EXPLORING EXECUTIVE FUNCTIONING PROCESSES AS POTENTIAL MEDIATING FACTORS BETWEEN CHILDHOOD TRAUMA & VIOLENCE

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Abstract

Despite establishing a link between childhood traumatic events and perpetrating violent behavior in adulthood, research examining potential mediating factors has been limited. The purpose of this study is to begin examining the potential moderating factors between childhood trauma and violence in adulthood. The current study aims to focus on executive functioning processes given the empirically established role neurocognition plays in both trauma and violence. Specifically, this study will look at response inhibition, risky decision-making, and cognitive flexibility. Individuals who have experienced traumatic events during childhood and score (1) higher on measures of response inhibition, (2) lower on measures of risky decision-making, or (3) higher on measures of cognitive flexibility, were hypothesized to exhibit fewer violent behaviors in adulthood. Using an archival dataset of 224 participants, this study utilized the Early Trauma Inventory to measure history of childhood trauma, Stop-Signal Task to measure response inhibition, Cambridge Decision-Making Task to measure risky decision-making, and Stroop Interference Task to measure cognitive flexibility. The mediation analysis demonstrated that while response inhibition partially mediated the relationship between childhood trauma and violent behavior with a significant indirect effect, risky decision-making and cognitive flexibility did not exhibit significant mediating roles based on non-significant total and direct effects. Potential limitations were discussed, including the use of archival data and limitations in the measurement tools used. Overall, identifying neurocognitive factors that mediate childhood trauma and violence in adulthood has implications for both violence risk assessment and trauma-informed treatment.

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Exploring Executive Functioning Processes as Potential Mediating Factors Between Childhood Trauma & Violence

The prevalence of trauma, characterized as "an emotional response to a terrible event," is often underestimated (American Psychological Association, 2021), even though approximately two-thirds of children report experiencing at least one traumatic event by age 16 (U.S. Department of Health & Human Services, 2022). Likewise, the occurrence of violence in the United States is not uncommon. According to the Federal Bureau of Investigation (2024), there were an estimated 1.2 million violent crime offenses nationwide in 2023. Emerging research indicates a connection between childhood traumatic experiences and manifestations of violent behavior in adulthood (Bruce & Laporte, 2014; Gillikin et al., 2016; Ross & Arsenault, 2018). However, not everyone who experiences a traumatic event during childhood exhibits violent behavior in adulthood. There is extensive research on risk and protective factors for both trauma and violence, including executive functioning processes (e.g., inhibition, risky decision-making, cognitive flexibility). Understanding these factors is imperative in addressing the consequences of childhood trauma and preventing violent behavior.

Trauma

Common examples of childhood trauma include various forms of abuse (e.g., physical sexual, emotional), as well as more general traumatic events (e.g., community violence, death of a loved one, parental separation; Bremner et al., 2007). Extensive research has shown that exposure to childhood trauma is associated with a wide range of issues including chronic physical health conditions (e.g., heart disease, cancer, lung disease) and negative behavioral health sequalae (e.g., suicide attempts, alcoholism, mental illness; Felitti et al., 1998; McKay et al., 2021; Norman et al., 2012). While a considerable portion of individuals who undergo a

traumatic event manage to move forward without enduring persistent adverse impacts, some encounter challenges and endure traumatic stress responses. This is often dependent on the interplay of risk and protective factors inherent to each individual's circumstances.

Risk factors contributing to childhood trauma exposure progressing to post-traumatic stress disorder (PTSD) encompass individual, family, and community domains (CDC, 2022a). Individual factors involve lacking caregiver connections, chronic physical or mental health conditions, early sexual activity, social isolation, and delinquent behaviors. Family factors include socioeconomic stress, corporal punishment, inadequate parental monitoring, and a history of abuse or neglect among caregivers. Community factors encompass high crime rates, poverty, limited recreational opportunities, and substance accessibility. Protective factors, essential for mitigating adverse outcomes, can be categorized into internal and external factors (Benavides, 2014). Internal factors comprise personal attributes like optimism, self-esteem, self-regulation, temperament, motivation, and a proactive orientation (Benavides, 2014; Cardoso & Thompson, 2010). Additionally, research has shown that executive functioning is a significant, independent risk factor for developing PTSD (Schultebraucks et al., 2022). External factors include positive family dynamics, supportive interpersonal relationships, community resources, and access to essential services (Benavides, 2014; Cardoso & Thompson, 2010). Children with caregivers who meet their needs, engage in positive activities, prioritize education, and provide constructive conflict-resolution mechanisms are less susceptible to childhood trauma and PTSD (CDC, 2022a).

