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Retaliatory attitudes as mediator of exposure to violence and firearm aggression among youth: The protective role of organized activity involvement

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Abstract

Firearm injury is a significant public health concern among youth living in the United States. Youth with exposure to violence (ETV) are more susceptible to carrying and using a firearm. Few researchers, however, have examined psychological mechanisms undergirding the association between ETV and firearm aggression. Retaliatory attitudes have been discussed as a potential mediator linking ETV with firearm aggression. Moreover, organized activity participation may disrupt direct and indirect pathways connecting ETV to firearm aggression. We tested: (1) the mediating role of retaliatory attitudes in the ETV-firearm aggression link, and (2) the moderating role of organized activity participation among 570 youth with past year illicit drug use and seeking emerging department care in an urban emergency department (ages 14–24; 58.8% males). Using multigroup path analysis, ETV indirectly influenced firearm aggression through retaliatory attitudes for youth not involved organized activities. Organized activities also buffered the association between retaliatory attitudes (mediator) and firearm aggression (outcome). Organized activities may, therefore, prevent firearm aggression by reducing retaliatory attitudes among youth contending with ETV.

Keywords

firearm aggression; retaliatory attitudes; organized activity participation; violent behaviors; resilience

In the United States, firearm-related injury is the leading cause of death among youth (age 14–24; Centers for Disease Control and Prevention, 2018). Nearly 12,000 youth are also seen in the emergency department for nonfatal firearm-related injuries (Injury Prevention & Control, 2015). Recognizing the scope of the problem, researchers have identified predictors of youth firearm aggression that may inform firearm aggression prevention strategies (Schmidt et al., 2019). Notably, exposure to violence (ETV) has consistently been

documented as a risk factor for youth firearm aggression (see Schmidt et al., 2019). While ETV may increase the likelihood of youth firearm aggression involvement, underlying psychological mechanisms connecting ETV to firearm aggression has received limited attention. Retaliatory attitudes, a predictor of firearm aggression, may be intermediary to the ETV-firearm aggression link (Carter et al., 2015; Carter et al., 2016; Carter et al., 2020; Copeland-Linder et al., 2012).

It is also important to mention that not all youth faced with ETV engage in firearm aggression. Guided by resilience theory (Zimmerman & Brenner, 2010), organized activities such as extracurricular or volunteer activities may counteract retaliatory attitudes which, in turn, reduces the likelihood of firearm aggression within the context of ETV. Among youth and young adults, for instance, organized activity participation has been associated with reductions in health risk behavior (see Denault & Poulin, 2019). Our understanding of protective factors within the context of ETV and youth firearm aggression is, however, limited. Our study, therefore, consisted of two aims. First, we examined whether retaliatory attitude is a mediating factor to the link between ETV and firearm aggression among youth (ages 14–24). Second, we examined whether the direct and indirect effects were moderated by organized activities. Moreover, we examine these research questions in a sample of high-risk youth (i.e., illicit substance use, assault-injured) who resides in a metropolitan area with elevated rates of violent crimes (Federal Bureau of Investigation, 2016). Thus, we evaluated our study aims among youth especially vulnerable to experiencing ETV and firearm aggression.

Exposure to Violence and Firearm Aggression

Early exposure to violence (ETV) is associated with a variety of negative sequelae later in life, including depression, stress, substance use, health risks, and poorer school outcomes, as well as increased likelihood of repeated victimization and perpetration of violent behavior (Heinze et al., 2017; Hsieh et al., 2017; Hsieh et al., 2020; Huesmann et al., 2021). Despite established links between youth ETV and later aggressive behavior (Moylan et al., 2010; Guerra et al., 2003), we have comparatively less evidence supporting associations between ETV and firearm related aggression. Exposure to peer, family, or community violence may increase the risk of firearm carriage (Reid et al., 2017; Yexley et al., 2002), as well as later involvement in firearm-related aggression (Carter et al., 2015; Kodjo et al., 2003). Direct victimization is consistently associated with greater firearm risk and holds regardless of the source (e.g., peers; family violence) of the victimization (Bergstein et al., 1996; Carter et al., 2013; Luster & Oh, 2001; Oliphant et al. 2019). Notably, observing violence, knowing victims, and other forms of *indirect* ETV are also associated with firearm carriage and violence (Lee et al., 2020; Schmitt et al., 2019; Webster et al., 1993). In a recent study, early exposure to violence with weapons such as neighborhood firearm violence and exposure to violent video games have been associated with firearm-related risk factors such as weapon carrying (Huesmann et al., 2021). Although informative, such studies center risk factors as key predictors of firearm aggression and do not consider positive influences that might mitigate risk. In addition, to date most studies of ETV and firearm aggression risk are limited to cross-sectional or retrospective designs (Oliphant et al., 2019), prohibiting the inclusion of mediating factors and thus richer understanding of ETV and firearm risk.

The limited available empirical evidence means that the mechanisms through which ETV leads to future violent experience, particularly firearm aggression, are not well understood. The developmental-ecological model (Bronfenbrenner, 1979; Tolan, Guerra, & Kendall, 1995) posits that the development of aggressive behaviors (e.g., firearm aggression) among youth may be determined by social and ecological context. Tolan and colleagues (2003), for instance, indicated that neighborhood characteristics (e.g., neighborhood poverty, violent crime) can influence ecological (e.g., neighborhood problems) and social factors (e.g., exposure to violence via peers) which can contribute to the development of violent behaviors (e.g., firearm aggression). The general aggression model (Allen et al., 2018) also posits that ETV may increase aggressive attitudes and contribute to aggression desensitization, which affects appraisal and decisionmaking processes that increase the likelihood of aggression. These theoretical models, taken together, posit that victims of ETV may have an increased risk for weapon carriage due to the social (e.g., gang membership) and psychological consequences (e.g., aggression desensitization) of ETV (Walton et al., 2009; Walton et al., 2017). More recently, a growing body of evidence considered additional motivations including revenge, peer behaviors, and other psychological motivations (Wilkinson et al., 2009). Moreover, because resilience scholars note variability in violence outcomes despite similar ETV histories, this suggests modifying factors contributing to differences in the pathways from violence exposure to firearm aggression, but this moderating effect has also not been extensively studied.

