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Distress level and daily functioning problems attributed to firearm victimization: sociodemographic-specific responses

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Abstract

Purpose: The purpose of this study was to estimate the effect of firearm involvement during violent victimization on the level of distress experienced and daily functioning within sociodemographic subgroups.

Methods: We used cross-sectional data from the National Crime Victimization Survey ($n = 5698$) and Targeted Maximum Likelihood Estimation. Sociodemographic subgroups were defined by age, race, sex, and socioeconomic position. Outcomes included experiencing the victimization as severely distressing and problems in the workplace or at school, or with peers or family.

Results: Among people victimized with a firearm, nearly 40% experienced the victimization as severely distressing and 28% reported daily functioning problems as a result of the victimization, compared with 25% and 27% of those victimized without a firearm. In most of the subgroups examined, a greater proportion of people described the event as severely distressing when a firearm was involved in the victimization, ranging up to 19 percentage points higher among women and among black respondents (95% CI for women = 10%–28%; for blacks = 6%–31%).

Conclusions: Our findings suggest an almost universal negative response to firearm involvement during a violent victimization as compared with violent victimizations involving other or no weapons. These findings highlight the need for efforts by medical and mental health practitioners to address the potential sequelae of experiencing severe distress during a firearm victimization.

Keywords

Firearms; Violence; Gun violence; Crime; Mental health

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Introduction

Violent victimization is associated with negative mental health consequences, including post-traumatic stress disorder, depression, anxiety, and substance use disorders [1,2]. The presence of a firearm during the commission of a violent crime may exacerbate mental health consequences [3]. In a previous study by the authors, people victimized with a firearm, as compared with another weapon or no weapon, were more likely to describe the victimization as severely distressing [3]. According to a nationally representative survey, the overall prevalence of socioemotional problems, defined as moderate or severe distress or problems in daily functioning, among those violently victimized in the United States from 2009 through 2012 was 57%, but it was 74% among those victimized with a firearm, similar to that for people experiencing an injury as a result of the victimization (77%) [4].

Some subgroups of the population are at far greater risk of experiencing interpersonal firearm violence than others. For example, young black men in the United States die from firearm homicide at more than 10 times the rate of white men and black women, and 25 times the rate of black men over the age of 65 years [5]. In a nationally representative sample of people victimized in a violent crime, men, black respondents, and youth aged 18 to 24 years were also over-represented among victims of nonfatal crimes involving firearms [6]. Low socioeconomic status is also associated with an increased risk of experiencing violence [7], and a related measure, county-level income inequality, is associated with firearm homicide rates, particularly among black residents [8]. These different patterns of exposure may lead to different responses to victimization with a firearm.

Certain forms of victimization, such as rape, those resulting in injury, and those characterized by fear for one's life, are more distressing than others [2]. Early evidence suggests that victimizations involving a firearm may fall into this category [3,4]. Responses to traumatic events such as these can vary by population group [2,9,10], although the evidence for variation in response across population groups depends in part on the sample, exposure, and outcome under study [2,11,12]. It is clear that stressful life events are a component cause of psychiatric disorders, and differential responses to these life events appear to be at least somewhat dependent on attributes such as race/ethnicity and socioeconomic position [9,11,13].

The degree to which psychological distress and daily functioning are impacted by violent victimization with a firearm may, therefore, depend on the individual's biology, previous life experiences, and social context. Our objective was to estimate the effect of firearm involvement during violent victimization on the level of distress experienced during the event and subsequent daily functioning problems attributed to the victimization. We examined these relationships by subgroups defined by age, sex, race, and socioeconomic position.

Methods

Data

The National Crime Victimization Survey (NCVS) is administered by the Bureau of Justice Statistics [14]. The NCVS uses a two-stage design to obtain a nationally representative sample. All consenting individuals 12 years and older in sampled households are interviewed. A screening questionnaire is applied to determine whether the respondent experienced a violent victimization in the preceding six months. If the response is positive, detailed information about each victimization is collected [14]. Data are available online from the Bureau of Justice Statistics. This study was deemed not to be human subjects research by the Institutional Review Board at the University of California at Davis.

Our sample included all respondents who experienced a personal violent victimization between 2008 and 2015, which we defined as threats of and attempts at violence in addition to attacks. We analyzed data only for the first reported personal victimization for individuals in the sample to limit the extent to which other victimizations influenced responses.

