Trends in the Lethality of Crime Methodology

The analysis, entitled Trends in the Lethality of Crime: What You Need to Know, examines trends in the lethality of violent incidents across the United States from 1994 to 2020. The data in this report are drawn from two sources: the National Crime Victimization Survey (NCVS) and the Supplementary Homicide Reports (SHR).

Datasets

National Crime Victimization Survey

The NCVS is a nationally representative survey of personal and household victimizations. People of 12 years of age or older were interviewed in each sampled household every six months for a period of three years. Respondents were asked about their victimization experiences during the six-month period prior to the first day of the month of their interview. Victimization experiences include rape, robbery, assault, burglary, larceny, and motor vehicle theft. The data also include specific information on each reported crime incident such as severity of crime, injuries or losses, time and place of occurrence, characteristics of offender(s), relationships between offender(s) and the victim, and whether the incident was reported to law enforcement. We used the NCVS Concatenated File, 1992-2021 for our analyses.[1]

The sample of this study was limited to two types of violent crime victimizations based on the type of crime code in the incident-level dataset: (1) assaults and (2) robberies. The assaults measure is composed of counts of self-reported (a) threatened assault with a weapon, (b) simple assault with injury, (c) assault without a weapon and without injury, and (d) verbal threat of assault. The robbery measure consists of all completed and attempted robbery victimizations (including completed robbery with injury from serious assault, completed robbery with injury from minor assault, completed robbery without injury from minor assault, attempted robbery with injury from serious assault, attempted robbery with injury from minor assault, and attempted robbery without injury). We limited the sample to these two types of nonfatal incidents that occurred in the United States.

[1] Bureau of Justice Statistics. (2022, September 19). *National crime victimization survey, concatenated file, [United States], 1992–2021* (Version 1) [Data set]. ICPSR. https://doi.org/10.3886/ICPSR38430.v1

Table A1. Offense Types Categorized as Assault and Robbery in the NCVS

Violent crime victimization	Types of offenses
Assault	Threatened assault with a weapon, simple assault with injury, assault without a weapon and without injury, and verbal threat of assault
Robbery	Completed robbery with injury from serious assault, completed robbery with injury from minor assault, completed robbery without injury from minor assault, attempted robbery with injury from serious assault, attempted robbery with injury from minor assault, and attempted robbery without injury.

Supplementary Homicide Reports

Data on homicide counts from 1994 to 2020 were obtained from a multiply-imputed SHR database of murders and nonnegligent manslaughters reported to law enforcement agencies in the United States since 1976. The SHR is a supplement to the Federal Bureau of Investigation's Uniform Crime Reporting program. The SHR provides incident-level information on homicides including location, circumstances, weapons, demographic characteristics of victims and offenders, as well as victim-offender relationships.

The SHR is limited, however, by missing data. For example, not every law enforcement agency in the nation reports its homicide data each year. Additionally, detailed information characteristics of victims, offenders, and incident circumstances is missing for a nontrivial proportion of SHR cases. Thus, we use a multiply-imputed dataset constructed and provided by James Alan Fox, which implements a two-stage multivariate imputation strategy.[2]

Estimating Descriptive Trends in Lethality, 1994-2020

We estimate descriptive trends in lethality for victims aged 14 and above from 1994 to 2020. We examine trends in both assault and robbery lethality. Further, we disaggregate violence lethality by victim sex (male, female), victim race (Black, White), victim age group (14-17, 18-24, 25-34, 35-49, 50-64, and 65 or above), and firearm presence (firearm, non-firearm).

[2] Fox, J. A., & Swatt, M. L. (2009). Multiple imputation of the supplementary homicide reports, 1976–2005. *Journal of Quantitative Criminology, 25*(1), 51–77. https://doi.org/10.1007/s10940-008-9058-2

Estimating trends in lethality required three steps:

Step 1. Calculate estimates for nonfatal violent incidents

We first calculated NCVS counts of assaults and robberies. We followed the *User's Guide to National Crime Victimization Survey (NCVS) Direct Variance Estimation* and the Stata syntax in Appendices A and F to estimate the total non-fatal victimizations each year.[3] Since we need the combination of the pseudo-stratum (V2117) and half-sample codes (V2118) to obtain the primary sampling units for total victimization estimation, the data of 1992 and 1993 were excluded from the analyses due to missing values in these variables. Year groups were classified as following: 1994-1996, 1997-2005, 2006-2015, and 2017-2020. To account for series victimizations, we adjusted for the victimization weight for multiple victimizations of the same type that are represented on the incident file as a single record.

For the total assault and robbery victimizations estimation, we used the *svyset* command in Stata to account for sample design. The stratum was first generated using the year group and pseudo-stratum variables. We then used the half-sample codes, the adjusted incident weight, the stratum variable to specify the sample design before estimation. We used the *total* command to estimate the total number of victimizations from the incident file. Due to the methodological changes in 2006 NCVS and the sample redesign in 2016, we instead used the average count of 2005 and 2007 for 2006 estimates and the average count of 2015 and 2017 for 2016 estimates.