Retaliatory Attitudes as a Mediator

Retaliatory attitudes, defined as “attitudes regarding payback for wrongdoing,” may be an underlying mechanism linking ETV to firearm aggression (Copeland-Linder et al., 2007, p. 761). Yet, only a few researchers examined cognitive mediators (e.g., retaliatory attitudes) between ETV and aggressive behaviors (McMahon et al., 2009). Several researchers have determined that ETV is associated with violent behaviors including firearm aggression (Carter et al., 2017; McMahon et al., 2009; Mullins, Wright, & Jacob, 2004). Carter and colleagues (2017), for instance, found that 25% youth presenting to the emergency department with assault-related injuries endorsed retaliatory attitudes. Moreover, nearly three quarters of youth who attacked a peer at a school using a weapon (e.g., gun) reported that they were “bullied, persecuted, or injured by others prior to the attack” (Vossekuil et al. 2004, p. 21). Youth indirectly exposed to violence (e.g., watching someone get mugged or beat up) and adult caregivers who endorse violence are also more likely to endorse retaliatory attitudes (Copeland-Linder et al., 2007). To understand the connection between ETV and retaliatory attitudes, it has been posited that youth contending with ETV may feel the need to restore their self-worth or deter future injustices (Cota-McKinley et al., 2001). Other scholars, leveraging the “Code of the Street” theory, postulated that youth residing in low-income, urban areas may develop retaliatory attitudes after direct (e.g., violent victimization) or indirect exposure to violence (e.g., observing violence) to gain respect, self-protect, and prevent future violent encounters (Anderson, 2019).

Researchers have also documented the influence of retaliatory attitudes on firearm aggression (Carter et al., 2015; Carter et al., 2017; Goldstick et al., 2017; Schmidt et al., 2019; Wilkinson et al., 2009). Carter and colleagues (2017), for instance, found that 21.3%

of firearm-related conflicts among youth were motivated by retaliation. Moreover, youth who never used a firearm were more likely to engage in firearm aggression within the next 24 months if they had higher levels of retaliatory attitudes (Goldstick et al., 2019). Alternatively, youth who have engaged in firearm aggression were more likely to engage in firearm aggression in the future if they endorsed higher levels of retaliatory attitudes (Goldstick et al., 2019). To better understand how retaliatory attitudes might be linked with violent behaviors, such as firearm aggression, researchers have applied social-cognitive theory (Crick & Dodge, 1994; Copeland-Linder et al., 2012). Specifically, it has been postulated that possessing beliefs that support hostility and retaliation, may promote violent behaviors (Crick & Dodge, 1994). Hence, retaliatory attitudes may be a relevant cognitive factor that underlies the association between ETV and firearm aggression.

When taken together, ETV has been associated with higher levels of retaliatory attitudes, and retaliatory attitudes has been associated with more firearm aggression. Researchers, however, have not tested whether ETV is indirectly associated with firearm aggression through retaliatory attitudes. Testing this pathway may inform prevention programs that reduce firearm aggression among youth contending with ETV-related stress.

The Protective Role of Organized Activity

Resiliency theory provides a framework for understanding why some youth experience healthy development despite being exposed to violence, while others experience negative developmental outcomes, such as involvement in firearm aggression (Luthar et al., 2000; Zimmerman et al., 2013). In particular, the protective model of resiliency refers to a process in which a positive factor (i.e., promotive factor) buffers the negative effect of a risk factor on an outcome (Zimmerman et al., 2013). Within the context of ETV, participation in organized activities – i.e., prosocial, structured activities beyond the typical school (high school, college) curriculum - may serve as an important protective factor that can help reduce the likelihood of engaging in firearm aggression. Researchers have documented the protective effect of organized activity involvement within the context of ETV noting they attenuate the influence of ETV on internalizing and externalizing behaviors (Gardner et al., 2012; Hardaway et al., 2012). Barkin, Kreiter, and DuRant (2001) also found that frequent participation in religious activities buffered the negative effect of community violence exposure on emerging adults' likelihood of choosing violent methods to resolve conflict. In sum, organized activity participation may attenuate the influence of ETV on firearm aggression.

Organized activity participation may reduce the likelihood of firearm aggression within the context of ETV through multiple mechanisms. First, involvement in organized activities may help reduce firearm aggression among youth who are exposed to violence by providing opportunities for mentorship and positive role modeling from adults in their community (Eccles & Gootman, 2002; Lerner et al., 2005). Consistent with the social learning theory (Bandura, 1977), it is plausible that during the time youth spend in organized activities, they are learning positive norms for behavior as well as strategies to resolve conflict positively and cope with violence effectively. For instance, social support from mentors and other role models has been associated with perceiving interpersonal conflicts as less threatening, which

leads to more positive conflict resolution (Sheehan et al., 1999). Youth involved in church and community activities are also more likely to utilize positive coping strategies to cope with violence exposure than youth who participate less (Yakin & McMahon, 2003).

A second mechanism for how organized activity participation may reduce the effects of ETV is by fostering connections with positive-oriented peers (Eisman et al., 2018; Fredricks & Eccles, 2008; Sokol et al., 2020). Peers are important socializing agents during adolescence and emerging adulthood, and youth who associate with prosocial peers are less likely to engage in health risk behaviors such as violent behaviors (Prinstein et al., 2001). Third, organized activities may strengthen youths' positive ties to their communities (Murray Nettles et al., 2000) and help promote community collective efficacy by creating the opportunity for youth and community members to interact (Gardner & Brooks-Gunn, 2009; Mahoney et al., 20005). A greater sense of community connectedness and higher levels of community collective efficacy have been associated with less crime and violence both at the individual and community levels (Farrington et al., 2012; Molnar et al., 2004; Morenoff et al., 2001).

A fourth potential mechanism by which organized activity participation may buffer the influence of violence exposure on firearm aggression is by attenuating retaliatory attitudes. While limited, researchers have found that affiliating with adults and peers who endorse violent behaviors is associated with higher levels of retaliatory attitudes (Copeland-Linder et al., 2007). Moreover, Kim, Lee, and Farber (2019) reported that youth who receive violent socialization messages from parents and peers such as verbal coaching intended to instigate an aggressive response or retaliation (i.e., *advised violence*) may increase risk for engaging in violent behaviors (e.g., firearm aggression) after violence exposure. Organized activity participation may help situate youth within an inter-generational network of prosocial peers and adults (Eisman et al., 2018) who do not advise violence as a coping mechanism or retaliation. This may help reduce exposure to socialization messages that contribute to the formation of retaliatory attitudes. In addition, organized activity participation has been associated with less violent behaviors (Eisman et al., 2018) and more emotional regulation and support seeking from prosocial adults (Denault & Poulin, 2016). It is also possible that involvement in organized activities weakens norms regarding retaliation and reinforces future orientation. Youth with higher levels of future orientation, for instance, are more likely to consider the future consequences of their actions and avoid problem behaviors, such as firearm aggression (Bolland, 2003; Bolland et al., 2007; Lee et al., 2020). Lastly, organized activity may be replacing time that youth might spend engaged in externalizing behaviors with negative peers that might reinforce negative violence-related activities.