Violence

According to the CDC (2021), violence is an "urgent public health problem" that can affect individuals in all stages of life. Violence can come in many shapes and forms including

sexual violence, bullying, intimate partner violence, homicide, and child maltreatment. Current models support the view that violence is the result of an interaction between individual, relationship, community, and societal factors play a role in the risk and prevention of perpetrating violence (CDC, 2022b). Risk factors for violence encompass characteristics or circumstances that increase the propensity of an individual to engage in violent behavior. These risk factors include a history of violence, antisocial behavior, interpersonal problems, employment problems, substance use, major mental disorders, personality disorders, traumatic experiences, violent attitudes, and problems with treatment response (Douglas et al., 2014). Additional risk factors include recent problems with insight, violent ideation, instability, living situations, personal support, and coping skills. Alternatively, protective factors, or aspects that reduce an individual's likelihood of perpetrating violence include internal, motivational, and external factors (De Vogel et al., 2011). Internal factors include intelligence, secure attachment in childhood, empathy, coping skills, and self-control. Motivational factors include work or steady employment, engagement in leisure activities or hobbies, ability to manage one's finances, motivation for treatment, health attitudes towards authority, having life goals, and medication compliance. External factors include positive social networks, intimate relationships, professional care, stable living circumstances, and external control.

Executive Functioning Deficits in Trauma and Violence

Recent studies have shed light on the profound impact of childhood trauma on the brain. Regions of the brain that appear to be the most affected among victims of childhood trauma include the prefrontal cortex (PFC), orbitofrontal cortex (OFC), anterior cingulate cortex (ACC), and amygdala (McLaughlin, 2016; Op den Kelder et al., 2018). Researchers suggest that the prefrontal cortex is responsible for maintaining goals and directing actions by sending signals to

other areas of the brain (Friedman & Robbins, 2021). Additionally, the prefrontal cortex aids in the resolution of cognitive conflicts (e.g., Stop Signal Task). The ACC would detect this conflict, while the dorsolateral prefrontal cortex (dlPFC) helps resolve it by focusing the individual's attention to the task at hand. In the context of trauma, the dlPFC is responsible for the mental processing of trauma, including determining the context and meaning of an experience (van der Kolk, 2003).

Growing evidence suggests that exposure to various forms of childhood trauma can lead to not only overall negative executive function outcomes, but also specific deficits in attention, working memory, cognitive flexibility, and inhibitory control (Lund et al., 2020; Majer et al., 2010; Op den Kelder et al., 2018; Reynolds et al., 2019; Scott et al., 2015; Teicher et al., 2016). A recent meta-analysis found that approximately 68% of trauma-exposed youth will exhibit lower scores on executive function measures compared to controls (Op den Kelder et al., 2018). Furthermore, a growing body of research suggests a relationship between neurocognitive deficits and violent offenders including executive functioning (Meijers et al., 2017; Reynolds et al., 2019). Specifically, executive functioning is responsible for functions such as inhibition, attention, working memory, set-shifting and planning. Research has shown that antisocial and violent behavior are associated with structural and functional deficits in the prefrontal cortex, which is responsible for executive functioning processes including self-regulation, reward processing, and impulse control (Chester et al., 2017; Yang & Raine, 2009). These neurocognitive alterations have significant implications for understanding the neuropsychological underpinnings of trauma-related psychopathology, particularly in the context of violent behavior in adulthood.

Alterations in Response Inhibition

Networks involving the brain regions most significantly impacted by trauma are activated during specific executive functioning processes including response inhibition, working memory, and emotion processing tasks. Specifically, response inhibition refers to "the suppression of actions that are inappropriate in a given context and that interfere with goal-driven behavior" (Mostofsky & Simmonds, 2008). For example, suppressing the urge to physically lash out at someone after a perceived insult. A recent meta-analysis showed that trauma-exposed youth perform significantly worse on tasks of inhibition than non-exposed youth (Op den Kelder et al., 2018). McLaughlin (2016) suggested that adverse experiences during childhood, such as abuse, neglect, or other forms of trauma, can disrupt the development of neural circuits involved in response inhibition. This disruption may lead to difficulties in suppressing impulsive or inappropriate responses, resulting in impaired inhibitory control.

Violent behavior has also been associated with response inhibition. For instance, Meijers et al. (2017), found that when conducting tasks measuring response inhibition, violent offenders exhibit significantly worse response inhibition than non-violent offenders. Moreover, recent findings by Madole et al. (2020) found that 16% of the variance in aggression can be accounted for by adverse childhood experiences, response inhibition, and emotion-related impulsivity. These findings suggest that deficits in response inhibition may contribute to violent behavior, particularly in the context of emotional arousal.

