

Emotional and Cognitive Disturbances in Adolescents Exposed to Community Gun Violence

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Abstract

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Exposure to community gun violence is increasing a sense of anxiety and hypervigilance in American society today. Whether or not they are direct victims, American children and adolescents often become casualties of community gun violence. Their safety, well-being, and even survival are at risk due to continued exposure to gun violence in their communities. This study utilized a retrospective sample of adolescents derived from the National Survey of Children's Exposure to Violence (NatSCEV) to understand the prevalence and severity of cognitive and emotional symptoms associated with childhood exposure to community gun violence compared to other types of adverse childhood events.

The results showed that adolescents who have been exposed to community gun violence self-reported higher levels of negative emotion and cognitive disturbance in comparison to peers who have had no exposure to these forms of adverse events. Compared to these peers reporting no adverse events, an increase of 30% was observed in negative emotions and 33% in cognitive disturbance when the adolescent is exposed to community gun violence. An increase of 22% in negative emotions and 30% in cognitive disturbance was observed when an adolescent is exposed to other forms of community disorder. Finally, adolescent participants who were exposed to childhood adverse events other than community disorder and gun violence reported 8% greater negative emotions and 28% greater cognitive disturbance than peers reporting no

adverse events during adolescence. These results suggest that exposure to gun violence promotes negative emotionality and increases cognitive disturbance.

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Dedication

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This work is dedicated to those who have endured pain because of gun violence. We conduct research to not only learn more but to protect more, care more and intervene more. Finally, to my precious lover of my soul, I thank you. I have laid hold of that for which you took hold of me, selah.

Chapter 1: Introduction

Gun Violence in America: A Crisis in 2020

On December 25, 2020, a 16-year-old female was fatally shot in the lobby of the Hyatt Regency Hotel in downtown Atlanta. Her assailant was a 16-year-old male acquaintance. Just four days prior, seven-year-old Kennedy Maxie was critically wounded in her family's vehicle by a stray bullet. She was a mere seven miles away from the Hyatt Regency Hotel; she was leaving the Phipps Plaza Shopping Mall in Buckhead, Atlanta. She succumbed to her injuries a few days later. These minors, along with 2,371 other teenagers were fatal victims of gun violence in 2020 (Gunviolencearchive.org, 2021). The devastating losses of these two young lives were among the 157 homicides reported in Atlanta in 2020; they also formed part of the homicide rate in Atlanta, which soared to a 22-year high by the end of the calendar year. Their deaths further sent the surrounding communities into a state of shock, fear, and mourning.

Community gun violence across several cities soared to unprecedented rates in 2020. For adolescents, the risk of exposure to gun violence is steadily increasing. Over the same December 25th holiday weekend of 2020, the city of Chicago reported thirty individual shootings, eight of which ended in fatalities. Just seven days prior, 38 Chicago residents were reported injured as result of gun activity in their communities. Six were fatally wounded. Adolescents were among the wounded and killed. Of the 115, 551 people killed by guns annually in America, 7,957 are children and teenagers (Brady, 2021). Furthermore, according to *The State of America's Children 2020* report on gun violence (2020), 84% of gun deaths and 91% of gun injuries among children and teenagers in 2017 occurred amongst 15 to 19-year-olds. Presently, teenagers continue to be disproportionately exposed to gun violence in their communities across America.

These case reports and prevalence statistics provide a synopsis of the current state of adolescent exposure to community gun violence in the United States.

The national response to the gun violence crisis in America is centered around three key aspects of federal intervention: 1) legislative action, 2) executive action, and 3) budget action (Center for American Progress, 2021). Budget action specifically calls for the introduction of more community-based interventions and for public health research. Research, followed by evidenced-based interventions, is crucial for major urban cities and communities of color facing this crisis, especially considering that a disproportionate percentage of exposure to community gun violence occurs in these communities.

According to the Center for American Progress (2021), gun lobbyists were successful at freezing approximately \$25 million in funding for gun violence research in 2019. In 2021, these funds were reallocated under the Biden administration through the 2021 omnibus funding bill. With a 38% increase in gun-related deaths in 2020, the need and opportunity to study the effects of exposure to community gun violence in America is not only grossly overdue; it is also vital for the survival of developing adolescents. With much more funding available in 2021, conducting this type of research is essential.

Exposure to community gun violence is increasing a sense of anxiety and hypervigilance across American cities at an alarming rate. According to Everytown.org (2021), 3 million American children and adolescents witness gun violence every year. In 2020 alone, 1,370 children and teenagers died of gun violence, and another 3,759 suffered non-fatal gunshot injuries (GVA, 2021). Every shooting elicits feelings that the long-term survival of American children and adolescents is being threatened. Whether or not they are direct victims, American children and adolescents are often directly in the line of fire and become casualties of community

gun wars. Their safety, well-being, and survival at the present time and in the future are at risk due to continued exposure to gun violence in their communities.

Existing prevalence data has shown that historically, more than half of all child and teenage gun deaths occurred in just 10 states: Texas, California, Illinois, Florida, Georgia, Ohio, Pennsylvania, Tennessee, Louisiana, and Missouri (The Children's Defense Fund, 2021). The highest incidence of gun deaths occurs among teenagers living in lower-income communities. Teenagers living in urban cities with significant socioeconomic challenges face high gun fatality and gun injury rates daily. Due to their continuous exposure, they are categorized as "at risk." In 2019, the Center for Disease Control reported a total of 3,378 adolescent gun fatalities. This was 1.45% greater than the number of reported deaths from motor vehicle accidents and 17.2 % greater than reported adolescent deaths from cancer. Adolescents living in communities with gun activity are more likely to die from a firearm injury than from a motor vehicle accident, cancer, suffocation, or poisoning.

This is an opportune time to conduct research of this specific focus, because it can be argued that the well-being of the United States is dependent upon it. The rise of gun activity during the COVID-19 pandemic has classified gun violence as a national health crisis. As a result, we are seeing a positive shift in funding support for gun violence research. According to Alcorn (2014), gun violence research was suppressed between 1998 and 2012, seeing only a slight increase in published work in 2013 and 2014. However, according to Alcorn there were few career researchers actively studying gun violence in 2014, in part because the Dickey Amendment of 1996 froze all CDC monetary support of any work that advocated or promoted gun control (Rajan et al, 2018). However, in 2019, Congress was persuaded to overturn the

amendment and hence restored the funding; lawmakers appropriated \$25 million, split between the C.D.C. and the National Institutes of Health (Gluck, 2020).

Distinguishing between Community Violence Exposure and Community Gun

Violence Exposure

Community gun violence is considered a component of community violence. In the literature, community violence has been defined as individual or group exposure to intentional acts of interpersonal violence committed in public areas by individuals who are not intimately related to the victim or victims. The types of community violence commonly experienced by adolescents include bullying, fights among gangs and other groups, and shootings in public areas such as schools and neighborhood playgrounds (The National Child Trauma Stress Network, 2021). A notable characteristic of community violence is its intentional attempt to hurt one or more people. It includes homicides, sexual assaults, robberies, and weapon attacks (e.g., bats, knives, guns). Community gun violence, specifically, is community violence that involves the use of a gun. Acts of gun violence are likely intentional in nature and can occur between people who are not intimately related, yet it is not exclusively so. Community gun violence exposure can be intentional and unintentional. It has intentional victims and consequential victims. According to NCTSN (2021), most forms of community violence can be anticipated. However, community gun violence and exposure to it frequently occurs suddenly and without warning. Exposure to violence in the community may be direct or indirect. In the literature, indirect exposure has been defined as witnessing domestic or community violence. Direct exposure has been defined as experiencing child or adolescent maltreatment or peer maltreatment (Mitchell et

al., 2019). The unexpected nature of these events causes youth and families who live with this form of community violence to have heightened fears that harm could come at any time and experience the world as unsafe and terrifying (NCTSN, 2021).

Statement of the Problem

This study addresses the gap in research concerning adolescent exposure to community gun violence and related literature that addresses the effect that exposure to this specific type of community violence has on the emotional and cognitive functioning of teenagers. There is a need for research that examines the impact of exposure to community gun violence on adolescent emotional and cognitive development. Specifically, there is a need for research that examines measures of emotionality and executive functioning when exposure to community gun violence is experienced during critical periods of adolescent brain development.

Purpose of the Study

The purpose of this research project is to examine the negative cognitive and emotional effects of exposure to community gun violence on teenagers. This research will, first, quantify the prevalence of self-reported emotional disturbance and cognitive impairment reported among adolescents exposed to community gun violence. Second, this research will assess the severity of this impact on teenagers. Thirdly, this research seeks to explore whether exposure to community gun violence is commensurate with other types of adverse childhood experiences, or has its own profile of emotional and cognitive impact. According to Finkelhor (2018) the original adverse childhood experience screener (ACE) involved asking questions about whether the patient or

child experienced maltreatment. The inventory asked specifically about childhood physical, sexual, or emotional abuse, physical or emotional neglect, exposure to domestic violence, household substance abuse, mental illness, parental incarceration, separation, and divorce. Questions about community gun violence exposure were omitted.

In 2019, Rajan et al. described ACEs as stressful or traumatic events that impact the healthy development of children through adolescence and into adulthood. Consequently, Rajan et al. (2019) proposed that gun violence exposure falls within this definition and therefore argued that the classification of youth exposure to gun violence as an ACE was critical. This research is purposefully intended to analyze the self-reported emotional and cognitive outcome retrospective of adolescents to determine if evidence of stress or trauma and cognitive disturbance exists to support the classification of community gun violence exposure as an ACE.

Research Questions, Questionnaire, and Data Analysis Plan

Research Question 1a.

Do adolescents exposed to gun violence self-report higher levels of negative emotions, compared to adolescents who have not experienced notable childhood adverse events (ACEs)?

Research Question 1b.

Do adolescents exposed to gun violence self-report more cognitive disturbance, compared to adolescents who have not experienced notable childhood adverse events?

Research Question 2a.

Do adolescents exposed to gun violence self-report higher levels of negative emotional consequences, compared to adolescents exposed to other forms of Community Disorder?

Research Question 2b.

Do adolescents exposed to gun violence self-report more cognitive disturbance, compared to adolescents exposed to other forms of Community Disorder?

Research Question 3a.

Do adolescents in this sample who have been exposed to community gun violence self-report similar levels of negative emotions to those who have been exposed to other ACEs (not involving Community Disorder including gun violence)?

Research Question 3b.

Do adolescents in this sample who have been exposed to community gun violence self-report similar levels of cognitive disturbance to those who have been exposed to other ACEs (not involving Community Disorder including gun violence)?

The Questionnaire

The National Survey of Children's Exposure to Violence (NatSCEV) series is a three-round data collection project. The baseline survey, NatSCEV I, was collected between January 2008 and July 2008. The second-round survey, NatSCEV II, was collected between March 2011 and January 2012. The third round, NatSCEV III, was collected between August 2013 and April 2014. The original survey assessed the experiences of a nationally representative sample of children ranging in age from one month old to 18 years old and living in the contiguous United States (excluding New Hampshire). The survey was designed to obtain lifetime and one-year incidence estimates of a comprehensive range of childhood victimizations across gender, race, and developmental stage (Finkelhor & Turner, 2008). The present retrospective study assesses experiences of adolescents between the ages of 13 and 17 with community violence and the community gun violence.

Questionnaire Components and Data Analysis Plan

Quantitative Aspects of the Study

Retrospective data from the NATSCEV series I, II and III was used for data analysis. The survey consists of multiple sections: parent screener, background questions, juvenile victimization questionnaire (JVQ) screener questions, social support, mental health, NATSCEV screener questions, JVQ and NATSCEV follow-up questions, lifetime and past year adversity, internet victimization, community disorder, delinquency, self-concept, parental conflict, alcohol use, prevention program participation, and exposure to family violence follow-up questions.

Variables of Interest

This retrospective study will examine measures of emotionality and cognitive functioning at the adolescent stage of human development captured via the National Survey of Children's Exposure to Violence Series (Finkelhor et al., 2015). This series was designed to obtain lifetime and one-year incidence estimates of a comprehensive range of childhood victimization across gender, race, and developmental stage. The original sample included children between the ages of 0 and 17 located in the contiguous United States, except for New Hampshire. The sample for the present secondary data analysis is limited to adolescents between the ages of 13-17 who completed the survey during the study dates of collection of 1997 and 2014.

The method of data collection for the original study included a short interview. Participants between the ages of 10 and 17 provided self-reports. They were asked background

questions, a series of juvenile victimization screening questions which consisted of 52 questions and follow-up questions, social support, mental health, lifetime and past year adversity, internet victimization, community disorder, bullying, delinquency, interpersonal dependency, parental conflict, parenting items, and alcohol use.

Adolescents' self-reported data from the mental health and the community disorder sections of the NATSCEV questionnaire were mined for this study along with demographic data. The variables under this section include self-reported difficulty concentrating and focusing, fear, and anxiety. For the purposes of this study, emotional disturbance is being operationalized as self-reported measures of fear and anxiety. Cognitive disturbance is being operationalized as self-reported measures of inattention and lack of focus. Negative emotions and cognitive disturbance are the dependent variables of interest for this study. The independent variables being examined are measures of exposure to any form of community violence as well as measures of exposure to community gun violence specifically. For the purpose of this study, community violence is operationally defined as any adverse childhood event that occurred in the community, with or without a weapon. Community gun violence is operationally defined as community violence specifically involving a gun or gun activity. Measurements of exposure to community violence and community gun violence will be obtained from participants' self-reported responses to juvenile victimization questionnaire (JVQ), section 3 of the questionnaire and the Community Disorder questions from section 10 of the questionnaire. The variables pertaining to community disorder consisted of drug sales in the community, policing in the community, gangs, neighborhood environment, and indirect and direct exposure to weapons.

Rationale for the Study

This study examines the relationship between adolescent exposure to community gun violence and adolescent emotionality and cognitive functioning. Specifically, it explores the possible causal relationship between adolescent exposure to community gun violence and disturbance to adolescent emotional and cognitive development and functioning.

In the discipline of human development and cognition, the study of adolescent community gun violence exposure is underdeveloped. Adolescent community gun violence exposure has been studied in the context of school violence, interpersonal violence, social science, and medicine but rarely in developmental science and even more rarely in the psychological or neuroscience literatures on adolescent cognitive development and functioning. Consequently, no specific and well-established theoretical frameworks was found in the literature within which this study of adolescent gun violence exposure and human development could be placed. Previous research on the impact of community violence, more broadly, and on community gun violence, more specifically, has confirmed their negative impacts on adolescent mental health. However, additional research is needed to describe this impact in the context of brain function and emotional and cognitive development. This research will compare self-reported measures of emotional functioning and cognitive disturbance of adolescents with no exposure to community gun violence to those with exposure. Measures of emotional and cognitive disturbance are considered behavioral measures related to effective cognitive capacity and brain function (Barch et al, 2018).

More specifically, a multidisciplinary approach to the research is needed to adequately address the multipronged effect community gun violence has on child and adolescent development. We are in need of research designs that examine brain, behavior, social emotional states and societal factors associated with high incidences of community gun violence activity simultaneously. Multidisciplinary teams have been credited with improved outcomes for target populations and therefore a research strategy of this type may improve the effectiveness of research-based community interventions.

Measuring Adolescent Brain and Cognitive Development in the Context of Community Gun Violence

Historically, adolescent brain and cognitive development assessments have been conducted using a comprehensive range of measures to determine youth current brain and cognitive function (Barch et al, 2018). Previous research has identified demographic information as a critical measure needed for the assessment of adolescent brain and cognitive development, given the key role that environmental factors play in shaping health and human development. However, there is no existing literature that has included exposure to community gun violence as an environmental factor and relevant measure of brain and cognitive development in adolescents. This study will contribute to our understanding of how adolescent brain and cognitive developmental trajectories are impacted by an adolescent exposure to gun violence in their community specifically.

Mental health measures of mood, anxiety and impulsivity are also key elements of an adolescent brain and cognitive development battery (Barch et al, 2018). Adolescent negative externalizing and internalizing behaviors have been associated with gun violence exposure

(Mitchel et al, 2019). However, utilizing measures of mood and anxiety to determine mental health and brain and cognitive capacity in the context of trauma requires greater exploration. This study will utilize these measures of mood and emotionality to characterize the brain and cognitive capacity of its research sample. In addition, impulsivity is believed to be associated with distinct neurocircuitry and neurotransmitter systems which are underdevelopment during adolescence. This study will look at measure of inattention to determine cognitive impairment or disruption due to exposure.

