



Prevalence and Correlates of Violence Against Law Enforcement Officers in the United States: A National Portrait

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1 Introduction

Front-line policing, in particular patrol work, is a dangerous job and can involve serious injuries and sometimes death for officers, with about 10% of officers assaulted each year in the USA (Bierie, 2017). The National

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Institute for Occupational Safety (NIOSH) has found that law enforcement officers (LEOs) as a group experience one of the highest rates of workplace homicides and have the highest occupational rate of violent victimization in the USA (Harrell et al., 2022; National Institute of Occupational Safety & Health, 1996). Despite these dangers that LEOs face, there is limited national data on violence against LEOs (VAO). Also, much of the research has focused on felonious killings of LEOs (e.g., the Census of Fatal Occupational Injuries and the National Law Enforcement Officer Memorial Fund database), with less on the broader set of police officer line-of-duty assaults not resulting in the death of an officer. The existing databases often undercount LEOs who were shot by a firearm but not killed, and completely miss LEOs who were shot at but not injured or not hit. They also contain only a limited number of community, agency, and situational risk factors for investigating patterns that would inform policies, protocols, and prevention. In sum, there is no clear national portrait of VAO.

To address some of these limitations, we collected novel survey data on the aggregate counts of VAO from 2015 to 2019 with a nationally representative sample of 800 US law enforcement agencies (LEAs). This is the first nationally representative survey on the aggregated yearly counts of VAO. The survey examines the number of VAO incidents (including incidents involving firearm shootings, and with other weapons or bodily force, in the past five years) and separately the number of officer-involved shooting (OIS) incidents, where a civilian shoots at an officer. We examine: (1) How many VAO and OIS incidents did the average US LEA experience in the past five years? (2) To what extent are agency characteristics, culture, policing practices, and required training related to the rate of VAO?

The US Context for VAO

Part of the context for considering VAO in the USA is the large size of the population, the large number of officers, and the ready availability

of firearms. Based on US Census data (<https://usafacts.org/data/topics/people-society/population-and-demographics/our-changing-population>), the population of the USA is roughly 332 million. Also, there are over 700,000 full-time sworn officers working for general-purpose law enforcement agencies at the state, county, or local level (Bureau of Justice Statistics, 2022). Also, the USA is one of the few Western countries that has a legally protected right to possess a firearm and in some states carry the firearm with them. This culture that is supportive of firearms is unique to the USA. No other Western nation is close to the rate of possession of handguns and handgun violence. With less than 5% of the world's population, the USA has nearly half (46%) of the world's civilian-owned guns, based on recent global survey data (Small arms survey, 2018). This unique context forms an important backdrop to the discussion of VAO in the USA.

Overall Rates of VAO and Trends Over Time

Felonious assaults on police are rare events from a statistical perspective, occurring in less than 0.5% of arrests (White et al., 2019). However, it can be serious when it occurs, and officers who have been attacked experience stress that can negatively affect their job performance in a variety of important ways (McMurray, 1990). Most aggression toward police results in minor injuries, and only a tiny percentage result in death (Bierie, 2017). The best available data on non-fatal VAO is the Law Enforcement Officers Killed and Assaulted (LEOKA) data covering LEOs who were killed, feloniously or accidentally, and LEOs who experienced an aggravated assault while performing their duties. However, even the LEOKA data have some shortcomings. First, LEOKA is a voluntary database and LEAs are not required to report attacks against officers to the FBI. While generally about 12,000 LEAs report data to LEOKA, not all agencies provide such reports. Second, while only a small percentage of shootings do not result in some injury, incidents that did not result in injury are not included in the LEOKA database. Third, the LEOKA database does not include a number of variables that are of interest

to researchers for model testing, as it was not designed as a research database.

The most recent LEOKA data on assaults on LEOs are from 2019 when 56,034 were assaulted while performing their duties and 30.7% were injured. In 2019, about 80% of LEOs who were assaulted in the line of duty were attacked with hands, fists, or feet; 3.8% were assaulted with firearms; and 16.9% with knives or other weapons. The 2019 rate of assaults on LEOs, 11.8% of sworn LEOs, represents a continuing increasing trend of officer assaults since 2015 (9.9% in 2015; 9.8% in 2016; 10.1% in 2017; 10.8% in 2018) (Federal Bureau of Investigation, 2019b). In an earlier analysis of LEOKA data from 2010 to 2016, Shjarback and Maguire (2021) assessed whether VAO has increased in the wake of events in Ferguson, Missouri involving police use of deadly force in 2014. Neither injurious nor non-injurious assaults on LEOs increased following Michael Brown's death in August 2014 and the findings were robust across a variety of model specifications and estimation techniques, providing little evidence of a "War on Cops" through 2016 (Shjarback & Maguire, 2021).