Firearm presence during a victimization

We defined exposure by the self-reported presence or absence of a firearm during a violent victimization, including handguns, long firearms, and “other firearms.” Violent victimizations in the comparison group involved another weapon, such as a knife or blunt object, or no weapon. This was assessed using two questions: “Did the offender have a weapon such as a firearm or knife, or something to use as a weapon, such as a bottle or wrench?” and “What was the weapon?” In a previous article, the authors found differences were large and significant whether firearm victimizations were compared with victimizations with or without other weapons [3]. Here we combine the comparison groups (other weapon and no weapon) to focus on differences within sociodemographic subgroups.

Distress and daily functioning

Respondents reported the level of distress associated with the index crime in response to the question, “How distressing was being a victim of this crime to you? Was it not at all distressing, mildly distressing, moderately distressing, or severely distressing?” Those reporting severe distress were compared with all other groups.

Daily functioning problems were defined as a positive response to one of the following two questions: “Did being a victim of this crime lead you to have significant problems with your job or schoolwork, or trouble with your boss, coworkers, or peers?” and “Did being a victim of this crime lead you to have significant problems with family members or friends, including getting into more arguments or fights than you did before, not feeling you could trust them as much, or not feeling as close to them as you did before?”

A secondary outcome combined the experience of severe distress and daily functioning problems to identify those with a more severe response to victimization.

Populations of interest

We tested differences in the prevalence of severe distress, daily functioning problems, and both combined comparing victimizations with a firearm to those with another weapon or no weapon within groups defined by age, sex, race, and socioeconomic position. We created four age categories: 12–18, 19–39, 40–59, and 60 and over, allowing us to estimate associations during school-age years and three phases of adulthood. Sex includes male and female. Owing to sample size limitations, we only included analyses for white and black racial groups. Finally, we created an index of socioeconomic status using principal components analysis with singular value decomposition using household income (<\$20,000, \$20,000–\$39,999, \$40,000–\$74,999, \$75,000+), education (no college degree, associate's degree, or higher), and homeownership [15,16]. We retained the first principal component and split it into terciles.

Confounders

Our analyses included a variety of demographic and socioeconomic characteristics known to be associated with mental well-being, including distress response and daily functioning, or a proxy for a potentially confounding variable [2,4]. These included the respondent's age, sex, and race, whether the offense was committed by a stranger, whether the respondent had reported previous nonviolent victimizations, housing type (house, flat or apartment vs. other), housing mobility (lived in current residence less than one year vs. more than one year), history of family separation (divorced or separated residents vs. no divorced or separated residents), and the same socioeconomic index described previously, split into quintiles rather than terciles to more flexibly control for socioeconomic status (SES).

Analytic approach

We used targeted maximum likelihood estimation (TMLE) [17–19] to estimate the marginal risk difference of each of our outcomes comparing violent victimization with and without a firearm within subgroups described previously. If the necessary assumptions are met, the marginal risk difference is the difference in the prevalence of each outcome if all members of the subgroup were violently victimized with a firearm compared with if none were. Marginal risk ratios are presented as well.

TMLE is a semiparametric, doubly robust, substitution estimator that can incorporate data-adaptive machine learning in model fitting [19]. TMLE uses a maximum likelihood–based approach with an additional targeting step to optimize the bias-variance tradeoff. It is doubly robust in that consistent estimation of either the treatment or outcome mechanism will result in unbiased estimates. In the first step, we used SuperLearner, a flexible machine-learning method, to get an initial estimate of the conditional mean outcome [20]. SuperLearner uses 10-fold cross-validation to find the optimal weighted average of algorithms that best predict each dependent variable. In the second step, TMLE uses information from the treatment mechanism, a propensity score also estimated using SuperLearner, to update the initial estimates. This is the targeting step that makes the estimator doubly robust.

All models included the covariates listed previously except when they matched the stratification variables under consideration (e.g., age was excluded when estimating effects

within age-specific subgroups). Survey weights were rescaled to reduce the magnitude of extreme weights. Censoring weights were included to adjust for missing outcome variables. Given that up to 24.7% of observations in a single model had missing data (primarily due to missing income responses), we imputed missing covariate values using multiple imputation with chained equations [21] and combined estimates across 30 imputed data sets using Rubin's combining rules [22].

The resulting estimate corresponds to the marginal risk difference under the following assumptions: no unmeasured confounders, positivity (the probability of experiencing each treatment value within all combinations of covariates is greater than zero), stable unit treatment value assumption or SUTVA (one version of treatment and individuals' potential outcomes are independent of the treatments received by others), and consistency (the observed outcome under a certain treatment is the same as the counterfactual outcome that would be observed under that treatment). Analyses were conducted using Stata 14.2 and R version 3.4.2.

Sensitivity analyses

To test for robustness to positivity violations, we conducted additional analyses excluding observations from each exposure group (victimized with or without firearm) that did not have sufficient observations with comparable probabilities of exposure in the alternate exposure group [23], including sampling weights and stratum variables as covariates in the model [24], and excluding observations with large survey weights (>6000).