Previous Research on Adolescent Gun Violence Exposure

Saxbe et al. (2017) conducted the first study focusing on community violence in conjunction with brain structure and function. Their research provides a premise for this research. Saxbe et al. (2017) found that community violence exposure in early adolescence predicted smaller manually traced left and right hippocampal and amygdala volumes in the brain after controlling for age, gender, and concurrent community violence exposure. The hippocampus is a brain structure that has a role in learning and memory. The amygdala is a brain structure associated with emotional memory and emotional regulation. Based on the findings of Saxbe et al. (2017), it is anticipated that this research will reveal self-reports of emotional and cognitive functional impairment in teenagers exposed to gun violence in their communities. It should be noted that Saxbe et al. also found that community violence exposure continued to predict hippocampus (but not amygdala) volumes after removing the effect of exposure to family violence, which suggests that interpersonal violence can affect learning and memory beyond emotional regulation. This indicates that exposure to forms of interpersonal community violence,

such as gun violence, may have greater impact on learning and memory than personal forms of violence.

Since that time, Mitchell et al. (2019) examined the impact of indirect community gun exposure on children and adolescents in the form of witnesses or those who heard gun activity in their neighborhoods. Mitchell et al. found that more than half of their participants (58%) reported being very or extremely distressed because of indirect gun violence. Feelings of distress were characterized as fear, anger, sadness, and being in a generally upset state. This research did not address cognitive functioning of the teenagers in their analysis. Fundamental cognitive skills, such as attention, learning, and memory capacity, are yet to be addressed in the research. This study aims to address these factors.

Also, in 2019, Turner et al. reported that youth who experience direct gun violence are often exposed to multiple violent contexts. Turner et al. studied how gun violence overlaps with other forms of victimization to have a negative psychological impact on children. According to Turner et al. exposure to multiple violent contexts or “polyvictimization” is most likely to lead to posttraumatic symptoms; however, in their research, witnessing gun violence uniquely predicted a higher level of negative psychological symptoms than other forms of violence exposure. Turner et al. (2019) argue that mental health professionals and trauma-informed services should be mindful that the traumatic impact of gun violence for children may not necessarily be attached to direct victimization experiences but may also result from simply seeing or hearing it in their neighborhoods. The present study examines indirect exposure to gun violence specifically, as opposed to the combined effect of gun violence and other forms of violence, and therefore has the potential to add to the discussion regarding how to best assess and characterize negative emotional or cognitive symptoms in teenagers exposed to gun violence in their communities.

A recent study (Pierre, 2020) on African American adolescent male exposure to gun violence has examined the protective factor of school belongingness for African American males between the ages of 14 and 19, finding that school attendance offered some protection from the negative consequences of gun violence exposure. Also, Smith et al. (2020) studied the effects of gun fatality exposure on minors. Their findings suggest that vicarious exposure to gun violence fatality is related to a higher prevalence of mental health symptoms. While impactful, each of these studies provide opportunities for additional research. For example, Pierre et al. (2020) did not include females in their sample and studied community violence holistically as opposed to studying community gun violence specifically. While females are less likely to have direct exposure to community gun violence, they are active members of at-risk communities, and they often experience indirect exposure. Therefore, the risk to their developmental trajectory needs to be addressed in the literature as well. Smith et al. (2020) did not include non-fatal incidents or community gun violence specifically. Non-fatal gun violence exposure occurs more frequently in communities, and, therefore, its specific impact needs to be addressed in the research. This study includes fatal and non-fatal exposure and examines its impact on the teen.

Conclusion

Frequent exposure to trauma, such as gun activity, can disturb the natural process of neural development in the adolescent brain. The evidence of this disruption has been documented in research that compared minors exposed to gun violence with those with no previous exposure. Structural differences in regions of the brain related to emotional response and learning and memory have been noted.

The cause of structural difference in these regions of the brain is likely related to the normal developmental trajectory of the adolescent brain being altered by an adolescent's frequent exposure to violent gun activity in their neighborhood. Existing research on adolescent brain development has revealed that the brain experiences an influx of synaptic pruning during adolescence, which is orchestrated by stimuli in an adolescent's external environment. External stimuli, such as community gun violence, likely compromise emotional and cognitive development, resulting in behaviors such as impulsivity, inattention to detail, and emotional expressions of aggression. The aim of this research is to explore the existence of a relationship between emotional and cognitive function and exposure to community gun violence and to determine if there is a causal relationship between adolescent exposure to community gun violence and emotional instability and cognitive disturbance in teenagers.

Chapter 2: Literature Review

Community Gun Violence

Community gun violence is a form of interpersonal gun violence. It takes place between non-intimately related individuals in cities or neighborhoods (EFSGV, 2021). Interpersonal gun violence is a type of violence not intended to further the aims of any formally organized group or cause (Aspholm, 2019). Community gun violence can be evidenced in public places, such as neighborhood streets, public parks, residential front stoops, or community corner street bodegas. It can be characterized as unexpected or sporadic, being evasive and disruptive although frequent and anticipated. Its effects are well understood, though its causes and characteristics still require investigation. Community gun violence shifts communal spaces such as school zones, basketball courts, and neighborhood churches from their intended purpose, making them danger zones rather than safe havens.

Community gun violence may thrive given certain societal conditions. The societal conditions that favor community gun violence include mass incarceration of community members, discriminatory social and economic policies, economic inequity, and a lack of neighborhood resources. Community gun violence is most prevalent in cities whose conditions mirror these descriptors and where guns are easily accessible. In the United States, prevalence data on gun violence activity has identified 127 cities as the collective key contributor to the country's gun violence occurrences. Together, these communities account for more than half of the nation's gun homicides (Beckett et al., 2017). With these cities facing high poverty rates and gross social, racial, and economic inequalities, and with guns being readily available, they present the ideal societal conditions in which community gun violence might thrive. Each of

these cities has a gun homicide rate higher than the national average. These cities are well known as gun active territories or community war zones (EFSGV,202).

Gun violence activities are unevenly distributed throughout the United States: 26% of gun violence occurs amongst 1.5% of the total population (EFSGV, 2021). This 1.5% is made up of neighborhoods heavily populated by Black and Hispanic/Latino residents. Thus, according to national statistics reported by EFSGV (2021) Black and Hispanic communities are disproportionately affected by community gun violence. Young Black males between the ages of 15 and 34 account for 2% of the United States population, yet they account for 37% of firearm homicide victims, making gun violence the leading cause of death in this population (EFSGV, 2021). Black females between the ages of 15 and 34 are 3.5 times more likely to be victims of gun violence than their white counterparts and 6.5 times more likely to be murdered by a firearm. Hispanic/Latino males and females have a lower incidence of gun violence when compared to their Black counterparts aged 15–34; however, gun-related homicide is the second leading cause of death for Hispanic males ages 15–34. Hispanic/Latino males are 3.4% more likely to be murdered by a gun violence attack than their white counterparts. Moreover, Hispanic/Latino females are twice as likely to be fatal victims of gun violence than their white female counterparts.

African American teenagers are at greater risk of being victims of community gun violence. Fifty eight percent of interpersonal gun violence victims are African American, which is eight times higher than their white counterparts. According to Phillips J. Cook (2020), these statistics highlight that African Americans are at risk of reduced life expectancy. Community gun violence specifically poses a health threat for the African American population, with this disparity in life expectancy believed to be causally related to interpersonal gun violence events.

A threat to life expectancy in any area of human development is considered a human risk factor and when the threat occurs during formative developmental years, it becomes a childhood adverse event Cook (2020). Gun violence, fatal or non-fatal, is a predeterminant of reduced life expectancy for communities where there are frequent firearm-related incidents of interpersonal violence.

Community gun violence prevalence should be studied by examining fatal and non-fatal outcomes of shooting injuries (Cook, 2020). Studying fatal and non-fatal outcomes will allow for a more accurate review of the true frequency of gun violence events in communities. Suicide shootings occur four times less frequently than interpersonal shootings, ending in death about 90% of the time. Meanwhile, interpersonal shootings have a 20% fatality rate. At the outset, the difference in fatality rates may drive the perception that suicide shootings are more impactful on societies than interpersonal shootings. However, interpersonal gun violence impacts more lives than gun-related suicide. In 2018, 27,000 self-inflicted gun violence victims were reported; in the same year, 70,000 interpersonal gun violence victims were also reported. Interpersonal events are almost three times more frequent than gun-related suicide events. Therefore, research and analysis that defines community violence as a form of interpersonal violence captures the broader effect, beyond fatalities, of gun violence exposure on all its victims. Gun violence exposure, in the context of this research refers to one of the following: being a victim of a gun attack in one's community, knowing a family member, friend or community member who was a victim of a gun attack in one's community, witnessing a gun attack in one's community, hearing gun shots or hearing of a report of a gun violent incident in one's community.

In summary, prevalence data on community teenage gun violence in America reveals it as geographically concentrated in specific areas of our country and most prevalent amongst Black

and Brown adolescents. Therefore, scholars have examined, the prevalence of community gun violence amongst teenagers according to geographic location and community socioeconomic conditions. This is important work as it correctly attends to the American landscape, where prevalence of community gun violence is high. However, the negative effects of gun violence exposure are experienced at the neural level, resulting in negative impacts on emotional and behavioral systems. The effect is experienced by the individual and is expressed on both individual and communal levels. Further research is needed to examine these individual effects of community gun violence on the brain and its expression in the daily communal behavior of teenagers. The urgency of this research is causally related to the diminished life expectancy of Black and Brown teenagers as result of gun violence in their communities.

Emotional Disturbance and Cognitive Impairment Amongst Teenagers

Experiencing Gun Violence in Their Communities

Exposure to gun violence promotes individual and communal fear, in particular the fear of threat. According to Whitley (1992), the orthodox Freudian definition of fear is reality anxiety, or a painful emotional experience based on the perception of a dangerous condition in the external world. Teenagers exposed to communal gun violence perceive danger in their external worlds daily, and therefore they experience this reality anxiety continuously.

Individual fear of threat activates fight-or-flight responses in the brain. Fight-or-flight responses are instinctual attempts to eliminate or escape threat (Katz et al., 2021). When an individual is confronted with threat, their brain is activated to perceive fear and to signal the body to remove itself from harm. This is a neurocognitive response that is typical in communities plagued with gun violence. If the threat is persistent, teenagers may choose to arm themselves to eliminate their fear of threat. Self-arming, which prepares individuals for a fight response in the

face of threat, may allow for control of the initial fear emotion, but it can introduce hypervigilance and paranoia. This causes the emotional disturbance introduced by gun violence exposure to persist. The prevalence of emotional disturbance increases as more individuals choose to self-arm and self-protect. This step introduces more violence and consequently more fear, perpetuating a vicious cycle.

The fear of threat can also lead to the desire to self-preserve. Self-preserving is a flight response in the face of a threat. Self-preserving, through fleeing, allows teenagers to proactively attempt avoidance when they encounter potential violence in their communities. According to Moscarello and Maren (2018), using the appropriate defense mechanisms in the face of a threat is essential to human survival. Humans and animals will avoid noxious outcomes if presented with the opportunity to do so. Therefore, teenagers living in areas plagued with community gun violence will naturally seek to develop and utilize the appropriate defense mechanisms to aid their survival.

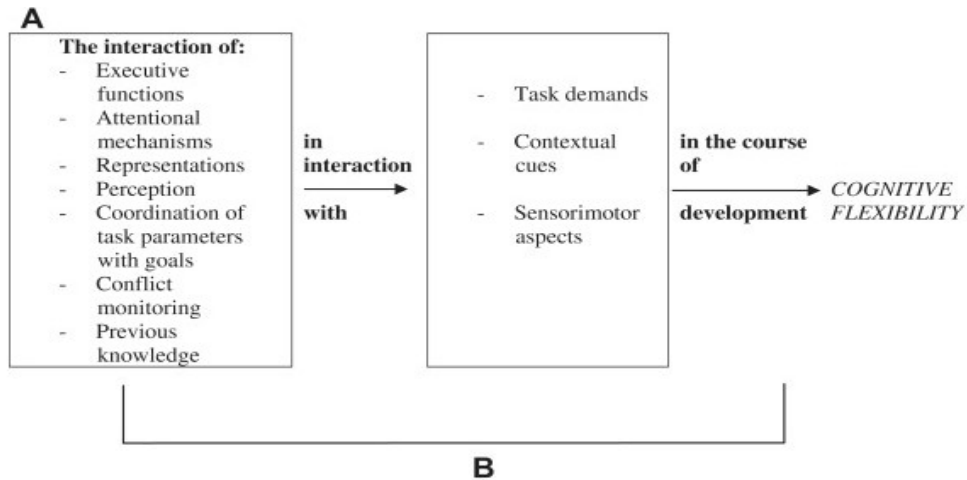
Cognitive flexibility involves an individual's adaptation skills; it is the cognitive skill that assists with an easier adjustment to all types of conditions, namely self-control in difficult situations, and ability to produce different solution paths and many alternatives (Martin 1994). According to Robinson et al (2011) healthy individuals initially respond to threat slower than anxious individuals but can increase the speed of their response if an initial threat is followed by a second threat. This adaptation is known as conflict adaptation and is an example of cognitive flexibility.

Cognitive flexibility allows individuals to adapt their responses to potential threats. It aids in the decision to flee, if appropriate, and properly regulates fear. Conversely, cognitive inflexibility limits an individual's ability to adapt their fight-or-flight responses and results in

cognitive impairment and an inability to successfully regulate fear and defensive behaviors. Cognitive flexibility is a property of various cognitive processes according to Ionescu (2012). The cognitive processes involve attentional mechanisms, mental representations, what is perceived in the environment, a successful coordination of personal goals within the context of the tasks to be performed, and finally, resolving and managing internal conflict and previous knowledge. If any elements of the interaction are compromised, then the overall level of cognitive flexibility is also compromised. Cognitive inflexibility is caused by any limitation in this interaction. Limitations might be in the individual's executive functioning, attention, or perception, or they might result from inaccuracies in an individual's mental representations. Teenagers living in areas plagued with community gun violence who are experiencing any of the limitations will not be able to successfully regulate their fears or defensive behaviors. This research aims to understand the prevalence and severity of those limitations in executive functioning and attention. Figure 1 is a representation of the developmental process of cognitive flexibility (Ionescu, 2012).

Figure 1.

Two kinds of interactions that lead to the emergence of cognitive flexibility: (A) interaction of cognitive mechanisms (the list presented here is not intended to be exhaustive); (B) interaction of cognition, sensorimotor mechanisms, and context, in developmental time (Ionescu, 2012).



A teenager's subsequent mental representations (memories) of a gun violence event may be strengthened or weakened by the teenager's decision, at the time of the event, either to fight or flee when confronted with threat. Research has shown that the act of fleeing activates stronger memories (cognitive representations) of the social interaction for the individual chasing or posing the threat than for the individual fleeing and under threat (Yin et al., 2018). In fact, the fleeing responsivity strengthens the cognitive representation of the interaction for the chaser.

The study of cognition in the context of gun violence exposure in humans is limited and even more rare in adolescents specifically. Developmental neurocognitive research has proven that the adolescent brain is structurally different from the child or adult brain in regard to its mass and neural connectivity in specific regions (Saxbe et al 2017). Due to these known differences in the adolescent brain, this research study seeks to examine the unique effect of gun violence exposure on the adolescent brain specifically during this period of human development. The research builds on previous research on animal brain structure and brain mass in the context of threat. It is not uncommon for animal cognition research to advise or guide human research as it often tells where complex human cognition comes from (Weir, 2020). Kotschal et al, (2017)

have conducted research on cognitive ability in organisms showing that brain structure and brain mass of an organisms under threat can vary and is altered by the occurrence of a predator in the community. This research proposes that the presence of a predator in the community has the capacity to affect the mass and structure of the organism brain.

Kotrschal et al. (2017) found a positive association between optic tectum, size of the organism and the mass of its predator. The optic tectum is the area of the brain responsible for visual processing. This suggests the bigger the predator is in size in the organism's community, the larger in mass and structure of the optic tectum becomes over the course of development. Kotrschal et al. (2017), found a negative association between olfactory bulb and hypothalamus size of the organism and the mass of its predator. The olfactory bulb is activated as organisms perceive and process scents in environment. The hypothalamus activates keys regions of the brain to restore homeostasis to the body when under threat. A reduction in size of these key brain structures that is proportionate to the size of predator suggests impaired functioning of key structures needed to manage threat and promote survival.

The findings of Kotrschal et al. (2017), suggests that being under persistent threat in one's environment can negatively influence brain structure in specific regions of the brain. This may be indicative of reduced cognitive function in these same regions. By conducting this study, we hoped to learn if adolescents living in conditions where there is gun violence report high levels of anxiety, depression, and inattention. We anticipated that the prevalence of anxiety, depression, and inattention amongst this population would be high, considering their need to constantly activate their fight-or-flight responses and to flee threats to survival.

