

# Does children's physiology mediate or moderate the relationship between exposure to violence and behavioral adjustment?

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## ABSTRACT

This study examined whether children's physiology mediated or moderated the relationship between children's exposure to community and inter-partner violence and children's behavioral adjustment in a low-income, rural sample. Forty-eight mothers and their 3-5 year old children participated in two home visits where the mothers reported on children's exposure to violence in the community, inter-partner violence, and children's behavioral adjustment. Additionally, mothers and children participated in a laboratory visit where children's physiology was collected during a baseline and frustrating situation.

Results revealed an interaction effect between children's violence exposure and vagal suppression during a frustrating task on children's behavioral adjustment even after controlling for SES. Children who showed greater vagal suppression were rated with the highest behavioral and emotional problems if they were in the high violence-exposure group but showed lowest adjustment problems if in the low violence-exposure group.

## AIMS

1.) To examine whether children's vagal suppression during a frustrating situation **mediates** the relationship between children's exposure to violence and their behavioral adjustment.

2.) To investigate whether children's vagal suppression during a frustrating situation **moderates** the relationship between children's exposure to violence and their behavioral adjustment.

## BACKGROUND

Research has consistently demonstrated that when children are exposed to high levels of violence within the community or home, they are at greater risk for the development of problematic outcomes. In particular, children who live in communities where high amounts of violence occur are more likely to display aggressive, disruptive, and antisocial behavior (e.g., Farrell & Bruce, 1997; Miller et al., 1999). Additionally, children exposed to high levels of interparental conflict is associated with children's behavioral and emotional dysfunction (e.g., Davies & Cummings, 1994; McDonald & Grych, 2006).

Recently, research has explored how children's cardiac vagal tone, or variability in heart rate due to respiration (i.e. RSA), is related to children's behavior and emotions. Vagal tone is believed to reflect one's ability to appropriately respond to the environment (Porges & Byrne, 1992; Porges, Doussard-Roosevelt, Portales, & Greenspan, 1996). In particular, children's vagal suppression regulates metabolic output allowing an individual to shift focus from internal homeostatic demands to generating strategies to control affective, cognitive, or behavioral arousal (e.g., Calkins, 1997; Porges et al., 1996). In other words, vagal suppression reflects the child's ability to flexibly engage and disengage from the environment. Research has shown that greater vagal suppression is associated with less behavior problems and better emotion regulation (e.g., Calkins, 1997; Degnan, et al., 2008; Porges et al., 1996). Further, links have been established between children's vagal suppression, exposure to interparental conflict, and behavior problems. El-Sheikh, Harger, & Whitson (2001) found that vagal regulation moderated the relationship between interparental conflict and adjustment problems. In particular, greater vagal regulation buffered boys against externalizing problems when exposed to high interparental verbal conflict, suggesting that good vagal regulation is a protective factor for children in environments high in parental conflict.

Despite the evidence that good vagal suppression may serve as a protective factor, Donzella and colleagues (2000a) found that greater vagal suppression during a situation designed to provoke anger/frustration in children was associated with higher ratings of tense/angry affect. This raises the question of whether it is reasonable to assume that vagal suppression is always the appropriate vagal response in every situation. Further, little is known about the role that vagal suppression plays in the developmental outcomes of children in families living in higher risk environments. In other words, under what conditions is vagal suppression adaptive? Does good vagal suppression serve as a risk or protector for low-income, rural children exposed to more community and inter-partner violence? This study was designed to investigate the role that children's vagal suppression plays in explaining the relations between exposure to violence and behavioral adjustment.

## METHOD

### Participants

- 48 mother-child dyads
- Referral Source: 24 Child and Youth Services (47.9%), 4 Family Intervention Crisis Services (8.3%), 21 Penn State FIRSt Families database (43.8%)
- Child Gender: 26 Female (54.2%), 22 Male (45.8%)
- Child Mean Age = 3.64 years
- Maternal Mean Age = 30 years
- Child Ethnicity: 38 White (79.2%), 1 African American (2.1%), 9 Multi-Racial (18.8%)
- Maternal Ethnicity: 44 White (91.7%), 1 African American (2.1%), 1 Hispanic/Latino (2.1%), 2 Multi-Racial (4.2%)
- Maternal Relationship Status: 28 Married (58.3%), 8 Single-Never Married (16.7%), 9 In a Committed Relationship (18.8%), 1 Divorced (2.1%), 2 Divorced but in a Committed Relationship (4.2%)
- Educational Attainment: 29 Left High School/High School/GED (60.4%), 13 Associates/College Degree (27.1%), 5 Masters (10.4%), 1 Post-Masters (2.1%)
- Income: 11 \$10,000 or less (22.9%), 17 \$10,001-\$30,000 (52.4%), 6 \$30,001-\$50,000 (12.5%), 13 \$50,001 or greater (12.1%), 1 unreported (2.1%)
- Type of Occupation: 7 Blue Collar (14.6%), 5 Clerical (10.4%), 10 Professional (20.8%), 26 Unemployed (54.2%)