Developmental Significance

Per the life course perspective, a significant spike in firearm aggression has been observed during youth (ages 14–24) – i.e., the developmental period that entails adolescence and emerging adulthood (Bottiani et al., 2021) and firearm aggression is a significant public health challenge among youth. ETV is also more prevalent during youth than any other developmental period (Finkelhor et al., 2005) and poses a significant risk for firearm aggression (Lee et al., 2020; Goldstick et al., 2017). While the link between ETV and

firearm aggression has been consistently documented among youth, our understanding of mechanisms and protective factors in this link is limited (Schmidt et al., 2019). We conceive of retaliatory attitudes as a salient pathway from ETV to firearm aggression during youth. As youth (i.e., adolescents, emerging adults) undergo identity development, retaliatory attitudes may be a mechanism by which youth protect their reputation and identity when contending with ETV (Jacobs, 2004). Researchers have reported, to this end, that adolescents and young adults endorse retaliatory attitudes after ETV (Copeland-Linder et al., 2007; Goldstick et al., 2017). Organized activity participation may also prevent youth violent behaviors, such as firearm aggression, by providing a constellation of developmental assets such as opportunities for support and mentorship for youth (Eisman et al., 2018).

Current Study

Our study consisted of two aims. First, we examined retaliatory attitudes as an underlying psychological mechanism bridging ETV to firearm aggression. To date, ETV has been associated with higher levels of retaliatory attitudes (Cunningham et al., 2019) and, in separate studies, retaliatory attitudes has been identified as a risk factor of firearm aggression (Carter et al., 2017; Carter et al., 2019). To evaluate retaliatory attitudes as a pathway by which ETV influences firearm aggression, we evaluated the indirect effect of ETV on firearm aggression through retaliatory attitudes. We hypothesized that ETV would be positively associated with retaliatory attitudes, and that retaliatory attitudes would be positively associated with firearm aggression.

Second, guided by resilience theory, we examined whether the intensity of organized activity participation mitigates the effect of ETV on firearm aggression and retaliatory attitudes, and retaliatory attitudes on firearm aggression (see Figure 1). While organized activity participation is documented as a protective factor in the context of ETV, less is known about whether organized activity participation can reduce the likelihood of firearm aggression in the context of ETV. Thus, we evaluated whether organized activity participation can mitigate the influence of ETV on firearm aggression and retaliatory attitudes, as well as retaliatory attitudes on firearm aggression. We hypothesized that organized activity participation would buffer all three paths, and thereby, disrupt the indirect influence of ETV on firearm aggression through retaliatory attitudes. Consistent with prior research, we controlled for demographic factors (i.e., sex, age, racially minoritized status, and parental educational attainment), mental health problems (i.e., depressive and anxiety symptoms, PTSD diagnosis), substance use correlates (i.e., cigarette, alcohol, and marijuana use), and ED treatment for assault-related injury during baseline in all of the examined models (Carter et al., 2015; Goldstick et al., 2017; Schmidt et al., 2019).

Method

Participants

The present study included 570 drug-using youth (i.e., ages 14–24) from a prospective cohort study (i.e., Flint Youth Injury study [FYI]; see Cunningham et al., 2015). Youth were recruited from an emergency department in Flint, Michigan, and those enrolled were followed at baseline and then in 6-month intervals for 24 months (i.e., 5 study waves

including baseline). The primary objective of the FYI study was to examine the timing and pattern of health outcomes and service utilization among drug-using (predominantly marijuana), urban youth with and without an initial emergency department visit for treatment of an acute violent injury. Of note, non-injured youth were seen at the ED for a wide variety of medical, non-violent injury related reasons such as an ankle sprain, abdominal pain, vehicle crash, and fall (see Cunningham et al., 2015). Our sample reflects the demographics of Flint (U.S. Census Bureau, 2019), which is 54.1% black, and similar to other research studies conducted at Hurley Medical Center (e.g., Cunningham et al., 2011; Resko et al., 2016). The violent crime rates in Flint are also comparable to other de-industrialized cities (Federal Bureau of Investigation, 2019). Table 1 provides detailed information on the demographic characteristics of the study participants.

The analytic sample for the current analysis includes 535 participants. Participants were excluded from the analysis if they had missing data on all of the outcome variables (i.e., retaliatory attitudes [wave 2], firearm aggression [waves 3–5]; $n = 35$). In wave 2, 88 participants had missing data, and 52 participants had missing data from waves 3 to 5. A logistic regression model (i.e., attrition analysis) revealed that no differences in study dropout were observed across the baseline variables (e.g., ETV, firearm aggression (wave 1), and organized activity) with exception to being white (Odds Ratio [OR] = 0.304), male (OR = 3.69), and older youth (OR = 1.19).

Measures

Firearm Aggression.—Firearm aggression was measured by aggregating 3-items (i.e., “in the past 6 months, you pulled a gun on someone”, “you used a gun on someone”, and “you used a gun on him/her [partner]”) during the follow-up visits (i.e., baseline measurements were excluded). If participants endorsed a value higher than “never” on any of the 3 firearm aggression items within the 12- to 24-month follow-up period (i.e., at any point during waves 3 to 5), they received a score of 1. If they never used a gun on someone within the 12- to 24-month follow-up period, they received a score of 0. This variable, therefore, reflects firearm aggression at least once within 12 to 24 months of their baseline visit. Using this dichotomized firearm aggression variable, 14.4% of participants reported firearm aggression during the past 24 months. Of note, baseline firearm aggression was also calculated at wave 1 and included as a covariate in the mediation analyses.

Retaliatory Attitudes.—Participants’ retaliatory attitudes was measured using the retaliatory subscale of the Children’s Perceptions of Environmental Violence during the second study wave (i.e., first follow-up; Hill & Noblin, 1991). Seven items were averaged to assess the extent to which participants agreed or disagreed with statements that pertained to retaliation (e.g., “I believe that revenge is a good thing”). Participants responded on a Likert-type scale of 0 (*strongly disagree*) to 3 (*strongly agree*). The scale demonstrated satisfactory internal consistency in our sample ($\alpha = .73$) and concurrent validity in prior studies of adolescents and emerging adults (Copeland-Linder et al., 2007; Goldstick et al., 2017; Sokol et al., 2020). Retaliatory attitudes was also assessed in wave 1 and included as a covariate in the mediation analysis.