Internalizing and Externalizing Behaviors and Victim Relationship

The type of emotions elicited by community gun violence exposure can be attributed to the type of violence experienced, the frequency of exposure, the severity of the incident, and the relationship between the gun violence victim and the child or adolescent exposed to the incident. Lambert et al. (2012) examined whether the relationship proximity to the victim of community violence is a partial determinant of the adolescent emotional and cognitive response to community violence exposure. Lambert et al. (2012) studied 501 10th-grade participants who each reported witnessing at least 10 community violence events in the past year. Participants were asked to report whether the victims of the events were family members, close friends, acquaintances, or strangers. The researchers were concerned with the psychosocial adjustment of teenagers exposed to community violence and whether emotions were internalized or externalized differently depending on how close the teenager was to the victim. They chose to evaluate anxious, aggressive, and depressive behaviors and hypothesized that witnessing a community violence event that involved a person with whom the teenager had a strong relationship would be associated primarily with anxiety and depressive symptoms, whereas witnessing strangers as victims of community violence would elicit aggressive symptoms.

Depressive and anxious symptoms were assessed using the Baltimore How I Feel Adolescent Version, Youth Report (BHIF-AY). Aggressive behavior was measured using the aggressive/disruptive behavior subscale of the Teacher Observation of Classroom Adaptation-Revised (TOCA-R). Lambert et al. (2012) found a significant gender effect on anxiety symptoms, with girls experiencing more anxiety than boys. Witnessing community violence against a family member was significantly positively associated with anxiety symptoms. There was a positive association between anxiety symptoms and witnessing community violence

against a close friend that was observed in boys but not in girls. Lambert et al. (2012) did not report any significant correlation between depressive symptoms and any degree of relationship proximity, and there was no gender effect; girls did not report more depressive symptoms than boys. There was a positive association between depressive symptoms and witnessing community violence against a family member or acquaintance, but this association was marginal. Aggressive behaviors were reported more commonly for boys than for girls. Lambert et al. (2012) found a marginal association between witnessing community violence against a close friend and aggressive behavior, while witnessing community violence against an acquaintance was significantly positively associated with aggressive behavior. Among boys, who were significantly more likely than girls to exhibit aggression, there was a marginally significant association between aggression and witnessing community violence against a stranger. Based on Lambert et al.'s (2012) findings, we anticipated finding gender differences in this retrospective study based on the participant's relationship to the victim of community gun violence. We also expected to find higher prevalence of anxiety among teenagers who had an intimate relationship with the victim, compared to those who had a casual relationship or no formal relationship with the victim.

Type of Exposure and Expression of Emotionality and Cognitive Impairment

The expression of emotionality or cognitive disturbance experienced by an adolescent exposed to gun violence in their community is dependent upon the medium through which the exposure occurs. Exposure can typically be firsthand or secondhand accounts of the events. The information is transmitted through visual or auditory stimuli. In their daily lives, adolescents learn of gun-related events via social media, community hearsay, by directly witnessing an incident, or by frequenting the scene of an incident. Viosin et al. (2011) conducted a study on

behavioral coping styles in an adolescent community on the Southside of Chicago where community violence was common. Five common forms of community violence were examined: physical attacks, fighting, incidents involving police officers, and gun violence or murder. This comparison study gathered qualitative data from 32 participants (16 males, 16 females) living in this community. Viosin et al.'s (2011) research findings highlight the differences in medium through which gun violence exposure occurs. Examining visual versus auditory exposure, Viosin et al. (2011) found differences in the detail and graphic nature of the descriptions from auditory exposure depending on gender. Males' descriptions of auditory processed events had greater detail and were more graphic than those of their female counterparts. This suggests that while the same region of the brain is employed in the processing of auditory stimulus of a community gun violence event, the level of brain activation differs between female and male adolescents. Further research in the field of neurocognition is needed to learn more about how the male and female adolescent brains differ in their function and activation to correspond with the differences in their exposure types. These findings suggest the mental representations of males exposed to community gun violence are stronger than those of females. However, a better understanding of how the cognitive system is impacted by this gender difference is needed.

Viosin et al. (2012) also reported a second between group difference. In addition to the fact that male subjects who reported hearing physically violent events were able to provide more vivid and graphic accounts of the occurrence when compared to their female counterparts who had the same type of exposure, the visual representations of the violence they created and stored in their long-term memory were also more detailed and descriptive of the violence when compared to those of their female counterparts. The visual representations of the violence they created and stored in their long-term memory were more detailed and descriptive of the violence

when compared to those of their female counterparts. This suggests that the cognitive disturbance of male teenaged exposure to community gun violence may be greater than that of their female counterparts, considering that their mental stores of the events are more vivid and likely more distracting.

Adverse Childhood Experiences

Gun violence exposure is not generally included in discussions of adverse childhood experiences, which were originally defined as childhood emotional, physical, or sexual abuse and household dysfunction (Brown et al., 2009). However, gun violence exposure impacts emotional, physical, and cognitive development in the lived environment, causing dysfunction. Therefore, we propose it should also be categorized as an adverse childhood experience. The current Adverse Childhood Experience Scale (ACES) includes items such as living in an unsafe neighborhood, witnessing violence, or experiencing discrimination, among other experiences (Bond et al., 2021). Adverse events have the potential to disturb, redirect or alter developmental trajectories in children and adolescents. These events can be classified as interruptions or influencers of brain development and function. The resultant behaviors are coping styles (Guinosso et al., 2016), yet can be maladaptive and in some cases fail to equip the individual to cope with stressors during their lifespan. Considering the current prevalence of gun violence activity amongst adolescents, the scale would benefit from the inclusion of this specific category.

The Emergence of the Adverse Childhood Experience Scale

An important research program on the effects of adverse childhood experiences was begun in 1985 by Dr. Vincent Felitti at the Kaiser Permanente Department of Preventive Medicine collaboration with the Center for Disease Control (Stevens, 2012). Like many preventive medicine clinics today, Dr. Felitti's weight loss clinic was experiencing a high rate of

patients being lost to follow-up: approximately 50%. The drop-out rate could not be attributed to failure to lose weight, since most patients had lost about 100 pounds at the time of their departure from the clinic. Therefore, the cause required further investigation.

Felitti, with the support of his institution and the CDC, launched a 25-year study to explore why patients were dropping out of the treatment program. He conducted chart reviews and interviewed the patients who left the program prematurely. Interview questions were general and intended to capture body weight at key developmental milestones. His findings revealed that adverse childhood experiences were commonly reported by patients, regardless of ethnic group and socioeconomic class, and these events were connected to major chronic illness later in adult life (Stevens, 2012). In fact, the first finding of an adverse event in the chart review was that of a female patient who, when asked about sexual history and weight, revealed she was a mere 40 pounds and four years of age at her first sexual encounter. She had been sexually abused by her father (Stevens, 2012). Dr. Felitti subsequently uncovered numerous cases of childhood sexual abuse, and several other colleagues serving as co-investigators on the study also found the same prevalence in their case reports. Dr. Felitti believed he had found a direct causal relationship between weight gain and a negative childhood memory and an indirect causal relationship between participation in the weight loss program and being at a safe weight, where the threat of abuse was considered unlikely (Stevens, 2012).

Adverse Childhood Experiences, Emotionality, and the Emergence of Maladaptive Behaviors

Adverse childhood experiences have a direct relationship with emotional disturbance. Dr. Felitti reported an association between adverse childhood experiences and feelings of anxiety, depression, and fear. His patients reported that they used food therapeutically to manage negative emotions and for a calming effect (Stevens, 2012). According to Stevens (2012), Felitti found

that eating habits were reported as a maladaptive coping style utilized to address an adverse event, and weight gain was reported as a solution to make the victim less visible to the perpetrator; by gaining weight the participant sought to self-protect. Unhealthy weight gain was not viewed as the problem by participants, but rather as the solution to an unfortunate life event. In fact, some participants reported abruptly stopping the program if they believed the drastic loss in weight made them more attractive to perpetrators. Healthcare professionals can credit to this work their enhanced understanding of how the presentation of chronic illness and addictive behaviors can be correlated to the suppression of negative mood and affect associated with the trauma of a past adverse childhood experience. As a result of this research, they can also seriously consider patient reluctance to participate in therapeutic or non-therapeutic interventions as a maladaptive coping style to avoid future victimizations and adverse experiences. In this context, the ACES model can be utilized to better understand the emotionality and cognitive flexibility of adolescents under the threat of community gun violence.

As mentioned earlier, more recent ACES assessments examine neighborhood safety and violence exposure. Research is needed to understand the emotionality and maladaptive behaviors that emerge in children and adolescents living under these conditions, and the work of Felitti can be used as a guide. Further research is needed to examine what chronic health illnesses are more pervasive and likely in people who have encountered gun violence in their communities during childhood and adolescence.

Childhood and Adolescent Adversity and Neural Systems

The neural pathways of the brain are directly affected by exposure to gun violence. More than half of children in the United States are reported to have experienced at least one adverse event prior to reaching adulthood (Sheridan et al., 2017). These events can be classified as acute

or chronic, and they range in severity. Adaptation to such events is varied. This leads to variations in behavioral responses to lived adversity. External maladaptive behaviors are easily recognized in academic and social settings. Neurocognitive deficits are less overt but equally damaging and cause impairment in daily functioning. Neurocognitive deficits are found in areas of executive functioning which are associated primarily with the frontal lobe of the brain. This region of the brain is essential for academic performance, socialization, language comprehension, and decision making. Sheridan et al. (2017) argued that adverse events during childhood can lead to living conditions that are deprived of social and cognitive stimulation. They postulated that certain environments, such as those featuring frequent gun violence, deny the developing brain the stimulation needed to build neural pathways and to support activation in the critical frontal lobe regions of the brain. These deprivations of stimulation can be directly correlated to neurocognitive deficits. Exposure to a threat in an individual's environment establishes a neural pathway for rapid identification of potential threats in the future (Sheridan et al., 2017). Early learning, which involves discovery of the relationship between physical threat and sheltering in place or physical threat and self-defense, can alter how the brain develops in cortical and subcortical regions. This early exposure and consequent stimulus-based learning directly impact how attention, all forms of memory (working, short-term, and long-term) and emotional regulation operate in fearful scenarios. As mentioned earlier, the operation of these key elements determines how cognitively flexible adolescents are when faced with a fight-or-flight decision. Research has shown that the long-term implication of this form of early learning under adverse conditions is an inability to correctly discern between threat and safety cues in new learning paradigms. This suggests that we can expect to see some evidence of reduced

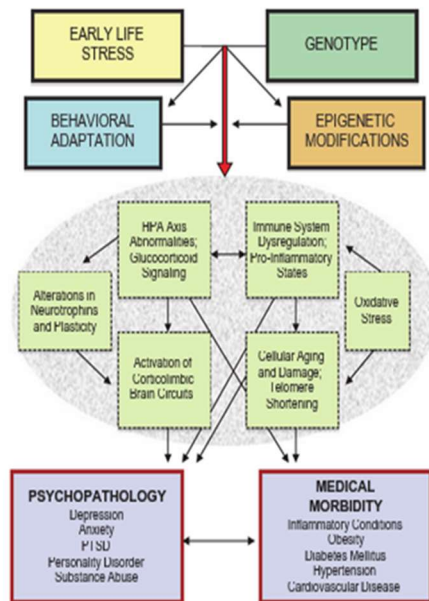
cognitive flexibility or cognitive impairment in individuals who were exposed to the threat of guns in their community during early childhood and adolescence.

Neurobiological Correlates of Childhood Adversity: A Model of Risk for Psychopathology and Medical Morbidity

Residents of an environment where gun fatalities frequently occur experience high levels of stress and anxiety. According to Tyrka et al. (2013), stress exposure during childhood has particularly overwhelming consequences for neuronal development, because this developmental stage is characterized by frequent changes to the neural pathways that regulate emotion and behavior. The circuits of the brain related to learning, memory, neuroplasticity, and stress response are supported by the stability of the living environment. If this stability is comprised, then neural development can be compromised. Children and adolescents who have endured adversity often experience long-lasting effects to their neurobiological, behavioral, cognitive, and social systems. Tyrka et al. (2013) conducted an expansive literature review of the neurobiological correlates of early life stressors in humans and derived a model of the neurobiological effects of childhood adversity, as seen in Figure 2.

Figure 2.

Model: Neurobiological effects of childhood adversity. Childhood adversity engenders risk for psychopathology and medical morbidity through a number of inter-related pathways. Genetic sensitivity to environmental factors is an important determinant of risk, and epigenetic effects of early adversity influence the biological impact of stress exposure. Behavioral adaptation may exacerbate or ameliorate these effects. Ensuing alterations of neuroendocrine, neuroimmune, and neurotrophin pathways are thought to be mechanisms of the development of psychiatric disorders and related medical conditions.



In their theoretical model, Tyrka et al. (2013) proposed that early life stressors and genotype have a combined effect on psychopathology and medical morbidity. For the purposes of this community gun violence research, the focus is on the aspect of the model that concerns psychopathologic outcomes, indicated at the lower left of the figure.

Early life adverse events combined with genetic predispositions have the capacity to alter the functioning of the neuroendocrine system, which consists of the hypothalamus and the pituitary gland. The hypothalamus assists with maintenance of the homeostasis of several bodily systems, including memory and stress management, while the pituitary gland produces several neurotransmitters that also regulate bodily functions. Collectively, these brain regions orchestrate bodily response to external stressors. When the body is under stress, neurotransmitters secreted from the hypothalamus modulate the pace of involuntary bodily behaviors. The heart rate and respiratory rate are directly affected. Cardiovascular activation

increases along with blood pressure, pushing blood to the brain and to the body's extremities to support rapid cognitive function and muscular action. Once the stressor is removed, the homeostatic nature of the neuroendocrine system releases a negative effect of cortisol to terminate the stress response. Tyrka et al. (2013) found that prolonged exposure to threat and stressors led to increased demand on the brain to attempt to maintain homeostasis. Adolescents under daily and persistent threat are likely to experience this ongoing cognitive demand to maintain homeostasis. This persistent demand alters the functioning of the autonomic, metabolic, and immune systems.

Adverse Childhood Experiences, Emotional Regulation and Executive Functioning

Children and adolescents who experience childhood adversity struggle with healthy management of emotions (Sheridan et al., 2017). Neuroscience has unveiled evidence of atypical function in the neural circuitry supporting their emotional regulation. The processes of internalizing and externalizing negative emotions can be impaired, and this can be clinically reported as an inability to emotionally regulate appropriately. Behaviors that are indicative of high degrees of emotionality and are disruptive to daily functioning can be interpreted as pathological.

Children and adolescents who have been exposed to violence have also shown evidence of structural alterations in the prefrontal cortex region of the brain (Cambridge Core, 2019). Thus, studies have examined the brain function in this area. The prefrontal cortex is responsible for working memory and executive functioning; these neurocognitive processes support learning in the classroom and behavior management in social situations. Cambridge et al. (2019) examined brain function in the context of violence. They studied childhood exposure to violence and its influence on performance and neural activation during emotional working memory tasks.

Working memory is a cognitive system, an executive function that temporarily holds information, supports reasoning, and guides decision-making. Emotional working memory is working memory of emotions.

Cambridge et al. (2019) recruited 66 participants between the ages of 6 and 19, with a mean age of 13.58 years. Half of the participant group had previously been exposed to violence ($n = 32$), and half had not ($n = 34$). The groups were matched for age and gender. Cambridge et al. (2019) hypothesized that children and adolescents who had experienced violence would perform less well on working memory tasks than youths who had not experienced violence. The researchers anticipated a worse performance for the former group when the facial expression was either neutral or happy. Their hypothesis was based on previous work that found adults who had been exposed to violence during childhood have working memory deficits for happy faces but not for angry faces. These adults experienced a suppressed emotional reactivity to happy facial emotions. Alternatively, heightened emotional reactivity to threat cues has been evidenced and well documented among children who have been exposed to violence (Cambridge, 2019).

Cambridge et al. (2019) found participants performed worse on neutral stimuli than angry stimuli as expected. They found a main effect for neutral emotion and group. Participants who had been exposed to violence performed worse when presented with neutral stimuli than when presented with happy or angry stimuli, and their overall performance was worse than that of participants with no previous exposure to violence. However, it should be noted that participants with exposure to violence only performed marginally worse than their counterparts when presented with angry stimuli.