Results

There were 8465 individuals who experienced a violent victimization (11,005 victimizations) in the NCVS data set for the years 2008–2015. We excluded individuals who had more than 1 victimization in the month of their first victimization because the data did not support a determination of which victimization in a single month came first ($n = 581$ people; $n = 1645$ victimizations). Of those responding to the firearm victimization question, 1421 were missing data on at least one of the distress and daily functioning questions (see Supplemental Materials for a description of the sample stratified by outcome missingness). The final analytic sample comprised 5698 individuals. Details of the exclusion process are displayed in Figure 1.

Table 1 shows the distribution of our total study sample across the sociodemographic categories of interest, using survey weights. A plurality (46.9%) were between the ages of 19 and 39 years, and a majority were white (77.2%). There was a fairly equal distribution across genders and, by design, SES terciles. Of the sample with complete exposure and outcome data, 9.2% reported being victimized with a firearm Table S1.

Of the sample, 26.1% reported feeling severe distress, 27.2% reported experiencing functioning problems, and 13.7% reported both outcomes as a result of the victimization (Table 1). Among people who were victimized with a firearm, 40% reported severe distress, 28.3% reported having daily functioning problems, and 17.4% reported both outcomes as a result of the victimization (Table 2).

Results for severe distress, daily functioning problems, and both combined are displayed in Figure 2. In most of the subpopulations we examined, the prevalence of experiencing severe distress was significantly higher when a firearm was involved in the victimization than when a firearm was not involved. Results from the adjusted models are discussed separately for each of the subgroups under study.

Age

We observed an inverse U-shaped pattern of risk differences in experiencing the event as severely distressing across age groups. Among the middle age groups (19–59 years old), an additional 18% (95% confidence interval [CI] for those 19–39: 11%, 25%; for those 40–59: 9%, 28%) of those victimized with a firearm described the victimization as severely distressing compared with those experiencing victimization without a firearm. However, among the youngest and oldest groups, differences in the proportions experiencing severe distress when a firearm was involved in their victimization were not statistically distinguishable from zero. Differences in daily functioning were small and did not reach statistical significance. The inverse U pattern remained for both outcomes combined, but the difference in the percentage reporting both was only statistically significant for those in the 19–39 age group (risk difference [RD]: 7%; 95% CI: 0.5%, 13%).

Sex

Men and women were more likely to describe the victimization as severely distressing when a firearm was involved. For men, the difference was 11% (95% CI: 5%, 18%), and for women, it was 19% (95% CI: 10%, 28%). Differences in daily functioning were again small and did not reach statistical significance. Women, but not men, also reported both outcomes with greater frequency when the victimization involved a firearm (RD: 9%; 95% CI: 1%, 17%).

Race

Among blacks, an additional 19% (95% CI: 6%, 31%) and among whites, an additional 14% (95% CI: 8%, 20%) of those victimized with a firearm described the event as severely distressing. Similar to previously reported results, we did not detect statistically significant differences in the prevalence of daily functioning problems. Black respondents were also more likely to report both outcomes when the victimization involved a firearm as compared with black respondents victimized without a firearm (RD: 15%; 95% CI: 4%, 27%).

Socioeconomic status

For all three terciles of SES, violent victimization with a firearm was associated with a greater prevalence of experiencing severe distress (low SES: 14% [95% CI: 5%, 23%]; medium SES: 15% [95% CI: 6%, 25%]; and high SES: 18% [95% CI: 8%, 28%]). We also found that, among people with low SES, victimization with a firearm relative to nonfirearm victimization was associated with a 29% increase in reporting daily functioning problems (95% CI: 0%, 65%), although the absolute difference was more modest and not significant (RD: 8%, 95% CI: –1%, 17%). No other differences were found for daily functioning

problems. Finally, among people with a high SES, an additional 8% (95% CI: 0.1%, 17%) of those victimized with a firearm reported both outcomes.

The sensitivity analyses produced qualitatively similar results (see Supplemental Materials).

Discussion

Our findings suggest victimization with a firearm is more distressing than victimization with another weapon or no weapon and that this response is almost universal across age, sex, race, and socioeconomic position. The findings for daily functioning were much weaker. Our results are consistent with research supporting a specific association between exposure to firearm violence and negative mental health outcomes [3,4]. This is the first study to estimate group-specific associations between firearm presence during a victimization and distress response and daily functioning problems.