### Procedure

Mothers and their preschool children were recruited from Child and Youth Services, Family Intervention Crisis Services, and the community to participate in the NIMH funded project called the FaMILY Study. The FaMILY study is an on-going project exploring how the stresses families experience and child maltreatment influence mother-child relationships, maternal emotion regulation, and children's self and emotion regulation development. Families participated in three visits: 2 home visits and 1 laboratory visit. For the current study, questionnaires obtained in the first and second home visits were used. In particular, mothers reported on children's exposure to violence in the community, their own inter-partner conflict, and children's behavioral adjustment. Additionally, children's baseline vagal tone and vagal suppression was collected during a frustrating situation in the laboratory visit.

### Measures

- Composite Violence Exposure
  - Children's Exposure to Community Violence (CECV; Richters & Martinez, 1993; Richters & Saltzman, 1990)
    - 52 item measure
    - Mothers reported on children's frequency of exposure to violence in the larger community that is assessed three ways: been victimized by, witnessed, or heard about 20 forms of violence and violence related activities
    - Sum of true answers
  - Revised Conflict Tactics Scale (CTS2; Straus et al., 1996)
    - 19 total items
    - Self-assessment that measures violence directed at the mother and the mother's partner
    - Verbal Aggression Scale (6 items)
    - Violence/Physical Aggression Scale (9 items)
  - Sum of standardized CECV, CTS2 Verbal Aggression, and CTS2 Violence/Physical Aggression scales
- Baseline Vagal Tone
  - Children watched a 5 minute neutral video
  - RSA edited in 30 second segments and averaged across segments
- Vagal Suppression
  - Children engaged in 4 minute frustrating situation called the Transparent Box (Goldsmith et al., 1999)
  - RSA edited in 30 second segments and averaged across segments
  - Subtracted Baseline RSA from Transparent Box RSA (baseline – task) for change RSA
- Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997)
  - 27 items rated by mother about her child
  - Total Behavior Problems Score composed of 5 subscales (Emotional Problems, Conduct Problems, Hyperactivity, Peer Problems, and Prosocial Behavior)
- Objective measure of SES using Adler's index (Adler et al., 2000; Operario et al., 2004; Wilkinson, 1999)
  - Standardized and averaged scores of mother's income, educational attainment, and occupational status