Neurodevelopment, Attention Bias and Community Exposure to Threat

Individuals' exposure to war-time conditions in their communities has been recognized as leading to symptoms of Post-Traumatic Stress Disorder (PTSD) and mood disorders such as depression and anxiety. In 2010, Bair-Haim et al. presented data on the effects of community threat on attention bias as well as on PTSD and symptoms of depression and anxiety. The purpose of the research was to assess the collection of stress-related symptoms that arise when an individual is exposed to a life-threatening event in their community. More specifically, the researchers examined associations in real time between imminent life-threatening danger, stress-related symptoms, and vigilance. Vigilance was an indirect measure of attention threat bias (Bar-Haim, 2010).

For the study, 131 individuals were recruited in the city of Tel Aviv. The participants came from urban communities; their average age was 37.3 years, and 33% were male. Data on PTSD, depression, anxiety, and attention threat bias was collected over a 6-day period of conflict and rocket-firing in the region. Participants resided at various distances from the launch site and therefore had varied time frames to seek shelter from fire. Shelter-in-place response times were 15 seconds, 30–45 seconds, 60 seconds, and out of rocket range.

Bar-Haim et al. (2010) found the highest levels of PTSD, anxiety and depression amongst individuals who had 15 seconds or less to shelter in place. However, PTSD, anxiety, and depressive symptoms reported by individuals who were out of rocket range were higher than those reported by individuals who had 60 seconds to seek shelter. A dot-probe task was performed to assess attention bias after rocket exposure. In this task, participants were shown two-word probes: a threatening word probe and a neutral word probe. Participants were asked to response as quickly as possible to each probe without error. The attention bias to threat was

determined by how quickly participants responded to probes that replaced the neutral stimuli with threat stimuli. A failure to respond or a slow response was indicative of avoidance of threat. The greatest avoidance of threat was seen amongst participants who required 30–45 seconds to shelter in place, followed by those who required 15 seconds or less to shelter in place. Participants who were out of rocket range displayed the lowest response times to threat; the greatest bias toward the threat was seen amongst participants living outside of rocket range. This suggests that the further an individual lives away from potential threat, the more heightened their attention to the potential of that threat. Individuals living near and previously exposed to life-threatening wartime rocket launching are less apt to attend to threatening stimuli but experience higher degrees of maladaptive residual emotion (Bair-Haim et al., 2010). These findings were collected in 2010, and therefore more timely research is needed to re-evaluate them. Factors such as shelter-in-place ordinances and policies regarding wartime conduct may have changed. In addition, the method used for measuring attention was to record response time, whereas newer measures of neural activity such as fMRI are now available and should be considered. It is also necessary to better understand the effect of community gun violence, where the members of the community share roles of victim and perpetrator.

Adolescent Development and Gun Violence Exposure

Teenagers growing up in communities where there is gun violence are actively navigating the processes of maintaining their survival, role switching, and successfully reaching key developmental milestones. In 1996, in their book chapter, “What Do We Need to Know to Understand Children in War and Community Violence?” Gabarino and Kostelny presented a developmental approach to assessing the effects of community violence or war on the developing child. They regarded the developmental process as a fluid one where the child’s capacity changes

continually, and they introduced a holistic perspective to childhood development, highlighting the importance of children gaining life skills that are relevant and critical for thriving in their current living environment. Gabarino and Kostelny (1996) note that human growth and development in these settings demand a critical understanding of personal roles that are specific to the environment. Successful human development involves the adaptation of societal roles and the emergence of skill mastery within these roles to maintain survival.

In war settings, children and adolescents toggle between the roles of minor and soldier. In settings where community violence is frequent, they may also toggle between minor, survivor, and perpetrator. If children and adolescents play multiple roles in communities where gun violence is prevalent, their development must take several trajectories to compliment the demands of their environment. Exposure to violence during development has the capacity to affect intellectual, physical, and emotional potential (Gabarino &, 1996). The theoretical developmental approach acknowledges that humans are unique in their cognitive, emotional, linguistic, and physical domains. Each domain has a separate expression of potential and proficiency and emerges distinctly in response to environmental stressors and stimulators (Gabarino & Kostelny, 1996). The aim of this research is to better understand how the environmental stressors in a community where gun violence is prevalent directly affect the emergence of adolescent skills in the domains of emotion and cognition. Brain growth and development are at the foundation of human development across the emotional and cognitive domains. Brain growth responds positively or negatively to environmental stressors or stimulation. On a neurocognitive level, the skill demand for societal role development and for role switching is an integral part of an adolescent's successful emotional and cognitive

development and, if not developed adequately, this jeopardizes the adolescent's current and future survival.

Existing research on the trauma caused by war and community violence has been associated with regression in language and daily bodily functioning such as toileting. Children and adolescents experience what Gabarino and Kostelny (1996) refer to as developmental regressions when exposed to the threat of violence. It might be expected that adolescent exposure to community gun violence would also cause developmental regressions; however, further research is needed to understand what these developmental regressions are, their expression, and their severity. It is imperative for research to explore how different forms of community violence have a varied effect on brain growth and functioning. It is equally important to understand the combined effect of innate developmental delays or deficits and community violence on emotionality and cognitive behavioral functioning and daily life.

Summary of the Literature

The World Health Organization (WHO) presents an ecological model to conceptualize the complex nature of gun violence (Cukier & Eagen, 2018). This research employs this model to identify in what ways this research project might be most applicable to the study of adolescent exposure to community gun violence. The model is appropriate because it considers the individual, situational, and contextual factors that are instrumental contributors to gun activity in communities. The model framework is depicted in Figure 3.

Previous research has shown there is no single factor that can explain why some people or groups are at higher risk of interpersonal violence, while others are more protected from it (VPA, 2021). Within the World Health Organization's ecological framework, each factor is

credited for its contribution to violence equally, and community gun violence is classified as a form of interpersonal violence that is a direct outcome of the interaction of many factors at four distinct levels: the individual, the relationship, the community, and the societal.

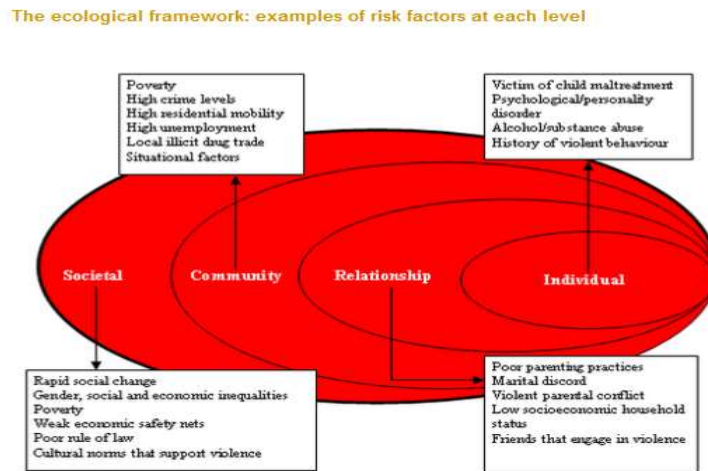
According to the WHO, the levels are defined as follows:

- At the **individual level**, personal history and biological factors influence how an individual behaves and increase their likelihood of becoming a victim or a perpetrator of violence. Among these factors are being a victim of child maltreatment, psychological or personality disorders, alcohol and/or substance abuse, and a history of behaving aggressively or having experienced abuse.
- Personal **relationships** such as family, friends, intimate partners, and peers may influence the risks of an individual becoming a victim or perpetrator of violence. For example, having violent friends may influence whether a young person engages in or becomes a victim of violence.
- **Community** contexts in which social relationships occur, such as schools, neighborhoods, and workplaces, also influence the risks of an individual becoming a victim or perpetrator of violence. Risk factors here may include the level of unemployment, population density, mobility, and the existence of a local drug or gun trade.
- **Societal** factors influence whether violence is encouraged or inhibited. These include economic and social policies that maintain socioeconomic inequalities between people, the availability of weapons, social and cultural norms such as those around male

dominance over women or parental dominance over children, and cultural norms that endorse violence as an acceptable method to resolve conflicts.

Figure 3.

The ecological framework: examples of risk factors at each level



As stated earlier, the intent of this research project was to examine the negative cognitive and emotional effects of community gun violence exposure on teenagers. The project consisted of a retrospective study of childhood adverse event reporting of teenagers exposed to community violence in general, and gun violence specifically, in their communities. It was hypothesized that gun violence exposure would have a distinct effect on emotional and cognitive functioning of teenagers when compared to other forms of community violence. It was also hypothesized that there would be group differences according to gender and the type of exposure experienced by the individual. This hypothesis was made based on the ecological framework of violence presented by the WHO and previous research on the relationship between emotionality and childhood adversity.

The aim of the present research is to better understand how individuals are affected by the prevalence of gun violence in their communities. This research evaluates brain development in natural settings, violent and not. In communities beset by gun violence, a teenager grows up in an environment where peers are victims and perpetrators while also being college-bound students, family members, athletes, and neighbors. Research in this domain should lead to greater insight into the cognitive functioning capabilities and emotional states of this population. It is hoped that the findings will be translational and will guide resources and preventative measures needed in these communities. This research is intended to improve care and environmental conditions for individuals and communities who live with gun violence daily.

Chapter 3: Methods

This chapter outlines the methods used in this study. Included in the section is the study design and procedures, a description of the study participants and the data analysis plan.

Description of Research Implementation

The National Survey of Children's Exposure to Violence (NATSCEV) series data base was the data source for this retrospective study. No formal participant recruitment was required. The database was accessed via the Inter-university Consortium for Political and Social Research (ICPSR) website. This is an international consortium of nearly 800 institutions. Membership in ICPSR includes access to studies, data, and publications. According to the website, the consortium facilitates the opportunity to conduct secondary research to support findings or current research, or to generate new findings and consequently was used for that purpose for this retrospective study. National Survey of Children's Exposure to Violence (NATSCEV) series I, II and III data was accessed. The original data set did not include direct identifiers (e.g., names, social security numbers, addresses, phone numbers) or indirect identifiers (codes or pseudonyms that are linked to the subject's identity) of the participants.

Description of the Survey Tool and Survey Interview Procedures

The National Survey of Children's Exposure to Violence (NatSCEV) is a nationwide study conducted to document the incidence and prevalence of children's exposure to violence in the United States. NatSCEV is a comprehensive assessment of exposure to violence that incorporates a wide range of victimization experiences and that include children across a wide developmental spectrum. A variety of potential predictors and outcomes of children's exposure to

violence were measured in the consequent data analysis. The principal investigators of the study are David Finkelhor of the Crimes Against Children Research Center, University of New Hampshire, and Heather Turner also of the Crimes Against Children Research Center, University of New Hampshire (Finkelhor and Turner, 2016). The initiative was a joint effort of the US Department of Justice and the Centers for Disease Control and Prevention initiated in 2008 entitled the National Survey of Children's Exposure to Violence (NatSCEV), with repeated assessments occurring at 3-year intervals in 2011 and again in 2014 (Finkelhor and Turner, 2016). These assessments have yielded a database of gathered information on exposure to violence, crime, and abuse among children 0 to 17 years old.

The National Survey of Children's Exposure to Violence questionnaire was designed to obtain lifetime and one-year incidence estimates of a comprehensive range of childhood victimizations across gender, race, and developmental stage (Finkelhor and Turner, 2016). The survey interview consisted of an initial short conference conducted with an adult caregiver (usually a parent) to obtain family demographic information. This initial encounter was followed by a second interview of a child or adolescent in the household. One child was randomly selected from all eligible children in a household by selecting the child with the most recent birthday. If selected child was 1 month to 9 years old, the main interview was conducted with the caregiver. If the selected child was 10-17 years old, the main interview was conducted with the child/adolescent (Finkelhor and Turner, 2016).

The questionnaire asked for household demographics and questions about the focal child's health. A series of 52 juvenile victimization screening questions (JVQ) were asked, and for every screener the respondent endorsed, a series of follow-up questions about that victimization was asked. In addition, the survey included sections on lifetime and past year

adversity, internet victimization, community disorder, bullying, delinquency, and the child/parent relationship.

Overview of the Study Design and Procedures

This study is a secondary analysis of data obtained from the National Survey of Children's Exposure to Violence Series. The data collection period of this project was 1997-2014. The National Survey of Children's Exposure to Violence (NatSCEV) study series is a data collection initiative that was conducted in three successive rounds. The data collection series was aimed to gather quantitative and qualitative incidence data of both lifetime and recent childhood victimizations. Finkelhor et al (1994) have explored the incidence, risk factors, and effects of child victimization. They report children are more vulnerable to victimization than adults and argue the overlap and co-occurrence of different types of victimization should be closely documented and studied to formulate integrative concepts around addressing common developmental risk factors associated with childhood adverse event experiences.

The body of work conducted by Finkelhor et al (1994) represents the foundational groundwork laid to introduce the term victimology of childhood to the field of human development. According to Finkelhor et al (1994), victimology of childhood is a field of study that adopts a developmental approach to understanding children's vulnerability to different types of victimizations and their different effects. Historically, Finkelhor et al (1994) have collected survey data in the form of parent or child self-reports of victimization nationally. They categorized these national statistics into three broad categories: the pandemic, such as sibling assault, affecting most children; the acute, such as physical abuse, affecting a fractional but significant percentage; and the extraordinary, such as homicide, affecting a very small group.

Participants for the NatSCEV series were obtained using four sampling frames: 1) an address-based sample (ABS) of households from which cell phone and residential numbers could be dialed, (2) a pre-screened sample of households with children from recent national random-digit-dialed surveys, (3) a listed land-line sample (with a known child in the household based on commercial lists), and (4) cell phone numbers drawn from a targeted random-digit-dialed sample frame (Finkelhor et al 2015). The combination of sampling frames was utilized to increase nationwide coverage of households, including those served only by cellphone, while efficiently reaching households with children to obtain the desired number of completed interviews. According to Finkelhor et al (2015), weights were developed to account for differential probability of selection within and across the sampling frames and to adjust for nonresponse.

Recruitment methods utilized during for the NatSCEV series involved the address-based sample (ABS) respondents receiving an advance letter for the study with a household information form to determine eligibility and willingness to participate in the study. Households with children aged 0-17 were deemed eligible to participate in the study. Participant initial monetary reimbursement was in the form of a \$5 check. After the study telephone interview was completed, participant households were given an additional monetary reimbursement of \$20. As a result of the described sampling method and this recruitment process, Finkelhor et al (2015) reported they obtained a nationally representative sample.

The purpose for gathering survey data like the NatSCEV series data is to obtain data and knowledge about the victimization and maltreatment of children (Finkelhor et al 2015). The research purpose of the NatSCEV series study specifically was to obtain lifetime and one year incidence estimates of a comprehensive range of childhood victimizations across gender, race, and developmental stage.

Upon completion of the NatSCEV study, Finkelhor et al (2015) discussed gaps in the research and outlined three research needs to further our understanding of childhood victimization and adversity and how to mitigate its effects on human development. First, they recommended better statistical methods to document and analyze the scope, nature, and trends of childhood victimization. Second, it was recommended to explore new theoretical approaches and research that cuts across and integrates the various forms of child victimization. Thirdly, Finkelhor et al (2015) argue that the field needs a more developmental perspective on child victimization, and that this would start with an understanding of the mix of victimization threats that face children of different ages.

The goal of this research is to build upon the foundational work conducted by Finkelhor and his colleagues. By applying a cognitive developmental theoretical approach to research of adolescent community gun violence exposure, we take a second look at mental health and emotional data collected during the original study as we explore the effects on the adolescent victim.

This study will utilize an adolescent retrospective data sample derived from the NatSCEV series to understand the prevalence and severity of cognitive and emotional symptoms associated with childhood victimization associated with community gun violence exposure. Leveraging what we know about the differences between the adolescent brain and the child brain, we anticipate a unique effect of gun violence on adolescent emotional and cognitive functioning. Finally, by focusing on community gun violence exposure specifically we hypothesize exposure to this type of violence in one's community during development is an adverse childhood experience that places the adolescent under direct or indirect threat. It is proposed the adolescent victims of this form of community gun violence are at a critical stage of human brain and

emotional development. It is believed that this work will further the research in the three areas Finkelhor et al (2015) recommended. Firstly, by broadening the application of the data from national solely incidence data to prevalence data in emotional and cognitive domains. Secondly, by introducing cognitive and neurocognitive development theoretical approaches to the research discussion and lastly, by placing a closer lens on the adolescent reports of gun violence exposure provides additional information on the effects on adolescent development solely that was not presented in the original work.

In conclusion, this retrospective non-experimental study will observe, describe, classify, and analyze the naturally occurring relationships between adolescent community gun violence exposure and emotional and cognitive development and function. As mentioned in the introduction, the variables of interest are measures of mental health functioning and measures of exposure to community disorder defined using responses to the NATSCEV questionnaire series.