We found a statistically significant association between describing the victimization as severely distressing and firearm presence during the victimization among those aged 19–59 years, but not for those at the extremes of our age range. For those over age 60 years, a large proportion of each exposure group (victimized with and without a firearm) reported severe distress (31% and 32%). This finding contrasts with previous research suggesting a muted mental health response to violent victimization at older ages [10]. The finding for those aged 12–18 years also contrasts with previous research, which suggests violent victimization during adolescence is associated with severe mental health consequences [1]. The sample sizes of the youngest and oldest age groups were among the smallest ($n = 952$ and 463 , respectively). We may have been underpowered to detect effects in these subgroups, or alternatively the presence of a firearm, compared with victimization without a firearm, may be equally distressing for these subgroups.

Men, women, whites, blacks, and people in all three levels of socioeconomic position who were victimized with a firearm were more likely to characterize the event as severely distressing than were those in the same sociodemographic group victimized without a firearm. The prior evidence around whether there are sex- or race-specific responses to violent victimization and trauma is mixed [2,25,11,26,27]. However, evidence suggests higher socioeconomic position may protect against the negative effects of trauma and exposure to violence, but does not erase them [28].

The only subgroup to show evidence of increased daily functioning problems attributable to firearm victimization was the low SES subgroup. This effect was evident based on measures of association assessed on the relative scale and on both scales in sensitivity analyses, but was less clearly evident on the absolute scale. At the same time, those in the high SES group who were victimized with a firearm were more likely to both describe the event as severely distressing and report detriments in daily functioning, compared with those victimized with another or no weapon. Nevertheless, the detrimental association with severe distress was evident across groups; taken together, these results suggest that firearm violence places a toll on the individuals exposed.

Reports of distress after a traumatic experience are well-recognized in the psychiatric epidemiological literature as part of the continuum of mental health that include related constructs such as demoralization [29] and negative emotional reactivity [30]. As this research progresses, understanding how firearm involvement may increase the risk for psychiatric disorders after victimization, such as post-traumatic stress and anxiety disorders, is a critical direction.

This study benefitted from the use of a large survey that incorporated timing into its question formulation such that the questions about distress and daily functioning were in reference to previous victimizations. Our statistical approach included flexible modeling of the exposure-outcome relationships and the use of a doubly robust estimator that may reduce the chance of producing biased estimates. Our approach is further strengthened by the inclusion of a broad set of covariates in our modeling process, although unmeasured confounders may remain. Finally, the exposures of some individuals are unlikely to influence the potential outcomes of others, with the exception of respondents sampled from the same households (9.4%), limiting the potential for violating SUTVA.

Limitations included a cross-sectional design and the use of self-reported measures. More rigorous measures of mental health based on DSM diagnostic criteria were not available, although self-rated health has been shown to be highly correlated with actual health [31]. Many study subjects also had missing data on covariates, prompting the use of multiple imputation, and missing outcome data, which was adjusted for by incorporating inverse probability of censoring weights into the TMLE. Among other assumptions, these methods assume missingness is recoverable from the observed data, which we cannot confirm empirically. Some subgroups had few members, leading to low statistical power. Concerns about subgroup sample size also prevented us from making additional comparisons, for example, between victimizations involving firearms and those involving nonfirearm weapons. Finally, we cannot empirically examine consistency, although this assumption could be violated if different forms of the exposure have different effects on the outcome [32].