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## RESULTS

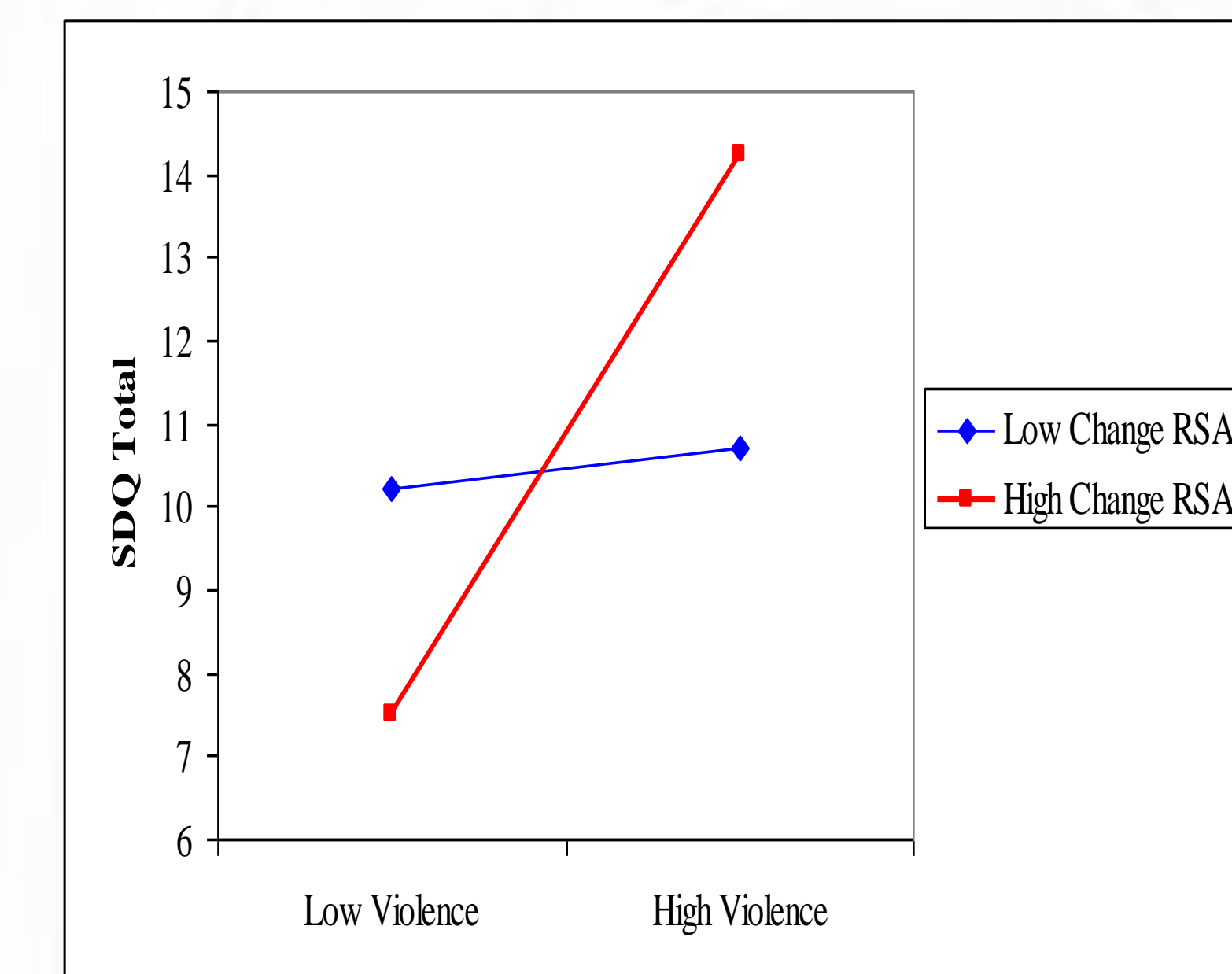
### 1.) Does children's vagal suppression during a frustrating task mediate the relationship between children's exposure to violence and behavioral adjustment?

•**NO**: Following the procedure outlined by Baron and Kenny (1986), mediation was not found. Although exposure to violence was related to SDQ Total Behavior problems ( $r = .47, p < .001$ ), there was no relationship between vagal suppression and SDQ Total Behavior Problems ( $r = -.02, p = n.s.$ ). Further, exposure to violence was related to SDQ Emotional Problems ( $r = .33, p < .05$ ), but vagal suppression was unrelated to SDQ Emotional Problems ( $r = -.06, p = n.s.$ ). Because vagal suppression (the mediator) was unrelated to SDQ Total Behavior Problems and Emotional Problems (the outcomes), we could not test for mediation.

### 2.) Does children's vagal suppression during a frustrating task moderate the relationship between children's exposure to violence and behavioral adjustment?