IRB Approval

On September 9, 2020, this study received approval under the category of exempt from the Teachers College, Columbia University Institutional Review Board (IRB) as protocol #20-424. Study data restricted access was requested from the Inter-university Consortium for Political and Social Research (ICPSR) on September 11, 2020. Restricted data access was granted, and study data was released via password protected electronic password on December 17, 2020. The data was accessed for data analysis on December 22, 2020. The protocol was granted IRB approval for an additional year on August 30, 2021.

Recruitment of Study Participants

This is a retrospective study. No formal recruitment process was utilized by the current researcher. The participant data was accessed via a restricted data share agreement with Consortium for Political and Social Research (ICPSR).

Description of the Study Participants

This research examines a measure of executive functioning of adolescents. According to the World Health Organization, the adolescent period is between age 10 and 19. The onset of this stage is marked by puberty, the onset of which is 10-14 for females and 12-16 for males. To accommodate for gender differences in the onset of puberty and the data capture range of the database, the set of participants analyzed here was limited to participants who were at least 13 years of age and no older than 17 years of age.

In addition, current neuroimaging research reports that gray matter volumes in the frontal cortex peak at approximately 11 years of age in girls and 12 years of age in boys. Changes in brain architecture allow the brain to become more efficient by allowing it to change structurally in response to the demands of the environment (Johnson, 2009). To effectively capture these changes, age eligibility guidelines for this study were set between the ages of 13 and 17.

Study Inclusion/Exclusion Criteria

This research involves secondary analysis of a preexisting data set, and is an exempt, minimal risk, retrospective study. Participants were not required to signed informed consent.

Inclusion Criteria

Participant Inclusion Criteria for the study is as follows:

- Must be between the ages of 13-17

- Must reside in United States
- Must have reported no exposure or exposure to community violence
- Must have reported no exposure or exposure to gun violence
- Must have reported being a victim of community violence or a victim of gun violence
- Must have resided with one or both parents or guardians at the time of the survey

Exclusion Criteria

Participant Exclusion Criteria for the study is as follows:

Any participant in the NatSCEV database not between the ages of 13-17.

Operational Definitions of Variables

Participant variables were obtained from participant self-reported measures captured during the NatSERV interview process.

Demographic Variables

Demographic information such as social economic status, race and ethnicity, age of respondent, date of birth, marital status of parents, household composition and educational level was collected for all participants.

Independent Variables

The independent variables within this study are the direct and indirect community violence exposures during the participant's lifetime with special interest in direct and indirect exposure to community gun violence during the lifetime. Other types of adverse childhood experiences are used as a control variable. These exposure scales are then used to define adverse experience groups, including a gun violence group.

Community Gun Violence, No Other Adverse Event Exposure Subscale Definitions

A continuous measure of Gun Violence Exposure, GVE, was defined using 3 survey questions (W8, W9, and CD9) from Section 10 of the Community Disorder the NATSCEV Caregiver Youth Survey. These items measured exposure to the sound of gun shots in the community, exposure to gunfire in a war setting, and exposure to a weapon in the school setting. The following three survey items and the associated possible responses utilized to operationalized for this measure are as follows:

1. At any time in your life, were you in any place in real life where (he/she /you) could see or hear people being shot, bombs going off, or street riots?

Yes No Not Sure Refused

2. At any time in your life, were you in the middle of a war where (he/she/you) could hear real fighting with guns or bombs?

Yes No Not Sure Refused

3. Have you ever gone to a school where a kid brought a gun or knife to school?

Yes No Not Sure Refused

Community Disorder, No Gun Violence Exposure and No other Adverse Childhood Event Exposure Subscale Definition

A continuous measure for Community Disorder, CDE, was defined using six survey questions (CD1, CD2, CD3, CD5, CD7, CD8) from Section 10 of the Community Disorder the NATSCEV Caregiver Youth Survey. The items measured illegal drug use in the community, police arrest activity in the community, parental restriction of movement through the community

due to crime and lack of community resources and funding for basic living needs of community members.

The survey items utilized and their relevant responses for this measure are as follows:

1. At any time in your life, did you ever see someone selling marijuana, cocaine, meth, or other illegal drugs to someone else?

Yes No Not Sure Refused

2. At any time in your life, did you ever see the police arrest someone in your neighborhood and take that person to jail in a police car?

Yes No Not Sure Refused

3. Have you ever lived in a neighborhood where there were gangs?

Yes No Not Sure Refused

4. At any time in your life, have you ever seen the police raid or enter a house in your neighborhood looking for a criminal or block off a place in your neighborhood because a crime happened there?

Yes No Not Sure Refused

5. At any time in your life, did you ever live in a house where your parents did not like to you play outside because of crime around the house?

Yes No Not Sure Refused

6. In some neighborhoods, because of lack of money or for other reasons, no one seems to fix things that break—houses don't get fixed, signs don't get fixed, trash doesn't get picked up. Sometimes heat or water doesn't work for a really long time. At any time in your life, did you ever live in a neighborhood like that?

Yes No Not Sure Refused

Subscale Definition for Other Adverse Childhood Events, not Including Gun Violence or Community Disorder

A continuous measure of other forms of Adverse Childhood Exposure (ACEE) apart from Community Disorder and Community Gun Violence, was defined using 22 items in the NATSCEV Caregiver Youth Survey. The items were derived from relevant subscales in Module A: Conventional Crime Screeners, Module B: Child Maltreatment Screeners, Module C: Peer and Sibling Victimization Screeners, Module D: Sexual Assault Screeners, Module E: Witnessing and Indirect Victimization Screeners and Section 9: Internet Victimization and Section 14: Parental Conflict.

Below are descriptions of the NATSCEV subscales that contributed items to the newly defined “Other Adverse Events” variable/subscale (ACEE), those items, and the possible item responses.

OTHER ACE SUBSCALE 1 CRIME SCREENERS: This subscale consists of 5 survey questions (C1, C2, C3, C7, C9) measure lifetime exposure to crime. Participants were asked to self-report life-time exposure to robbery by force or without force, vandalism, physical threats, and physical assault. The 5 survey items are listed below:

1. At any time in your life, did anyone use force to take something away from you that (he/she was/you were) carrying or wearing?

Yes No Not Sure Refused

2. At any time in your life, did anyone steal something from you and never give it back? Things like a backpack, money, watch, clothing, bike, cell phone, computer, or anything else?

Yes No Not Sure Refused

3. At any time in your life, did anyone break or ruin any of your things on purpose?

Yes No Not Sure Refused

4. At any time in your life, did someone threaten to hurt you when you thought they might really do it?

Yes No Not Sure Refused

5. At any time in your life, have you been hit or attacked because of your skin color, religion, or where your family comes from?

Yes No Not Sure Refused

6. Because of a physical problem (your child has/you have)? Or because someone said (your child was/you were) gay?

Yes No Not Sure Refused

OTHER ACE SUBSCALE 2 Childhood Maltreatment: This subscale consists of 1 survey question (M2) that measured lifetime exposure to childhood maltreatment in the form of spanking or other forms of corporal punishment which included being hit, beat, or kick by a caregiver, including parents. The survey item is listed below:

At any time in your life, did you get scared or feel really bad because grown-ups in your life called you names, said mean things you, or said they didn't want you?

Yes No Not Sure Refused

OTHER ACE SUBSCALE 3 Peer or Sibling Victimizations: This subscale consists of 4 survey questions (P1, P2, P4, P5) that measured lifetime exposure to peer and sibling victimizations in the form of peer or gang physical attacks, bullying or verbal abuse. The survey items and response items are listed below:

1. Sometimes groups of kids or gangs attack people. At any time in your life, did a group of kids or a gang hit, jump, or attack you?

Yes No Not Sure Refused

2. At any time in your life, did any kid, even a brother or sister, hit you? Somewhere like: at home, at school, out playing, in a store, or anywhere else?

Yes No Not Sure Refused

3. At any time in your life, did any kids, even a brother or sister, pick on you by chasing you or grabbing you or by making you do something you didn't want to do?

Yes No Not Sure Refused

4. At any time in your life, did you get really scared or feel really bad because kids were calling you names, saying mean things to you, or saying they didn't want you around?

Yes No Not Sure Refused

OTHER ACE SUBSCALE 4 Exposure to Sexual Assault: This subscale consists of 1 survey question (S5) that measured lifetime exposure to sexual assault in the form forced visual exposure to someone's private parts. The survey item and responses items are listed below:

At any time in your life, did anyone make you look at their private parts by using force or surprise, or by "flashing" you?

Yes No Not Sure Refused

OTHER ACE SUBSCALE 5 Witnessing Indirect Victimizations: This subscale consists of 6 survey questions (W1,W2,W3,W4,W5,W6) that measured lifetime Adverse Childhood Event exposure through the witnessing and indirect victimization. This exposure consisted of observing parent assault by a partner or sibling, observing a physical attack of a parent with or without

weapon in the community or having a member of the family murdered. The survey items and response items are listed below:

1. At any time in your life did you see a parent get pushed, slapped, hit, punched, or beat up by another parent, or their boyfriend or girlfriend?

Yes No Not Sure Refused

2. At any time in your life, did you see a parent hit, beat, kick, or physically hurt your brothers or sisters, not including a spanking on the bottom?

Yes No Not Sure Refused

3. At any time in your life, in real life, did you see anyone get attacked or hit on purpose WITH a stick, rock, gun, knife, or other thing that would hurt? Somewhere like: at home, at school, at a store, in a car, on the street, or anywhere else?

Yes No Not Sure Refused

4. At any time in your life, in real life, did you anyone get attacked or hit on purpose WITHOUT using a stick, rock, gun, knife, or something that would hurt?

Yes No Not Sure Refused

5. At any time in your life, did anyone steal something from your house that belongs to your family or someone you live with? Things like a TV, stereo, car, or anything else?

Yes No Not Sure Refused

6. At any time in your life, was anyone close to you murdered, like a friend, neighbor, or someone in your family?

Yes No Not Sure Refused

OTHER ACE SUBSCALE 6 Internet Victimization: This subscale consists of 2 survey questions (INT1, INT2) that measured lifetime exposure to: Internet Victimization in the form of internet harassment or bullying. The survey and response items are listed below:

1. Has anyone ever used the Internet to bother or harass you or to spread mean words or pictures about you?

Yes No Not Sure Refused

2. Did anyone on the Internet ever ask you sexual questions about yourself or try to get you to talk online about sex when you did not want to talk about those things?

Yes No Not Sure Refused

OTHER ACE SUBSCALE 7 Internet Parent Conflict: This subscale consists of 1 survey question (CNF1) that measured lifetime exposure to parental conflict in the home in the form of seeing parents argue in the home. The survey and response items are listed below:

You often see your parents arguing

Very true A little true Not true Not sure Refused

Creation of Subscale Scores for Independent Variables

All questions defined above were summed to provide continuous summary scores for Gun Violence (GVE), Community Disorder (CDE), and all other Adverse Childhood Events (ACEE). Prior to summing, all responses were recoded as binary variables to allow for a possible value of 0 or 1. The original possible responses to these questions were 1 Yes, 2 No, 3 Not Sure and 4 Refused. These responses are recoded as 1, 0, 0 and 0 as follows:

Yes responses were coded as 1

No responses were coded as 0

Not Sure responses were coded as 0

Refused responses were coded as 0

ACE Subscale 7 had a unique set of responses, and was coded as follows:

Very true responses were coded as 1

“A little true responses were coded as 1

Not true responses were coded as 0

Not sure responses were coded as 0

Refused responses were coded as 0

Participant Group Definitions

The independent variable exposure scales were then used to define participant groups. As a first step the variables were used to create binary grouping variables. This was done by defining a score of zero as a No, and any values greater than zero recoded as Yes. Therefore, each participant now has binary values indicating whether or not they were exposed to the three different forms of violence and adverse events. The variables are defined as:

GV_bin: exposed to Gun Violence (GV), Yes or No

CD_bin: exposed to community Disorder (CD), Yes or No

AE_bin: exposed to other Childhood Adverse Event (ACE), Yes or No

Using these three binary variables, each individual participant was retroactively assigned to one of four groups, based on the described coding of their responses to the community disorder survey items on the National Survey of Adverse Childhood Events.

The Control Group (group 0) is defined as someone having a score of No for all three binary independent variables, GV_bin, CD_bin, ACE_bin. This is coded as: IF (GVE+ CDE + ACEE) = 0 then Group = 0. There were 360 participants assigned to this group.

The Community Gun Violence Exposure Group (group 3) is defined as someone having a score of Yes for Community Gun Violence (GV_bin). This is coded as: IF (GVE>0) then group =3. There are 1409 participants assigned to this group. This group may have been exposed to other forms of ACEs.

The Community Disorder Exposure Group (group 2) is defined as someone having a score of No for Community Gun Violence exposure (GV_bin), but Yes for Community Disorder exposure (CD_bin). This is coded as: IF (GVE=0) and (CDE>0) then group =2. There are 1192 participants assigned to this group.

The All-Other Adverse Childhood Event Group (group 1) is defined as someone exposed to adverse childhood events other than gun violence or community disorder but not to gun violence nor to other community disorder, i.e., having a score of No for Gun Violence (GV_bin), No for Community Disorder (CD_bin), and Yes for other Adverse Childhood Event (ACE_bin). This is coded as: IF (ACEE>0 and CDE=0 and GVE=0) then Group = 1. There are 1353 participants assigned to this group.

Dependent Variables

The dependent variables of interest included measures of anxiety and cognitive disturbance. Emotions of anxiety are defined as self-reported internal feelings of nervousness or jumpiness, self-reported feelings of fear, self-reported feelings of worry and self-reported ideations of scary mental imagery. Cognitive disturbance is defined as self-reported disruptions

in cognitive processing evidenced by daydreaming or intentionally interrupting deep thought, forgetting information and the mind abruptly going blank without participant intentionally clearing or interrupting their thought process.

The measures of negative emotion and cognitive disturbance were extracted from participant responses to relevant questions in the mental health portion of the questionnaire. Participants were asked questions about how they have been feeling lately. Statements that describe things that adolescents sometimes think, feel, or do were read to the participants. They were asked to tell the interviewer how often they felt the negative emotions in the *last month* preceding the interview (Finkelhor & Turner, 2014).

Negative Emotion

A continuous measure of Negative Emotion was defined using 4 items from NATSCEV Caregiver Youth Survey, Section 5 of the Mental Health screener. The survey items utilized for this measure and the possible responses are as follows:

1. Feeling like you did something wrong

Never Sometimes Often Very Often Not Sure Refused

2. Feeling nervous or jumpy inside

Never Sometimes Often Very Often Not Sure Refused

3. Feeling afraid

Never Sometimes Often Very Often Not Sure Refused

4. Worrying about things

Never Sometimes Often Very Often Not Sure Refused

Creation of Sub scores for Negative Emotion Dependent Variable

The original possible responses to these questions are 1 *Never* 2 *Sometimes* 3 *Often* 4 *Very often* 5 *Not sure* and 6 *Refused*. These responses are recoded as 0, 1, 2, and respectively.

Responses were coded as follows:

Never responses were coded 0

Sometimes responses were coded as 1

Often responses were coded as 2

Very often responses were coded as 3

Not sure responses were coded as 0

Refused responses were coded as 0

The responses to these four questions were summed and then rescaled. The rescaling modifies the sum of these questions so that its range is between zero and one. Since each dependent variable was defined with a different number of questions, they were all rescaled to have a range of zero to one. Rescaling was performed by dividing the sum by the total number of questions. A score of zero indicates no exposure and a score of one indicates the individual responded yes to all questions. This ensures comparability of constructed variables by enforcing matched ranges. A zero on this variable indicates that an individual responded *Never* to all four questions and is self-reporting no negative emotion in the previous month. A response of one indicates a *Very Often* on all four questions and *Very Often* within the past month. Recoding 5 *Not sure* and 6 *Refused* as 0 maybe and missing responses as zero is a conservative approach in these analyses.

Cognitive Disturbance

A continuous measure of Cognitive Disturbance was defined using 3 items from NATSCEV Caregiver Youth Survey, Section 5 of the Mental Health screener. The survey items utilized for this measure are as follows:

1. Going away in your mind, trying not to think

Never Sometimes Often Very Often Not Sure Refused

2. Forgetting things, or you can't remember things

Never Sometimes Often Very Often Not Sure Refused

3. Having your mind going empty or blank

Never Sometimes Often Very Often Not Sure Refused

Creation of Sub scores for the Cognitive Disturbance Dependent Variable

The original possible responses to these questions are 1 *Never*, 2 *Sometimes*, 3 *Often*, 4 *Very often*, 5 *Not sure*, and 6 *Refused*. These responses were recoded as follows:

- *Never* responses were coded 0
- *Sometimes* responses were coded as 1
- *Often* responses were coded as 2
- *Very often* responses were coded as 3
- *Not sure* responses were coded as 0
- *Refused* responses were coded as 0

The responses to these three questions are summed and then rescaled. The rescaling modifies the sum of these questions so that its range is between zero and one. As with the Negative Emotion dependent variable, rescaling was performed by dividing the sum by the total

number of questions. This ensures comparability of constructed variables by enforcing matched ranges. A zero on this variable indicates that an individual responded *Never* to all three questions and reports no cognitive disturbances events in the previous month. A response of one indicates a *Very Often* on all three questions and *Very Often* within the past month. Recoding 5 *Not sure* and 6 *Refused* as 0, and missing responses as zero is a conservative approach in these analyses as well.

