ABSTRACT

Title of Thesis:	THE RELATIONSHIP BETWEEN VIOLENCE EXPOSURE AND PERCEIVED COGNITIVE DIFFICULTIES IN ADOLESCENTS: THE MEDIATING ROLE OF MENTAL HEALTH
	Lindsey Wood, Master of Arts, 2025
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The goal of this study was to investigate the relationship between violence, mental health problems, and perceived cognitive difficulties among U.S. high school students, particularly in the context of the COVID-19 pandemic. Utilizing data from the Adolescent Behaviors and Experiences Survey (ABES), this study addressed two primary questions: 1) Is involvement in or exposure to violence associated with perceived cognitive difficulties in adolescents? and 2) To what extent does mental health mediate this relationship? Findings identified several factors related to violence that were associated with perceived cognitive difficulties in adolescence, including weapon-carrying at school, feeling unsafe at school, being threatened or injured with a weapon at school, physical fighting, and exposure to community violence. Mental health significantly mediated these relationships, although the magnitude and influence of this

mediation differed across the examined variables. These findings highlight the nuanced interplay between violence exposure, mental health, and cognitive functioning in adolescents.

THE RELATIONSHIP BETWEEN VIOLENCE AND PERCEIVED COGNITIVE DIFFICULTIES IN ADOLESCENTS: THE MEDIATING ROLE OF MENTAL HEALTH

by

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Chapter 1: Introduction

A significant proportion of youth in the U.S. experience violence in their schools, communities, and homes. In a nationally representative sample, 60.8% of American children aged 0-17 reported experiencing violence in the past year, with 37.3% being victims of an assault. Adolescents, in particular, face greater exposure to severe forms of violence and are more likely to experience multiple types of victimization (Finkelhor et al., 2015).

Adolescence represents a pivotal stage in development, marked by significant cognitive, emotional, and social growth. During adolescence, the brain undergoes maturation in frontal regions associated with executive functions such as attention, memory, and decision-making (Giedd et al., 1999; Casey et al., 2008). Given the dynamic nature of brain development influenced by individual experiences and environmental factors (Cogtay et al., 2024), it is plausible that exposure to or involvement in community or interpersonal violence is associated with cognitive impacts.

In prior studies, exposure to interpersonal violence in public spaces, or community violence, has been linked to a wide range of adverse effects, including mental health consequences (e.g., anxiety, depression, and post-traumatic stress disorder), emotional and behavioral problems, increased risk of substance abuse, reduced academic achievement, and cognitive deficits, such as decreased attention and impulse control (Aisenberg & Herrenkohl, 2008; Sharkey et al., 2014; Sharkey et al., 2012; Berton & Stabb, 1996). These effects have been observed across a wide age range, from early elementary school through adolescence (Lynch, 2003).

However, the relationship between violence and cognitive difficulties is complex. One of the key questions of this study is whether exposure to or involvement in violence directly impacts cognitive functioning, such as memory, attention, and decision-making, or if these cognitive difficulties are mainly the result of mental health conditions like depression, anxiety, or chronic stress that develop after being exposed to or involved in violence. Although mental health problems are well-documented to contribute to cognitive difficulties, it is unclear whether they serve as the main pathway between violence exposure and perceived cognitive challenges or if violence exposure exerts a direct influence on perceived cognition.

Exposure to Violence and Poor Mental Health

Exposure to community violence is consistently linked to negative mental health outcomes in children and adolescents, including stress, anxiety, and depression (Fowler et al., 2009; Kliewer et al., 1998; Buckner et al., 2004; Gorman-Smith & Tolan, 1998). Schwab-Stone et al.'s longitudinal analysis confirmed that violence exposure could have lasting impacts, showing that exposure to violence in early adolescence predicted internalizing symptoms (i.e., anxiety, depression) two years later (Schwab-Stone et al., 1999). Neuroimaging research by Dark and colleagues (2020) showed that childhood violence exposure disrupts functional connectivity within key brain regions involved in stress and emotion regulation, including the amygdala, hippocampus, and prefrontal cortex, contributing to long-term emotional dysregulation and vulnerability to mental health challenges. The study also established that individual differences in affective styles (i.e., emotional predispositions) moderate the relationship between violence exposure and functional connectivity changes (Dark et al., 2020).

In addition to affective styles, other studies suggest various factors may further influence the severity and prevalence of the mental health impacts of violence exposure. The meta-analysis by Fowler and colleagues (2009) found that more recent exposure to community violence had a stronger impact on internalizing symptoms. Additionally, direct victimization was identified as having a greater effect on these symptoms compared to witnessing or hearing about violence, indicating that personal experiences of harm are more detrimental than indirect exposure. Research has also shown that children show more internalizing symptoms compared to adolescents, indicating age-related differences in the effects of violence exposure (Fowler et al., 2009; Schwab-Stone et al., 1999). Meanwhile, a study by Mrug et al. (2008) suggested that adolescents might become desensitized to high levels of violence, with a plateau or slight decrease in symptoms observed at high exposure levels.

Collectively, these studies underscore that exposure to violence is a substantial predictor of poor mental health among adolescents. Factors such as the type of violence exposure, the age of the individual, and the extent of the exposure can influence the severity and nature of these impacts.

Poor Mental Health and Cognitive Impairment

It is well-established that poor mental health, including stress, depression, and anxiety, can lead to cognitive impairments.

Individuals experiencing ongoing stress have been shown to experience neurological effects that may contribute to cognitive difficulties. When exposed to stress, whether chronic or acute, the amygdala triggers pathways in the hypothalamus and brainstem, leading to the release of high levels of noradrenaline and dopamine. While moderate amounts of these neurotransmitters enhance alertness and environmental awareness, excessive levels can impair executive functions and cognition by negatively impacting the prefrontal cortex (Arnsten, 2009; Lupien et al., 2009).

Beyond stress, depression and anxiety are also strongly linked to cognitive deficits. Chen et al. (2023) found that adolescents with depression and a history of suicide attempts scored lower in executive function and working memory compared to controls. Wagner et al.'s (2015) meta-analysis revealed that children and adolescents with Major Depressive Disorder (MDD) performed worse on tasks related to working memory, sustained attention, planning, and verbal memory. Snyder (2013) further highlighted broad executive function deficits in MDD, including issues with inhibition, cognitive flexibility, and verbal fluency. Chavez-Baldini et al. (2023) found that patients with psychiatric disorders including depression and anxiety exhibited cognitive dysfunction in areas such as verbal memory and visual attention, highlighting that increased depressive and anxiety symptoms were correlated to worse cognitive functioning. Likewise, Gualtieri and Morgan (2008) found that a higher proportion of patients with anxiety, depression, and bipolar disorder demonstrated cognitive impairment compared to the control group.

While these studies provide valuable insights, they primarily relied on objective measures of cognitive impairment. However, subjective experiences of cognitive difficulties may offer additional insight into the mental health-cognition relationship. One study by Dhillon et al. (2020) found that perceived cognitive difficulties significantly predicted depressive symptom severity for adults with depression, even after accounting for objective cognitive test scores. For older adults, the systematic review by Hill et al.

(2016) found a bidirectional association between subjective cognitive impairment and greater depressive symptoms, increased anxiety, and poorer mental health among older adults without clinically assessed cognitive impairment.

Adolescents report similar experiences. According to data collected by the Adolescent Behaviors and Experiences Survey (ABES), 44.9% of high school students in the United States reported having perceived cognitive difficulties (i.e., serious difficulty concentrating, remembering, or making decisions), while 31.1% of respondents reported that their mental health was not good (e.g. stress, anxiety, or depression) most of the time or always during the past 30 days. Among individuals who reported having poor mental health over the last 30 days, 67% of boys and 81% of girls endorsed having cognitive difficulties (Iverson & Iverson, 2022). These findings suggest a possible relationship between poor mental health and perceived cognitive difficulties. However, further statistical analysis is necessary to better understand this relationship, which is a primary goal of the present study.

Exposure to Violence and Cognitive Impairment

It has been established that exposure to violence can contribute to mental health difficulties, which are often associated with cognitive impairments. This section will review the research on the direct relationship between exposure to violence and cognitive impairments.

Much of the literature focuses broadly on early adversity, encompassing both violence exposure as well as other stressors. Two main types of early adversity are generally recognized: threat-based, arising from exposure to fear-inducing or traumatic situations (e.g., exposure to violence), and deprivation-based, stemming from a lack of nurturing or stimulation in the early environment (e.g., poverty or social isolation). While deprivation-based adversities have been associated with deficits in executive function and socioemotional development, threat-based adversities like violence exposure have been shown to cause alterations in brain functioning that are specific to processing threatening stimuli, leading to heightened fear responses, attentional biases towards threatening cues, or overgeneralization of perceived threats in non-threatening situations (Hauser, 2020). Generally, early life stress, including exposure to violence, has been shown to be associated with poorer memory and executive functioning in later life (Goodman et al., 2018; Pechtel & Pizzagalli, 2011). Not all individuals exposed to adversity show the same degree of impairment, though, highlighting the role of resilience and protective factors, both biological and environmental (Hauser, 2020; Ozer & Weinstein, 2010).