Alterations in Decision-Making

Risky decision-making occurs when individuals make choices despite being aware of potential risks or when available options offer both potential gains and losses (Buelow et al., 2022). For example, engaging in gang-related activity, despite knowledge that choosing to

confront a rival gang, knowing that it could result in violent or illegal actions. Rogers, Owen, and colleagues (1999) found that patients with lesions in the orbital prefrontal cortex (PFC) exhibit marked impairments in risk-taking, suggesting this part of the brain contributes to decision-making. Alterations in the PFC functioning have been found among individuals who have experienced trauma (van der Kolk, 2003). Furthermore, childhood trauma affects sensory systems, as well as network structures and circuits involved in threat detection, emotional regulation, and reward anticipation (Teicher et al., 2016). Reduced volume, connectivity, and thickness of the anterior cingulate cortex (ACC), which plays a fundamental role in the brain's reward anticipation, has been noted among individuals with a history of childhood maltreatment. These reductions can lead to diminished reward anticipation (Teicher et al., 2016), which is associated with risk-taking behavior (Becker et al., 2023). Ultimately, experiences of childhood trauma are associated with relatively poor decision-making under risk (Stoltenberg et al., 2011) and significantly higher engagement in risk-taking behaviors (Maepa & Ntshalintshali, 2020).

Eker and Yilmaz (2016) found that among young adults who experienced childhood trauma, smoking, alcohol consumption, and engaging in fights were the most prevalent risk-taking behaviors. This underscores how similar decision-making dynamics manifest in violent individuals. Research has shown that increased risk in decision-making tasks is significantly related to higher levels of aggression (Kuin et al., 2015). Romero-Martínez et al. (2021) suggested that this tendency for risky decision-making among violent individuals could be explained by diminished attention, processing speed, and working memory abilities. Overall, they noted that perpetrators of intimate partner violence (IPV) tended to take longer to make decisions and showed greater risk-taking tendencies, irrespective of the likelihood of a favorable outcome. Specifically, they found that individuals who perpetrated IPV exhibited poorer

performance compared to non-violent controls across various cognitive domains, including attentional switching attention, sustained attention, processing speed, working memory, spatial span, and decision-making. Of these domains, impaired attention and working memory were associated with worse decision-making skills among IPV perpetrators. These cognitive deficits may contribute to their difficulties in considering different options to address problems or switching from inappropriate to more appropriate behaviors.

Alterations in Cognitive Flexibility

Trauma-exposed youth further exhibit lower levels of cognitive flexibility compared to controls (Lund et al., 2020; Op den Kelder et al., 2018). Cognitive flexibility, defined as the capacity to adaptively shift perspectives or strategies in response to changing circumstances, is crucial for navigating complex cognitive tasks and daily challenges (Diamond, 2013). This cognitive ability, which is mediated by the prefrontal cortex, involves the flexible adjustment to new demands, rules, or priorities. For instance, if a person is confronted with someone else's aggressive behavior, their ability to shift from a defensive mindset to a problem-solving approach can allow them to find peaceful resolutions rather than responding with violence themselves. Moreover, cognitive flexibility is intricately linked with other cognitive processes including working memory and inhibition, which are also impacted by childhood trauma (Lund et al., 2020; Majer et al., 2010; Op den Kelder et al., 2018).

Similar cognitive impairments can be found among violent offenders. For example, perpetrators of IPV generally present with alterations in cognitive flexibility (Romero-Martínez et al., 2022). One study showed that violent juvenile offenders had reduced brain activity related to cognitive set-switching compared to the control group (Vilà-Balló et al., 2015). However, they showed increased brain activity related to processing feedback, suggesting they relied more on

external feedback to guide their behavior. Behaviorally, the violent juvenile offenders had more difficulty implementing new rules, possibly due to problems with switching to new behaviors and processing feedback effectively. These findings suggest that difficulties in cognitive flexibility and feedback processing may play a role in maintaining harmful behaviors in juvenile offenders.

Relationship Between Childhood Trauma & Adult Violence

A growing body of research has shown a link between a history of childhood trauma and perpetrating violent behavior as an adult (Bruce & Laporte, 2014; Gillikin et al., 2016; Ross & Arsenault, 2018). One study conducted by Gillikin and colleagues (2016) established that a history of childhood and adult trauma and PTSD was highly associated with becoming a perpetrator of interpersonal violence in adulthood, even while controlling for depression and demographics. Bruce and Laporte (2014) found that individuals diagnosed with a severe mental history and a reported history of childhood trauma were 2.8 times more likely to engage in violent behavior than seriously mentally ill individuals without a trauma history. While this rate may differ for individuals without a serious mental illness, it is still clinically important and underscores the need for additional research on the adult incarcerated population.