Fatalities Against LEOs

There are several federal datasets on fatal shooting of LEOs. First, White and colleagues (2019) examined nearly 50 years of all LEO line-of-duty deaths (1970–2016) using National Law Enforcement Officer Memorial Fund (NLEOMF) data. They found that the number of deaths declined dramatically over the last five decades and concluded that policing is a much safer profession now compared to 50 years ago. They suggest that the reasons for this decline in officer deaths, compared to the 1970s and 1980s, include better trauma care in hospitals to save the lives of officers who in earlier decades might have died, advances in body armor along with mandatory policies to wear it, and better training, supervision, and technologies. While there has been a 75% drop in deaths, there has been remarkable stability in geographic, temporal, and incident-level characteristics (White et al., 2019).

Second, an analysis of 1980–1992 LEOKA data reveals that about 1000 LEOs were killed in the line of duty during this timeframe, with the highest number of deaths occurring in 1980 (104) and the lowest in 1992 (62) (Bailey, 1996). In contrast, over this period the total number of assaults on LEOs increased considerably (57,847 in 1980; 91,252 in 1992), including those involving firearms (3295 in 1980; 4455 in 1992) (Bailey, 1996). The number of LEOs killed per 1000 total assaults and firearm assaults was much higher in 1980 (1.80 and 31.59, respectively) than in 1992 (0.68 and 13.9) (Bailey, 1996). Also, an analysis of the number of LEOs killed feloniously from 1996 to 2008 showed the rate at which they were killed in the line of duty decreased approximately 36% (LEOKA, 1996, 2008) from 55 (0.14 per 1000) to 41 (0.09 per 1000) (Brandl & Stroshine, 2012). In an analysis of 37 years of LEOKA data by Zimring and Arsiniega (2015), from 1976 to 2012, the death rate of police from violent assaults dropped from 27.88 per 100,000 to 7.16 per 100,000, a decline of almost 75%.

More recently, LEOKA data from 2009 to 2021 shows considerable fluctuation in the number of felonious officer deaths. Figure 1 reveals that from 2009 to 2011 there was an increase in the number of LEOs killed from 48 to 72 but then a sharp decrease to 27 in 2013 (Federal Bureau of Investigation, 2022). However, there was another increase to 66 officer deaths in 2016, and after a decrease again to 46 in 2020, there was a sharp increase to 73 in 2021.

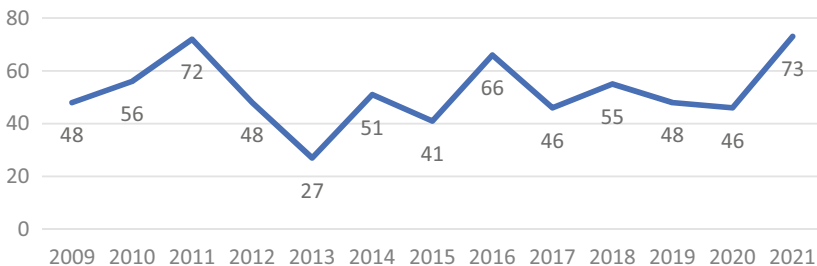


Fig. 1 Leoka data on the number of felonious deaths of officers from 2009 to 2021 (based on BJS data; Federal Bureau of Investigation, 2022)

Next, Tiesman and colleagues (2010) examined workplace injury deaths among LEOs from 1992 to 2002 using the Census of Fatal Occupational Injuries and also found that officer deaths were rare events. From 1992 to 2002, 2280 LEOs died from an occupational injury, with a fatality rate of 11.8 per 100,000: 47% were homicides ($n = 1072$; rate = 5.6 per 100,000), 36% were transport related ($n = 815$; rate = 4.2 per 100,000), 11% were due to other causes ($n = 249$; rate = 1.3 per 100,000), and 5% were workplace suicides ($n = 122$; rate 0.6 per 100,000).