Our findings suggest an almost universal negative response to firearm involvement during a violent victimization as compared with violent victimizations involving other or no weapons. These findings highlight the need for efforts to mitigate the potential sequelae associated with experiencing severe distress during a firearm victimization on the part of medical and mental health practitioners. They also provide one more reason for preventing firearm violence. Finally, while results for an association with daily functioning were weak, the strong and consistent associations with distress suggest there could be mental health implications, apart from daily functioning, worthy of future research.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- [1]. Kilpatrick DG, Ruggiero KJ, Acierno R, Saunders BE, Resnick HS, Best CL. Violence and risk of PTSD, major depression, substance abuse/dependence, and comorbidity: Results from the National Survey of Adolescents. *J Consult Clin Psychol* 2003;71(4):692. [PubMed: 12924674]
- [2]. Kilpatrick DG, Acierno R. Mental health needs of crime victims. *Epidemiol Outcomes* 2003;16(2):119–32.
- [3]. Kagawa Rose MC, Cérda M, Rudolph K, Pear V, Keyes K, Wintemute G. Firearm involvement in violent victimization and mental health: An observational study. *Ann Intern Med* 2018;169(8):584–5. [PubMed: 29913485]
- [4]. Langton L, Truman J. Socio-emotional impact of violent crime US Department of Justice. Washington, DC: Bureau of Justice Statistics; 2014 <https://www.bjs.gov/content/pub/pdf/sivc.pdf>.
- [5]. Fatal injury reports. Web-based Injury Statistics Query and Analysis System (WISQARS). Accessed January 2, 2019.
- [6]. Planty M, Truman J. Firearm violence, 1993-2011 US Department of Justice. Washington, DC: Bureau of Justice Statistics; 2013 <http://www.bjs.gov/content/pub/pdf/fv9311.pdf>.
- [7]. Cubbin C, Smith GS. Socioeconomic inequalities in injury: Critical issues in design and analysis. *Annu Rev Public Health* 2002;23(1):349–75. [PubMed: 11910067]
- [8]. Rowhani-Rahbar A, Quistberg DA, Morgan ER, Hajat A, Rivara FP. Income inequality and firearm homicide in the US: A county-level cohort study. *Inj Prev* 2019;25(Suppl 1):i25–30. [PubMed: 30782593]
- [9]. Keyes CLM. The black–white paradox in health: Flourishing in the face of social inequality and discrimination 2009;77(6): 1677–706.
- [10]. Norris FH. Epidemiology of trauma: Frequency and impact of different potentially traumatic events on different demographic groups. *J Consult Clin Psychol* 1992;60(3):409–18. [PubMed: 1619095]
- [11]. Schilling EA, Aseltine RH, Gore S. Adverse childhood experiences and mental health in young adults: A longitudinal survey. *BMC Public Health* 2007;7(1): 30. [PubMed: 17343754]
- [12]. Mersky JP, Topitzes J, Reynolds AJ. Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: A cohort study of an urban, minority sample in the U.S. *Child Abuse Neglect* 2013;37(11):917–25. [PubMed: 23978575]
- [13]. Mezuk B, Rafferty JA, Kershaw KN, Hudson D, Abdou CM, Lee H, et al. Reconsidering the role of social disadvantage in physical and mental health: Stressful life events, health behaviors, race, and depression. *Am J Epidemiol* 2010;172(11):1238–49. [PubMed: 20884682]
- [14]. Bureau of Justice Statistics. National Crime Victimization Survey, 2008-2015. Washington DC: United States Department of Justice.
- [15]. Berzofsky M, Smiley-McDonald H, Moore A, Krebs CJRW, DC: Bureau of Justice Statistics. Measuring socioeconomic status (SES) in the NCVS: Background, options, and recommendations. Washington, DC: Bureau of Justice Statistics; 2014.
- [16]. Wall ME, Rechtsteiner A, Rocha LM. Singular value decomposition and principal component analysis In: A practical approach to microarray data analysis. Boston, MA: Springer; 2003 p. 91–109.
- [17]. Petersen M, Schwab J, Gruber S, Blaser N, Schomaker M, van der Laan M. Targeted maximum likelihood estimation for dynamic and static longitudinal marginal structural working models. *J Causal Inference* 2014;2(2):147–85. [PubMed: 25909047]
- [18]. Stitelman Ori M, De Gruttola V, van der Laan Mark J. A general implementation of TMLE for longitudinal data applied to causal inference in survival analysis. *Int J Biostatistics* 2012;8(1).
- [19]. Van der Laan MJ, Rose S. Targeted learning: Causal inference for observational and experimental data. New York, NY: Springer Science & Business Media; 2011.

- [20]. Van der Laan MJ, Polley EC, Hubbard AE. Super learner. *Stat Appl Genet Mol Biol* 2007;6(1).
- [21]. Royston P, White IR. Multiple imputation by chained equations (MICE): Implementation in Stata. *J Stat Soft* 2011;45(4):20.
- [22]. Rubin DB. Multiple imputation for nonresponse in surveys, 81. New York: John Wiley & Sons; 2004.
- [23]. Stürmer T, Rothman KJ, Avorn J, Glynn RJ. Treatment effects in the presence of unmeasured confounding: Dealing with observations in the tails of the propensity score distribution—a simulation study. *Am J Epidemiol* 2010;172(7):843–54. [PubMed: 20716704]
- [24]. DuGoff EH, Schuler M, Stuart EA. Generalizing observational study results: Applying propensity score methods to complex surveys. *Health Serv Res* 2014;49(1):284–303. [PubMed: 23855598]
- [25]. Kessler R, Sonnega S, Bromet EJ, Hughes M, Nelson C. Posttraumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry* 1995;52(12): 1048–60. [PubMed: 7492257]
- [26]. Dunn EC, Gilman SE, Willett JB, Slopen NB, Molnar BE. The impact of exposure to interpersonal violence on gender differences in adolescent-onset major depression: Results from the National Comorbidity Survey Replication (NCS-R). *Depress Anxiety* 2012;29(5):392–9. [PubMed: 22447513]
- [27]. Ahern J, Karasek D, Luedtke AR, Bruckner TA, van der Laan MJJE. Racial/ethnic differences in the role of childhood adversities for mental disorders among a nationally representative sample of adolescents 2016;27(5):697–704.
- [28]. Mock SE, Arai SM. Childhood trauma and chronic illness in adulthood: Mental health and socioeconomic status as explanatory factors and buffers. *Front Psychol* 2010:1246.
- [29]. Dohrenwend BP, ShROUT PE, Egri G, Mendelsohn F. Non-specific psychological distress and other measures for use in the general population. *Arch Gen Psychiatry* 1980;37(11):1229–36. [PubMed: 7436685]
- [30]. Aldao A, Nolen-Hoeksema S, Schweizer S. Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clin Psychol Rev* 2010;30(2): 217–37. [PubMed: 20015584]
- [31]. Idler E, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. *J Health Soc Behav* 1997;38(1):21–37. [PubMed: 9097506]
- [32]. Rehkopf DH, Glymour MM, Osypuk TL. The consistency assumption for causal inference in social epidemiology: When a rose is not a rose. *Curr Epidemiol Rep* 2016;3(1):63–71. [PubMed: 27326386]