Exposure to Violence (ETV).—ETV was measured by aggregating the participants' responses across three measures during baseline (i.e., first study wave): (1) violent victimization, (2) community violence, and (3) family conflict. Violent victimization was measured using a subset of items from the National Longitudinal Study of Adolescent Health and consisted of 5-items ($\alpha = .68$; Bearman & Jones, 1997). Participants responded on a Likert-type scale of 0 (*never*) to 6 (*20+ times*) and sample items include "someone shot you" and "you were jumped." Community violence was assessed using 5-items from the Survey of Exposure to Community Violence (Richter & Saltzman, 1990; $\alpha = .73$). Participants responded on a Likert-type scale of 0 (*never*) and 3 (*many times*), and sample items include "I have seen somebody get stabbed or shot" and "my house has been broken into." Lastly, family conflict was assessed using the Conflict subscale from within the Family Environmental Scale (Moos & Moos, 1981) and consisted of 5 items ($\alpha = .86$). Participants responded on a scale of 0 (*hardly ever*) to 3 (*often*) and sample items include "family members get so angry they throw things" and "family members lose their tempers." The participants' mean score on each measure were standardized prior to aggregating the measures of ETV.

Organized Activity Participation.—To assess organized activity participation, we used three-items to evaluate the frequency of participation in (1) religious activities, (2) extracurricular school activities, and (3) community activities. Participants responded on a Likert scale of 0 (*never*) to 6 (*more than once a week*). Responses were averaged and then dichotomized to generate two groups: (1) participants who engaged in the bottom 75% of organized activity participation ($n=428$; 75.1%), versus (2) participants who engaged in the top 25% of organized activity participation ($n=142$; 24.9%). We dichotomized the data to ascertain that we have ample sample sizes in each group to conduct multigroup analyses. We chose to test the highest 25th percentile with the rest of the sample following others who have used similar thresholds in developing cumulative scores of multiple positive factors (Bowen & Flora, 2002; Newcomb & Felix-Ortiz, 1992; Ostaszewski & Zimmerman, 2006; Stoddard et al, 2012). Ostaszewski and Zimmerman (2006), for example, used the top quartiles to create several dichotomous variables which they then summed to develop a cumulative score of both positive (promotive) and negative (risk) variables to predict adolescent behavioral outcomes. The rationale for the highest quartile was to ensure summary scores included the highest levels of the construct. We chose to examine the highest quartile for the same reason, to ensure that the two groups assessed were clearly distinguished from each other to test our hypothesis. Given that researchers have not established the level of activity involvement necessary to have an effect, we chose the upper 25% following previous research using a cumulative approach. It would be useful for future research to examine the thresholds when various levels of activity involvement may be most relevant for predicting different adolescent outcomes, but for our purposes we were most interested in testing the notion that the most involved youth would be protective. Lastly, to assess whether our measure of organized activity varies based on developmental period (i.e., adolescence [ages 14–17]; emerging adulthood [ages 18–24]), we conducted a chi-square test and did not find an association between developmental period and organized activity participation ($\chi^2(1) = 0.449, p = .503$).

Covariates.—Demographic correlates such as sex (male vs. female), age, and race (White vs. racially minoritized status) were assessed at the first study wave (i.e., baseline). We also accounted for youth who presented to the ED with or without an active injury at baseline. Two mental health correlates were examined – that is, post-traumatic stress disorder (PTSD) and symptoms of internalizing problems. Research assistants administered the Mini International Neuropsychiatric Interview (Sheehan et al., 1998) and determined whether participants met the diagnostic criteria PTSD. A subset of items from the Brief Symptom Inventory (BSI; Derogatis & Spencer, 1982) was also administered by research assistants to measure internalizing symptoms in the past 6 months (i.e., depressive & anxiety symptoms). Twelve items of the BSI were averaged, and participants responded on a scale of 0 (*not at all*) to 5 (*extremely*) for each item ($\alpha = .92$). Lastly, we also accounted for the frequency of cigarette use, marijuana use, and alcohol use in the past 6 months. The marijuana and cigarette use frequency were measured on Likert scale of 0 (*never*) to 6 (*every day/almost daily*), while alcohol use frequency was measured on a Likert scale of 0 (*never*) to 4 (*4 or more times a week*).

Procedures

The study was conducted at Hurley Medical Center (HMC) in Flint, Michigan. HMC is the region's only Level-1 trauma center (Cunningham et al., 2015). Youth (ages 14–24) seeking emergency department (ED) treatment for an assault injury and reporting past 6-month drug use (AIG), as well as a proportionally sampled comparison group (CG) of youth presenting for other reasons who also reported past 6-month drug use were eligible to enroll in the longitudinal study. Recruitment proceeded 12/2009–9/2011. Trained research assistants (RAs) recruited participants 7 days/week (excluding holidays), 21 hours/day (5am–2am) on Tuesday and Wednesday, and 24 hours/day Thursday through Monday. Following written consent (or assent with parental consent if youth < age 18), participants self-administered a screening survey. An assault-injury was defined as any intentional injury caused by another person. Past 6-month drug use was assessed using the National Institute on Drug Abuse Alcohol, Smoking, and Substance Involvement Screening Test (i.e., NIDA-ASSIST). Exclusion criteria included ED presentation for sexual assault, suicidal ideation/attempt, child maltreatment, or a cognitive condition precluding consent (e.g., acute psychosis, alcohol intoxication). Youth arriving to the ED in active police custody or those not speaking English (<1%) were also excluded. Youth screening positive for an assault and past 6-month drug use were enrolled in the AIG cohort. The CG was systematically recruited in parallel (to limit seasonal and temporal variation) to balance the cohorts by age (i.e., 14–17, 18–20, 21–24) and sex (male/female). Youth enrolled in either the AIG or CG cohort subsequently completed a baseline survey comprised of a self-administered questionnaire and an RA-structure interview. Follow-up assessments were conducted in-person at 6-, 12-, 18-, and 24-months post-baseline. Remuneration was \$1 for the screen, \$20 for the baseline, and \$35, \$40, \$40, and \$50 for the 6-, 12-, 18-, and 24-month follow-ups. The FYI Study was approved by the University of Michigan (HUM00026787) and Hurley Medical Center IRBs (IRBNet ID: 177665) and an NIH certificate of confidentiality was obtained.