Agency and Community Risk Factors for VAO

In studies over a decade old, researchers examined *agency-level* factors related to VAO, including mandatory vest-wear policies, officer density, arrests, two-officer patrols, and the use of improved firearms (Kaminski, 2002, 2004, 2008), with only the level of police officer density (proximity) and the numbers of arrests (exposure) found to be significantly related to VAO risk. However, contrary to these studies, other research has found stricter body armor policies to be related to decreases in VAO (Fridell et al., 2009; LaTourrette, 2010; Liu & Taylor, 2017). Research on *community-level* factors suggests that more dangerous areas, characterized by a disproportionate number of calls for service, are also places where VAO is more likely to occur (Belvedere et al., 2005). Along these lines, research has found that the police were more likely to be murdered in certain regions (Boylen & Little, 1990; Kaminski et al., 2000), economically depressed areas (Chamlin, 1989; Jacobs & Carmichael, 2002; Kaminski, 2008; Kaminski & Marvell, 2002), and locales high in general violence (Fridell & Pate, 1995; Handberg et al., 1988; Jacobs & Carmichael, 2002; Kaminski et al., 2003), though with at least one exception (Kaminski, 2008). Conversely, police homicide risk was lower in urbanized counties and in counties located in the Northeast (Kaminski, 2008). Some studies have found an association between firearm availability in the community and police murders (Lester, 1984, 1987; Swedler et al., 2015); others have not (Kaminski & Marvell, 2002; Mustard, 2001).

Gaps in the Literature

The federal datasets covering VAO and OIS undercount LEOs who were shot but not killed, fail to count LEOs who were shot at but not hit, and LEOs who were shot but not injured. Many of the studies on VAO (Covington et al., 2014; Johnson, 2008; Kaminski et al., 2007; Kent, 2010) have focused on a single or a handful of LEAs (Brandl & Strohshine, 2012; Garner, 1996), limiting across-agency comparisons or the review of statistics applicable to the whole of the USA. A number of these studies are also now outdated, being from ten or more years ago. Many of the VAO studies focus on assaults with firearms and many only cover officer fatalities (Fridell & Pate, 1995; Tiesman et al., 2010; Zimring & Arsiniega, 2015). They also contain only a limited number of community and agency factors to investigate patterns that would inform policies. This study is one of the first comprehensive national surveys to estimate five years of data on VAO and OIS in a nationally representative sample.

2 Methods

Agency Survey Methodology and Sample

We collected our data so that it would be representative of all law enforcement agencies in the USA. A stratified random sample of 4000 LEAs were drawn from the 2017 National Directory of Law Enforcement Administrators (NDLEA) (National Public Safety Information Bureau, 2017), using updated contact information from the 2021 NDLEA to facilitate the locating of agencies to complete the survey (National Public Safety Information Bureau, 2021). The NDLEA is an electronic commercial database listing of over 15,000 municipal, county, and state LEAs in the USA, which is updated yearly and enumerates every LEA and which is considered to be among the most comprehensive lists. Information available from the NDLEA included agency name, type, size (i.e., sworn officer count), email, and phone number of the chief executive officer. LEAs were stratified by type and size. As OIS is a

rare event, we oversampled larger LEAs. All State Police/Highway Patrol agencies and LEAs with 250 or more sworn officers were sampled with certainty, LEAs with 100–249 officers were sampled at 75%, LEAs with 50–99 officers were sampled at 50%, and LEAs with 25–49 officers were sampled at 25%. All other LEAs were sampled proportional to the frame. The survey was restricted to publicly funded civilian LEAs representing municipal, county, state police and highway patrol, or Bureau of Indian Affairs LEAs (no federal LEAs were included in the study) that employ at least one full-time sworn officer with general arrest powers.

Prior to national distribution, the research team conducted a pilot test and cognitive interviews with a small sample of LEAs. The fielding period for the survey was February 2021–February 2022. LEAs were initially invited via email with a unique agency link to take the survey online. Hard copy invitation letters were mailed to LEAs when email addresses were not available. About 25 email and hard copy reminders were sent throughout the survey fielding period to each non-responding LEA. The Police Executive Research Forum (PERF) conducted targeted phone call reminders to smaller LEAs, identified as a subgroup with low participation rates, which had accessed the survey. LEAs were offered several options for completing a survey, including online or via hardcopy (to be returned by mail, email, or fax).

A total of 800 LEAs completed the survey (response rate = 20%). Most surveys were completed online ($n = 778$, 97%), while the remainder were returned via email ($n = 22$, 3%). The sample was weighted to be nationally representative of LEAs in the USA and adjusted for non-response. All results reported from these analyses were weighted (see Table 1 for a sample description).