More specifically, some studies employing cognitive testing and functional magnetic resonance imaging (fMRI) suggest that exposure to violence may independently impact cognitive functioning. Research by Bogliacino et al. (2017) found that individuals recalling violent or emotionally charged experiences had poorer short-term memory and cognitive control than those recalling neutral or pleasant events, suggesting that the cognitive impacts of violence might be context-specific, being reactivated when traumatic memories are triggered. Mattheiss et al. (2022) found through fMRI that childhood exposure to violence was linked to reduced connectivity between prefrontal and limbic regions, particularly the anterior cingulate cortex. However, while emotional and cognitive control networks were impacted, working memory was not. This finding suggests that exposure to violence may not uniformly impact all areas of cognition. Finally, Cará and colleagues (2019) found that more exposure to violence in early adolescence was associated with reduced inhibitory control and less activation in a network of frontal brain regions. Recent exposure to violence specifically led to reduced activation in the superior parietal lobe. This suggests that the timing of recent exposure could influence the specific regions affected.

Furthermore, previous studies by Iverson, I. A., Cook, and Iverson, G. L. have explored predictors specifically for perceived cognitive impairments among adolescents (Iverson & Iverson, 2022; Iverson et al., 2024). In their 2022 study, Iverson and Iverson analyzed perceived cognitive impairment among U.S. high school students based on data from the 2019 Youth Risk Behavior Survey (YRBS), which has been conducted by the Centers for Disease Control and Prevention (CDC) since 1991. The analysis focused on various psychosocial and mental health variables, including feelings of safety at school, adversity, mental health problems, and drug use. Predictors of perceived cognitive impairment included adverse experiences (e.g., bullying), mental health challenges (e.g., depression, suicidal thoughts), insufficient sleep, and low academic grades. Notably, feeling unsafe or threatened at school was included as a significant predictor of perceived cognitive impairment (i.e., "During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?"; "During the past 12 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?"). Then, in 2024, Iverson et al. used the CDC's 2021 Adolescent Behaviors and Experiences Survey (ABES) to explore the link between adverse childhood experiences (ACEs) and perceived cognitive difficulties among U.S. high school students, while also considering mental health factors. The ABES was a one-time, anonymous online survey to assess risk behaviors during the COVID-19 pandemic Iverson et al. (2024) found that poor mental health was a significant predictor of cognitive difficulties, with many students reporting these challenges also experiencing ACEs, such as parental abuse and sexual violence. This research highlighted the need to differentiate between cognitive impairments directly tied to ACEs and those influenced by pre-existing mental health conditions (Iverson et al., 2024).

Gaps in Knowledge

This study addresses several key gaps in the literature regarding perceived cognitive difficulties, the impact of the COVID-19 pandemic, and the role of mental health. Unlike many prior studies that focus on the direct cognitive impacts of violence exposure using objective measures like cognitive testing or neuroimaging, this research focused on self-reported or perceived cognitive difficulties. This subjective measure provides a broader understanding of how adolescents perceive and experience cognitive challenges, such as difficulties with attention, memory, and decision-making. While the studies by Iverson and Iverson (2022) and Iverson et al. (2024) also focus on perceived cognitive functioning in adolescents, this study is distinct in several ways. It specifically strives to examine data collected during the COVID-19 period, incorporate mental health as a mediating factor, and include novel violence exposure variables.

Iverson and Iverson’s 2022 study utilized data from the 2019 Youth Risk Behavior Survey (YRBS), which does not capture the unique impacts of the COVID-19 pandemic. Importantly, during the COVID-19 pandemic, the U.S. saw a surge of violence, including a record number of gun-related deaths. Over the first two years of the pandemic, there was a 45% rise in gun homicide rates and a 7% increase in non-gun homicides. In 2021, the country saw the highest rates of firearm fatalities to date, marking a 7.6% increase from 2020, the previous record (Davis et al., 2023). By leveraging data from the Adolescent Behaviors and Experiences Survey (ABES), administered during the pandemic, this research uniquely contextualizes the cognitive impacts of violence exposure during this time. Additionally, while Iverson and Iverson's 2022 study included two items related to feelings of safety at school, they did not include a broad range of violence exposure measures, such as weapon carrying, physical fighting, and witnessing violence in one's community, all of which are included in this research. These additional variables provide a more comprehensive view of the ways in which different forms of violence exposure impact cognitive functioning. Furthermore, while Iverson and Iverson (2022) identified mental health as a significant predictor of cognitive impairment, they did not specifically investigate how mental health might mediate the relationship between cognitive difficulties and feelings of safety. In contrast, this study explores the extent to which mental health challenges, such as anxiety, stress, and depression, mediate the relationship between violence exposure and perceived cognitive difficulties.

The more recent work by Iverson et al. (2024) also differs from this study in key ways. Their research focused primarily on the impact of ACEs on perceived cognitive functioning and did not include variables directly related to violence exposure. Additionally, while Iverson et al. (2024) examined mental health as a mediating factor between ACEs and cognitive outcomes, this study builds on their work by including mental health as an mediating variable to investigate how it influences the relationship between violence exposure and cognitive difficulties.

Research Questions and Hypothesis

By utilizing data from the Adolescent Behaviors and Experiences Survey (ABES), this study uniquely examined the interplay between violence exposure, perceived cognitive difficulties, and mental health variables, specifically within the context of the COVID-19 pandemic, which had intensified both violence (Davis et al., 2023) and mental health issues (Twenge & Joiner, 2020; Rogers et al., 2021). The goal of this study was to address the following questions: 1) Is involvement in or exposure to violence associated with perceived cognitive difficulties in adolescents? and 2) To what extent does mental health mediate this relationship?

Incorporating a survey question on mental health status was crucial, as cognitive difficulties reported by students may be closely tied to underlying mental health conditions. This question framed cognitive difficulties as potentially secondary to physical, mental, or emotional challenges, suggesting that respondents might attribute cognitive issues to mental health factors like stress, anxiety, or depression. By including mental health status in the analysis, the study was able to more precisely distinguish between cognitive impairments directly resulting from violence exposure and those driven by pre-existing mental health conditions.

It was hypothesized that adolescents exposed to violence—whether as victims, bystanders, or perpetrators—will report higher levels of perceived cognitive difficulties compared to those not exposed to violence. Additionally, it was expected that mental health will partially mediate the relationship between violence exposure and perceived cognitive difficulties, such that higher violence exposure will be associated with poorer mental health, which in turn will be linked to greater perceived cognitive difficulties.

Chapter 2: Design and Methods

Adolescent Behaviors and Experiences Survey (ABES)

This research utilized data from the Adolescent Behaviors and Experiences Survey (ABES). The CDC provides public access to the ABES questionnaire, data, and documentation on their website: https://www.cdc.gov/healthyyouth/data/abes.htm.

In 2021, the CDC administered the ABES as a one-time, anonymous online survey to assess risk behaviors during the COVID-19 pandemic. The purpose of the ABES was to examine student behaviors and experiences, including unintentional injury, violence, tobacco product use, sexual behaviors, and dietary behaviors (Rico et al., 2022).

The ABES was a cross-sectional survey conducted between January and June of 2021. It included 7,998 students from 128 public and private high schools (grades 9–12) across all 50 states and the District of Columbia, with valid data collected from 7,705 completed questionnaires. The survey was offered in both English and Spanish and administered through a secure web-based platform, designed for students to complete outside of school. While students were encouraged to finish the survey in a single sitting, they had the option to save their progress and return later. Responses were flagged as "subverted" if participants answered 20 or fewer questions or gave identical answers to more than 15 consecutive questions. In these cases, only demographic data were retained. The survey achieved a school response rate of 37.8%, with 128 out of 339 sampled schools participating, and a student response rate of 48.0%, with 7,705 out of 16,037 eligible students completing the questionnaire. The overall response rate was 18.1%, calculated as the product of the school and student response rates. Students from alternative special education schools, vocational schools, U.S. Department of Defense schools, and Bureau of Indian Education schools were excluded from the sample. To ensure national representativeness, a three-stage cluster sampling method was used, and the data were weighted by sex and grade level to account for the oversampling of non-Hispanic Black and Hispanic students (Rico et al., 2022).

Participants

Within the ABES national database, data is publicly-available from 7,705 students. For the purposes of this study, 735 students were excluded due to missing responses on cognitive difficulty and/or mental health problems. The final sample for this study totals 6,970 students, including 3,680 girls (52.79%), 3,268 boys (46.89%), and 22 students of unspecified sex (0.003%). Students' self-reported racial and/or ethnic identities are reported in Table 1.