Analytic Approach

To evaluate the first study aim, path analysis was estimated to assess the association between ETV (i.e., wave 1) and firearm aggression (i.e., waves 3–5) through retaliatory attitudes (i.e., wave 2). Bayesian methodology was used to estimate the mediation model as the sampling distribution of parameter estimates (e.g., direct, indirect effects) are not assumed to be normally distributed (Yuan & MacKinnon, 2004). A Markov Chain Monte Carlo (MCMC) process using the Gibbs sampling algorithm was implemented for parameter estimation. 100,000 iterations, with 50,000 iterations were used during the burn-in phase, and four chains of the Gibbs sampler were specified. Potential scale reduction (PSR) value of 1.01 or less, adequate mixing in parameter trace plots, and low autocorrelation between parameter values across iterations for different chains ascertained model convergence (Van de Schoot & Depaoli, 2014). Of note, if autocorrelation was detected for parameter values, a thinning procedure ($k = 5$) was implemented to attenuate autocorrelation (Gelman et al., 2011). Model fit was evaluated with posterior predictive checking (Gelman et al., 2011). Specifically, a non-significant 95% confidence interval for the difference between the observed and replicated χ^2 values and a posterior predictive p-value (PPP) of greater than .10 suggested good model fit. To calculate the indirect effect, the model constraint function was used to implement the product of coefficient method (Mackinnon et al., 2004). Consistent with previous research (e.g., Carter et al., 2015), covariates of firearm aggression included sex, age, racially minoritized status, highest grade completed, acute violent injury (i.e., group assignment), internalizing symptoms, alcohol use, cigarette use, marijuana use, and meeting the diagnostic criteria for PTSD. Additionally, in line with findings from Copeland-Linder and colleagues (2007), covariates for retaliatory attitudes included age, highest grade completed, acute violent injury, and mental health indices (i.e., internalizing problems, PTSD). Weakly informative priors (i.e., Normal($\mu = 0, \sigma = 5$)) were specified for the a , b , and c paths (see Figure 1), while diffuse priors (i.e., Normal($\mu = 0, \sigma = 10^{10}$)) were specified for all other effects. For all parameter estimates, we reported median point estimates, posterior standard deviation (SD_{post}), and the 95% credibility intervals (95% C.I.).

To evaluate the second study aim, a multigroup mediation model was estimated to evaluate whether the intensity of organized activity participation (i.e., *no/lower intensity* vs. *higher intensity*) attenuated the direct and indirect effects linking ETV, retaliatory attitudes, and firearm aggression. A Bayesian estimation procedure, akin to what was conducted for study aim 1, was used to evaluate a multigroup mediation model (e.g., 100,000 iterations, 4 chains). Moreover, weakly informative priors (i.e., Normal ($\mu = 0, \sigma = 5$)) were specified for the a , b , and c paths (see Figure 1) in both groups, while diffuse priors (i.e., Normal($\mu = 0, \sigma = 10^{10}$)) were specified for all other effects. The same covariates from the prior model were controlled for in the multigroup model. After ascertaining model convergence and fit, model constraint functions were used to determine group differences in direct (i.e., retaliatory attitudes on ETV, firearm aggression on ETV, and firearm aggression on retaliatory attitudes) and indirect effects between individuals in the low and high intensity group.

All analytic procedures were conducted in Mplus, version 8.4. The FYI study data is publicly accessible through the Inter-university consortium of political and social research (Cunningham, 2017). This study was not preregistered.

Results

Preliminary Analyses

Descriptive statistics and bivariate correlations are presented in Table 1. Of note, 14.74% ($n = 80$) youth reported pulling a firearm on someone during the 12- to 24-month follow-up period (i.e., waves 3 to 5). Youth, on average, also endorsed retaliatory attitudes ($M = 2.25$) and 24.9% of youth reported that they participated in an organized activity at baseline for at least multiple times within the prior six months ($n = 142$). Correlations between study variables indicated a positive association between ETV and retaliatory attitude ($r = .23$), ETV and firearm aggression ($r = .34$), and retaliatory attitudes and firearm aggression ($r = .27$). Organized activity participation was not associated with ETV, retaliatory attitudes, or firearm aggression.

Aim 1: Retaliatory Attitudes as a Mediator

Model convergence and fit.—After 50,000 MCMC iterations, the highest PSR was less than 1.001 indicating appropriate model convergence. A visual inspection of the parameter trace plots revealed adequate mixing and stationarity of the four chains (see Figure 1a in supplemental materials). To attenuate strong autocorrelations (i.e., $> .20$) between the iteration of parameter values within each chain, we thinned each chain by taking every 5th observation ($k = 5$; see Figure 1b in supplemental materials). The estimated mediation model examining the influence of ETV (Wave 1) on firearm aggression (Waves 3–5) through retaliatory attitudes (Wave 2) fit the data well. Specifically, the 95% confidence interval for the difference between the observed and replicated χ^2 value was not significant ($-10.978, 34.259$) and the PPP was larger than .10 (PPP = .144).

Model coefficients.—As shown in Table 2, ETV (wave 1) was associated with higher levels of retaliatory attitudes (wave 2; $b = 0.121$, $SD_{post} = 0.030$, 95% C.I.[0.062, 0.179]) and likelihood of firearm aggression (during waves 3 to 5; $b = 0.351$, $SD_{post} = 0.132$, 95% C.I.[0.091, 0.607]), and retaliatory attitudes was associated with higher likelihood of firearm aggression ($b = 0.418$, $SD_{post} = 0.158$, 95% C.I.[0.110, 0.727]). An indirect effect of ETV on firearm aggression was observed ($b = 0.048$, $SD_{post} = 0.023$, 95% C.I.[0.009, 0.098]) and accounted for 12.03% of the total effect between ETV and firearm aggression. Thus, retaliatory attitudes partially mediated the influence of ETV on firearm aggression. With respect to covariates, males ($b = 0.420$, $SD_{post} = 0.186$, 95% C.I.[0.064, 0.792]) were more likely to engage in firearm aggression, while prior retaliatory attitudes (i.e., wave 1; $b = 0.497$, $SD_{post} = 0.037$, 95% C.I.[0.426, 0.569]) was associated with more retaliatory attitudes (wave 2).

Aim 2: The Protective Role of Organized Activities

Model convergence and fit.—After 50,000 MCMC iterations, the highest PSR was less than 1.001, parameter trace plots revealed adequate mixing and stationarity of the four chains, and thinning was applied ($k = 5$) to attenuate autocorrelations between iteration of parameter values within each chain. The estimated multigroup mediation model demonstrated good model fit, as demonstrated by the PPP (.202) and a non-significant

difference between the observed and replicated χ^2 value (95% Confidence Interval [−18.050, 43.431]).

Model coefficients.—Model constraints were employed to evaluate indirect effects and to evaluate group differences across four parameters – that is, the association between ETV and firearm aggression, ETV and retaliatory attitudes, retaliatory attitudes and firearm aggression, and the indirect effect of firearm aggression on ETV through retaliatory attitudes. As indicated in Table 3, the association between retaliatory attitudes and firearm aggression was different between youth in the higher organized activity participation intensity group ($b = -0.289$, $SD_{post} = 0.342$, 95% C.I.[−0.965, 0.375]) versus youth in the no/lower intensity group ($b = 0.779$; $SD_{post} = 0.201$, 95% C.I.[0.382, 1.172]; *model constraint*: $b = -1.069$, 95% C.I.[−1.856, −0.302]). In addition, group differences were observed for the indirect effect between youth in the higher organized activity participation intensity group ($b = -0.035$; $SD_{post} = 0.058$, 95% C.I.[−0.172, 0.063]) relative to youth in the no/lower group ($b = 0.082$; $SD_{post} = 0.035$, 95% C.I.[0.022, 0.154]; *model constraint*: $b = -0.123$, 95% C.I.[−0.273, −0.004]). Group differences, however, were not observed for two paths: ETV on firearm aggression (*model constraint*: $b = 0.357$, 95% C.I.[−0.415, 1.175]), and ETV on retaliatory attitudes (*model constraint*: $b = 0.038$, 95% C.I.[−0.104, 0.184]).