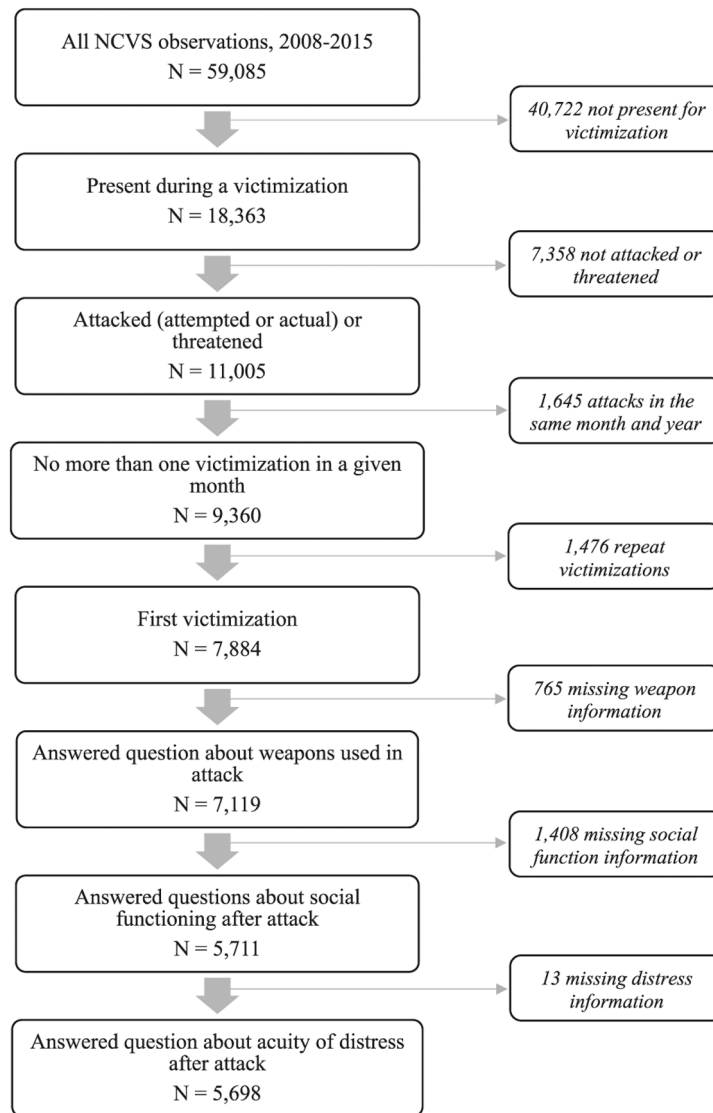
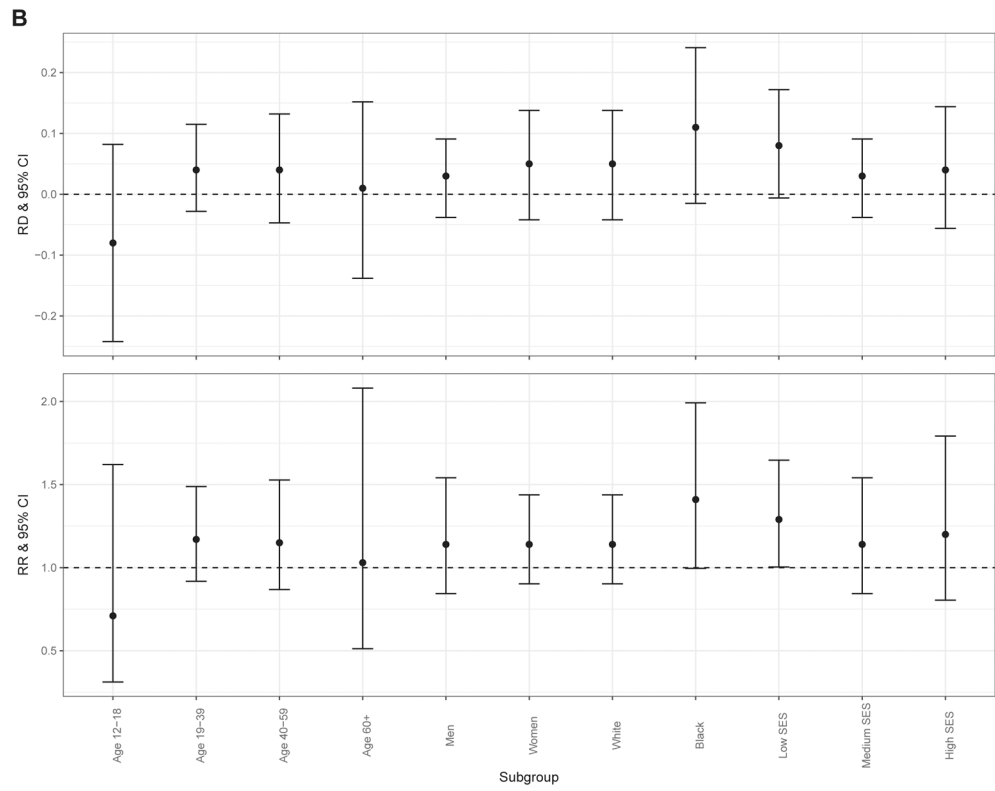