Table 1

Participant Self-Reported Race/Ethnicity

Race Category	Non-Hispanic or Unspecified	Hispanic
American Indian/Alaska Native	76 (1.09%)	182 (2.61%)
Asian	323 (4.63%)	24 (0.34%)
Black/African American	1023 (14.68%)	95 (1.36%)
Native Hawaiian/Other Pacific Islander	28 (0.40%)	58 (0.83%)
White	3200 (45.91%)	811 (11.64%)
Mixed Race	433 (6.21%)	135 (1.94%)
Unspecified	44 (0.63%)	538 (7.72%)

The age composition of the sample is as follows: 14 years old or younger, n = 822 (11.79%); 15 years old, n = 1,754 (25.13%); 16 years old, n = 1,787 (25.16%); 17 years old, n = 1,634 (23.44%); 18 years old or older, n = 966 (13.86%), and unspecified, n = 7

(0.001%). The grade composition of the sample is as follows: 9th grade, n = 1,920 (27.63%); 10th grade, n = 1,766 (25.41%); 11th grade, n = 1,680 (24.18%); 12th grade, n = 1,569 (22.58%); ungraded or other grade, n = 8 (0.001%); and unspecified, n = 6 (0.0009%).

Variables and Survey Questions

The ABES presented survey questions relating to various topics: “Unintentional Injuries and Violence,” “Mental Health,” “Tobacco Use,” “Alcohol and Other Drug Use,” “Sexual Behaviors,” “Dietary Behaviors,” “Physical Activity,” “Obesity, Overweight, and Weight Control,” “COVID-19 Pandemic Impact,” “Health Care/Telemedicine,” and “Other Topics.” This analysis utilized participant response outcomes under three of these categories: “Other Topics,” “Unintentional Injuries and Violence,” and “Mental Health.”

The independent variables were coded binomially based on responses to seven survey items from the "Unintentional Injuries and Violence" category, which address various aspects of involvement in and exposure to violence: (1) weapon-carrying at school, (2) gun-carrying, (3) absenteeism due to safety concerns, (4) threatened or injured with a weapon at school, (5) physical fighting, (6) physical fighting at school, and (7) exposure to community violence. Table 2 displays the original survey item wording alongside the coding system used for analysis.

Table 2

Survey Items Pertaining to Violence Exposure Coded as Binomial Independent Variables

Variable	Survey Question	Response Options	Coding System
Weapon-carrying at school	Q12. During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club on school property?	(a) I have not attended school in-person during the past 30 days, (b) 0 days, (c) 1 day, (d) 4 or 5 days, (e) 2 or 3 days, (f) 6 or more days	Students who selected responses (c) through (f) were coded as 1 (i.e., having carried a weapon on school property). Students who selected response (b) were coded as 0. Students who selected response (a) were not included in the analysis.
Gun-carrying	Q13. During the past 12 months, on how many days did you carry a gun? (Do not count the days when you carried a gun only for hunting or for a sport, such as target shooting.)	(a) 0 days, (b) 1 day, (c) 4 or 5 days, (d) 2 or 3 days, (e) 6 or more days	Students who selected responses (b) through (e) were coded as 1 (i.e., having carried a gun). Students who selected response (a) were coded as 0.
Absentee-ism due to safety concerns	14. During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?	(a) I have not attended school in-person during the past 30 days, (b) 0 days, (c) 1 day, (d) 4 or 5 days, (e) 2 or 3 days, (f) 6 or more days	Students who selected responses (c) through (f) were coded as 1, (i.e., having missed school due to safety concerns). Students who selected response (b) were coded as 0. Students who selected response (a) were not included in the analysis.
Threatened or injured with a weapon at school	Q15. During the past 12 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?	(a) I have not attended school in-person during the past 12 months, (b) 0 times, (c) 1 time, (d) 2 or 3 times, (e) 4 or 5 times, (f) 6 or 7 times, (g) 8 or 9 times, (h) 10 or more times	Students who selected responses (c) through (h) were coded as 1, (i.e., having been threatened or injured with a weapon at school). Students who selected response (b) were coded as 0. Students who selected response (a) were not included in the analysis.
Physical fighting	Q16. During the past 12 months, how	(a) 0 times, (b) 1 time, (c) 2 or 3	Students who selected responses (b) through (h) were coded as 1

	many times were you in a physical fight?	times, (d) 4 or 5 times, (e) 6 or 7 times, (f) 8 or 9 times, (g) 10 or more times, (h) 12 or more times	(i.e., having been in a physical fight). Students who selected response (a) were coded as 0.
Physical fighting at school	Q17. During the past 12 months, how many times were you in a physical fight on school property?	(a) I have not attended school in-person during the past 12 months, (b) 0 times, (c) 1 time, (d) 2 or 3 times, (e) 4 or 5 times, (f) 6 or 7 times, (g) 8 or 9 times, (h) 10 or more times	Students who selected responses (c) through (f) were coded as 1, (i.e., having been in a physical fight on school property). Students who selected response (b) were coded as 0. Students who selected response (a) were not included in the analysis.
Exposure to community violence	Q18. Have you ever seen someone get physically attacked, beaten, stabbed, or shot in your neighborhood?	(a) yes, (b) no	Students who selected (a) were coded as 1 (i.e., having been exposed to community violence). Students who selected response (a) were coded as 0.

The dependent variable was also coded binomially based on responses to a single survey item from the "Other Topics" category, measuring reported cognitive difficulties. Table 3 again displays the original survey item wording alongside the coding system used for analysis.

Table 3

Survey Item On Perceived Cognitive Difficulties Coded as the Binomial Dependent Variable

Variable	Survey Question	Response Options	Coding
Cognitive difficulties	Q109. Because of a physical, mental, or emotional problem, do you have serious difficulty concentrating, remembering, or making decisions?	(a) yes, (b) no	Students who selected (a) were coded as 1 (i.e., having cognitive difficulties). Students who selected response (a) were coded as 0.

Finally, two survey items from the "Mental Health" category were coded as multinomial mediator variables in order to address the second research question. The original survey item wording and the coding system used for these items are presented in Table 4.

Table 4

Survey Items Pertaining to Mental Health Coded as Multinomial Mediator Variables

Variable	Survey Question	Response Options	Coding
Mental health during COVID-19	Q88. During the COVID-19 pandemic, how often was your mental health not good? (Poor mental health includes stress, anxiety, and depression.)	(a) never, (b) rarely, (c) sometimes, (d) most of the time, (e) always	Students who selected responses (c) through (e) were coded as having poor mental health during the COVID-19 pandemic. Students who selected response (c) were coded as 1. Students who selected response (d) were coded as 2. Students who selected response (e) were coded as 3. Students who selected responses (a) and (b) were coded as 0.
Current mental health	Q104. During the past 30 days, how often was your mental health not good? (Poor mental health includes stress, anxiety, and depression.)	Response options: (a) never, (b) rarely, (c) sometimes, (d) most of the time, (e) always.	Students who selected responses (c) through (e) were coded as having poor mental health in the past 30 days. Students who selected response (c) were coded as 1. Students who selected response (d) were coded as 2. Students who selected response (e) were coded as 3. Students who selected responses (a) and (b) were coded as 0.

Questions 12, 14, 15, and 17 were contingent on students' in-person school attendance during the specified period. Students who did not attend school were excluded from the analysis, and their responses were not coded. Table 5 presents the total number of respondents for each independent variable, including non-responses and students who did not attend school.

Table 5

Respondent Breakdown for Independent Variables

Survey Item	Not In School	Non-Responses	Respondents	Prevalence [a]
Q12. Weapon-carrying at school	1852	945	4173	133 (3.19%)
Q13. Gun-carrying	-	20	6950	246 (3.54%)
Q13. Absenteeism due to safety concerns	1849	946	4175	309 (7.40%)
Q14. Threatened or injured with a weapon at school	1173	1173	4624	224 (4.84%)
Q15. Physical fighting	-	10	6960	1131 (16.25%)
Q16. Physical fighting at school	1173	1172	4625	222 (4.8%)
Q17. Exposure to community violence	-	16	6954	1433 (20.61%)

[a] Refers to the proportion of respondents who reported experiencing the specific behavior or exposure, calculated as the number of respondents coded as “1” divided by the total number of valid responses for that survey item.

Of note, survey questions not requiring school attendance (i.e., Q13, Q16, Q18) had about 15 missing responses per item, whereas questions related to school attendance (i.e., Q12, Q14, Q15, Q17) had on average 1,059 missing responses per item. Although the ABES included a response option for students to indicate they had not attended school in person, the significantly higher number of missing responses for school-related questions suggests that many students who were not in school may have opted to leave these items unanswered.

Table 6 presents demographic comparisons by sex and age between students who did and did not respond to school-related questions, in order to assess whether students who did not attend school during the COVID-19 pandemic differed meaningfully from those who did attend.