Chapter 4 Results

This chapter presents the study results. The results have been organized by research question and categorized by the dependent variables.

Demographics of the Sample and Simple Descriptives

The retrospective study sample was comprised of 4422 participants between the ages of 13 and 17, (n=4422). The mean age of the participant sample was 15.06 years (min=13, max=17, SD=1.39). The sample was 50.9% male (n=2232) and 49.5% female (n=2190). Self-reported race was White 68.9% (n=3047), Black 12.3% (n=545), Asian 4.8% (n=214) and American Indian 13.5% (n=598). The median household income was 50K-70K, min= 0K, max=100K. Table 1 reports the sample demographics and raw means. It is followed by Table 2 which reports the means of the dependent variables by sample demographics.

Table 1.

Demographics of Participants N= (4422)

Sample Demographics	Frequency	Percent	Mean
Gender (M/F)			
Male	2232	50.5	
Female	2190	49.5	
Self-Reported Race			
White	3047	68.9	
Black	545	12.3	
Asian	214	4.8	
Hispanic/Other	598	13.5	
Age (Years)			
13	811	18.3	15.06

14	836	18.9	
15	915	20.7	
16	992	22.4	
17	868	19.6	
Household Income (K per year)			Median 50-70K
<5	90	2.0	
5-10	111	2.5	
10-15	123	2.8	
15-20	187	4.2	
20-30	318	7.2	
30-40	308	7.0	
40-50	318	7.2	
50K-70	684	15.5	
75K-10	661	14.9	
>=100	1245	28.2	

Table 2

Means and Standard Deviations of the Dependent Variables (Negative Emotion and Cognitive Disturbance) by Level of Sample Demographic Variables

<i>Negative Emotion by Gender</i>			
	N	Mean	Std. Deviation
Male	2232	.221	.169
Female	2190	.263	.182

<i>Cognitive Disturbance by Gender</i>			
	N	Mean	Std. Deviation
Male	2232	.224	.197
Female	2189	.244	.207

<i>Negative Emotions by Age (Years)</i>			
Age	N	Mean	Std. Deviation
13	811	.222	.184
14	836	.235	.178
15	915	.240	.174
16	992	.253	.174
17	868	.255	.174

Cognitive
Disturbance by Age
(Years)

Age	N	Mean	Std. Deviation
13	811	.204	.192
14	836	.220	.202
15	915	.231	.195
16	992	.252	.211
17	868	.255	.203

Negative Emotion

by Race	N	Mean	Std. Deviation
White	3047	.244	.003
Black	545	.232	.008
Asian	214	.238	.011
Hispanic/Other	598	.241	.007

Cognitive
Disturbance by

Race	N	Mean	Std. Deviation
White	3047	.236	.202
Black	545	.232	.008
Asian	214	.249	.189
Hispanic/Other	598	.222	.202

Negative Emotion by Household Income (K)	N	Mean	Std. Deviation
<=5	90	.249	.218
5-10	111	.257	.188
10-15	123	.237	.188
15-20	187	.253	.196
20-30	318	.248	.198
30-40	308	.241	.179
40-50	318	.237	.182
50-75	684	.25	.178
75-100	661	.240	.170
>=100	1245	.235	.165

Cognitive Disturbance by Household Income (K)	<=5	90	.228	.218
	5-10	110	.252	.209
	10-15	123	.2345	.225
	15-20	187	.248	.225
	20-30	318	.251	.219
	30-40	308	.239	.195
	40-50	318	.250	.213
	50-75	684	.246	.205
	75-100	661	.238	.203
	>=100	1245	.211	.180

Exploratory Analysis

Exploratory analyses were performed to check for associations of the DVs with potential confounding variables that should be controlled as covariates in subsequent analyses. The four research groups were compared to one another on the following demographic variables: gender, race, age, and family annual household income. The analysis revealed that gender had a significant effect on the total measure of negative emotion self-reported by adolescents at the $p < .05$ level [$F(1, 4414) = 79.753, p < .001$]. Self-reported race was also found to have a significant effect on self-reported negative emotion at the $p < .05$ level [$F(3, 4414) = 9.146, p < .002$]. Age did not have a significant effect on the total measure of negative emotion self-reported by adolescents at the $p < .05$ level [$F(1, 4414) = 2.5593, p < .110$]. Household income levels did not show significant differences on the total measure of negative emotion self-reported by adolescents at the $p < .05$ level [$F(1, 4414) = .015, p < .903$].

Main Analyses

Tests of the Research Questions

Table 3 presents the mean response of each dependent variable for each participant group. Participants who have had community gun violence exposure during adolescence (GV) presented the highest negative emotion mean responses ($M=.282$) when compared to the remaining participant groups. The no adverse event exposure group (No ACE) had a mean negative emotion response of $M=.108$. The other ACEs group (Other ACE) had a mean negative emotion response of $M=.225$, and the community disorder exposure group (CD) had a mean negative emotion response of $M=.249$.

Participants who have been exposed to community gun violence during adolescence (GV) also presented the highest cognitive disturbance mean responses ($M=.274$) when compared to the remaining participant groups. The no adverse event exposure group (No ACE) had a mean negative emotion response of $M (.094)$. The other ACEs group (Other ACEs) had a mean negative emotion response of $M (.215)$, and the community disorder exposure group (CD) had a mean negative emotion response of $M (.243)$.

The mean negative emotion response outcome data and cognitive disturbance outcome data are presented in bar chart format in Figure 4 and Figure 5, respectively. Figure 4 compares the participant groups, showing the GV had the largest negative emotion response. In like manner, Figure 5 compares the participant groups, displaying the GV group had the largest cognitive disturbance.

Table 3

Participant Group Means on the Dependent Variables

Exposure Groups	N	Mean Negative Emotion	Negative Emotion Std. DV	Mean Cognitive Disturbance (CD)	Cognitive Disturbance Std. DV
Total	4422	.242	.177	.234	.202
No ACE	360	.108	.123	.094	.129
Other ACE	1353	.225	.157	.215	.175
CD	1192	.249	.170	.243	.191
GV	1517	.282	.192	.274	.225

Figure 4

Bar Chart of Estimated Marginal Means of Negative Emotion by Group

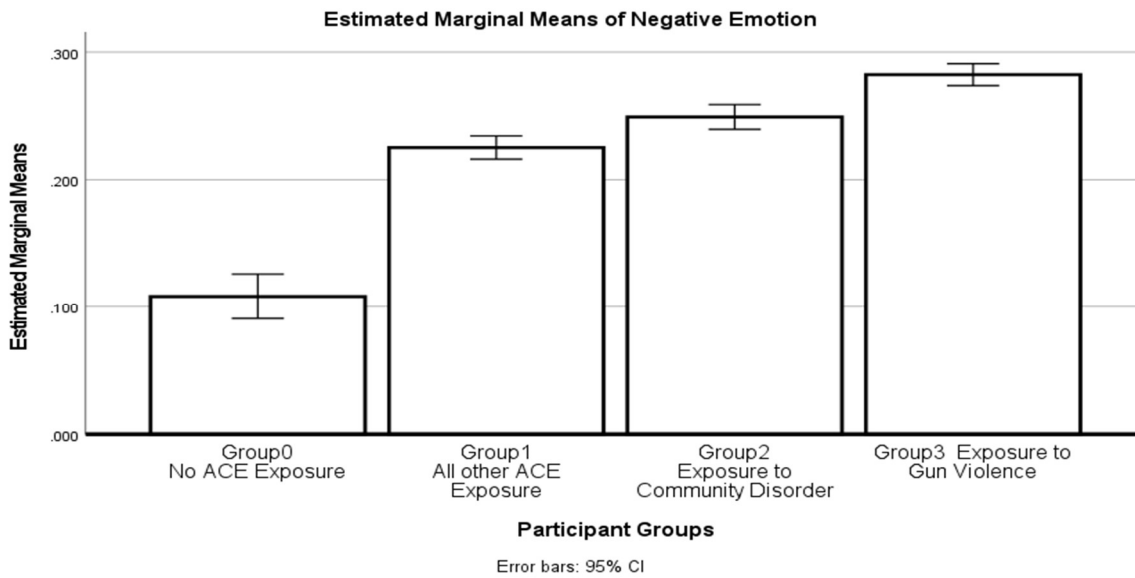
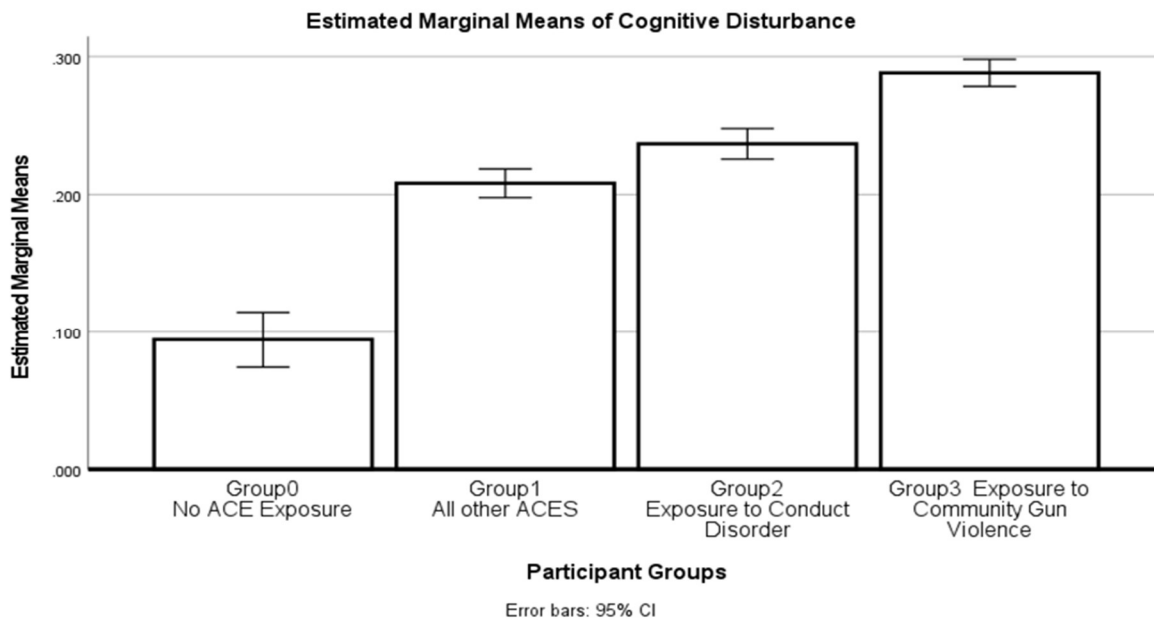


Figure 5

Bar Chart of Estimated Marginal Means of Cognitive Disturbance by Group



The main analyses employed ANCOVAs rather than ANOVAs, in order to examine whether dependent variables still differed after controlling for any effects of important demographic variables within and across the four participant groups.

Dependent Variable Negative Emotion

The main research questions regarding self-reported negative emotion were as follows:

Research Question 1a.

Research Question 1a. Do adolescents exposed to gun violence self-report more frequent negative emotions, compared to adolescents who have not experienced notable childhood adverse events (ACEs)?

Research Question 2a.

Do adolescents exposed to gun violence self-report negative emotions, compared to adolescents exposed to other forms of Community Disorder?

Research Question 3a.

Do adolescents in this sample who have been exposed to community gun violence self-report similar negative emotions to those who have been exposed to other ACEs (not involving Community Disorder including gun violence)?

These research questions were answered by one ANCOVA predicting the emotional disturbance DV from the four exposure groups, controlling for the previously discussed nuisance variables. For the negative emotion DV, the ANCOVA results are shown in Table 4.

Table 4

Univariate Analysis of Covariance (Dependent Variable Negative Emotion)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	12.362 ^a	9	1.374	48.176	<.001	.016
Intercept	.281	1	.281	9.851	.002	.018
Exposure Group	9.733	3	3.244	113.788	<.001	.001
Race	.782	3	.261	9.146	<.001	.351
Gender	2.274	1	2.274	79.753	<.001	.861
Age	.073	1	.073	2.559	.110	.001
Household income	.000	1	.000	.015	.903	.001
Error	125.277	4394	.029			
Total	395.062	4404				
Corrected Total	137.639	4403				

a. R Squared = .090 (Adjusted R Squared = .088)

The ANCOVA revealed that gender and race had significant effects (at the .05 level) on the total measure of negative emotion self-reported by adolescents: for Gender, $F(3,4403) = 79.753$, $p < .001$, and for Race $F(3,4403) = 9.146$, $p < .001$. The main effect of gender yielded an effect size of 0.81 (using eta-squared). The main effect of race yielded an effect size of .351. Age did not have a significant effect on the total measure of negative emotion self-reported by adolescents, $F(3, 4413) = 2.559$, $p = .110$. Household Income did not have a significant effect on the total measure of negative emotion self-reported by adolescents, $F(3, 4413) = .015$, $p = .903$.

Post hoc comparisons between the GV group and the three other exposure groups are shown in Table 5. In this table, the participant groups are labeled No ACE (group 0), Other ACEs (Group 1), CD (Community Disorder Exposure Group 2) and GV (Community Gun Violence Exposure, Group 3). Comparison of group means of GV and No ACE, while controlling for mentioned covariates, revealed that GV had a higher mean for self-reported negative emotion. Comparison of group means of GV and Other ACE, while controlling for covariates, revealed GV had higher mean score of self-reported negative emotion. Comparison of group means of GV and CD, while controlling for covariates, also revealed GV had a higher mean score of self-reported negative emotion. According to Cohen's d , the effect size for negative emotion was largest, $d = -1.07$, between the no exposure and gun violence exposure groups. However, the effect size between no exposure and community disorder was also found to be large, $d = -.95$. The effect size between no exposure and all other ACEs was also large, $d = -.83$.

Table 5

Pairwise Post-Hoc Tests (Dunnett's Procedure) of Group Means, Controlling for Covariates

(Negative Emotion)

(I) Exposure Group	(J) Exposure Group	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
All Other	No ACE	.117*	.010	<.001	.097	.136
CD	No ACE	.143*	.010	<.001	.123	.164
	All Other ACEs	.027*	.007	<.001	.014	.040
GV	No ACE	.182*	.010	<.001	.162	.202
	All Other ACEs	.066*	.007	<.001	.053	.079
	CD	.039*	.007	<.001	.026	.052

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

Dependent Variable Cognitive Disturbance

The main research questions regarding self-reported cognitive disturbance were as follows:

Research Question 1b.

Do adolescents exposed to gun violence self-report more severe cognitive disturbance, compared to adolescents who have not experienced notable childhood adverse events?

Research Question 2b.

Do adolescents exposed to gun violence self-report cognitive disturbance, compared to adolescents exposed to other forms of Community Disorder?

Research Question 3b.

Do adolescents in this sample who have been exposed to community gun violence self-report similar cognitive disturbance to those who have been exposed to other ACEs (not involving Community Disorder including gun violence)?

These research questions were answered by one ANCOVA predicting the DV from the four exposure groups, controlling for the previously discussed nuisance variables. For the cognitive disturbance DV, the ANCOVA results are shown in Table 6 and the post-hoc pairwise tests are shown in Table 6. The analysis revealed that race, gender and age had significant effects (at the .05 level) on the total measure of cognitive disturbance self-reported by adolescents: for Gender, $F(3,4402) = 14.135, p < .001$, for Age $F(3,4402) = 12.924, p < .001$ and for Self-reported race $F(3, 4402) = 10.786, p < .001$. The main effect of race yielded an effect size of 0.465. The main effect of Gender yielded an effect size of .864. The main effect of age yielded an effect size of .003. Household Income did not have a significant effect on the total measure of cognitive disturbance self-reported by adolescents, $F(3, 4402) = .371, p = .543$.

