

perceived support. The internal consistency of the Adverse Early Environment index was .75.

Procedures

The following procedures were reviewed and approved by the institutional review board at the first author's institution. To recruit parents for the study, informational flyers were distributed through local agencies (e.g., daycares, churches, social service agencies). The informational flyers stated that parents would be asked to "complete a packet of questionnaires," which would take approximately 50 min and for which participants would receive \$20. To ensure that an adequate number of high risk participants were recruited, we deliberately targeted high CPA risk participants by distributing flyers in programs that served families with risk factors for abuse (e.g., voluntary home visiting programs, shelter services).

Upon arrival for the data collection session, parents were asked to read and sign a consent form that provided them with information regarding the procedures, risks, benefits, and voluntary nature of their participation. Data were collected in small groups in a classroom setting. After completing the questionnaires, parents were given a debriefing statement and paid \$20.

Analytic Strategy

Pearson correlations were used to assess bivariate associations between measures of adverse early environment, attention, and CPA risk. Before conducting the analyses to test for mediation, the associations between demographic factors and the variables of interest (Adverse Early Environment index, ACS total score, and CAP abuse scale) were

examined. Demographic variables significantly associated with Adverse Early Environment, ACS scores, or CAP abuse scores were entered as control variables in the mediation analyses. Next, the four-step approach to mediation testing outlined by Baron and Kenny (1986) was used to examine whether attentional control mediated the association between adverse early environment and adult CPA risk. The extent of mediation was examined using the Sobel test.

Results

Table 1 presents the bivariate associations between the Adverse Early Environment scale, the ACS, and the CAP abuse scale and subscales. None of the demographic variables were significantly associated with the Adverse Early Environment Index scores or the ACS total scores (all p 's > .05). For CPA risk, both education ($r = -.18$, $p = .041$) and marital status (coded single/separated/divorced versus married/cohabitating; $r = -.24$, $p = .004$) were significantly associated with CAP abuse scores. To account for the possible influence of these variables on the mediation analysis results, both education and marital status were entered as control variables in all regression analyses.

Hypothesis 1—Are Adverse Early Environment Scores Associated with CPA Risk?

After controlling for education and marital status, results of the regression predicting CAP abuse scores revealed that Adverse Early Environment index scores were predictive of CAP abuse scores ($\beta = .32$, $p < .001$), such that participants

Table 1 Bivariate associations for attentional control, adverse early environment, and child abuse potential scales/subscales

Scale/subscales	1	2	3	4	5	6	7	8	9
1. ACS Total score	–	–.30**	–.40**	–.41**	–.02	–.29**	–.26**	–.14	–.28**
2. Adverse Early Environment		–	.34**	.40**	–.13	.33**	.28**	.15	.37**
3. CAP Abuse scale			–	.90**	.33**	.60**	.56**	.37**	.67**
4. CAP Distress				–	.12	.45**	.45**	.34*	.58**
5. CAP Rigidity					–	.11	–.01	.07	.34**
6. CAP Unhappiness						–	.37**	.19*	.39**
7. CAP Problems from family							–	.15	.37**
8. CAP Problems with child/self								–	.19*
9. CAP Problems from others									–
<i>M</i>	33.13	7.89	129.98	77.41	17.05	11.98	11.08	4.25	10.39
<i>SD</i>	9.50	3.65	89.50	66.20	15.06	12.67	12.18	6.34	8.16

$N = 138$; ACS=Attentional Control Scale; CAP=Child Abuse Potential

* $p < .05$, ** $p < .01$

with higher adverse early environment scores obtained higher CAP abuse scores (see Table 2, Model 2).

Hypothesis 2—Are Adverse Early Environments Associated with Lower Attentional Control Abilities?

As expected, results of the regression predicting attentional control revealed that adverse early environment index scores were predictive of ACS total scores, $B=-.79$, $SE=.22$, $\beta=-.30$, $p=.001$, $R^2=.09$, such that participants with higher adverse early environment scores obtained lower ACS total scores. Neither education nor marital status was a significant predictor of ACS total scores ($p's>.10$).

Hypothesis 3—Is Attentional Control Associated with CPA Risk?