Potential Mediating Factors

Thus far, research has strongly suggested a link between traumatic experiences and perpetrating violent behavior (Bruce & Laporte, 2014; Gillikin et al., 2016; Ross & Arsenault, 2018). A significant body of research outlines the various protective and risk factors associated with trauma and violence individually. However, the research surrounding the mediating effects of these factors on trauma and violence is still growing. Allen (2011) examined how self-capacities including identity impairment, affect dysregulation, and interpersonal conflicts are

related to aggressive behavior in individuals who have experienced childhood maltreatment. They found that dysfunctional self-capacities fully mediated the relationship between childhood maltreatment and various forms of aggression. Another study, conducted by Jones and colleagues (2021) found that PTSD symptomology significantly mediated the relationship between adverse childhood experiences and perpetrating intimate partner violence among cis-gender adult women. Dugal and colleagues (2021) also found that affect dysregulation, maladaptive personality traits, and negative urgency mediate the relationship between childhood cumulative trauma and psychological intimate partner violence. Finally, a non-peer-reviewed dissertation analyzing the mediating effect of social information processing and emotion regulation on the relationship between childhood maltreatment and adult aggression found that maladaptive social information processing and anger expression "partially" mediated this relationship (Ridder, 2018).

Purpose of this Study

To date, most research has examined factors that influence trauma and violence separately. Despite establishing a link between trauma and violence, research examining the pathway between the two has been limited. Additionally, most research on violence and trauma has focused on inner city or urban areas (Gillikin et al., 2016; Ross & Arsenault, 2018), inpatient psychiatric units (Bruce & Laporte, 2014), and perpetrators of intimate partner violence (Dugal et al., 2021; Jones et al., 2021). There has been limited research conducted on the adult incarcerated population. The purpose of this study is to fill these gaps in the literature to inform psychological assessment and intervention. Of all potential mediating factors, this study emphasized executive processes given the significant role of neurocognition in both trauma and violence. Identifying executive functioning processes that mediate childhood trauma and

violence in adulthood can provide inform risk assessment and help identify opportunities for neurocognitive interventions.

Research Questions and Hypotheses

The current study aims examine the extent to which certain executive functioning processes (i.e., response inhibition, risky decision-making, cognitive flexibility) mediate the relationship between childhood trauma and violent behavior in adulthood. Specifically, it is hypothesized that among individuals who have experienced childhood trauma, (1) response inhibition, (2) risky decision-making, and (3) cognitive flexibility will significantly mediate the outcome of perpetrating violent behavior in adulthood.

Method

Procedure

The current study was a secondary analysis of archival data collected by another researcher. The confidential and restricted data was provided with permission from the National Archive of Criminal Justice Data (NACJD) from the Inter-university Consortium for Political and Social Research (ICPSR). Data was obtained through ICPSR Study 20349: Neuropsychological and Emotional Deficits as Predictors of Correctional Treatment Response in Maryland, 2003-2005 by Diana Fishbein, Ph.D. Participants previously consented to the use of their data for future research projects; no additional consent was required. All data used by the research team was previously de-identified by the original research team. All electronic records were stored on a password-protected external hard drive that remained in the locked office of the researchers.

Participants

The present study utilized data from the ICPSR Study 20349, designed to investigate neuropsychological and emotional regulatory mechanisms associated with responses to a specific cognitive-behavioral therapy (CBT) intervention among incarcerated individuals. The initial sample consisted of 232 incarcerated individuals who voluntarily enrolled in the CBT program offered by the Maryland Department of Public Safety and Correctional Services. Participants underwent comprehensive baseline assessments comprising various dimensions of higher-order neuropsychological functions. Following data cleaning procedures, eight participants were excluded due to incomplete variable data, resulting in a final sample size of 224 participants. Table 1 presents the basic descriptive statistics for the sample characteristics. All participants were male (100%), ranging in age from 21 to 49 (M = 31 years old, SD = 5.76). The sample was composed of 41 White (18.3%), 170 Black (79.5%), four Native American (1.8%), two Mexican (0.9%), and seven Puerto Rican (3.1%) individuals. Participants were single (69.2%), married (16.5%), divorced (8.9%), or separated (4%). Most participants completed high school (59.4%) or less than high school (34%), with a small number completing post-secondary education (6.2%).

Measures

Of the variables included in ICPSR Study 20349, the current study utilized the Early Trauma Inventory to determine a history of childhood trauma. Adult violent behavior was quantified through the documentation of violent charges accrued over time. Executive functioning processes hypothesized to mediate the relationship between childhood trauma and adult violence were evaluated using established neuropsychological tasks. Specifically, response inhibition was assessed using the Logan Stop-Signal Task, while risky decision-making was

measured via the Cambridge Decision-Making Task. Finally, cognitive flexibility was evaluated using the Stroop Interference Task.