Table 6

Demographic Comparison Between Students Who Did and Did Not Attend School

Demographic	Non-Response Group	Respondent Group
Q12. Weapon-carrying at school		
% Male	43.19	49.36
% Female	56.49	50.32
Mean Age in Years	16.03	16.02
Q13. Absenteeism due to safety concerns		
% Male	43.18	49.37
% Female	56.49	50.32
Mean Age in Years	16.03	16.02
Q14. Threatened or injured with a weapon at school		
% Male	43.90	48.40
% Female	55.75	51.30
Mean Age in Years	16.05	16.01
Q16. Physical fighting at school		
% Male	43.84	48.43
% Female	55.82	51.26
Mean Age in Years	16.05	16.01

[a] Includes both non-responses and students who did not attend school.

As shown above, demographic differences between the respondent and non-response groups were minimal. Across all items, the mean age differed by no more than 0.04 years, and the proportion of male and female students varied by no more than 5 to 6 percentage points. These small discrepancies suggest that non-response related to school attendance is unlikely to have introduced substantial demographic bias into the analyzed sample.

Statistical Methods

Data analyses were conducted using Version: 29.0.0.0 (241) of IBM SPSS Statistics (Statistical Package for the Social Sciences).

Research Question 1

For the first research question, binary logistic regressions were used to assess unadjusted associations between exposure to violence and self-reported cognitive difficulties. All variables were dichotomous, coded as either 1 or 0, as outlined in Tables 2 and 3. The Enter method was applied, in which all independent variables were entered simultaneously to estimate their independent contributions to the outcome.

Independent variables were categorized into two groups for separate regression models: "weapon-carrying" and "victimization and violence exposure". Weapon-carrying includes carrying a weapon on school property (Q12) and carrying a gun (Q13), reflecting individual risk behaviors. Victimization and violence exposure encompasses absenteeism due to safety concerns (Q14), threatened or injured with a weapon at school (Q15), physical fighting (Q16), physical fighting at school (Q17), and witnessing community violence (Q17). This categorization distinguishes students actively engaging in weapon-carrying from those exposed to violence in other contexts, ensuring that each set of variables is analyzed within its relevant framework. Two separate regression models were conducted accordingly: one examining independent variables related to weapon-carrying and another analyzing independent variables related to victimization and violence exposure.

The unadjusted analyses completed for the first research question identified how each independent variable relates to cognitive difficulty according to their odds ratios (OR). An OR greater than 1.0 indicates a higher likelihood of reporting cognitive difficulties associated with the independent variable. Statistical significance was assessed using a 95% confidence interval (CI); a CI that exceeds 1.0 confirms the significance of any observed associations.

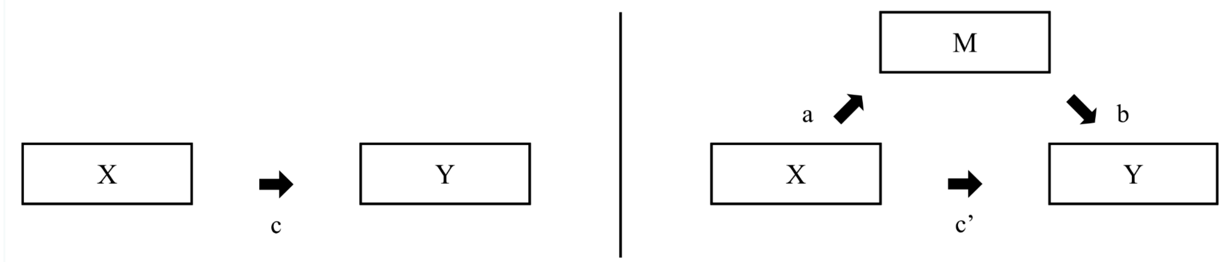
To control for multiple comparisons, a Bonferroni adjustment was applied. Given that two logistic regressions were conducted (i.e., weapon carrying, victimization and violence exposure), the significance threshold (α) was adjusted from 0.05 to 0.025. Results were considered statistically significant at $p < 0.025$.

Research Question 2

For the second research question, mediation analyses were conducted using Model 4 of the PROCESS macro (Version 5.0) for SPSS to examine whether mental health participates as a mediating variable in the relationship between violence exposure and perceived cognitive difficulties. A mediator (M) is an intermediate variable that explains how or why an independent variable (X) influences a dependent variable (Y). This means X affects M, which in turn affects Y. Mediators are part of the causal pathway, serving as mechanisms that drive the relationship between X and Y (Hayes & Rockwood, 2017). This relationship is depicted in Figure 1.

Figure 1

Conceptual Model of Mediation



In this study, violence exposure (X) included weapon-carrying (Q12-13) and victimization/violence exposure (Q14-18). The mediator (M) was self-reported mental health, assessed using two variables: mental health during the COVID-19 pandemic and current mental health. The dependent variable (Y) was self-reported cognitive difficulties.

Two separate mediation analyses were conducted: one examining the role of mental health in how weapon-carrying influences cognitive difficulties and another exploring the role of mental health in how victimization and violence exposure affect cognitive difficulties. Direct and indirect effects were tested using bootstrapped confidence intervals (5,000 resamples), with significant mediation determined by confidence intervals that did not include zero. The total effect (C) of X on Y, the direct effect (C′) of X on Y while controlling for M, and the indirect effect (AB) of X on Y through M were reported. Effect sizes were interpreted based on standardized regression coefficients.

Chapter 3: Results

Research Question 1

The binary logistic regression analysis shown in Table 7 examined whether weapon-carrying behaviors were associated with cognitive difficulties.

Table 7

Associations Between Weapon-Carrying and Cognitive Difficulties

Independent Variable	β	SE	Wald	p	OR	95% CI
Weapon-carrying at school	0.551	0.187	8.69	0.003	1.735	1.203–2.504
Gun-carrying	0.22	0.158	1.947	0.163	1.247	0.915–1.699
Constant	-0.206	0.032	40.869	<.001	0.814	

Note. Cox & Snell $R^2 = 0.003$, Nagelkerke $R^2 = 0.004$

Carrying a weapon at school was a significant predictor of cognitive difficulties ($\beta = 0.551$, $p = .003$, OR = 1.735), indicating that students who carried a weapon at school were 73.5% more likely to report cognitive difficulties compared to those who did not. Gun-carrying was not a significant predictor of cognitive difficulties ($\beta = 0.22$, $p = .163$, OR = 1.247).

The binary logistic regression analysis shown in Table 8 examined whether victimization and violence exposure were associated with cognitive difficulties.

Table 8

Associations Between Victimization/Violence Exposure and Cognitive Difficulties

Independent Variable	β	SE	Wald	p	OR	95% CI
Absenteeism due to safety concerns	0.786	0.133	35.156	<.001	2.194	1.692–2.845
Threatened or injured with	0.768	0.168	20.816	<.001	2.156	1.550–2.999

a weapon at school						
Physical fighting	0.367	0.093	15.501	<.001	1.443	1.202–1.732
Physical fighting at school	-0.098	0.17	0.332	0.564	0.907	0.650–1.265
Exposure to community violence	0.408	0.082	24.467	<.001	1.503	1.279–1.767
Constant	-0.411	0.038	118.328	<.001	0.663	

Note. Cox & Snell R Square = 0.039, Nagelkerke R Square = 0.052

Experiences of victimization and violence exposure were strongly associated with cognitive difficulties. Absenteeism due to safety concerns (β = 0.786, $p < .001$, OR = 2.194) and being threatened or injured with a weapon at school (β = 0.768, $p < .001$, OR = 2.156) were the strongest predictors, with both variables more than doubling the odds of reported cognitive difficulties. Exposure to community violence (β = 0.408, $p < .001$, OR = 1.503) was also a significant predictor, with those exposed to physical violence in their neighborhood being 50.3% more likely to report cognitive difficulties. Physical fighting also showed a significant association (β = 0.367, $p < .001$, OR = 1.443). However, physical fighting at school was not a significant predictor (β = -0.098, $p = .564$, OR = 0.907).

Research Question 2

Mediation Analysis for Weapon-Carrying

The multiple mediation analysis examining whether mental health mediates the relationship between weapon-carrying and perceived cognitive difficulties is shown in Table 9. Indirect effects are detailed in Table 10.