Sensitivity Analysis. We conducted a sensitivity analysis to assess whether the direct and indirect effects of ETV on firearm aggression through retaliatory attitudes varied between youth who presented to the ED with and without violent injury. Per our multigroup mediation model, no significant differences were detected in the association between ETV and firearm aggression ($b = -0.596$; $SD_{post} = 0.288$, 95% C.I.[−1.166, 0.038]), ETV and retaliatory attitudes ($b = 0.053$; $SD_{post} = 0.066$, 95% C.I.[−0.067, 0.172]), retaliatory attitudes and firearm aggression ($b = -0.303$; $SD_{post} = 0.351$, 95% C.I.[−0.998, 0.378]), and the indirect effects ($b = -0.006$; $SD_{post} = 0.050$, 95% C.I.[−0.112, 0.084]).

Discussion

Our results provide support for resiliency theory and that organized activity participation can disrupt the mechanism from ETV to firearm aggression (Fergus & Zimmerman, 2005). This is supported by our finding that the mediating model differed for youth engaged in higher levels of organized activities. Notably, the main pathway that differed was that retaliatory attitudes did not predict youth's involvement in firearm aggression for youth most highly involved in organized activity. This may be due to the support and positive role modeling youth receive in these contexts that helps them cope with ETV in ways that does not turn retaliatory attitudes into actions. This positive socializing and social ties to prosocial adults and peers may help younger youth regulate their emotional responses to ETV and help them seek support from prosocial adults (Eccles & Gootman, 2002; Lerner et al., 2005). It is also possible that engaging in prosocial, organized activities (e.g., organized religious activity) may play a role in preventing cognitions that translate retaliatory attitudes into firearm behaviors for younger and older youth. Researchers have noted, for instance, that addressing health risk cognitions such as the perceived health risk of smoking can reduce the probability of the youth smoking (Wiener et al., 2020). Lastly, it is also conceptually plausible that organized activity participation reduces involvement with risky behaviors (e.g.,

substance use with peers) that has the potential to escalate into violence among adolescents and emerging adults. Our results suggest that efforts to understand cognitions regarding firearm aggression might be a useful direction for future research.

Our results also indicated that ETV had both direct and indirect effects on firearm aggression through retaliatory attitudes among youth who participated in no and low levels of organized activities. Frequent participation in structured, community-led activities may, to this end, provide youth with opportunities to cope with the cognitive consequences (e.g., retaliatory attitudes) of ETV by preventing harmful behaviors (Eisman et al., 2018; Kogan et al., 2005). This is consistent with cross-sectional data demonstrating that youth endorsing higher coping skills were also less likely to also report concurrent involvement in risky firearm behaviors (Carter et al., 2020). Regardless, by increasing social connections with prosocial adults and peers (Eisman et al., 2018) and by offering opportunities for social support (Oosterhoff, Kaplow, Wray-Lake, & Gallagher, 2017), youth who endorse retaliatory attitudes may engage in non-violent behaviors to address ETV-related stress. Youth who frequently participate in organized activities may, for instance, leverage social support, engage in emotional regulation, and focus on prosocial problem-solving approaches to disrupt the relation between retaliatory attitudes and firearm aggression. Organized activity participation may also reinforce prosocial, anti-violence cognitions for resolving conflicts, as well as increase contacts with pro-social peers. Therefore, the intensity of organized activity participation may disrupt the indirect influence of ETV on firearm aggression by mitigating the effect of retaliatory attitudes on firearm aggression.

Contrary to our expectation, however, we did not find frequent organized activity participation attenuated the influence of ETV on retaliatory attitudes. The preponderance of research on organized activity participation and youth well-being has, to date, focused on behavioral outcomes (e.g., substance use, aggression) rather than cognitive outcomes (e.g., retaliatory attitudes). It is plausible that higher levels of ETV may increase hypervigilance or watchfulness for future ETV encounters, which may, in turn, increase retaliatory attitudes. Espousing retaliatory attitudes may, therefore, be a reactive cognition for coping with anticipatory threat and the prospect of future violent victimization after ETV. Moreover, organizational activity participation may not take away the impulse to retaliate when violently victimized, but may reinforce coping strategies and conflict remediation skills that disrupts the likelihood of violent behaviors such as firearm aggression. In addition, it is possible that youth from Flint, Michigan are also more likely to contend with chronic violence because Flint has one of the highest rates of community violence per capita in the U.S. (Federal Bureau of Investigation, 2016). Thus, Flint youth may be more vulnerable to developing reactive cognitions such as retaliatory attitudes than other urban youth. This may explain why 60% of our sample of youth seeking ED care were assault-injured and more vulnerable to mental health issues and substance use. Consequently, the intensity of organized activity participation, within the context of high ETV, may be more effective in helping youth avoid harmful behaviors and disrupt the influence of retaliatory attitudes on harmful behaviors such as firearm aggression.

It is noteworthy to mention that retaliatory attitudes partially mediated the influence of ETV on firearm aggression among youth with no or low levels of organized activity

participation. This implies that ETV may be linked to firearm aggression because of retaliatory attitudes, in conjunction with other mediating variables. In one qualitative study, for instance, Mateu-Gelabert (2002) noted that general deterrence of violent victimization, self-protection, and establishing respect from potential assailant were motives for firearm carriage. Schmidt and colleagues (2019) also concluded in a review of risk and protective factors that individual-level (e.g., delinquency, substance use), peer-level (e.g., peer delinquency, gang membership), family-level (e.g., family structure, parent-child relationship), and community-level factors (e.g., neighborhood safety, community rates of violent crime) contribute to youth firearm aggression. Thus, while retaliatory attitudes mediate the influence of ETV on youth firearm aggression, other individual-, social-, and community-level factors may also operate as intermediary pathways linking ETV to youth firearm aggression. Our results, however, appear to eliminate participation in organized activities as reducing ETV effects on retaliatory attitudes. Although organized activities may increase connections to positive adults, these adults may not play a role in helping youth avoid retaliatory attitudes as a way to cope with ETV. Nevertheless, our results do suggest they may help youth think about the consequences of retaliation and therefore reduce the effects of such attitudes on their subsequent behaviors.