Early Trauma Inventory – Self Report

The Early Trauma Inventory – Self Report (ETI-SR) is a 62-item self-report questionnaire developed from the clinician-administered version of the ETI (Bremner et al. 2000; Bremner et al., 2007). This measure encompasses four domains of childhood traumatic events: physical abuse, emotional abuse, sexual abuse, and general trauma. Physical abuse is defined as, "physical contact, constraint, or confinement, with intent to hurt or injure" (Bremner et al., 2007, p. 3) and is measured using items such as, "Were you ever punched, kicked, choked, pushed, or burned?" Emotional abuse includes "verbal communication with the intention of humiliating or degrading the victim" (p. 3). Items used to measure emotional abuse include, "Were you ever put down or ridiculed, treated in a cold and uncaring way, ignored, or told that you were no good?" Sexual abuse is defined as "unwanted sexual contact performed solely for the gratification of the perpetrator or for the purposes of dominating or degrading the victim" (p. 3). Sexual abuse is measured by items such as, "Were you ever touched in an intimate or private part of your body, (e.g. thighs, genitals) in a way that surprised you or made you uncomfortable?" Finally, general traumatic events comprise a range of stressful and traumatic events such as a serious accident or personal injury, death of a loved one, being raised in a home without one's biological parents, and witnessing violence. Each positively endorsed item includes follow-up questions regarding frequency, perpetrator, and age of onset. Additionally, each domain includes questions about the current impact on the individual's social, occupational, and emotional well-being concerning the items within that domain. The ETI-SR has been shown to be a valid measure of early trauma experiences. Individual domains of physical, emotional, and sexual abuse, and general trauma,

were found to be internally consistent ($\alpha = 0.78–0.90$) and valid (0.39–0.47 for correlation with the Clinician Administered PTSD Scale) (Bremner et al., 2007). Furthermore, a Childhood Trauma Severity Index was utilized for the current study. This index is a summation of each of the domains and represents a "total trauma burden" (Bremner, 2000, p. 5).

Violence in Adulthood

Included in the variables of ICPSR Study 20349 was the number of all prior convictions obtained from the participants' file. These convictions were broken down into eight offense categories: (1) shoplifting/vandalism, parole/probation violations, prostitution, contempt of court, disorderly conduct, vagrancy, public intoxication, driving while intoxicated, driving violations; (2) forgery, larceny; (3) burglary, breaking and entering, auto theft; (4) drug charges (possession or distribution; (5) weapons offense, robbery, assault; (6) arson, murder; (7) less serious sex offenses (voyeurism, exhibitionism, etc.); and (8) serious sex offenses (rape, child molestation, selling child pornography, etc.). The number of convictions for each of these categories was coded. Based on the Federal Bureau of Investigation's classification of violent crimes, the current study utilized categories five, six, and eight to create a Total Violent Offenses score. Therefore, this includes weapons offenses, robbery, assault, arson, murder, and serious sex offenses (rape, child molestation, selling child pornography, etc.). Individuals with no history of convictions in these categories were deemed to have no history of violent convictions and coded as zero.

Stop-Signal Task

The Stop-Signal Task (SST), developed by Logan and Cowan (1984), measures an individual's "ability to inhibit thoughts and actions when they are no longer relevant to the current goals" (p. 296). The SST is based on the "horse-race model," which posits that if the

primary task process finishes before the stop signal process, the response will be performed. Alternatively, if the stop signal process is completed before the primary task process, the response will be inhibited. On the SST, subjects are given a task to perform throughout which a "stop signal" is presented that tells them not to respond on a specific trial. Specifically, for each trial, participants are asked to respond as quickly and accurately as possible to a primary task, or "go stimulus." On subsequent, periodic trials, participants are presented with the stop signal, at which point they are required to inhibit their response to the go stimulus. Measures are taken on speed, accuracy, and stop signal reaction time. Research using the SST has shown links between Stop Signal Reaction Time (SSRT), deficits in inhibitory control, and increased impulse-control problems (Lipszyc & Schachar, 2010; Verbruggen et al., 2019).

Cambridge Decision-Making Task

The Cambridge Decision-Making Task (CDMT) is a computerized cognitive measure designed to evaluate decision-making and risk-taking behavior outside of a learning context (Rogers, Blackshaw, et al., 1999; Rogers, Owen, et al., 1999). This measure was developed to create a distinction between cognitive elements that contribute to decision-making processes including impulsivity, sensitivity to consequences, sensitivity to rewards, and risk-taking. Participants start the task with 100 points and are instructed that a ring is hidden randomly in one of six yellow or blue boxes on the screen (Fishbein, Hyde, et al., 2005). Their goal is to guess which color box contains the ring. Each round is independent, like rolling a die. They must decide how many points to bet on their choice, with odds ranging from 10 to 90 for blue versus yellow. The ratio of colored boxes and rewards changes across trials according to a fixed pseudorandom sequence, ensuring each scenario is presented five times. In trials with unequal box ratios, the larger reward typically corresponds to the less likely outcome, reflecting risk-