According to Baron and Kenny (1986), the association between a proposed mediator (attentional control) and the outcome of interest (CPA risk) must be significant after taking into account their shared association with the initial predictor variable (adverse early environments). Results of the regression analyses conforming to this approach revealed that ACS total scores were predictive of CAP abuse scores ($\beta=-.31$, $p<.001$), even after controlling for education, marital status, and early adverse environment index scores (see Table 2, Model 3). Hence, parents reporting lower attentional control were higher in CPA risk.

Table 2 Summary of regression analysis for variables predicting CAP inventory abuse scores ($N=138$)

Variable	<i>B</i>	<i>SE B</i>	β
Model 1			
Education	-3.84	2.49	-.13
Marital status	-43.79	15.15	-.24**
Model 2			
Education	-3.12	2.37	-.10
Marital status	-39.20	14.40	-.22**
Adverse Early Environment	7.87	1.97	.32**
Model 3			
Education	-3.32	2.24	-.11
Marital status	-40.24	13.65	-.22**
Adverse Early Environment	5.55	1.96	.22**
ACS Total Score	-2.92	.74	-.31**

$R^2 = .08$ for Model 1; R^2 change = .10 for Model 2; R^2 change = .09 for Model 3 ($p's < .01$); ACS = Attentional Control Scale; CAP = Child Abuse Potential.

** $p < .01$

Hypothesis 4—Is the Association Between Adverse Early Environments and CPA Risk Reduced After Attentional Control is Taken into Account?

As shown in Table 2, after controlling for education, marital status, and ACS total scores, the Adverse Early Environment index remained a significant predictor of CAP abuse scores, albeit the magnitude of the association between adverse early environment and CAP abuse scores was reduced by the inclusion of ACS scores in the final model ($\beta = .32$ versus $.22$; see Table 2, Models 2 and 3).

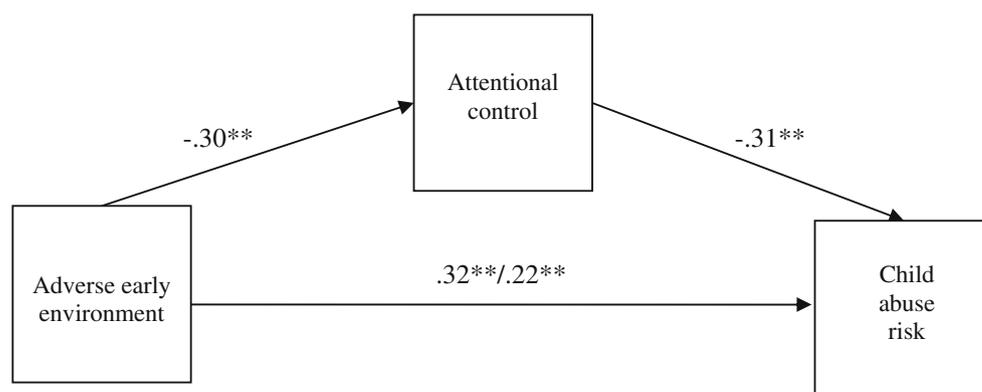
The Sobel test was used to confirm the significance of the mediated path from the Adverse Early Environment to CAP abuse scores through ACS total scores, Sobel test = 2.65, $SE = 0.86$, $p = .007$. Figure 1 presents the standardized weights for the final model examining attentional control as a mediator of the relationship between adverse early environment and child abuse risk.

Discussion

As expected, adverse early environments, characterized by harsh discipline and low levels of support, were associated with lower levels of attentional control and higher CPA risk in adulthood. These findings are consistent with previous research suggesting that the quality of early caregiving influences the development of self-regulation and attentional control (e.g., Belsky et al. 1980). Further, results from the mediational analyses indicate that attentional control may partially mediate the intergenerational transmission of problematic parenting. That is, individuals exposed to harsh discipline and who lacked support early in life may fail to develop the attentional control necessary to allow them to respond flexibly to the competing demands of parenting and/or to respond adaptively to negative thoughts and feelings that may arise during difficult moments in parenting.