Measures

Incidents and Rates of Violence Against Officers (VAO)

VAO was defined in the survey for agencies as a “physical confrontation where a subject used bodily force or a weapon (e.g., discharges, uses, or brandishes a firearm, knife, etc.) against one or more officers during the

Table 1 Weighted agency sample descriptions

	VAO model (<i>N</i> = 707) Frequency/mean (SD)	OIS model (<i>N</i> = 707) Frequency/mean (SD)
Type		
<i>Municipal</i>	86.8%	86.7%
<i>County/state police/ highway patrols</i>	13.2%	13.3%
Size (full-time sworn officers)		
<i>Less than 100</i>	87.0%	87.0%
<i>100–249</i>	8.3%	8.3%
<i>250 or more</i>	4.7%	4.7%
Region		
<i>Northeast</i>	17.4%	16.8%
<i>Midwest</i>	32.1%	32.4%
<i>Southeast</i>	19.1%	19.2%
<i>South</i>	10.8%	12.2%
<i>West</i>	20.6%	19.4%
Average calls for service (2017–2019)	4.18 (163,265.7)	4.17 (163,148.7)
Violent crime rate	129.54 (226.31)	132.80 (229.72)
Officer to population ratio	0.27 (0.30)	0.27 (0.30)
In-service training hours	52.00 (64.52)	51.37 (63.05)
Count of non-lethal weapons authorized	7.64 (1.37)	7.64 (1.37)
CALEA accreditation	13.9%	14.7%
Written foot pursuit policy		
<i>No guidelines</i>	12.3%	13.0%
<i>Guidelines but no mandatory policy</i>	22.2%	22.3%
<i>Written mandatory policies</i>	56.4%	55.5%
Written body armor policy	94.2%	93.6%
Simulation training offered	89.9%	89.9%
CIT training offered	94.3%	94.3%
Responding to mental illness training offered	95.3%	95.3%
Body-worn cameras deployed	70.2%	70.0%
Dedicated community policing budget	39.7%	39.1%
Dedicated community policing officers	43.7%	44.0%
Host community policing events once a month or more	47.6%	48.1%

Note *N* represents the number of non-missing observations, with outliers removed. For the VAO and OIS models, three distinct outliers were removed from each sample

past five years”. LEAs were asked to report the total number of incidents where officers were assaulted for each year from 2015 to 2019, and the calls for service (CFS) of each year from 2017 to 2019. The rates of VAO were calculated as measured by the average yearly incidents of VAO incidents per 10,000 CFS.

Incidents and Rates of Officers Shot at by Subjects (OIS)

The rate of OIS was measured by the total number of incidents of a subject discharging a firearm at an officer (regardless of whether the officers were hit and whether the incident resulted in injury or death) across the five-year period 2015–2019, divided by the five-year sum of CFS. CFS was only collected for 2017–2019, and thus CFS for 2015 and 2016 were imputed using the average CFS across 2017–2019 (there is little variation between years).

Covariates

Agency Characteristics

- **Agency region** was measured by reported US census region from the NDLEA (Northeast—the reference category for analysis; Midwest; Southeast; South; and West).
- **Agency size** was measured by the number of full-time sworn officers in the agency, placed in one of three categories by size variable: less than 100 (reference), 100–249, and 250 or more full-time sworn officers.
- **Agency type** included municipal law enforcement (reference) and others, including county law enforcement, state police/highway patrols, and tribal LEAs.
- **CALEA accreditation** was reported by LEAs, coded as “Yes” or “No” (reference).
- **Police population ratio** was calculated as the percentage of the total number of sworn officers over the population of the agency the jurisdiction serves.

Community Characteristics

- **Crime rate** was measured as the average yearly rate of homicides and aggravated assaults between 2017 and 2019 per 100,000 of the population.

Agency Policies, and Trainings

- **In-service training hours** is a continuous measure of the total estimated hours for annual in-service training.
- **Count of weapon types authorized** is measured as the number of weapons and less-lethal tools authorized by an agency, including handguns, patrol rifles, shotguns, batons or other impact weapons, electronic control weapons (e.g., Taser, stun gun), chemical agents (e.g., oleoresin capsicum (OC) spray or Corson-Stoughton gas or CS tear gas), weapon-deployed chemical agents (e.g., pepper ball), other impact munitions (e.g., rubber bullets, bean bags), neck restraints, and takedown techniques (e.g., straight-arm bar).
- **Foot pursuit policy** was measured by asking if an agency had written mandatory policies, guidelines but no mandatory policy, or no guidelines on foot pursuits (reference).
- **Body armor policy** was captured as a dichotomous measure if the agency has a written policy requiring officers to wear body armor, measured as Yes or No (reference).
- **Body-worn camera (BWC) deployment** was measured by asking if the agency currently deploys BWCs, with response options of “Yes” or “No” (reference).
- **Trainings offered to new recruits or in-services** were measured in three distinct covariates for whether the agency offered: (1) decision making/simulation/virtual reality/simulations training; (2) crisis intervention training (CIT); or (3) training in responding to mental illness, for either in-service officers or new recruits (coded as 1 if training was offered).