taking conflict. Participants press buttons labeled “yellow” or “blue” to make their selection, and if correct, the associated points are added to their total; otherwise, points are deducted. No monetary value is attached to the points earned. The CDMT has been found to reliably activate the inferior and orbital prefrontal cortex, which is involved in higher-order cognitive functions such as social skills, impulse control, and risk-taking (Rogers, Blackshaw, et al., 1999; Rogers, Owen, et al., 1999; Fishbein, Eldreth, et al., 2005). The outcome measure utilized in this study was the mean reaction time for the riskiest decisions.

Stroop Interference Task

The Stroop Interference Task (Stroop, 1935) was designed to assess attentional control, or an individual’s “ability to selectively ignore certain environmental features while being influenced by others” (Cohen et al., 1990, p. 333). This task indirectly measures cognitive flexibility by requiring participants to switch between different mental processes or cognitive sets. In this task, participants are presented with color words written in different ink colors. When asked to read the word, participants are easily able to disregard the ink color and name the word. However, when asked to name the ink color, participants struggled to suppress the word’s influence. For example, response time is consistently slower when the word is incongruent with the ink color (e.g., “Blue” in red ink) when compared to congruent stimuli (e.g., “Blue” in blue ink). Participants must flexibly switch their attention between two conflicting sources of information: the word itself and the ink color. Furthermore, the Stroop task may include both congruent trials (where the word and the ink color match) and incongruent trials (where the word and the ink color conflict). Successfully completing the task requires participants to adapt their responses based on the trial type, demonstrating cognitive flexibility in adjusting their behavior according to the changing task demands. The primary outcome measure of the Stroop is the

interference score, which is calculated by comparing reaction times between the congruent and incongruent conditions (Fishbein et al., 2009). Performance on the Stroop is associated with frontal lobe damage (Demakis, 2004) and difficulty with cognitive flexibility (Stuss & Benson, 1984). When compared to non-offenders, violent offenders exhibited a significantly smaller Stroop effect and mean reaction time on incongruent trials (Schiffer et al., 2014). This was coupled with activity in brain areas involved in cognitive control, attention, language, and emotional processing.

Statistical Analysis

Data was analyzed using IBM SPSS Statistics version 29. Descriptive statistics were computed to examine the characteristics of the study variables, as well as participant demographics. Pearson correlation coefficients were calculated to assess the bivariate relationships among these variables, specifically examining the associations between childhood trauma, violent behavior, and the mediating variables (i.e., response inhibition, risky decision-making, and cognitive flexibility). Mediation analysis was performed to investigate the indirect effects of childhood trauma on violence through the hypothesized mediating variables. This analysis was conducted using the PROCESS macro for SPSS version 4.2. Three separate mediation models were estimated to test the following pathways. Finally, an overall model was calculated to examine the collective mediating effects of the variables.

First, a mediation model was examined with response inhibition as the mediator between childhood trauma and violence. Second, a similar mediation model was tested with risky decision-making as the mediator. Lastly, a mediation model was explored with cognitive flexibility as the mediator. Assumptions of mediation analysis were rigorously checked, including linearity of relationships between variables, normality of residuals, absence of

multicollinearity among predictors, and identification of any outliers that could influence the results. Model fit indices and effect sizes were reported to assess the strength and significance of the mediated pathways and provide insight into the relationships between childhood trauma, mediating variables, and violence outcomes. All statistical tests were two-tailed with a significance level set at $p < 0.05$, ensuring robust and reliable interpretations of the mediation analyses within the context of the study's research questions and hypotheses.

Results

Demographic Analyses

Table 2 and Table 3 display the descriptive statistics of the predictor and outcome variables (i.e., childhood trauma exposure and the number of violent offenses). Participant scores on the Childhood Trauma Severity Index ranged from zero to 108, with a mean of 24.8. The number of lifetime violent offenses among participants ranged from zero to 11, with a mean of 1.4.

Associations Between Childhood Trauma, Mediator Variables, & Violence

Multiple preliminary bivariate correlations were calculated to satisfy statistical test assumptions, which can be found in Table 4. Results revealed a statistically significant positive correlation between childhood trauma and the number of total violent offenses ($r = 0.159$, $p = 0.030$), indicating that higher levels of childhood trauma were associated with greater involvement in violent offenses. Additionally, a weak negative correlation was found between the number of total violent offenses and response inhibition ($r = -0.178$, $p = 0.017$), suggesting that reduced response inhibition may be linked to increased engagement in violent behavior. However, no significant associations were observed between childhood trauma and the mediating variables of response inhibition, risky decision-making, or cognitive flexibility.