Table 9

Mediation Analysis of Weapon-Carrying, Mental Health, and Perceived Cognitive Difficulties

Independent Variable	β	SE	Z	p	Upper CI	Lower CI
Model 1: Predicting Mental Health During COVID-19						
Constant	1.9041	0.0204	93.3701	<.0001	1.8641	1.9441
Weapon-carrying at school	0.5439	0.1171	4.6453	<.0001	0.3143	0.7734
Gun-carrying	0.0772	0.1002	0.7704	0.4411	-0.1193	0.2737
Model 2: Predicting Current Mental Health						
Constant	1.7212	0.0201	85.5076	<.0001	1.6817	1.7606
Weapon-carrying at school	0.6943	0.1156	6.0085	<.0001	0.4678	0.9209
Gun-carrying	0.0365	0.0989	0.3695	0.7118	-0.1574	0.2305
Model 3: Predicting Perceived Cognitive Difficulties (Direct Effects)						
Constant	-2.4269	0.0855	-28.3699	<.0001	-2.5945	-2.2592
Weapon-carrying at school	-0.0423	0.2254	-0.1878	0.8511	-0.4840	0.3994
Mental health during COVID-19	0.4266	0.0422	10.1200	<.0001	0.3440	0.5092
Current mental health	0.7677	0.0438	17.5145	<.0001	0.6818	0.8537
Gun-carrying	0.2431	0.1918	1.2675	0.2050	-0.1328	0.6191

Note. Model 1: $R = 0.0782$, $R^2 = 0.0061$, $MSE = 1.6289$, $F(2, 4159) = 12.7978$, $p < .001$. Model 2: $R = 0.0975$, $R^2 = 0.0095$, $MSE = 1.5870$, $F(2, 4159) = 19.9411$, $p < .001$. Model 3: $\chi^2(4) = 1405.66$, $p < .001$, McFadden $R^2 = 0.2450$, Cox-Snell $R^2 = 0.2866$, Nagelkerke $R^2 = 0.3832$.

Table 10

Indirect Effects of Weapon-Carrying on Perceived Cognitive Difficulties

Variable	Effect [a]	Boot SE [b]	Boot Lower CI	Boot Upper CI
Weapon-carrying at school				
TOTAL	0.7651	0.1350	0.5057	1.0349

Mental health during COVID-19	0.2320	0.0589	0.1237	0.3541
Current mental health	0.5331	0.0971	0.3436	0.7275
Gun-carrying				
TOTAL	0.0610	0.1157	-0.1666	0.2874
Mental health during COVID-19	0.0329	0.0454	-0.0555	0.1225
Current mental health	0.0281	0.0807	-0.1295	0.1885

[a] Represents the size of the indirect effect, calculated as the product of the effect of the predictor on mental health (path A) and the effect of mental health on perceived cognitive difficulties (path B), indicating how much of the relationship is explained by the mediator.

[b] Represents the standard error of the effect estimate based on the bootstrap resampling process, a statistical method used to estimate the sampling distribution of a statistic by repeatedly resampling the data with replacement, with Boot Lower CI and Boot Upper CI indicating the lower and upper bounds of the bootstrap confidence interval.

In Models 1 and 2 (Table 9), weapon-carrying at school significantly predicted both mental health during COVID-19 ($\beta = 0.5439$, $p < .001$) and current mental health ($\beta = 0.6943$, $p < .001$), representing a significant path A from weapon-carrying to mental health (See Figure 1). In contrast, gun-carrying was not a significant predictor of either mental health variable, indicating no evidence of a path A for this variable. In Model 3, both mental health during COVID-19 ($\beta = 0.4266$, $p < .001$) and current mental health ($\beta = 0.7677$, $p < .001$) significantly predicted perceived cognitive difficulties, demonstrating a significant path B from mental health to cognitive difficulties. However, weapon-carrying at school ($\beta = -0.0423$, $p = 0.8511$) was no longer a significant predictor of perceived cognitive difficulties after controlling for mental health variables. This non-significant path C' suggests that the relationship between weapon-carrying and perceived cognitive difficulties was fully mediated by mental health, with the initial total effect (path C) accounted for by the indirect effect through mental health.

Weapon-carrying at school did have a significant indirect effect (Effect = 0.7651), mediated by both mental health during COVID-19 (Effect = 0.2320) and current mental health (Effect = 0.5331). Weapon-carrying at school significantly affected mental health (path A) and, in turn, mental health significantly affected cognitive difficulties (path B). Gun-carrying did not have a significant indirect effect on perceived cognitive difficulties, as all confidence intervals included zero.

Moderation tests (X*M interactions) were non-significant for both weapon-carrying at school (M1X: $\chi^2 = 0.67$, $p = 0.41$; M2X: $\chi^2 = 0.0004$, $p = 0.98$) and gun-carrying (M1X: $\chi^2 = 0.99$, $p = 0.32$; M2X: $\chi^2 = 0.08$, $p = 0.77$), indicating that mental health did not moderate these relationships. In other words, the association between weapon-carrying or gun-carrying and cognitive difficulties remained consistent across different levels of mental health.

Mediation Analysis for Victimization and Violence Exposure

The multiple mediation analysis examining whether mental health mediates the relationship between victimization and violence exposure and perceived cognitive difficulties is shown in Table 11. Indirect effects are detailed in Table 12.

Table 11

Mediation Analysis of Victimization and Violence Exposure, Mental Health, and Perceived Cognitive Difficulties

Independent Variable	β	SE	Z	p	Upper CI	Lower CI
Model 1: Predicting Mental Health During COVID-19						
Constant	1.7880	0.0231	77.3109	<.0001	1.7427	1.8334
Absenteeism due to safety concerns	0.5729	0.0772	7.4247	<.0001	0.4216	0.7242
Threatened or injured with a weapon at school	0.4137	0.0952	4.3440	<.0001	0.2270	0.6004
Physical fighting	0.1660	0.0571	2.9060	0.0037	0.0540	0.2780
Physical fighting at school	-0.2030	0.1016	-1.9981	0.0458	-0.4022	-0.0038
Exposure to community violence	0.2718	0.0507	5.3592	<.0001	0.1724	0.3712
Model 2: Predicting Current Mental Health						
Constant	1.6016	0.0228	70.1781	<.0001	1.5569	1.6464
Absenteeism due to safety concerns	0.5202	0.0761	6.8327	<.0001	0.3710	0.6695
Threatened or injured with a weapon at school	0.4651	0.0940	4.9492	<.0001	0.2808	0.6493
Physical fighting	0.1359	0.0564	2.4098	0.0160	0.0253	0.2464
Physical fighting at school	-0.1583	0.1003	-1.5788	0.1145	-0.3549	0.0383

Exposure to community violence	0.3302	0.0500	6.5995	<.0001	0.2321	0.4284
Model 3: Predicting Perceived Cognitive Difficulties (Direct Effects)						
Constant	-2.5354	0.0888	-28.5551	<.0001	-2.7094	-2.3614
Mental health during COVID-19	0.4248	0.0426	9.9599	<.0001	0.3412	0.5084
Current mental health	0.7540	0.0443	17.0317	<.0001	0.6673	0.8408
Absenteeism due to safety concerns	0.3959	0.1581	2.5034	0.0123	0.0859	0.7059
Threatened or injured with a weapon at school	0.4788	0.1985	2.4115	0.0159	0.0897	0.8679
Physical fighting	0.3331	0.1106	3.0102	0.0026	0.1162	0.5499
Physical fighting at school	0.0810	0.2044	0.3960	0.6921	-0.3197	0.4817
Exposure to community violence	0.1839	0.0983	1.8705	0.0614	-0.0088	0.3767

Note. Model 1: $R = 0.1995$, $R^2 = 0.0398$, $MSE = 1.5737$, $F(5, 4152) = 34.4352$, $p < .001$. Model 2: $R = 0.2086$, $R^2 = 0.0435$, $MSE = 1.5324$, $F(5, 4152) = 37.7660$, $p < .001$. Model 3: $-2LL = 4273.0916$, $ModelLL = 1459.9125$, $df = 7$, $p < .001$, McFadden $R^2 = 0.2547$, Cox-Snell $R^2 = 0.2961$, Nagelkerke $R^2 = 0.3958$.

Table 12

Indirect Effects of Victimization and Violence Exposure on Perceived Cognitive Difficulties

Variable	Effect [a]	Boot SE [b]	Boot Lower CI	Boot Upper CI
Absenteeism due to safety concerns				
TOTAL	0.6356	0.0887	0.4611	0.8134
Mental health during COVID-19	0.2433	0.0412	0.1683	0.3277
Current mental health	0.3923	0.0650	0.2705	0.5247
Threatened or injured with a weapon at school				

TOTAL	0.5264	0.1080	0.3094	0.7416
Mental health during COVID-19	0.1757	0.0469	0.0873	0.2708
Current mental health	0.3507	0.0754	0.2063	0.5057
Physical fighting				
TOTAL	0.1730	0.0634	0.0507	0.3002
Mental health during COVID-19	0.0705	0.0255	0.0234	0.1227
Current mental health	0.1024	0.0435	0.0173	0.1887
Physical fighting at school				
TOTAL	-0.2056	0.1198	-0.4466	0.0361
Mental health during COVID-19	-0.0862	0.0477	-0.1809	0.0049
Current mental health	-0.1194	0.0823	-0.2810	0.0468
Exposure to community violence				
TOTAL	0.3645	0.0592	0.2470	0.4776
Mental health during COVID-19	0.1154	0.0253	0.0689	0.1679
Current mental health	0.2490	0.0422	0.1677	0.3337

[a] Represents the size of the indirect effect, calculated as the product of the effect of the predictor on mental health (path A) and the effect of mental health on perceived cognitive difficulties (path B), indicating how much of the relationship is explained by the mediator.