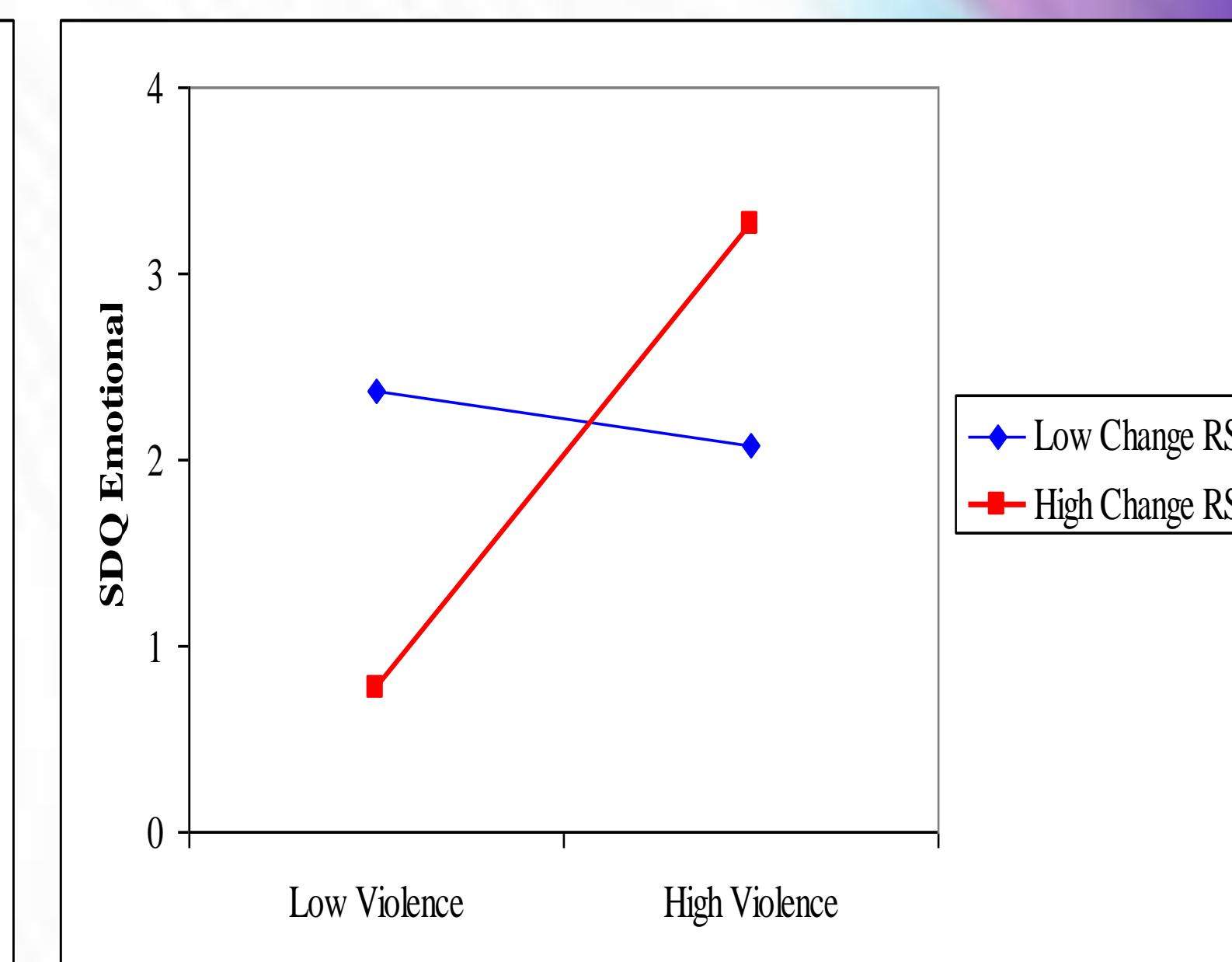
•**YES**: Children's vagal suppression moderated the relationship between children's exposure to violence and SDQ Total Behavior Problems and Emotional Problems. Children exposed to high levels of violence who showed greater vagal suppression also received higher scores on SDQ Total Behavior Problems and Emotional Problems even after controlling for SES.

Violence X Vagal Suppression → Total Behavior Problems



$B = .888, t = 1.752, p = .088$

Violence X Vagal Suppression → Emotional Problems



$B = .396, t = 2.029, p < .05$

## DISCUSSION

The goal of the present study was to test whether children's vagal suppression mediated or moderated the relationship between children's exposure to community and inter-partner violence and children's behavioral adjustment. Results revealed that children's vagal suppression during a frustrating situation served to moderate, and not mediate, relations between violence exposure and adjustment even after controlling for SES. In particular, children's exposure to violence predicted SDQ Total Behavior Problems and Emotional Problems at high levels of vagal suppression.

Previous research suggests that greater vagal suppression buffers the effects of interparental conflict and behavioral adjustment (e.g., Calkins, 1997; Donzella et al., 2000b; El-Sheikh et al., 2001). In contrast, the findings from the current study suggest that greater vagal suppression during a frustrating situation may actually operate as a risk factor in more at-risk populations (i.e., high violence). According to Belsky's differential susceptibility hypothesis (Belsky, 1997; Belsky, 2005; Belsky, et al., 2007; Belsky, et al., 1998), children exposed to similar environments can have different outcomes depending on their own individual characteristics. In other words, because of their individual physiology, some children are more likely thrive in supportive environments, whereas they may be at greater risk for maladjustment when in adverse or unsupportive environments. Further, Belsky suggests that it is critical to investigate children's differential susceptibility to environments in more at-risk populations because it may further explain at-risk children's pathways to problematic outcomes. Additionally, the findings from the current study and those of Donzella et al. (2000b) support the notion that vagal suppression might not always be the most adaptive physiological response for all contexts, especially in situations where frustration is evoked.

The current study highlights the need to continue to study the relations between physiology and behavioral adjustment, especially in more at-risk populations. However, given the findings from the current study, it is important for future studies to conduct longitudinal research in order to determine the directionality of effects.