Mediation Analysis

The mediation analysis was conducted to examine the indirect effects of childhood trauma on violent behavior through response inhibition, risky decision-making, and cognitive flexibility as mediators. First, for response inhibition as the mediator, the analysis revealed a significant total effect of childhood trauma on violent behavior, with a coefficient of 1.7573 (p = 0.0591). The direct effect of childhood trauma on violent behavior was statistically significant (coefficient = 1.9596, p = 0.0406), suggesting that response inhibition partially mediated this relationship. The standardized indirect effect of childhood trauma on violent behavior through response inhibition was -0.1483, indicating a significant mediation effect.

Second, for risky decision-making as the mediator, the analysis showed no significant total effect of childhood trauma on violent behavior (coefficient = 60.0077, p = 0.3166). The direct effect of childhood trauma on violent behavior was also not significant (coefficient = -0.0002, p = 0.8634), suggesting no mediation by risky decision-making. Third, for cognitive flexibility as the mediator, the analysis revealed no significant total effect of childhood trauma on violent behavior (coefficient = 0.1061, p = 0.4425). The direct effect of childhood trauma on violent behavior was not statistically significant (coefficient = -0.3806, p = 0.5207), indicating no mediation by cognitive flexibility.

The overall model, including all three mediator variables, accounted for 7.0% of the variance in violent behavior (R^2 = 0.0703, $F(4, 219) = 2.5894$, p = 0.0395). The direct effect of childhood trauma remained significant even after including the mediators, indicating a robust relationship between childhood trauma and violent behavior. However, the combined indirect effect of all mediator variables was not significant. While the overall model is significant and childhood trauma directly predicts violent behavior, the three mediator variables do not

significantly contribute to this relationship when considered together. Overall, the findings suggest that response inhibition partially mediates the relationship between childhood trauma and violent behavior, whereas risky decision-making, and cognitive flexibility do not appear to play significant mediating roles in this context.

Discussion

The current study sought to address existing gaps in the literature by exploring the mediating role of executive functioning processes between trauma and violence. Specifically, this study aimed to determine the extent to which response inhibition, risky decision-making, and cognitive flexibility mediate the relationship between childhood trauma and violent behavior in adulthood. It was hypothesized that among individuals who have experienced childhood trauma, response inhibition, risky decision-making, and cognitive flexibility would significantly mediate the outcome of perpetrating violent behavior in adulthood. Preliminary correlations supported previous research, confirming an association between childhood trauma and perpetrating violent behavior as an adult (Bruce & Laporte, 2014; Gillikin et al., 2016; Ross & Arsenault, 2018). There was a significant positive association between childhood trauma and the number of total violent offenses, indicating that higher levels of childhood trauma were associated with increased involvement in violent behavior in adulthood. The mediation analysis revealed that response inhibition acts as a partial mediator in the relationship between childhood trauma and violent behavior, with a significant indirect effect. However, risky decision-making and cognitive flexibility were not found to be significant mediators, as evidenced by non-significant total and direct effects.

The lack of significant mediation effects observed for risky decision-making and cognitive flexibility in this study could be attributed to several factors. Firstly, the relationship

between childhood trauma, executive functioning processes, and violent behavior is likely intricate and influenced by various unmeasured factors not included in this analysis. Secondly, the study sample's characteristics, such as demographic differences or variations in childhood trauma experiences, might have impacted the observed associations. For example, over 65% of the current sample completed high school or higher, compared to the 62% of all prisoners in the Unites States who have not completed high school (Beatty & Snell, 2021). Additionally, almost 9% of the current sample reported being divorced, compared to the 20% of all prisoners in the Unites States. These findings suggest that the current sample may be non-representative of the incarcerated adult population. Finally, this sample only includes individuals who were convicted of criminal offenses and voluntarily participated in the original research project, and as such response inhibition may play a stronger role in this sample. Furthermore, limitations in the measurement tools used to assess risky decision-making and cognitive flexibility could have contributed to the non-significant findings, as these constructs are complex and multifaceted. Regardless, these results underscore the specific neurocognitive processes through which childhood trauma may influence later violent behavior, emphasizing the importance of response inhibition as a potential target for intervention and further investigation.

Implications

This study further replicates previous findings about the associations between adverse childhood experiences and violent offending. This may further contribute to the existing research that early assessment of adverse childhood experiences may be beneficial. Overall, this study contributes more questions about the neurocognitive underpinnings of the trauma-violence relationship, as only one aspect of executive functioning partially mediated the relationship between ACEs and violence. This could highlight the potential study of specific aspects of

response inhibition in regard to psychological assessment and intervention strategies aimed at mitigating the impact of childhood trauma on adult violent behavior. First, this study could inform violence risk assessment to include measures of executive functioning that target response inhibition, such as the SST. Using the SST in particular may be advantageous due to its short administration time, computerized format, and ability to provide objective, quantifiable outcomes.