[b] Represents the standard error of the effect estimate based on the bootstrap resampling process, a statistical method used to estimate the sampling distribution of a statistic by repeatedly resampling the data with replacement, with Boot Lower CI and Boot Upper CI indicating the lower and upper bounds of the bootstrap confidence interval.

In Models 1 and 2 (Table 11), absenteeism due to safety concerns, being threatened or injured with a weapon at school, physical fighting, and exposure to community violence significantly predicted both mental health during COVID-19 and current mental health, representing a significant path A. However, physical fighting at school did not have a significant association with mental health during COVID-19 ($p = .0458$) or current mental health ($p = 0.1145$), indicating no significant path A for this variable. In Model 3, perceived cognitive difficulties were strongly predicted by both mental health during COVID-19 ($\beta = 0.4248$, $p < .001$) and current mental health ($\beta = 0.7540$, $p < .001$), demonstrating a significant path B. Additionally, absenteeism due to safety concerns ($\beta = 0.3959$, $p = .0123$), being threatened or injured with a weapon at school ($\beta = 0.4788$, $p = .0159$), and physical fighting ($\beta = 0.3331$, $p = .0026$) were significant predictors of perceived cognitive difficulties, even after accounting for mental health variables, demonstrating a significant direct effect (path C').

Table 12 shows that absenteeism due to safety concerns (Effect = 0.6356), being threatened or injured with a weapon at school (Effect = 0.5264), and physical fighting (Effect = 0.1730) have significant indirect effects with non-zero confidence intervals. Both mental health during COVID-19 and current mental health contributed significantly to their indirect effects on perceived cognitive difficulties.

Model 3 indicated that exposure to community violence ($p = .0614$) was not a significant predictor of perceived cognitive difficulties after mental health adjustment. However, it did show a significant indirect effect (Effect = 0.3645), with both mental health during COVID-19 (Effect = 0.1154) and current mental health (Effect = 0.2490) serving as mediators, indicating full mediation. The lack of a significant direct effect (path C') after adjusting for mental health suggests that mental health fully accounts for the relationship between exposure to community violence and perceived cognitive difficulties.

Moderation tests (X*M interactions) were non-significant for all variables, including absenteeism due to safety concerns (M1X: $\chi^2 = 1.72$, $p = 0.19$; M2X: $\chi^2 = 1.43$, $p = 0.23$), being threatened or injured with a weapon at school (M1X: $\chi^2 = 0.08$, $p = 0.77$; M2X: $\chi^2 = 0.38$, $p = 0.54$), physical fighting (M1X: $\chi^2 = 0.08$, $p = 0.77$; M2X: $\chi^2 = 0.49$, $p = 0.48$), physical fighting at school (M1X: $\chi^2 = 1.94$, $p = 0.16$; M2X: $\chi^2 = 0.68$, $p = 0.41$), and exposure to community violence (M1X: $\chi^2 = 0.02$, $p = 0.88$; M2X: $\chi^2 = 0.17$, $p = 0.68$). In other words, the association between these predictors and cognitive difficulties remained consistent across different levels of mental health.

Summary of Results

Table 13 summarizes the results of these analyses, outlining the associations between violence exposure and cognitive difficulties, as well as the mediating role of mental health. For research question 1, the OR was interpreted based on the criteria as referenced by Iverson (2022), with ORs between 1.20 and 1.71 classified as small, ORs between 1.72 and 2.40 as medium, and ORs greater than 2.40 as large.

Table 13

Summary of Associations Between Violence, Mental Health, and Cognitive Difficulties

Independent Variable	Effect on Cognitive Difficulties	Mediation by Mental Health
Weapon-Carrying		
Weapon-carrying at school	OR = 1.75 (Medium)	Full Mediation
Gun-carrying	Insignificant	-
Victimization and Violence Exposure		
Absenteeism due to safety concerns	OR = 2.19 (Medium)	Partial Mediation
Threatened or injured with a weapon at school	OR = 2.16 (Medium)	Partial Mediation
Physical fighting	OR = 1.44 (Small)	Partial Mediation
Physical fighting at school	Insignificant	-
Exposure to community violence	OR = 1.50 (Small)	Full Mediation

Chapter 4: Discussion

This research identified several factors related to violence that were associated with perceived cognitive difficulties in adolescence, including weapon-carrying at school, feeling unsafe at school, being threatened or injured with a weapon at school, physical fighting, and exposure to community violence. The results demonstrated that mental health significantly mediated the relationship between each of these factors and perceived cognitive difficulties, although to varying extents. While feeling unsafe at school, being threatened or injured with a weapon at school, and physical fighting remained independently correlated with cognitive difficulties after mediation, weapon-carrying at school and exposure to community violence no longer showed an independent association with cognitive difficulties once mental health was accounted for. Each of these findings are discussed in turn.

Weapon-Carrying

Students who reported carrying a weapon such as a gun, knife, or club on school property at least once in the last 30 days were 75% more likely to report cognitive difficulties. However, students who reported carrying a gun at least once in the last 12 months, not counting the days when a gun was carried only for recreational purposes, were not significantly more likely to report cognitive difficulties. The lack of a significant association between general gun-carrying and cognitive difficulties, in contrast to the strong association observed for weapon-carrying at school, might be explained by several factors.

First, differences in response characteristics should be considered. The respondent pool for bringing a weapon to school ($n = 4{,}173$) was significantly smaller than the respondent pool for gun-carrying (n = 6,950) due to the requirement that students attended school during the COVID-19 pandemic. Interestingly, students did report these actions at similar rates, with 3.19% reporting bringing a weapon to school and 3.54% reporting carrying a gun (see Table 5). The differing respondent pools, influenced by school attendance during COVID-19, may limit the comparability of these two survey items. Additionally, the gun-carrying question covered a 12-month period, whereas the weapon-carrying at school question focused on the past 30 days, which may further limit the ability to draw direct comparisons; a 12-month period may encompass various situational factors that are less immediate and more variable compared to the 30-day window.

Furthermore, the discrepancies between these two survey items could also be due to differences in the context and intent behind the behaviors. In the gun-carrying question, while the survey instructed respondents to exclude recreational gun use (e.g., hunting or target shooting), gun-carrying overall still encompasses a broader and more variable range of behaviors compared to bringing a weapon to school. Carrying a firearm, which is generally harder to obtain than other weapons like knives or clubs, may be associated with different motivations or risk factors. While some students may carry firearms for non-violent reasons, bringing a weapon to school is both explicitly prohibited and poses immediate and severe risks to safety, both for the individual and those around them. This act could be driven by more immediate concerns, such as fear for safety or the potential for criminal intent. It could also suggest pre-existing, underlying issues with judgment, decision-making, or coping strategies. Given these distinctions, it is not surprising that weapon-carrying at school was significantly linked to cognitive difficulties, while general gun-carrying was not.

This is consistent with the findings of Rosenbaum and colleagues (2024), who found that increased perceived neighborhood disorder and exposure to violence were strongly associated with a higher likelihood of adolescent gun-carrying. Similarly, Sheley and Wright (1998) found that the primary reason for carrying firearms among male high school students was for recreation or protection, not criminal activity. Notably, in their study, recreational gun use was found to be unrelated to criminal behavior or exposure to dangerous environments. However, carrying a gun specifically outside the home was, in fact, associated with increased exposure to dangerous social environments and was associated with increased likelihood to be engaged in criminal activities. These findings suggest that the context in which a firearm or weapon is carried may indicate differences in its relationship to other outcomes, such as cognitive difficulties.

Finally, the association between weapon-carrying at school and cognitive difficulties was fully mediated by mental health, suggesting that students who bring weapons to school are more likely to experience broader mental, emotional, or psychological challenges, which may, in turn, contribute to cognitive difficulties. It is possible that rather than weapon-carrying directly leading to cognitive difficulties, students with pre-existing mental health or cognitive challenges could be more likely to carry weapons. While the relationship between these factors may not necessarily imply causation, it is clear that mental health does play a role in explaining why students who carried weapons at school also reported cognitive difficulties.

Unsafe School Environment

The strongest associations in this study were seen for survey questions regarding the safety of the school environment. Specifically, students who reported missing school at least once in the last 30 days because they felt they would be unsafe at school or on the way to or from school were 119% more likely to report cognitive difficulties. Similarly, students who reported being threatened or injured with a weapon such as a gun, knife, or club on school property at least once in the last 12 months were 116% more likely to report cognitive difficulties. The strong link between unsafe school environments and cognitive difficulties is unsurprising given that these factors represent direct victimization or the explicit anticipation of harm, which is known to have greater effect on internalizing symptoms compared to witnessing or hearing about violence (Fowler et al., 2009).