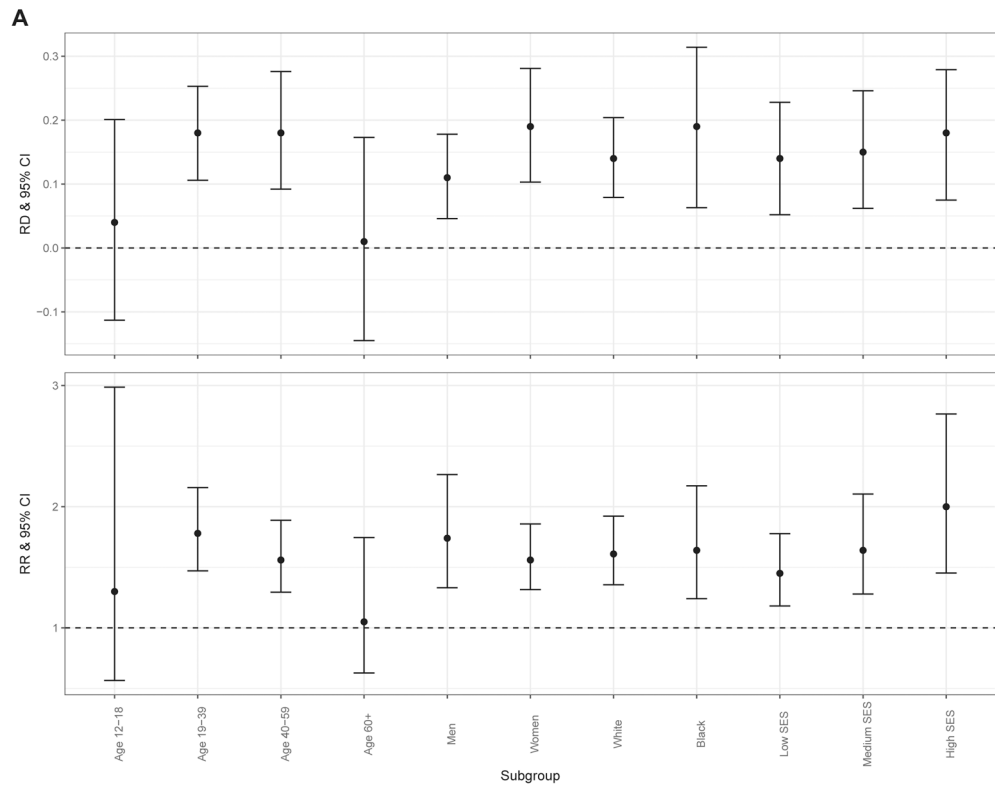