Limitations and Future Directions

While our study contributes to our understanding about how ETV shapes firearm aggression among youth, several limitations require attention. First, our sample consisted of adolescents residing in one urban setting with high crime rates (e.g., Federal Bureau of Investigation, 2016). Youth in our sample also reported illicit drug use during the past year and received medical care in an urban emergency department (Cunningham et al., 2014). Our results, therefore, may not generalize to non-clinical, non-substance using youth living in other geographic locations (e.g., rural). Our sample provides insights into how ETV influences firearm aggression via retaliatory attitudes among urban youth residing in contexts with high rates of violent crime which characterize many economically challenged small cities throughout the U.S.

Second, our data were collected nearly decade ago (i.e., 2009 to 2011) and the results may be time bound. Rates of violent crime and assault in Flint have, however, been fairly consistent since 1994 (Federal Bureau of Investigation, 2016). The rationale of retaliatory attitudes as a predictor of firearm aggression also continues today (Carter et al., 2020). Nevertheless, it is important that researchers examine the underlying mechanisms of ETV and firearm aggression among youth using more current data.

Third, while our study examines a longitudinal pathway from ETV to firearm aggression through retaliatory attitudes, researchers should leverage quasi-experimental designs such as propensity score matching to support causal inference. Moreover, retaliatory attitudes partially mediated the association between ETV and firearm aggression. Researchers should continue to examine cognitive, social, behavioral, ecological, and familial processes linking ETV to firearm aggression. We also measured violence exposures across settings, but it is possible that direct personal victimization may operate differently than witnessing violence in the neighborhood. Our study suggests this would be a useful direction for future research.

Fourth, the direct and indirect effects of ETV and firearm aggression through retaliatory attitudes may be modified by demographic correlates such as sex. Researchers, for instance, noted that males are more likely to endorse retaliatory attitudes within the context of aggression (i.e., at home, school, & neighborhood; Copeland-Linder et al., 2007). Other researchers have documented sex, class, and racial differences in firearm aggression (Carter et al., 2020). It is important, therefore, that researchers evaluate whether demographic factors such as sex modify linkages between ETV, retaliatory attitudes, and firearm aggression.

Fifth, while organized activities offer protection within the context of ETV for all youth, the mechanisms undergirding the protective influence of organized activity participation may vary for adolescents and emerging adults. For instance, adult, supervised activities may be especially beneficial for adolescents than emerging adults. Our measure of organized activity participation also consists of none to low intensity versus high intensity participation. We recommend that scholars evaluate other aspects of psychological (e.g., motivation to engage) and behavioral (e.g., duration, frequency) engagement, as well as engagement in other activities (e.g., sports, arts). Despite this limitation, we were able to detect moderated pathways (e.g., retaliatory to firearm aggression) using our classification of organized activity participation.

Conclusion

These limitations notwithstanding, our study is the first to investigate the association between ETV and firearm aggression in two unique and significant ways. First, we demonstrate that ETV (i.e., observing violence, being victimized) may contribute to retaliatory attitudes, and that retaliatory attitudes may, in turn, increase the risk of firearm aggression within a 2-year period. This finding signals that ETV invokes psychological consequences, which then contribute to firearm aggression. The finding, thus, offers a beginning point for identifying psychological points of intervention that can prevent firearm aggression among youth contending with ETV. Second, we found that organized activity participation helped youth be resilient against the mechanism from ETV to firearm aggression through retaliatory attitudes. Organized activities may offer youth opportunities a myriad of social (e.g., mentors, prosocial peers), psychological (e.g., prosocial behaviors, less hostility), and developmental benefits (e.g., academic engagement) that cultivate resilience within the context of ETV and prevent firearm aggression. Our results suggest that a high intensity of organized activity participation may provide a vital strategy preventing firearm aggression, especially for youth exposed to violence.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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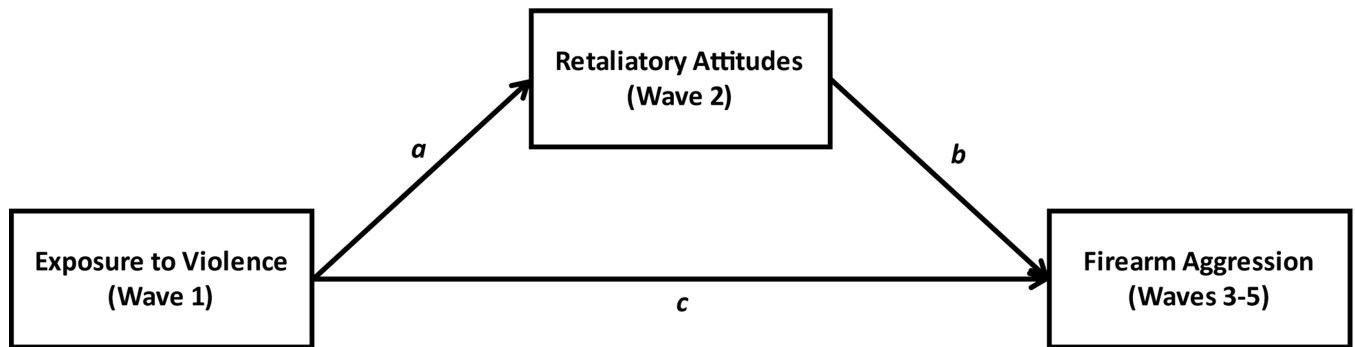


Figure 1.

Conceptual model of the indirect effect from Exposure to Violence (Wave 1) to Firearm Aggression (during waves 3–5) through Retaliatory Attitudes (Wave 2). The empirical path coefficients for *a* (0.121), *b* (0.418), and *c* (0.352) are consistent with our theoretical framework for aim 1.

Table 1

Sample Characteristics

Predictors	Pooled Sample (n=570) [M(SD) or %]	No to Low Intensity OAP (n=428) [M(SD) or %]	Higher Intensity OAP (n=142) [M(SD) or %]
Male	58.20%	57.20%	61.30%
Racial Minority	68.40%	66.40%	74.60%
Age	20.06 (2.42)	19.96 (2.39)	20.34 (2.50)
Educational Attainment	2.69 (0.92)	2.81 (0.97)	2.64 (0.90)
Violent Injury (ED Visit)	58.60%	56.10%	66.20%
Marijuana Use	4.31 (1.77)	4.26 (1.81)	4.44 (1.64)
Cigarette Use	3.88 (2.65)	3.86 (2.68)	3.91 (2.58)
Alcohol Use	1.32 (1.24)	1.30 (1.23)	1.39 (1.27)
PTSD	10.4% PTSD Diagnosis	11.4% PTSD Diagnosis	7% PTSD Diagnosis
Internalizing Symptoms	0.73 (0.80)	0.74 (0.79)	0.70 (0.84)
Organized Activity Participation	0.88 (1.18)	0.31 (0.47)	2.62 (0.98)
Exposure to Violence	.00 (0.74) ^a	0.00 (0.75) ^a	0.00 (0.70) ^a
Retaliatory Attitudes (Wave 1)	2.54 (0.57)	2.53 (0.56)	2.58 (0.61)
Retaliatory Attitudes (Wave 2)	2.55 (0.54)	2.55 (0.54)	2.56 (0.55)
Firearm Aggression (Wave 1)	9.80%	9.10%	10.60%
Firearm Aggression (Waves 3 to 5)	10.00%	10.50%	8.50%

Note. OAP = Organized Activity Participation. M = Mean. SD = Standard Deviation.