Community Policing

- **Community policing budget** was captured by asking LEAs whether the agency has a dedicated portion of the budget for community policing, with response options of “Yes” or “No” (reference).
- **Dedicated community policing officers** was measured by LEAs reporting whether they have one or more dedicated community policing officers, coded as “Yes” or “No” (reference).
- **The frequency of community policing events** was measured by asking LEAs to report how often officers in their agency involved in community meetings or events, such as “coffee with the cop”, coded into a two-point scale of a few times a year or fewer (reference) to once a month or more.

Analysis Plan

We conducted the following steps for analysis for both VAO and OIS separately.

Step 1: Fitting Intercept-Only Models to Determine the Best-Fitting Model Types

We performed regression analysis to examine the effects of covariates on VAO and OIS rates separately using count models (Long, 1997). We first modeled VAO yearly average rates with an intercept-only model (no predictor variables included) using Poisson regression. A test of over-dispersion indicated a larger variance than expected, and, thus, we fit a negative binomial regression to compare the model fit with the Poisson model. Using a deviance goodness-of-fit test (Rodríguez, 2007), we found that the negative binomial model fits the data better. We then carried out a Bonferroni outlier test (Fox, 2015; Fox et al., 2007) which suggested the need to remove three outliers to improve the model fit. We further examined the residuals and confirm that the model fits the data well.

We modeled the OIS rates similarly. That is, we fitted both Poisson and negative binomial models, and conducted Bonferroni outlier tests, a dispersion test, and residual analysis to compare the model fit. In addition, as 60% had a zero OIS, we investigated the need for zero-inflated models to account for a large proportion of zeros. The overdispersion test indicated that the negative binomial model fits the data better than a Poisson model. However, using Vuong's non-nested hypothesis test (Vuong, 1989; Zeileis et al., 2008), we found that the zero-inflated models did not improve the model fit significantly. Bonferroni outlier tests indicated the need to remove three outliers for model fit improvement. Therefore, we decided on a negative binomial regression with the three outliers removed.

Step 2: Conducting Multiple Imputation

To address missing data issues, we employed multiple imputation (Rubin, 1987). To avoid outliers biasing regression estimates, for both the models we removed outliers from the dataset prior to imputation. We generated 25 datasets using multiple imputation by chained equations (Van Buuren, 2018; Van Buuren & Groothuis-Oudshoorn, 2011), conducted analyses on all 25 datasets, and reported pooled results using the well-accepted Rubin's Rules (Little & Rubin, 2019; Rubin, 1976).

Step 3: Adding Covariates

To assess the effects of covariates on OIS and VAO, we fit three different stepwise models separately for the two outcomes. Model 1 only included agency and community characteristics, Model 2 included the additional agency policies and training variables, and Model 3 included the additional community policy variables. To ease model convergence, we mean centered and scaled all continuous variables, including crime rate, police–population ratio, in-service training hours, and the number of authorized weapons.

All the analyses were weighted, and we used R software version 4.2.1.

3 Results

Descriptive Statistics

Agencies reported an average of 12.43 VAO incidents per year ($SD = 78.62$) and 0.11 OIS incidents annually of officers being shot at by a subject ($SD = 0.57$). Between 2015 and 2019, agencies reported an average total of 0.57 OIS incidents ($SD = 2.85$) during the five-year period, with 86.8% of agencies not having any OIS shootings of officers in the period of study.

The number of VAO and OIS incidents varies widely by agency size. Agencies with less than 100 sworn officers (87% of agencies in the sample) reported an average of 6.22 VAO incidents annually; LEAs with 100–249 officers (8.3%) reported 21.01 VAO incidents per year; and LEAs with 250 or more officers (4.7%) reported an average of 112.67 VAO incidents per year. Using the NDLEA sampling frame, we extrapolated the total number of VAO incidents per year based on averages by agency size strata. As such, we would expect 147,058 incidents of VAO across all LEAs in the USA per year, with a total of 735,290 VAO incidents across the five-year period of 2015–2019.

Similarly, we estimated the number of OIS incidents nationally. Agencies with less than 100 officers reported an average of 0.030 OIS incidents per year; LEAs with 100–249 officers reported 0.24 OIS incidents per year; and agencies with 250 or more officers reported an average of 1.43 OIS incidents per year. Thus, we estimated an average of 1152 OIS incidents in the nation per year between 2015 and 2019, with a total of 5761 OIS incidents during the five-year period.