Step 2. Calculate estimates for fatal violent incidents

Second, we calculated SHR counts of homicides per year. To estimate homicide counts per year, we used the multiply-imputed SHR dataset. When estimating counts, we included the weight variable, *WT_ALL_P*. This weight variable adjusts the homicide counts (1) to correspond to the FBI's annual UCR estimates of homicide counts by year and state, and (2) to match the victim age, sex, and race distributions found in the National Center for Health Statistics (NCHS) mortality data.

Step 3. Calculate estimates for lethality

Third, we calculated lethality ratios. Lethality ratios measure the number of homicides per 1,000 assaults or per 1,000 robberies. Assault lethality ratios represent the count of homicides divided by the count of assaults and multiplied by 1,000. Robbery lethality

[3] Shook-Sa, B., Couzens, L. G., & Berzofsky, M. (2015). *User's guide to national crime victimization survey (NCVS) direct variance estimation*. U.S. Department of Justice, Office of Justice Programs. https://www.ojp.gov/ncjrs/virtual-library/abstracts/users-guide-national-crime-victimization-survey-ncvs-direct

ratios represent the count of homicides divided by the count of robberies and multiplied by 1,000.

Multivariate Analyses: Lethality Trends and Firearms

Appended Dataset

To conduct our multivariate analyses, we created an appended database of assaults and robberies from the NCVS and fatal incidents from the multiply-imputed SHR. Because the NCVS data only include participants aged 12 and above and because the youngest imputed age group was coded as 0-13, we limited our appended database to victims aged 14 or above.

In the pooled dataset, lethality is the outcome of interest. Lethality is coded as 1 if the incident came from the multiply-imputed SHR and coded as 0 if the incident came from the NCVS.

To ensure comparability across the fatal and nonfatal incidents, we used the following variables and made the following recodes.

For year, we used *V4015* (the year when the reported incident occurred) in NCVS and *year* in SHR.

For firearm presence, we recoded from three variables indicating whether the offender had a weapon including handgun (*V4051*), other gun (*V4052*), or gun type unknown (*V4057*) in NCVS. In SHR, we recoded from *iweapon* if a firearm was involved. For multiple-offender incidents, we pulled out the firearm use information (*iweapon)* for each offender from the SHR offender file and linked to our SHR database.

Regarding characteristics of victims, we generated a victim age group variable including five categories (0 = 14-17, 1 = 18-24, 2 = 25-34, 3 = 35-49, and 4 = 50+) from *V3014* in NCVS and *ivicage* in SHR. For victim sex, we used *V3018* in NCVS and *ivicsex* in SHR to generate a new sex variable (1 = male, 0 = female). We created a variable to indicate victim race including White, Black, and other race. In NCVS, we recoded the new race variable from *V3023* and *V3023A*. For White, we included responses of White for *V3023* (end 2002 Q4) and White only for *V3023A* (start 2003 Q1). For Black, we included responses of Black for V3023 and Black only, White-Black, Black-American Indian, Black-Asian, Black-Hawaiian/Pacific Islander, White-Black-Indian, and White-Black-Asian for *V3023A*. Other races include the remaining categories in *V3023* and *V3023A*.

Given that the SHR dataset is victim-based rather than incident-based and there are multiple victims in one incident, we made an adjustment to the SHR weight. We

weighted each victim by the total number of victims in the incident. For example, in an incident that involved three victims, each victim was weighted by .33.

Analytical Strategy

To assess whether the association between firearm presence and the lethality of violent crime incidents has become stronger over three decades, we use a logistic regression model. We treat lethality as the outcome and include year, firearm presence, victim age group, victim sex, and victim race in the model. We also include an interaction term (year by firearm presence) in the model. We use robust standard errors and cluster on the year variable. After running our logistic regression model, we use marginal effects commands to estimate the average marginal effect of firearm presence on the predicted probability that a violent incident ends in death at each year (e.g., 1994, 1995, … 2019, 2020).

Results

Results from our logistic regression model are displayed in Table A2.

Table A2. Logistic Regression Model Predicting Lethality

Variable	b (SE)
Year	0.019*** (.004)
Firearm presence	2.936*** (.057)
Interaction (year x firearm presence)	0.013* (.005)
Victim age	
14-17 (reference)	
18-24	0.636*** (.066)
25-34	0.829*** (.078)
35-49	0.657*** (.078)
50 and over	0.706*** (.106)
Victim sex	
Female (reference)	
Male	0.963*** (.053)
Victim race	
White (reference)	
Black	1.234*** (.044)
Other	-0.023 (.104)