The present study is the first to demonstrate that self-reported attentional control is inversely related to adult CPA risk. Parents at higher risk of CPA were more likely to describe themselves as having greater difficulty focusing their attention and maintaining concentration. Further, parents at higher risk of CPA described themselves as having greater difficulty blocking out distracting noises or thoughts and as being less effective at multi-tasking. Post-hoc inspection of the bivariate associations for the CAP subscales (see Table 1) revealed that attentional control was associated with negative affective states and interpersonal problems (e.g., distress, unhappiness, problems from family, problems from others) but was not associated with risk-potentiating beliefs about children and parenting (as measured on the CAP rigidity and problems with child/self subscales). Collectively, these findings suggest that

Fig. 1 Standardized weights for the final model examining attentional control as a mediator of the relationship between adverse early environment and child abuse risk. ** $p < .01$



attentional control may influence CPA risk via its potentiation of negative affective states. In contrast, attentional control appears to operate independent of (although it may interact with) the presence of negative/rigid beliefs about parenting, children, and/or oneself.

Limitations of the present study include the fact that each of the measures examined was obtained through self-report. Hence, measurement bias may account for some of the associations observed among the constructs of interest. Further, self-reports of the quality of early rearing environments were obtained retrospectively, and as such are subject to recall bias. Moreover, the cross-sectional nature of the data limits the extent to which mediation/causation can be inferred. For example, while we suggest that attentional control influences CPA risk, it also is possible that the negative affective states characteristic of CPA risk may diminish attentional control. It should also be noted that CPA perpetration was not directly assessed in the present study, thus it is not clear whether the present findings generalize to abusive parents. Finally, demographic differences between those included and excluded in the study may limit the generalizability of our findings to general population parents.

These limitations notwithstanding, the findings reported herein suggest the need for additional research examining attentional processes in parents who are at risk for CPA. Replication and extension of the present study using a prospective longitudinal design would help clarify the causal mechanisms underlying the associations between early life experiences, attentional control, and parenting capacity. Such causal mechanisms likely range from basic neural systems to higher order cognitive/emotional processes. For example, attentional control may influence caregiving behavior by increasing one's capacity for empathy (Rothbart and Rueda 2005). More specifically, attentional control may allow a parent to shift attention from personal feelings of distress and to focus more on the thoughts and feelings of their children. Indeed, higher levels of personal distress and lower levels of empathic concern have been shown to be associated with increased CPA risk (Perez-Albeniz and de

Paul 2003). Moreover, research examining how attention is deployed in response to child-related stimuli and/or in stressful conditions would further elucidate the role attentional processes play in adult CPA risk.

If replicated, the present findings suggest that interventions designed to augment attentional control may prove useful in helping parents improve their emotional, cognitive, and behavior regulation, which in turn may reduce risk of hostile, aggressive, and abusive parenting behaviors. Indeed a number of interventions designed to strengthen attentional control have been developed and might prove useful with at-risk parents. For example, Tang et al. (2007) reported that participants randomly assigned to a brief meditation program (i.e., integrative mind-body training) showed improvements in attention, as well as reductions in negative affect (i.e., anxiety, depression, anger). Similarly, Jha et al. (2007) suggested that mindfulness training, such as Kabat-Zinn's (1994) mindfulness-based stress reduction program, may enhance components of attention. Kaplan and Berman (2010) proposed that attention restoration techniques, such as exposure to natural environments (e.g., parks, lakes, mountains), meditation, and sleep, may each strengthen attentional control, which in turn may improve self-regulation and reduce CPA risk.

Coda

Control over attentional processes is believed to be important to self-regulation. Attentional control allows individuals to pursue goals, respond adaptively to environmental demands, and regulate their emotional reactivity (e.g., Claes et al. 2009; Derryberry and Rothbart 1988; Posner and Rothbart 2007). The present findings are consistent with a growing body of literature indicating that the quality of one's early environment affects the development of higher order attentional abilities, which in turn may have long term implications for social and emotional adjustment. Reactive aggression toward children in the context of caregiving could be conceptualized as a breakdown in self-regulatory processes, in which intended goals associated with sensitive

and responsive caregiving are overridden by impulsive aggression triggered by mounting negative affective states. Findings from the present study are consistent with the possibility that deficits in attentional control may reduce one's ability to modulate negative affective reactions, resulting in increased risk of hostile, aggressive, and abusive parenting behaviors.

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