Violence Against Officers

As seen in Table 2, controlling for agency and community characteristics, the VAO rate did not significantly differ by region. In contrast, agency size was significantly negatively associated with the VAO rate. In Model 1, agencies with 100–249 officers ($IRR = 0.43$, $p = 0.04$) and 250 or more officers ($IRR = 0.38$, $p = 0.04$) had lower VAO rates

compared to agencies with 100 or fewer full-time sworn officers. The officer to population ratio was also significantly associated with the VAO rate. A higher proportion of officers to their respective population was associated with lower VAO rates (Model 3 IRR = 0.71, $p = 0.03$). This finding remained significant in each of the three stepwise models. Agency training, policies, community policing practices, or violent crime rates were not significantly associated with VAO rates.

Subject Shootings of Officers

As seen in Table 3, whereas no regional differences were found in the VAO model, region was significantly associated with OIS rate. Southeast (Model 3 IRR = 3.05, $p = 0.02$) and Southern (Model 3 IRR = 2.81, $p = 0.04$) agencies were associated with nearly three times the OIS rate of one or more officers being shot by a subject, as compared to Northeastern agencies. This finding remained significant in each of the three stepwise models. In Model 2, controlling for agency trainings and policies, agencies with 250 or more full-time officers had higher OIS rates compared to agencies with 100 or fewer officers (IRR = 2.16, $p = 0.04$), which was marginally significant in Model 1 ($p = 0.07$). This finding remained significant when controlling for community policing covariates in Model 3 (IRR = 2.11, $p = 0.05$). The association between the violent crime rate and OIS rate was not significant in Model 1 but was marginally significant in Model 2 (IRR = 1.32, $p = 0.10$) and Model 3 (IRR = 1.32, $p = 0.10$). Agency training, policies, or community policing practices were not significantly related to OIS rates.

4 Discussion

Our project data reveal that VAO and OIS are relatively rare events statistically. This is not to diminish the significance of VAO and OIS. Many officers experience mental and physical injuries associated with VAO and OIS or even lose their lives (Papazoglou & Tuttle, 2018). Nevertheless, in dealing with any societal problem we need to be cognizant of its scope.

Table 2 Stepwise Poisson regression models for VAO rate ($N = 707$)

	Model 1 Incident rate ratio (IRR)	Model 2 IRR	Model 3 IRR
Type ^a			
<i>County/state police/ highway patrols</i>	1.05	1.42	1.34
Size (full-time sworn officers) ^b			
100–249	0.43*	0.70	0.74
250 or more	0.38*	0.59	0.62
Region ^c			
Midwest	1.67	1.15	0.98
Southeast	1.01	0.97	0.92
South	0.50	0.65	0.65
West	0.69	0.75	0.68
Violent crime rate	1.17	1.16	1.18
Officer to population ratio	0.71*	0.71*	0.71*
In-service training hours	–	0.89	0.89
Count of non-lethal weapons authorized	–	0.82	0.87
CALEA accreditation	–	0.80	0.85
Written foot pursuit policy	–		
<i>Guidelines but no mandatory policy</i>	–	0.97	0.98
<i>Written mandatory policies</i>	–	1.09	1.13
Written body armor policy	–	1.14	1.18
Body-worn cameras deployed	–	1.81	1.70
Simulation training offered	–	0.59	0.60
CIT training offered	–	1.25	1.27
Responding to mental illness training offered	–	0.22	0.19
Dedicated community policing budget	–	–	0.64
Dedicated community policing officers	–	–	1.10
Frequency of community policing events	–	–	0.89

Notes Reference categories: ^amunicipal; ^bless than 100 full-time sworn officers; ^cNortheast;

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3 Stepwise Poisson regression models for OIS against officers' rate ($N = 707$)