This study may also inform more targeted and effective intervention studies potentially aimed at mitigating the risk of violence. For example, Romero-Martínez and colleagues (2022) found reduced recidivism rates among IPV perpetrators who participated in cognitive training. However, research on specific response inhibition training has been limited. This study provides preliminary evidence that this type of treatment for individuals who have experienced childhood trauma, could be used in conjunction with other evidence-based treatments to reduce risk.

Limitations & Future Directions

The foremost limitation of this study lies in its use of archival data. Due to this reliance, all coding was conducted exclusively based on the information available within the dataset. Therefore, researchers were unable to ask any clarifying questions about historical information. Additionally, this limitation constrained researchers to utilize only the measures selected by previous researchers for their respective study, potentially limiting the accuracy of the data available for analysis. Regarding the ETI, Bremner and colleagues suggest that the Childhood Trauma Severity Index should assign greater weight to items that inflict more severe harm. For instance, it would be logical for rape to be considered more detrimental than being spanked with a hand. The inability to adapt the ETI or other measures to reflect these distinctions could impact the study's findings and their implications for understanding the severity of childhood trauma

and its long-term effects. Furthermore, the self-report nature of the ETI adds to its limitations, as it depends on how the participants interpret each item and how much they choose to disclose.

Regarding coding violence in adulthood, the archival dataset grouped offenses into categories. One category classified weapons offenses along with robbery and assault. Weapons offenses are generally considered serious crimes, but not all weapons offenses are classified as violent crimes. The classification of a crime as violent often depends on the specific circumstances and intent involved. For example, using a weapon to cause harm to another person would likely be considered a violent crime, whereas possession of a weapon without the intent to harm someone might not be classified as such. Another category grouped rape, child molestation, and selling child pornography together. While child pornography is a serious crime, it is not inherently violent. Without access to the original dataset, it was not possible to parse these crimes apart. Regardless, using violent crime convictions as a measure of violent behavior is another limitation in being able to fully capture an individual's violence history. Criminal records likely do not include every violent act an individual has ever committed. Overall, violence is challenging to measure and research due to its subjective and context-dependent nature, variability in forms, and significant underreporting by victims.

Lastly, given the limited time of the research project, only three factors were evaluated for a mediating effect. It is possible that other intermediate processes significantly mediate the relationship between childhood trauma and violence but were not included in the scope of the present study. Since numerous factors protect against violence and trauma, future research should continue to explore additional mediating variables within this complex relationship to inform targeted interventions and support efforts to reduce violence in at-risk populations.

Potential future research studies may also examine interaction effects of potential mediators along the pathway between childhood trauma and violence in adulthood.

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Tables

Table 1

Sample Characteristics (n = 224)

Demographic	Frequency	Percent
Age	range = 21 – 49	mean = 31
Gender		
Male	224	100
Race		
White	41	18.3
Black	170	75.9
Native American	4	1.8
Hispanic – Mexican	2	.9
Hispanic – Puerto Rican	7	3.1
Marital Status		
Married	37	16.5
Separated	9	4
Divorced	20	8.9
Single, Never Married	155	69.2
Missing Data	3	1.3
Education		
< high school	76	34
= high school	133	59.4
> high school	14	6.2
Missing Data	1	.4

Table 2

Early Trauma Inventory (n = 224)

	Frequency	Percent
0	5	2.2
1 – 25	130	58.2
26 – 50	72	32.1
51 – 75	15	6.2
76 – 100	1	.4
101 +	1	.4

Note: Mean score on the Trauma Severity Index = 24.8; range = 0 – 108

Table 3

Total Number of Violent Offenses (n = 224)

	Frequency	Percent
None	78	34.8
1	73	32.6
2	34	15.2
3	20	8.9
4	6	2.7
5	5	2.2
6	3	1.3
7	0	0
8	2	.9
9	1	.4
10	1	.4
11	1	.4

Note: Mean number of violent offenses = 1.4

Table 4

Correlations Between Childhood Trauma, Response Inhibition, Risky Decision-Making, Cognitive Flexibility, and Perpetrating Violent Behavior.

Variables	1	2	3	4	5
1. Childhood Trauma	-				
2. Response Inhibition	.057	-			
3. Risky Decision-Making	.011	.049	-		
4. Cognitive Flexibility	-.062	-.250*	-.118*	-	
5. Violence	.159*	-.178*	.085	.065	-

Note: *$p < .05$