Table 6

Univariate Analysis of Covariance (Dependent Variable: Cognitive Disturbance)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	14.551 ^a	9	1.617	43.071	<.001	.003
Intercept	.088	1	.088	2.354	.125	.008
Exposure Group	12.404	3	4.135	110.147	<.001	.864
Race	1.215	3	.405	10.786	<.001	.465
Gender	.531	1	.531	14.135	<.001	.003
Age	.485	1	.485	12.924	<.001	.003
Household income	.014	1	.014	.371	.543	.000
Error	164.900	4393	.038			
Total	421.102	4403				
Corrected Total	179.450	4402				

a. R Squared = .081 (Adjusted R Squared = .079)

The pairwise post hoc comparisons of the GV group with the other groups are shown in Table 7. Comparison of group means of GV and No ACE, while controlling for covariates, revealed that GV had a higher mean score of self-reported cognitive disturbance. The difference in the mean scores was significant. Comparison of group means of GV and Other ACEs, while controlling for covariates, revealed that GV had higher mean score of self-reported cognitive disturbance. Comparison of group means of GV and CD, while controlling for covariates, also revealed GV had a higher mean score of self-reported cognitive disturbance. According to Cohen's *d*, it was determined that the effect size for cognitive disturbance was largest, $d = -1.06$ between no exposure and gun violence exposure groups. However, the effect size between no exposure and community disorder was also found to be large, $d = -.88$. The effect size between no exposure and all other ACEs was medium, $d = -.74$. Cohen's *d* was found by calculating the mean

difference between the two groups being compared, and then dividing the result by the pooled standard deviation.

Table 7

Pairwise Post-hoc Tests (Dunnett's Procedure) of Group Means, Controlling for Covariates (Cognitive Disturbance)

(I) Exposure Group	(J) Final Group	Mean Difference		Sig. ^b	95% Confidence Interval for Difference ^b	
		(I-J)	Std. Error		Lower Bound	Upper Bound
All Other ACEs	No ACE	.111*	.012	<.001	.088	.133
CD	No ACE	.140*	.012	<.001	.117	.163
	All Other ACEs	.029*	.008	<.001	.014	.044
GV	No ACE	.199*	.012	<.001	.176	.222
	All Other ACEs	.089*	.008	<.001	.074	.104
	CD	.060*	.008	<.001	.044	.075

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

Regarding the covariates, the analysis (revealed that gender and age had significant effects (using the .05 level) on the total measure of cognitive disturbance self-reported by adolescents: For Gender $F(3,4413) = 14.176, p < .001$; for Age, $F(3,4414) = 14.505, p < .001$. Self-reported race was also found to have a significant effect on self-reported negative emotion, $F(3, 4413) = 10.282, p < .001$. Household Income did not have a significant effect on the total measure of cognitive disturbance self-reported by adolescents, $F(3, 4413) = .018, p = .893$.

Table 5 displays the Analysis of Covariance Table for the cognitive disturbance DV, with the demographic variables used as covariates.

Additional results tables are found in Appendix C. The tables in this Appendix are simple Analysis of Variance Tables for dependent variables Negative Emotion and Cognitive Disturbance, not controlling for the covariates mentioned previously. These tables are presented only for informational purpose and should be interpreted as such. However, note that there are significant differences in the DVs across the exposure groups for both the ANOVAs and ANCOVAs.

Chapter 5: Discussion

Summary of the Main Findings

The purpose of this study was to examine the effects of adolescent community gun violence exposure on negative emotions and cognitive disturbance in this population, and to gain an understanding of the severity of negative emotion and cognitive disturbance reported by teenagers who have been exposed to gun violence in their communities. Negative emotion was operationalized as feelings of anxiety, and cognitive disturbance was operationalized as inattention and distractions in cognitive processing. The results show that both feelings of anxiety and cognitive disturbance are self-reported at higher levels for adolescents who have been exposed to community gun violence in comparison to peers who have had no exposure to these forms of adverse events.

The findings that emerged from this retrospective study were: 1) Adolescents who are exposed to gun violence in their community reported experiencing significantly higher amounts of negative emotion when compared to peers who were exposed to community disorder alone. 2) They also reported significantly higher amounts of negative emotion when compared to peers who were exposed to other forms of adverse childhood events. 3) These individuals, who were exposed to gun violence in their communities during their adolescent years, reported experiencing significantly higher amounts of negative emotion when compared to those who reported never having experienced any form of adverse event during their childhood or adolescent development periods.

Additional findings of this retrospective study were: 1) Adolescents who were exposed to gun violence in their community reported experiencing significantly higher amounts of cognitive

disturbance when compared to peers who were exposed to community disorder alone. 2) They also reported significantly higher amounts of cognitive disturbance when compared to peers who were exposed to other forms of adverse childhood events. 3) Finally, adolescents who were exposed to gun violence in their community reported experiencing significantly higher amounts of cognitive disturbance when compared to those who reported never having experienced any form of adverse event during childhood or adolescent development periods.

In summary, according to the data, participants who were exposed to any form of childhood adverse events experience 8% greater negative emotions and 28% greater cognitive disturbance than peers never exposed to any form of adverse events during adolescence. This difference increases to 22% in negative emotions and 30% in cognitive disturbance when an adolescent is exposed to Community Disorder. In comparison, there is increase of 30% in negative emotions and 33% in cognitive disturbance when the adolescent is exposed to community gun violence.

Strengths and Limitations of the Study

Historically, retrospective studies are believed to provide an inferior level of evidence compared with prospective studies. In retrospective studies control participants have been recruited by convenience sampling and consequently are considered not to be representative of the general population which may result in selection bias. As mentioned previously, participants of this retrospective study were recruited using four sampling frames: 1) an address-based sample of households from which cell phone and residential numbers were contacted via telephone, (2) a pre-screened sample of households with children from recent national random-digit-dialed surveys, (3) a listed land-line sample (with a known child in the household, based on commercial lists), and (4) cell phone numbers drawn from a targeted random-digit-dialed sample

(Finkelhor et al 2015). The sample that resulted was representative of the 2019 US Census (please see Table 8). However, the current literature reports that approximately fifty-eight percent of community gun violence victims are Black/African American (Cook, 2020). Therefore, the sample was not representative of the predominantly impacted population. This sampling limitation could be argued to be a strong support for more focused future research. The present research findings indicate that any adolescent, regardless of race or ethnicity, exposed to community gun violence is at risk for negative emotions and cognitive disturbance during development. This foundational finding supports the need for research that examines the expression of dependent outcome variables, negative emotion, and cognitive disturbance of participants in the context of race as opposed to because of racial origin.

Table 8

2019 United States Racial Categories per US Census vs Race Demographics of Study vs CDC Gun Homicide by Race

Racial Category	2019 US Census	Study Sample	CDC Gun Exposure Violence by Race 2019
White	60.3%	68.9%	3.8%
Black/African American	13.4%	12.3%	53%
Asian	5.9 %	4.8%	<3.8%
Hispanic/Latino	18.5%	13.5%	6.6

An additional limiting factor of the study was the use of a self-report assessment tool to capture outcome measures. Self-report scales are known to vary in reliability and validity of the data. Participants can under report or over report symptomology or fail to respond to survey questions.

In addition, the survey tool utilized for this study, the National Survey of Children's Exposure to Violence (NATSCEV), is not a validated tool for the clinical assessment of emotionality or cognitive functioning. The data analysis revealed significant outcomes irrespective of the tools utilized. Therefore, future research is needed to compare study outcomes derived from self-report data collection to study outcomes derived from validated clinical evaluations. It is hypothesized that symptoms of trauma are likely being under reported in self-report tools and even greater differences in group means would be evidenced if validated clinical assessment tools are utilized. These differences in group means are likely to be in favor of the Gun Violence group.

Finally, while a few covariates were considered in the main analysis, it well noted that exposure to community gun violence is dependent on numerous other factors that were not measure or likely were not controlled. Therefore, additional research is needed to explore what additional factors are likely predict exposure and what factors predict severity of negative developmental and mental consequences as a result of exposure.

Analytical Strengths and Weakness

A notable analytical strength of the study is the large sample size. The large sample size provides confidence in the mean values, allowed for the identification of outlier responses to the survey that had the potential to skew the data, and results in more precise estimation. A weakness of the data sample, however, was the underrepresentation of Black and Hispanic participants in the Gun Violence group. A second weakness was the No ACE exposure group being approximately a quarter of the size of the other groups which may have led to less accurate estimation of the severity of negative emotion and cognitive disturbance in this group.

A secondary analytical limitation of the study is the single time point of data collection of the outcome variables. Participants were asked to report lifetime exposure to adverse childhood

events and community gun violence exposure. The literature reports that age at the time of exposure is directly related to the severity of the symptoms related to a traumatic experience as well as ability to recover from those symptoms. Thus, the interpretation of the study results is limited to severity of symptoms of negative emotion and cognitive disturbance, it cannot be extended to understanding if there is any variance in severity due to participant age at the time of exposure or at the time of self-reporting symptoms.

Finally, the last noted analytical weakness is also the strongest argument for future research in this area. The National Survey of Children's Exposure to Violence (NATSCEV) was not designed to measure trauma related to community gun violence specifically. The intent of the gun violence aspect of the original survey was to quantify exposures to gun violence as opposed to trauma caused by community gun violence exposure. The present retrospective study examined the relationship between the negative emotions and cognitive disturbance reported by the participants and compared their states of emotion and cognitive functioning to the traumas they experienced during development. Additional research is needed to categorize community gun violence as an adverse childhood event specifically and to develop adverse event screening tools that effectively and accurately assess symptomology associated with child and adolescent community gun violence exposure.

Implications for Practice

Implications for Clinical Assessment and Treatment of Adolescents with Adverse Childhood Event Experiences Specific to Community Gun Violence Exposure

Finkelhor (2018) argued that clinical and social policy rationale supporting the widespread use of a screening tool for adverse childhood events was still premature in 2018. His argument was premised upon one critical precept; a great deal about adverse childhood

experiences remained unknown. Today, in 2021, community gun violence exposure is yet to be classified as an adverse childhood event and as result little is known about how this type of exposure impedes the health and development of children and adolescents.

In previous literature, Finkelhor (2018) posed the following questions about adverse childhood events 1) what are the effective interventions and responses we need to have in place to offer to those with positive ACE screening results, 2) what are the potential negative outcomes and related costs to screening that need to be buffered in any effective screening regime, and 3) what exactly should we be screening for (Finkelhor, 2018). These three questions offer a framework within which we can not only explore the classification of community gun violence as an adverse childhood event, but we can also turn to research to develop effective screening tools for measuring the impact and characterizing the symptoms of community gun violence exposure during adolescence. These questions provide a roadmap to future research initiatives.

At the outset, the findings of this retrospective study indicate adolescents exposed to community gun violence present a positive ACE response to both negative emotion and cognitive disturbance. This positive response calls for diagnostic approaches and treatment interventions that are specific to emotional and cognitive needs of this target population. This aligns with Finkelhor's (2018) first call for effective interventions that address the symptoms adverse childhood screening unveils.

Secondly, the findings of this research challenge the fields of child and adolescent psychology and psychiatry to develop a cost efficient, clinical sensitive, yet non-invasive screening tool for identifying emotional and cognitive impairments related to community gun violence exposure in teens. Thirdly, because the results were statistically significant for both dependent variables, after controlling for demographics, we can be confident that community

gun violence negatively impacts emotions and cognitive function of adolescents. This foundational knowledge justifies the need for clinicians to actively screen for evidence of emotional and/or cognitive disruption in adolescents living in communities where there is a high incidence of gun activity. However, it also indicates a need to accurately classify and differentiate emotionality and cognitive disturbance related to community gun exposure over other forms of emotionality and cognitive impairment.

Implications for Practice in Academic Settings

In January of 2021, the Everytown for Gun Safety Support Fund, a violence prevention organization, released an executive summary titled “Keeping Our Schools Safe, A Plan for Preventing Mass Shootings and Ending All Gun Violence in American Schools” This summary outlined 3 clear aims: 1) Demonstrate What Gun Violence in American Schools Looks Like 2) Outline a Plan to Prevent Gun Violence in Schools 3) Stop Schools from Arming Teachers. The utilization of the NATSERV assessment tool to screen for gun violence exposure and related negative emotions and cognitive disturbance is an appropriate method for reaching these specific aims.

Adolescents exposed to gun violence in their schools and communities require additional supportive services that can reestablish safety and distance adolescents from known communal threats. Everytown proposes the establishment of evidence-based threat assessment programs in schools to identify students who may be in crisis, assess the risk, followed by providing appropriate interventions is an effective response to gun violence in schools. The results of this study imply the utilizing the NATSERV assessment tool to screen and report symptoms of anxiety and loss of attention in this setting is feasible and can lead to more expansive diagnostic screening for these symptoms in this population.

The Everytown executive order (2021) calls for mental health services as opposed to discipline or criminal justice system to respond the rising incidence of gun violence in communities and schools across the country. Assessment tools, utilizing self-reported outcomes to measure severity and frequency of symptoms have been a long-term best practice of mental practitioners. The reliability of the assessment method along with the significance of the outcomes on both dependent variable measures of negative emotion and cognitive disturbance suggest that revisiting this research strategy in a longitudinal research setting is ideal for redirecting adolescents away from the criminal justice system toward need based services in the areas of gun violence prevention and trauma response.

Further implications of this research in the context of the Everytown executive summary includes taking a trauma-informed approach to any gun violence drills involving students. This research shows that students who have been exposed to gun violence in their lifetime already present evidence of negative emotion and cognitive disturbance, therefore active shooter drills may inadvertently cause feelings of trauma and promote cognitive instability in the school setting. This implies educators must actively consider preexposure to trauma when conducting such drill activities and consider therapeutic approaches to reestablishing safety in communities with a history of gun violence exposure.

Lastly, while this study did not find any significant effect of race on the measure of negative emotion or cognitive disturbance reported by the sample, the expansive literature review has found gun violence in American has a disproportionate impact on male adolescents of color. Everytown reports this is consistent with the school gun violence exposure data, which shows gun violence in schools predominately effects students of color. The Everytown, executive order seeks to establish safe and equitable schools to help reduce gun violence,

especially in high-risk communities. This research is able to inform those acting on this initiative by providing a research-based platform with which the effects of gun violence exposure has been examined and can re-examined factoring in that the research shows regarding gender academic performance.

Policy Implications

On June 23, 2021, President Joseph Biden released his comprehensive strategy to prevent and respond to Gun Crime and to ensure public safety. As the nation entered the pandemic summer months of 2021, President Biden prepared for an anticipated spike in gun violence by unveiling what he terms a whole-government approach. Research has shown that the summer months trend as the deadliest for adolescents living in inner cities and the combined effect of the pandemic resulted in a predicted high spike. It causes lasting trauma, with cascading consequences for children, families, and communities.

A summary of the Biden plan is as follows:

- Stem the flow of firearms used to commit violence, including by holding rogue firearms dealers accountable for violating federal laws;
- Support local law enforcement with federal tools and resources to help address summer violent crime;
- Invest in evidence-based community violence interventions;
- Expanding summer programming, employment opportunities, and other services and supports for teenagers and young adults; and
- Help formerly incarcerated individuals successfully reenter their communities.

President Biden announced the American Rescue Plan, \$350 billion, in state and local funding would be allocated to invest in evidence-based community violence (CVI) programs.

This decision was made because of the previous evidence based CVIs have been shown to reduce violence by as much as 60%. In addition, guidance from the Department of Education followed, clarifying that ARP's \$122 billion in K-12 funds are now authorized for CVI strategies. This retrospective study is a blueprint for evidenced based community violence interventions. The research findings clearly indicate that community and school-based interventions targeting negative emotions (anxiety specifically) and cognitive disturbance (inattention specifically) should be the strategic target of these funded initiatives.

It should also be noted that Biden's 2021 plan, did not include a response to gun violence specifically. Therefore, we can deduce that this study informs current policy to need for addressing adolescent community gun violence related trauma specifically.

Implications for Future Research

It is desired that this work is a step toward future research that will thoroughly explore the relationship between adolescent neurocognitive development and the treatment of adolescent trauma in clinical and non-clinical settings. There is a need for research-based interventions to support adolescent neurocognitive recovery after and during gun trauma exposure. In the absence of such interventions, we cannot with confidence state that children and adolescents in the United States are growing in community settings that support their well-being.

Approximately 25 years ago Duncan et al (1996) published a paper on the relationship between environmental trauma, childhood development and emotional disturbance. Their paper has the potential to serve as a guide to the management of adolescent emotional symptoms after direct or indirect exposure to community gun violence. This prevention-focused paper provides insight into the immediate symptomology the emotional disturbance of a child after immediate exposure as well as long lasting symptomology after the event has passed.