	Model 1 Incident rate ratio (IRR)	Model 2 IRR	Model 3 IRR
Type ^a			
<i>County/state police/</i>	1.07	1.01	1.03
<i>highway patrols</i>			
Size (full-time sworn officers) ^b			
100–249	1.55	1.61	1.56
250 or more	1.88	2.16*	2.11*
Region ^c			
Midwest	1.94	1.81	1.80
Southeast	2.73*	3.12*	3.05*
South	2.73*	2.85*	2.81*
West	1.64	1.73	1.72
Violent crime rate	1.24	1.32	1.32
Officer to population ratio	0.66	0.64	0.63
In-service training hours	–	1.02	1.02
Count of non-lethal weapons authorized	–	1.07	1.07
CALEA accreditation	–	0.80	0.80
Written foot pursuit policy	–	0.82	0.82
<i>Guidelines but no</i>	–	1.07	0.81
<i>mandatory policy</i>			
<i>Written mandatory</i>	–	0.64	1.04
<i>policies</i>			
Written body armor policy	–	0.70	0.63
Body-worn cameras deployed	–	0.34	0.70
Simulation training offered	–	0.97	0.33
CIT training offered	–	0.99	0.94
Responding to mental illness training offered	–	0.82	1.00
Dedicated community policing budget	–	–	1.19
Dedicated community policing officers	–	–	1.05
Frequency of community policing events	–	–	1.06

Notes Reference categories: ^amunicipal; ^bless than 100 full-time sworn officers; ^cNortheast

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

We have found that LEAs report an average of about 12 total VAO incidents per year and less than one (0.11) OIS incident annually. That is, the vast majority of officers will not experience VAO nor OIS. Also, the number of VAO and OIS incidents varies widely by agency size. Agencies with less than 100 sworn officers report on average six VAO incidents annually; LEAs with 100–249 officers report 21 VAO incidents per year; and LEAs with 250 or more officers report 113 VAO incidents per year.

Using our sampling frame statistics, we have been able to extrapolate our results to all LEAs across the USA, suggesting that the total number of VAO incidents per year is 147,058. This number suggests that VAO occurs in about 1% of the 13 million or so arrests per year in the USA (Snyder, 2011). Our data suggest that 2.5 times as many assaults against officers occur than Department of Justice (DOJ) data indicate based on LEOKA data (Federal Bureau of Investigation, 2010). DOJ estimates that 57,268 officers are assaulted each year (Snyder, 2011). More research will be needed to help explain this difference, but our initial assessment is that the differences could be related to methodology. Given that a number of LEAs do not report data to the DOJ, that might contribute to the difference. While we had a modest response rate for our survey, we did apply statistical weights and non-response bias adjustments to our estimates, something not done by the DOJ. Also, it is possible that our survey methods, with a promise of confidentiality, as opposed to full public release of the data by the DOJ, leads to higher levels of reporting VAO and OIS.

Our extrapolation for OIS suggests that there are 1152 OIS incidents per year across the USA. As noted earlier, the field does not have any data reporting on a broad range of OIS; the extant databases focus on officer deaths. LEOKA data (see earlier literature review) suggest that somewhere between 25 and 70 officers are feloniously killed each year, mostly by firearms, but our data of 1152 OIS incidents per year suggest there are many more officers being shot at than those who are killed.

While front-line law enforcement is one of the more dangerous jobs, officers should be realistic about these dangers. In our study, we found that 87% of agencies did not have a single OIS incident in the five-year period of study. Given the more than 13+ million arrests that are made annually by the police (Snyder, 2011) and hundreds of millions of other

interactions that the police have with the public each year, VAO and OIS rarely occur. While officers should follow appropriate safety protocols when interacting with the public, these data suggest that officers should mostly feel safe in interacting with the public. For example, community policing practices encouraging frequent positive interactions with the public in building partnerships and problem solving will most likely proceed without any VAO or OIS. However, as is human nature when it comes to risk, officers like most people may misinterpret these risks such as people being scared of shark attacks when statistically they are extremely rare. We also note that the risk to officers is often specific to patrol officers providing front-line policing and less for tactical teams with more advanced training, skills, and equipment. Also, these risks do not typically apply to the substantial number of officers working behind a desk, those in other administrative or technical positions such as managing service calls or monitoring cameras.

Next, we then observed only a small number of significant covariates in our VAO rate models, suggesting that VAO is an across-the-nation problem for all LEAs. A consistently significant correlate associated with VAO rates across all three of our models was the ratio of officers-to-citizens in the population. A higher ratio was associated with lower VAO rates. That is, having more officers per citizen is associated with less VAO. This finding is consistent with prior research that has found that lower police-to-citizen ratios increases rates of police injurious assaults (Wilson & Zhao, 2008). Our results suggest that assaulting an officer is perhaps less likely when more police are visible to suspects and that this “boots-on-the-ground” approach might be an effective way to deter VAO (Wilson & Zhao, 2008). This finding is especially relevant to the hiring and retention crisis in law enforcement (Taylor et al., 2005; Wilson et al., 2010) that has continued into the current environment of agencies struggling to hire and retain enough officers to cover all their shifts (International Association of Chiefs of Police, 2020; Police Executive Research Forum, 2021). For many agencies attempting to police their jurisdictions with too few officers, these data suggest that officers might be at greater risk of being a victim of VAO.