Fig. 1.
Sample exclusions.



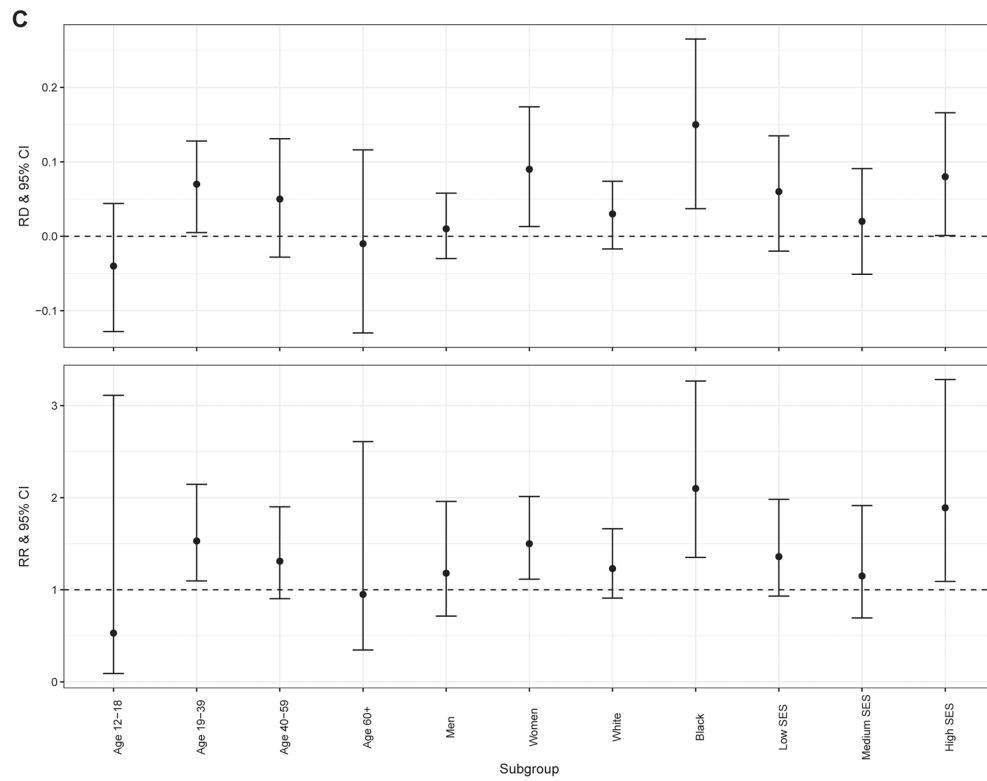


Fig. 2. Adjusted risk differences (RD) and ratios (RR) for (A) severe distress, (B) daily functioning problems, and (C) both outcomes associated with firearm involvement during a violent victimization, by age, sex, race, and socioeconomic status.

Table 1

Description of study sample

Sociodemographic characteristics and key outcomes	Total sample, N (weighted %)
Total	5,698 (100)
Outcomes	
Severe distress	1536 (26.13)
Functioning problems	1568 (27.24)
Both combined	809 (13.68)
Age	
12-18	952 (20.16)
19-39	2551 (46.85)
40-59	1732 (26.62)
60+	463 (6.36)
Sex	
Male	2841 (51.72)
Female	2857 (48.28)
Race	
White	4512 (77.15)
Black	768 (15.52)
SES	
Low	1474 (33.20)
Medium	1474 (33.94)
High	1474 (32.86)

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Table 2

Prevalence of outcomes by subgroups of interest

	Severe distress, N (weighted %)	Functioning problems, N (weighted %)	Distress and functioning problems, N (weighted %)
Total	1536 (26.13)	1568 (27.24)	809 (13.68)
Victimization			
Firearm	215 (39.96)	152 (28.33)	96 (17.37)
Non-Firearm	1321 (24.73)	1416 (27.13)	713 (13.31)
Age			
12-18	143 (14.79)	271 (27.88)	90 (9.06)
19-39	641 (24.96)	694 (26.82)	344 (13.18)
40-59	605 (35.16)	504 (28.75)	310 (17.79)
60+	147 (32.80)	99 (21.95)	65 (14.82)
Sex			
Male	491 (17.23)	563 (19.87)	229 (8.04)
Female	1045 (35.66)	1005 (35.13)	580 (19.72)
Race			
White	1158 (24.67)	1206 (26.39)	612 (13.00)
Black	258 (32.56)	227 (29.53)	123 (15.64)
Other race	120 (27.83)	135 (31.31)	74 (16.66)
SES			
Low	489 (31.74)	452 (29.84)	252 (16.07)
Medium	386 (25.44)	431 (28.75)	214 (13.93)
High	269 (18.07)	328 (22.80)	141 (9.57)