These survey items had some of the strongest associations with mental health, reinforcing the idea that experiencing or expecting violence may contribute to stress, anxiety, and depression. The questions imply an ongoing sense of fear or danger, which may heighten stress, anxiety, or hypervigilance—consistent with research showing that threat-based adversities, such as violence exposure, lead to heightened fear responses and attentional biases toward threats (Hauser, 2020)—thereby exacerbating cognitive challenges.

Furthermore, this reinforces the previous findings of Iverson and Iverson (2022) in their analysis of the 2019 YRBS data, which identified that feeling unsafe or threatened at school was a significant predictor of perceived cognitive impairment using the same survey questions (i.e., "During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?"; "During the past 12 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?"). The replication of these associations across multiple datasets suggests a consistent relationship between school safety concerns and cognitive functioning, while the present study adds the nuance of mental health's role in driving this association.

However, concurrently, the fact that these relationships were only partially mediated by mental health suggests that there could be other factors contributing to cognitive difficulties in students who feel unsafe at school. For instance, school absenteeism itself might disrupt learning and lead to cognitive challenges. Another possibility is that the mental health measures used in the survey might not fully capture the specific psychological burden, such as trauma-related cognitive impairments, experienced by students who feel unsafe. Additionally, students in unsafe school environments may be in less supportive or lower-resourced educational settings. Further research would be needed to better understand the underlying mechanisms driving this association.

Physical Fighting

Students who reported being in a physical fight at least once in the last 12 months were 44% more likely to report cognitive difficulties. However, students who were in a physical fight on school property at least once in the past 12 months were not significantly more likely to report cognitive difficulties. This discrepancy raises important questions about underlying factors that may influence these relationships.

Again, differences in response characteristics should first be considered. A much larger number of students reported being in a physical fight in general compared to those who reported fighting specifically at school. Specifically, out of 6,960 respondents, 1,131 students (16.25%) reported being in a physical fight; in comparison, out of 4,625 respondents, only 222 students (4.8%) reported fighting specifically at school (see Table 5). The larger sample size for overall physical fighting may have increased the power to detect an association with cognitive difficulties. However, given the strong associations found between cognitive difficulties and other variables in this study, this explanation alone seems insufficient.

Furthermore, another possibility is that students who engage in physical fights outside of school may be more likely to experience broader patterns of interpersonal violence or involvement in high-risk environments. In contrast, school-based fights might consist of more isolated incidents that do not necessarily reflect ongoing exposure to violence. If fights occurring outside of school are part of a larger pattern of chronic, recurrent exposure to violence, whether in the home or community, their cognitive impact may therefore be more pronounced. Additionally, if school-based fights tend to be more isolated conflicts with known peers, their emotional and cognitive consequences may differ from those of fights occurring in unstructured, high-risk environments outside of school. Finally, fights that occur outside of school settings also may be less likely to be interrupted by adults or authority figures, which may prolong their duration or increase the risk of more severe physical and psychological consequences.

There are important limitations to consider when interpreting these findings due to the structure of the survey questions, which lack specificity regarding the context and nature of the fights. For instance, it is unclear whether the fights were mutually initiated, instances of self-defense, or unprovoked attacks. The degree of victimization in these incidents could vary significantly, which may influence their psychological and cognitive impact (Fowler et al., 2009).

This complexity aligns with the findings of Johnson and colleagues (2004), who explored perceptions of violence and fighting among urban youths aged 14-22 through focus group interviews. Their study revealed that many adolescents did not view fighting purely as aggressive behavior, but rather as a harm-reduction strategy to prevent further violence, maintain social standing, or ensure personal safety. Some participants indicated that avoiding fights could lead to continued victimization or escalation, even heightening the risk of weapon involvement. Others saw fighting as a coping mechanism used to release stress and manage anxiety. This study underscores the multifaceted nature of physical fighting for adolescents, emphasizing why sweeping conclusions cannot be drawn from these statistics and helping to explain why fighting is linked to cognitive difficulties in some contexts but not others.

Finally, the fact that the relationship between physical fighting and cognitive difficulties was only partially mediated by mental health indicates that other factors may also play a role. One possibility, though not directly supported by this data, is that repeated physical altercations may be correlated with head injuries or other physiological effects that impact cognition. Alternatively, the cognitive demands of navigating social conflicts or anticipating threats could contribute to difficulties with cognition. Further research is needed to explore these potential explanations.

Exposure To Community Violence

Students who reported ever seeing someone get physically attacked, beaten, stabbed, or shot in their neighborhood during their lifetime were 50% more likely to report cognitive difficulties. This relationship was fully mediated by mental health, meaning that community violence exposure was not independently associated with cognitive difficulties once mental health factors were accounted for.

The nature of this survey question also introduces important considerations. Because it does not specify a timeframe, students may have been recalling events that happened recently or ones that occurred years earlier. Due to this broad window of reference, this item had the highest rate of affirmative responses among all violence-related questions, with 20.1% of students reporting having witnessed such an event (see Table 5). This lack of specificity could mean that for some respondents, the event was a distant memory with limited ongoing cognitive impact, while for others, it was a recent or distressing experience. Research indicates that the timing of violence exposure influences both the severity of symptoms and the specific brain regions affected (Cará et al., 2019; Fowler et al., 2009). This could explain why the association with cognitive difficulties was weaker compared to other forms of violence.

Additionally, it's important to consider that students who witness violence in their communities might also be living in environments with broader stressors or ongoing exposure to other adversities. These factors, rather than the act of witnessing violence itself, could contribute to both mental health challenges and cognitive deficits. However, because the survey question only asked about a single incident of exposure, it does not capture whether students are experiencing ongoing violence or living in persistently high-risk environments.

Ultimately, while this study suggests that mental health fully accounts for the cognitive effects of witnessing community violence, further research is needed to better understand the long-term impact of such exposure.

Mental Health as a Mediator

In the context of the relationship between violence exposure and cognitive difficulties, this study found that poor mental health functions as a mediating variable. These results highlight the role of mental health in the pathway through which violence exposure leads to cognitive difficulties, indicating that poor emotional well-being may heighten vulnerability to cognitive impacts. These findings build upon the work of Iverson and colleagues (2024), who analyzed the role of mental health in the association between ACEs and cognitive difficulties. This underscores that the mediating role of mental health in cognition extends across multiple forms of early life stress and adversity. Furthermore, the findings of the present study are in line with the body of previous research demonstrating that poor mental health is associated with deficits in various cognitive domains, which spans both objective measures and subjective experiences of cognitive difficulties (Chen et al., 2023; Wagner et al., 2015; Snyder, 2013; Chavez-Baldini et al., 2023; Gualtieri & Morgan, 2008; Dhillon et al., 2020; Hill et al., 2016).

Simultaneously, these results raise the possibility that healthy emotional regulation and positive mental well-being could act as a protective factor in similar contexts, potentially mitigating the negative effects of violence. That is, individuals with stronger mental health resources, such as emotional resilience and effective coping strategies, may experience fewer cognitive challenges despite exposure to violence.

Mental health may serve both as a mediator of adverse outcomes and a buffer against them. This is in agreement with the aforementioned findings of Dark and colleagues (2020), who highlighted how individual affective styles and emotional predispositions moderate the link between childhood violence exposure and structural brain changes related to mental health. Their study suggests that how we process and regulate emotions plays a key role in shaping neurological impacts, ultimately influencing both mental health outcomes and cognition. This is also in line with findings by Kliewer and colleagues (2004), which identified that child emotion regulation skills were one of the protective factors against the internalizing and externalizing adjustment problems related to community violence exposure.

This supports the possibility that interventions targeting emotional resilience and psychological well-being could serve as protective mechanisms, reducing the cognitive burden associated with violence exposure.

Practical Implications

Research by Johnson and Muhammad (2018) and Stanford (2019) have highlighted how cognitive impairments can increase the risk of academic underperformance, behavioral issues, and involvement in the juvenile justice system, contributing to the school-to-prison pipeline and disproportionately affecting students from minority backgrounds. As such, it is important to consider the implications of our findings for informing practical strategies to address the individual and societal effects of cognitive difficulties. By emphasizing the mediating role of mental health in the link between violence exposure and cognitive impairments, this study advocates for a holistic public health approach to supporting students affected by violence.

One practical recommendation is for speech-language pathologists (SLPs) to collaborate more closely with mental health professionals both within and beyond school settings. SLPs are essential in evaluating and addressing cognitive difficulties and disorders across the lifespan: SLPs assess cognitive-communication skills, focusing on deficits in attention, memory, and executive functioning, in order to develop therapeutic interventions, provide strategies to improve daily functioning, and support students' overall well-being. The findings of this study emphasize the need for interdisciplinary collaboration among SLPs, mental health professionals, and educators, particularly when working with adolescents experiencing exposure to violence or multifactorial social challenges. An interdisciplinary approach can provide more comprehensive support for adolescents by addressing not only cognitive difficulties but also the emotional and psychosocial factors that contribute to them.