^a = average of standardized ETV indices.

Table 2

Indirect Effect from ETV to Firearm Aggression Through Retaliatory Attitudes

Firearm Aggression (Waves 3–5)	<i>b</i>	<i>SD_{post}</i>	95% C.I.
Retaliatory Attitudes (Wave 2)	0.418	0.158	0.110, 0.727
Exposure to Violence	0.351	0.132	0.091, 0.607
Sex	0.420	0.186	0.064, 0.792
Racially minoritized status	0.388	0.204	−0.005, 0.798
Age	0.025	0.037	−0.049, 0.097
Educational Attainment	−0.120	0.110	−0.343, 0.091
Firearm Aggression (Wave 1)	0.431	0.247	−0.052, 0.918
Violent Injury (ED Visit)	−0.094	0.173	−0.432, 0.246
Marijuana Use	0.030	0.052	−0.072, 0.132
Cigarette Use	0.037	0.035	−0.031, 0.107
Alcohol Use	−0.075	0.071	−0.215, 0.064
PTSD	0.097	0.258	−0.413, 0.596
Internalizing Symptoms	0.021	0.116	−0.206, 0.249
Retaliatory Attitudes (Wave 2)	<i>b</i>	<i>SD_{post}</i>	95% C.I.
Exposure to Violence	0.121	0.030	0.062, 0.179
Age	−0.002	0.009	−0.020, 0.016
Educational Attainment	−0.047	0.024	−0.095, 0.000
Violent Injury (ED Visit)	−0.032	0.041	−0.112, 0.048
PTSD	0.012	0.007	−0.125, 0.150
Internalizing Symptoms	−0.035	0.028	−0.090, 0.020
Retaliatory Attitudes (Wave 1)	0.497	0.037	0.426, 0.569
Indirect Effect	<i>b</i>	<i>SD_{post}</i>	95% C.I.
Violence Exposure → Retaliatory Attitudes → Firearm Aggression	0.048	0.023	0.009, 0.098

Note. Variables assessed at Wave 1 unless otherwise specified. *b* = median point estimate.
SD_{post} = Standard deviation of posterior distribution. 95% C.I. = 95% Credibility Intervals.

Table 3

Multigroup Mediation by Organized Activity Participation Intensity

	No / Low Intensity (75.1%)			High Intensity (24.9%)		
	<i>b</i>	<i>SD_{post}</i>	95% C.I.	<i>b</i>	<i>SD_{post}</i>	95% C.I.
Firearm Aggression (Waves 3–5)						
Retaliatory Attitudes (Wave 2)	0.779	0.201	0.382, 1.172	–0.289	0.342	–0.965, 0.375
Exposure to Violence	0.342	0.151	0.043, 0.637	0.699	0.374	–0.034, 1.436
Sex	0.569	0.225	0.135, 1.014	0.515	0.467	–0.383, 1.448
Racially minoritized status	0.280	0.232	–0.165, 0.746	1.061	0.565	0.000, 2.210
Age	0.046	0.043	–0.039, 0.128	–0.141	0.099	–0.342, 0.047
Educational Attainment	–0.139	0.134	–0.406, 0.119	0.165	0.300	–0.413, 0.767
Firearm Aggression (Wave 1)	0.305	0.297	–0.281, 0.883	0.848	0.599	–0.345, 2.013
Violent Injury (ED Visit)	–0.264	0.200	–0.653, 0.128	1.156	0.630	0.018, 2.471
Marijuana Use	0.037	0.060	–0.080, 0.155	0.055	0.144	–0.226, 0.338
Cigarette Use	0.007	0.041	–0.073, 0.087	0.192	0.099	0.008, 0.394
Alcohol Use	–0.164	0.089	–0.340, 0.009	0.087	0.151	–0.208, 0.385
PTSD	0.150	0.293	–0.428, 0.717	0.209	0.720	–1.244, 1.575
Internalizing Symptoms	0.069	0.138	–0.207, 0.335	–0.328	0.309	–0.950, 0.259
Retaliatory Attitudes (Wave 2)						
Exposure to Violence	0.110	0.033	0.043, 0.175	0.148	0.066	0.021, 0.277
Age	0.000	0.010	–0.020, 0.021	–0.006	0.019	–0.043, 0.033
Educational Attainment	–0.057	0.028	–0.112, –0.002	–0.023	0.051	–0.123, 0.077
Violent Injury (ED Visit)	–0.009	0.047	–0.100, 0.083	–0.079	0.090	–0.254, 0.098
PTSD	–0.026	0.076	–0.178, 0.121	0.166	0.187	–0.206, 0.526
Internalizing Symptoms	–0.007	0.032	–0.070, 0.057	–0.114	0.056	–0.224, –0.004
Retaliatory Attitudes (Wave 1)	0.493	0.043	0.409, 0.576	0.508	0.073	0.364, 0.652
Indirect Effect						
	<i>b</i>	<i>SD_{post}</i>	95% C.I.	<i>b</i>	<i>SD_{post}</i>	95% C.I.
Violence Exposure → Retaliatory Attitudes → Firearm Aggression	0.082	0.035	0.022, 0.154	–0.035	0.058	–0.172, 0.063

Path Coefficient Comparisons Between No/Low Intensity vs. High Intensity Groups

Firearm Aggression (Waves 3–5)	No / Low Intensity (75.1%)			High Intensity (24.9%)		
	<i>b</i>	<i>SD_{post}</i>	95% C.I.	<i>b</i>	<i>SD_{post}</i>	95% C.I.
Exposure to Violence → Retaliatory Attitudes	0.038	0.074	−0.104, 0.184			
Retaliatory Attitudes → Firearm Aggression	−1.069	0.397	−1.856, −0.302			
Exposure to Violence → Firearm Aggression	0.357	0.404	−0.415, 1.173			
Indirect effect comparison	−0.123	0.068	−0.273, −0.004			

Note. Variables assessed at Wave 1 unless otherwise specified. *b* = median point estimate. *SD_{post}* = Standard deviation of posterior distribution. 95% C.I. = 95% Credibility Intervals.