According to Duncan et al (1996) adolescents exposed to any form of community violence potentially display symptoms of acute stress and Post Traumatic Stress Disorder. These symptoms include sleep disturbances, nightmares, anxiety, depression, and recurrent intrusive memories of the traumatic event. The findings of the present retrospective study reveal that exposure to community gun violence has a significantly higher effect on the total measure of negative emotions self-reported by adolescents, which supports Duncan's position. This study operationalized self-reported feelings of anxiety as a measure of negative emotion which also further supports Duncan's claim that anxiety is one of the negative emotions readily evidenced and associated with trauma exposure in children and adolescents. Duncan (1996), also postulated, children growing up in violence ridden neighborhoods undergo repeated exposures and the effects are additive resulting in chronic trauma. This retrospective study utilized a questionnaire that measure lifetime exposure to gun violence, however it was single timepoint response meaning participants were not re-interviewed at consequent developmental milestones during adolescence. There we cannot confirm that the findings of this research align with Duncan's claim of repeated exposure causing an additive trauma effect. However, understanding the additive effect of gun trauma exposure on the adolescent neurocognitive and emotional development is critical for the well-being of our nation. As we see a steady increase in gun activity in our communities, we understand the state of all national affairs is being compromised. This implies we need to understand the additive effect of gun violence on our children and adolescents over the course of their development.

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Appendix A

Institutional Review Board Exemption Notification

Attachments:

- Exemption Notification - IRB ID: 21-430.pdf



Teachers College IRB

Exempt Study Approval

To: Joanne Nicholls
From: Kailee Kodama Muscente, Administrative Coordinator
Subject: IRB Approval: 21-430 Protocol
Date: 08/30/2021

Thank you for submitting your study entitled, "*Emotional and Cognitive Disturbances in Adolescents Exposed to Community Gun Violence*," the IRB has determined that your study is **Exempt** from committee review (Category **4, 10**) on 08/30/2021.

Due to COVID-19 precautions, any studies that can be conducted online (remotely) should move forward with online procedures and forgo in-person engagement. Following guidance from New York State and Teachers College, the Institutional Review Board is reviewing proposals for in-person data collection on a case-by-case basis.

Please keep in mind that the IRB Committee must be contacted if there are any changes to your research protocol. The number assigned to your protocol is **21-430**. Feel free to contact the IRB Office by using the "Messages" option in the electronic Mentor IRB system if you have any questions about this protocol.

Further, all research recruitment materials must include the study's IRB-approved protocol number.

As the PI of record for this protocol, you are required to:

- Use current, up-to-date IRB approved documents
- Ensure all study staff and their CITI certifications are on record with the IRB
- Notify the IRB of any changes or modifications to your study procedures
- Alert the IRB of any adverse events

You are also required to respond if the IRB communicates with you directly about any aspect of your protocol. Failure to adhere to your responsibilities as a study PI can result in action by the IRB up to and including suspension of your approval and cessation of your research.

You can retrieve a PDF copy of this approval letter from Mentor IRB.

Best wishes for your research work.

Sincerely,
Kailee Kodama Muscente
Administrative Coordinator
IRB@tc.edu

Appendix B

Frequency Tables and Variable Tables

Figure 6.

Table of NatSERV Independent and Dependent Variables

ACE #1 CRIME SCREENER Y/N)	ACE#2: Childhood Maltreatment (not necessarily occurring in the Community. Y/N	ACE#3: Peer or Sibling Victimization	ACE#4 Sexual Assault Screening	ACE#5 Witnessing an ACE	ACE#6 Exposure to Community Disorder	ACE#7 Exposure to Internet Violence	ACE# 8 Exposure to Parent Conflict	Gun Violence Exposure (GV)
C1:ROBBERY	M2: Verbally abused by a grown up	P1: Victim of a gang attack not including a sibling	S5: Victim of sexual assault	W1: Witnessing a parent physically abused	CD1: Have you been exposed to illegal drug sales	INT1: Have you ever been bullied on the internet	CNF1: Do you see your parents argue often	W8: Hearing real life gun shots
C2:ROBBERY		P2: Victim of a sibling or gang physical attack Y/N		W2: Witnessing a sibling abused by a parent	CD2: Have you seen the police arrest people in your neighborhood	INT2: Have you ever been sexually harassed on the internet		W9: Ever been in the middle of a war where you could hear gun fire
C3:VANDELISM		P4:Victim of teasing and peer bullying Y/N		W3: Witnessing a general physical attack with a weapon	CD3: Are there gangs in your neighborhood			CD9: Has anyone ever brough a weapon to school
C7: THREATENED		P5: Victim of teasing and peer bullying Y/N		W4: Witnessing a physical attack without a weapon	CD5: Witnessed a crime scene been investigated			
C9: RACIAL ATTACK				W5: Robbery at home	CD7: Can't play outside because of community crime			
				W6: Knowing a murder victim	CD8: Live in an area of extreme poverty			

Table 9

Negative Emotion Item: Feeling Nervous Inside

		Frequency	Percent	Valid Percent
Valid	Not at All	1609	36.4	36.4
	Sometimes	2146	48.5	48.5
	Often	544	12.3	12.3
	Very Often	122	2.8	2.8
	Total	4421	100.0	100.0
Missing	System	1	.0	
Total		4422	100.0	

Table 10

Negative Emotion Item: Feeling Afraid

		Frequency	Percent	Valid Percent
Valid	Not at All	2808	63.5	63.5
	Sometimes	1401	31.7	31.7
	Often	170	3.8	3.8
	Very Often	40	.9	.9
	Total	4419	99.9	100.0
Missing	System	3	.1	
Total		4422	100.0	

Table 11

Negative Emotion Item: Worry about Things

		Frequency	Percent	Valid Percent
Valid	1	748	16.9	16.9
	2	2145	48.5	48.5
	3	1125	25.4	25.4
	4	404	9.1	9.1
	Total	4422	100.0	100.0

Table 12

Negative Emotion Item: Having Scary Ideas

		Frequency	Percent	Valid Percent
Valid	Not at All	3070	69.4	69.4
	Sometimes	1032	23.3	23.3
	Often	237	5.4	5.4
	Very Often	82	1.9	1.9
	Total	4421	100.0	100.0
Missing	System	1	.0	
Total		4422	100.0	

Table 13

Cognitive Disturbance: Going Away in Your Mind

		Frequency	Percent	Valid Percent
Valid	Not at All	2419	54.7	54.9
	Sometimes	1428	32.3	32.4
	Often	396	9.0	9.0
	Very Often	162	3.7	3.7
	Total	4405	99.6	100.0
Missing	System	17	.4	
Total		4422	100.0	

Table 14

Cognitive Disturbance: Forgetting Things

		Frequency	Percent	Valid Percent
Valid	Not at all	1360	30.8	30.8
	Sometimes	2156	48.8	48.8
	Often	669	15.1	15.1
	Very Often	234	5.3	5.3
	Total	4419	99.9	100.0
Missing	System	3	.1	
Total		4422	100.0	

Table 15

Cognitive Disturbance: Your Mind Going Empty

		Frequency	Percent	Valid Percent
Valid	Not at all	2472	55.9	56.0
	Sometimes	1577	35.7	35.7
	Often	289	6.5	6.5
	Very Often	79	1.8	1.8
	Total	4417	99.9	100.0
Missing	System	5	.1	
Total		4422	100.0	

Appendix C

ANOVA Tables

Table 16

Univariate Analysis of Variance Descriptives

		N	Mean	Std. Deviation	Std. Error
Negative Emotion	No ACE	360	.108	.123	.007
	All other ACEs	1353	.225	.157	.004
	CD	1192	.249	.170	.005
	GV	1517	.282	.192	.005
	Total	4422	.242	.177	.003
Cognitive Disturbance	No ACE	360	.094	.129	.007
	All other ACEs	1353	.208	.175	.005
	CD	1192	.237	.191	.006
	GV	1516	.288	.225	.006
	Total	4421	.234	.202	.003

Table 17

Univariate Analysis of Variance (Dependent Variable Negative Emotion)

Tests of Between-Subjects Effects					
Dependent Variable: Negative Emotion					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	9.352 ^a	3	3.117	106.564	.000
Intercept	149.272	1	149.272	5103.036	.000
Exposure Group	9.352	3	3.117	106.564	.000
Error	129.233	4418	.029		
Total	397.132	4422			
Corrected Total	138.585	4421			

a. R Squared = .067 (Adjusted R Squared = .067)

Table 18

Table of Contrasts of Group Means (Dependent Variable Negative Emotion)

(I) Exposure Group	(J) Exposure Group	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
No ACE	All Other ACEs	-.117*	.010	<.001	-.137	-.097
	CD	-.141*	.010	<.001	-.161	-.121
	GV	-.174*	.010	<.001	-.194	-.154
All Other ACEs	No ACE	.117*	.010	<.001	.097	.137
	CD	-.024*	.007	<.001	-.037	-.011
	GV	-.057*	.006	<.001	-.070	-.045
CD	No ACE	.141*	.010	<.001	.121	.161
	All Other ACEs	.024*	.007	<.001	.011	.037
	GV	-.033*	.007	<.001	-.046	-.020
GV	No ACE	.174*	.010	<.001	.154	.194
	All Other ACEs	.057*	.006	<.001	.045	.070
	CD	.033*	.007	<.001	.020	.046

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

Table 19

Univariate Analysis of Variance (Dependent Variable Cognitive Disturbance)

Tests of Between-Subjects Effects

Dependent Variable: **Cognitive Disturbance**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12.377 ^a	3	4.126	108.668	.000
Intercept	136.595	1	136.595	3597.857	.000
Exposure Group	12.377	3	4.126	108.668	.000
Error	167.694	4417	.038		
Total	422.349	4421			
Corrected Total	180.071	4420			

a. R Squared = .069 (Adjusted R Squared = .068)

Table 20

Table of Comparison of Group Means (Dependent Variable: Cognitive Disturbance)

(I) Exposure Group	(J) Exposure Group	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
No ACE	All Other ACEs	-.114*	.012	<.001	-.136	-.091
	CD	-.142*	.012	<.001	-.165	-.119
	GV	-.194*	.011	<.001	-.216	-.171
All Other ACEs	No ACE	.114*	.012	<.001	.091	.136
	CD	-.029*	.008	<.001	-.044	-.013
	GV	-.080*	.007	<.001	-.094	-.066
CD	No ACE	.142*	.012	<.001	.119	.165
	All Other ACEs	.029*	.008	<.001	.013	.044
	GV	-.051*	.008	<.001	-.066	-.037
GV	No ACE	.194*	.011	<.001	.171	.216
	All Other ACEs	.080*	.007	<.001	.066	.094
	CD	.051*	.008	<.001	.037	.066

Based on estimated marginal means * . The mean difference is significant at the .05 level.

Exploratory Analysis

Table 21a shows the comparisons between groups using demographics as predictors of the negative emotion outcome variable. Table 21b shows the comparisons between groups using demographics as predictors of the cognitive disturbance outcome variable. Gender was a significant predictor of negative emotion and cognitive disturbance.

Table 21a

The change in the dependent variable negative emotion associated with Group Exposure with all other demographic predictors being held constant.

Parameter Estimates						
Dependent Variable: Negative Emotion						
Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	.173	.030	5.703	.000	.113	.232
No ACE	-.177	.010	-17.598	.000	-.197	-.158
All Other ACE	-.060	.006	-9.192	.000	-.072	-.047
CD	-.034	.007	-5.204	.000	-.047	-.021
GV	0 ^a	.	.	.	.	.
Gender	.045	.005	8.850	.000	.035	.055
Age	.003	.002	1.836	.066	.000	.007
Self-Reported Race	-.006	.002	-2.947	.003	-.010	-.002
Household Income	.000	.000	.550	.582	-.001	.001

Table 21b

The change in the dependent variable cognitive disturbance associated with Group Exposure with all other demographic predictors being held constant.

Parameter Estimates						
Dependent Variable: Cognitive Disturbance						
Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	.146	.035	4.218	.000	.078	.215
No ACE	-.193	.012	-16.734	.000	-.216	-.171
All Other ACE	-.081	.007	-10.906	.000	-.096	-.067
CD	-.054	.008	-7.076	.000	-.069	-.039
GV	0 ^a	.	.	.	.	.
Gender	.022	.006	3.765	.000	.011	.033
Age	.008	.002	3.809	.000	.004	.012
Race	-.008	.002	-3.207	.001	-.012	-.003
Household Income	-0.00	.001	-.134	.893	-.001	.001

Table 22a shows the ANOVA table for the analysis of the negative emotion DV. Table 22b shows the ANOVA table for the analysis of the cognitive disturbance DV.

Table 22a

Total Adverse Event Exposure Analysis of Variance Table (Negative Emotion)

Tests of Between-Subjects Effects					
Dependent Variable: Negative Emotion					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12.127 ^a	4	3.032	105.899	.000
Intercept	146.468	1	146.468	5115.940	.000

Total Adverse Event	2.776	1	2.776	96.961	.000
Exposure					
Groups	6.712	3	2.237	78.147	.000
Error	126.457	4417	.029		
Total	397.132	4422			
Corrected Total	138.585	4421			

a. R Squared = .088 (Adjusted R Squared = .087)

Table 22b

Total Adverse Event Exposure Analysis of Variance Table (Cognitive Disturbance)

Tests of Between-Subjects Effects					
Dependent Variable: Cognitive Disturbance					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	16.501 ^a	4	4.125	111.371	.000
Intercept	133.446	1	133.446	3602.722	.000
Total Adverse	4.124	1	4.124	111.336	.000
Event Exposure					
Participant Group	8.236	3	2.745	74.115	.000
Error	163.570	4416	.037		
Total	422.349	4421			
Corrected Total	180.071	4420			

a. R Squared = .092 (Adjusted R Squared = .091)

The results of the regression with Negative Emotion scores are presented in Table 23.

Table 23

Multiple Regression with Negative Emotion Scores

Correlations

	Negative Emotion	Gun Violence Exposure	Community Disorder Exposure	All other ACE Exposure
Negative Emotion	1.000			
Gun Violence Exposure	.183	1.00		
Community Disorder Exposure	.203	.579	1.000	
All other ACE Exposure	.454	.403	.456	1.00

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.454 ^a	.206	.206	.158

a. Predictors: (Constant), AE, GV, CD

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.595	3	9.532	382.854	.000 ^b
	Residual	109.990	4418	.025		
	Total	138.585	4421			

a. Dependent Variable: Negative Emotion

b. Predictors: (Constant), AE, GV, CD

Coefficients^a

Model		Unstandardized		Standardized			Collinearity Statistics	
		Coefficients	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.138	.004		35.166	.000		
	GV	.001	.004	.003	.192	.848	.640	1.561
	CD	-.001	.002	-.007	-.385	.701	.605	1.652
	AE	.022	.001	.456	29.709	.000	.763	1.311

a. Dependent Variable: Negative Emotion

Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	(Constant)	Variance Proportions		
					Gun Violence Exposure	Community Disorder Exposure	All other ACE Exposure
1	1	3.017	1.000	.03	.03	.03	.03
	2	.523	2.401	.26	.36	.07	.06
	3	.267	3.361	.06	.59	.83	.00
	4	.193	3.955	.65	.01	.07	.92

a. Dependent Variable: Negative Emotion

The results of the Regression with Cognitive Disturbance scores are presented in Table 24.

Table 24

Multiple Regression with Cognitive Disturbance Scores

Correlations				
	Cognitive Disturbance	Gun Violence Exposure	Community Disorder Exposure	All other ACE Expos ure
GV	.214	1.000	.579	.403
CD	.238	.579	1.000	.456
All Other ACE	.443	.403	.456	1.000

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.445 ^a	.198	.197	.181

a. Predictors: (Constant), AE, GV, CD

ANOVA^a						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.661	3	11.887	363.582	.000 ^b
	Residual	144.410	4417	.033		
	Total	180.071	4420			

a. Dependent Variable: Cognitive Disturbance

b. Predictors: (Constant), AE, GV, CD

Coefficients^a

Model	Unstandardized		Standardized			95.0% Confidence		Collinearity		
	Coefficients		Coefficients			Interval for B		Statistics		
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF	
1	(Constant)	.116	.004		25.907	.000	.108	.125		
	GV	.008	.005	.028	1.653	.098	-.001	.017	.640	1.562
	CD	.005	.003	.032	1.819	.069	.000	.010	.605	1.653
	AE	.023	.001	.417	27.02	.000	.022	.025	.763	1.311

Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	GV	CD	AE
1	1	3.017	1.000	.03	.03	.03	.03
	2	.523	2.401	.26	.36	.07	.06
	3	.267	3.362	.06	.59	.83	.00
	4	.193	3.955	.65	.01	.07	.92

a. Dependent Variable: Cognitive Disturbance