Some studies have already demonstrated the benefits of integrated models. For example, Müller and colleagues (2025) outlined a school-based co-therapy model in which SLPs and mental health professionals work together to support students with intellectual and developmental disabilities. Interviews with practitioners indicated that students benefited from the interdisciplinary approach, and clinicians reported increased confidence in addressing complex needs. Similarly, Novak and Kapolnek (2001) described a treatment program for individuals with mental illnesses that incorporated SLP intervention to support memory, cognition, problem-solving, planning, and organization. These examples provide a strong framework for further collaboration between disciplines.

Additionally, school- and community-based interventions could play an important role in improving student mental health and cognitive outcomes. This research underscores the importance of integrating trauma-informed care as a foundational framework for such efforts. Programs that promote social-emotional learning, healthy relationship skills, social-emotional regulation and skill building, and effective communication can be implemented across various settings, including schools, outpatient clinics, community centers, and after-school programs. Both SLPs and mental health professionals can play a role in developing, implementing, and sustaining these initiatives in order to foster resilience.

Finally, these findings emphasize the impact of school safety on students' cognitive functioning. While further research is needed to clarify the specific mechanisms connecting unsafe school environments to cognitive difficulties beyond mental health factors, efforts to improve school climate and reduce violence in schools should be considered in order to support the best cognitive outcomes for adolescents.

Limitations

The conclusions drawn about the relationship between violence, mental health, and cognitive difficulties in this study may be limited by several factors, including the structure of the ABES survey questions. For example, some survey questions referred to the past 30 days, while others referred to the past 12 months, leading to inconsistencies in response timelines and limiting direct comparisons that can be made by researchers. Additionally, questions about violence varied by setting; some inquired about violence in the neighborhood, while others focused on violence at school. Of note, this study only examined violence exposure at school and in the community, and did not account for the potential impact of domestic violence, for example, on adolescent mental health and cognitive functioning.

Additionally, this study accounted for mental health status as a mediating variable using a broad question about poor mental health, encompassing stress, anxiety, and depression. However, due to the questions' format, we were unable to distinguish between specific mental health conditions. This lack of specificity limits our ability to determine how different mental health challenges, either individually or in combination, contribute to cognitive difficulties. Likewise, the study's dependent variable, which measured general difficulty with concentration, memory, and decision-making, did not specify which cognitive functions were most affected.

Other unmeasured confounding variables, such as socioeconomic status, family environment, health/disability status, school resources, or geographic region, also could have influenced both violence exposure and cognitive difficulties but were not accounted for in this analysis. These factors may potentially affect the observed relationships or contribute to disparities. Additionally, other covariates provided by the ABES, such as age, grade level, sex, and race/ethnicity, could be analyzed in future studies to further refine our understanding of these associations across different groups.

Finally, missing responses or non-responses to certain survey questions present another limitation. Because the reasons for omitted responses are unknown, missing data may affect the generalizability of the results and could lead to an underestimation or overestimation of these relationships. Additionally, school closures during the COVID-19 pandemic prevented some students from fully participating in certain survey questions (see Table 5). Although Table 6 indicates minimal differences in age and sex between students who did and did not attend school, it is worth noting that students who were not in school may differ in other unmeasured ways, such as academic engagement, home or community context, or mental health status, which could influence their experiences with violence and associated cognitive outcomes. Additionally, not all school absences may have been due to pandemic-related school closures; some students may have been absent for other reasons, such as suspension, expulsion, or chronic truancy, further complicating the interpretation of group differences.

Recommendations for Improving Survey Design

While the ABES provides valuable insights into adolescent health and risk behaviors, several methodological limitations identified in this study suggest opportunities for improvement in future iterations of the ABES or the YRBS.

As previously discussed, one major limitation of the ABES design is the inconsistency in reference periods across survey items. For instance, some questions refer to behaviors or experiences within the past 30 days, while others refer to the past 12 months. These discrepancies introduce challenges in establishing temporal relationships between variables, particularly when assessing mediation effects or risk factors. Standardizing the reference time frames across related items would allow for more coherent and reliable comparisons.

Another way to improve comparability among survey items is by streamlining how different types of violence-related behaviors are categorized and measured. For example, the ABES includes separate items for weapon-carrying at school and general gun-carrying. The weapon-carrying question is specific to school property, while the gun-carrying item lacks a defined setting, which complicates efforts to draw direct comparisons or conclusions. Future versions of the survey should aim for greater consistency in the scope and wording of such items, for instance, by including parallel questions that distinguish between general and setting-specific behaviors.

Additionally, the survey's reliance on broadly worded items limits the level of detail available for meaningful analysis. Adding follow-up questions to existing ABES survey items would enhance the depth and accuracy of the data by capturing important contextual information. For example, binary questions such as "Have you ever seen someone get physically attacked, beaten, stabbed, or shot in your neighborhood?" do not account for the frequency, recency, or duration of such exposure. Future iterations of the survey should include follow-up items (e.g., "How many times in the past 6 months have you witnessed this type of event?") to provide more precise information. Similarly, questions about fighting at school fail to distinguish between one-time incidents and repeated altercations, or whether the respondent was physically harmed, acting in self-defense, or whether weapons were involved. In the same way, the question about cognitive difficulties fails to differentiate between separate cognitive domains, and mental health is measured with a broad item referencing stress, anxiety, and depression, rather than with separate questions that capture the presence and severity of distinct symptoms. Enhancing the survey with follow-up items to address these gaps in information would significantly improve its capacity to capture the complexity of students' experiences.

Another omission in the survey design is the lack of geographic or neighborhood-level data. The absence of location-based data makes it difficult to contextualize findings or explore how environmental factors moderate the relationship between violence exposure, mental health, and cognitive function. Incorporating questions about geographic region, school zip code, or neighborhood characteristics would allow researchers to investigate how place-based factors contribute to disparities.

In addition, while the ABES gathers information about school violence and community violence, it does not ask about perceived safety in these environments. Adolescents' subjective sense of safety may be just as important as objective measures of violence exposure when it comes to predicting mental health and cognitive outcomes. Questions that assess perceived school safety, neighborhood safety, and trust in school personnel or community members could provide deeper insight into how environmental stressors are internalized by adolescents.

Lastly, future surveys should include questions that capture protective factors and sources of resilience. Items that assess access to mental health care, relationships with supportive adults, school connectedness, participation in extracurricular activities, and community engagement could help researchers understand what may buffer against the negative effects of violence exposure and promote positive outcomes.

Directions for Future Research

Given these limitations, future research should aim to build on these findings in several ways. For example, studies employing longitudinal design may help to track the long-term effects of violence exposure on adolescents' cognitive and mental health outcomes, rather than relying on cross-sectional surveys like the ABES, which capture only a single point in time. Additionally, future studies could examine other protective factors, such as family and teacher support, community involvement, school climate, or peer relationships, to better understand what contributes to resilience and mitigates the negative internalizing effects of violence exposure.

Furthermore, future research might build on our findings to explore how the intersection of multiple forms of violence exposure (e.g., school violence, community violence, domestic violence) affects adolescents' cognition and mental health differently based on gender, age, ethnicity, or other social factors. Understanding how these intersecting factors contribute to cognitive difficulties will provide a more nuanced understanding of the problem and might help to guide effective solutions.

Finally, it is important to note that perceived cognition, as reported by adolescents, may differ from objective measures of cognitive function. Adolescents who have experienced violence may report cognitive difficulties influenced by emotional and psychological factors, which may not align with standardized cognitive assessments. This discrepancy underscores the need for future research to consider both subjective and objective measures to more accurately assess the impact of violence exposure on cognitive functioning.

Conclusion

This study examined the relationship between weapon-carrying, victimization, and violence exposure with perceived cognitive difficulties in adolescents. Our findings indicated that weapon-carrying at school was linked to cognitive difficulties, with mental health fully mediating this relationship, whereas general gun-carrying did not demonstrate a similar pattern. Among victimization factors, feeling unsafe at school and experiencing threats or injuries on school property showed the strongest associations with cognitive difficulties. While involvement in physical fights was modestly related to cognitive difficulties, this association was not observed for fights occurring specifically on school property. Exposure to community violence also showed a small association with cognitive difficulties, with mental health fully mediating this relationship. Notably, certain variables—including absenteeism due to safety concerns, being threatened or injured with a weapon at school, and physical fighting—remained independently associated with cognitive difficulties even after accounting for mental health. These results highlight the complex interplay between violence exposure, mental health, and cognitive functioning in adolescents and emphasize the need for intervention and prevention efforts that address both environmental and psychological factors.

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