In our first VAO model, we found that agencies with 100–249 officers and 250+ officers had lower VAO rates compared to agencies with

100 or fewer officers. While there is more VAO in larger agencies overall, as noted in the descriptive results, here we are examining rates of VAO per 10,000 calls for service. That is, in some smaller agencies with less than 100 officers, they have a very small number of calls for service and their ratio of VAO to calls for service can be high, even though the raw VAO numbers are much smaller than the larger agencies with more than 100 officers. However, once we introduce the agency policy/training and community policing measures in the second and third VAO models the number of officers was no longer significantly associated with VAO rates. Given the non-significant findings in VAO models 2 and 3, we do not believe there is a strong relationship between the number of officers and VAO rates. However, even the non-significant findings in VAO models 2 and 3 are important, which means that even smaller agencies need to be concerned about VAO and that officers are not safer in smaller communities than in larger communities. This is especially concerning given the typical scarcity of resources in many small LEAs where officers might have fewer options to address any trauma they might have experienced from their assault.

In the OIS models, we observed two consistent statistically significant variables, that is, region and agency size. For all three OIS models, Southeast and Southern agencies were associated with nearly three times the rate of OIS incidents as compared to Northeastern agencies. The Northeast having lower OIS rates is consistent with Uniform Crime Reports (UCR) data that the Northeast has the lowest crime rates in the USA. Conversely, the South tends to have among the highest rates (Federal Bureau of Investigation, 2019a). This finding is also consistent with research by Kaminski who found police homicide risk was lower in the Northeast (Kaminski, 2008). Also, the South typically has been characterized as being particularly risky for officers compared to other regions (Fridell & Pate, 1997; Geller & Scott, 1992; Kaminski et al., 2000).

While not significant in OIS Model 1 ($p = 0.07$), in both Model 2 (controlling for agency policies/training) and Model 3 (controlling for community policing variables), we found that agencies with 250 or more full-time officers had higher OIS rates compared to agencies with 100 or fewer officers. These data suggest that the larger agencies (more likely to be in urban areas with higher homicide rates) are facing greater dangers

of OIS. These findings are consistent with the results of Kaminski's (2004) research which found that LEAs with more police officers were associated with an increase in the likelihood of an officer homicide.

For the VAO and OIS models we expected that our community policing variables would have been significant since such strategies are designed to improve police–community relationships and tend to improve the dynamic work environment associated with the police profession (Cordner, 1997; Greene, 2000) and increase the perceived legitimacy of the police (Hawdon et al., 2003) and residents' perceptions of the police (Zhao et al., 2002). However, they were not related to these outcomes. Part of this may be due to the broad nature of our community policing measures. Future research should consider more measures that assess each of the three key components of community policing: community partnerships, problem solving, and organizational transformation to implement partnerships and problem solving (Office of Community Oriented Policing Services, 2021).

We were also surprised that we did not find that the violent crime rate was related to VAO or OIS. Based on prior work, we thought that crime and violence in general, and VAO/OIS, would share common structural causes, and thus where violent crime was high, we thought we would see elevated rates of VAO and OIS. Nevertheless, our finding of the non-significance of violent crime is consistent with prior research (Kaminski, 2008; Kaminski & Marvell, 2002; Peterson & Bailey, 1988).

5 Limitations

With our research relying on LEAs to self-report VAO and OIS, this study is subject to many of the typical limitations of survey research (e.g., inaccurate reporting) that could be compounded by the fact that agencies might be motivated to not report VAO or OIS as it might discourage others from joining their agency as new officers. However, LEAs have been completing these type of organizational surveys for decades (e.g., the BJS LEMAS program) and the field has accepted these surveys as a recognized practice. Another limitation is the depth of our survey. While we attempted to collect at least ten years of data from all the sampled

LEAs, most of the sample could only produce five years of reliable data. In addition, due to the aggregated nature of the data, we were not able to collect more detailed information on VAO and OIS incidents or details on the community being patrolled by the officers. Finally, given the relative rarity of VAO, we note that the law of small numbers suggest that we should use some caution in interpreting our numbers in that small swings could affect our reported proportions.

6 Conclusion

This study confirms in a nationally representative sample of LEAs that VAO and OIS are relatively rare events, with LEAs reporting about 12 total VAO incidents and less than one (0.11) OIS incident annually, with 87% of LEAs reporting no OIS incidents over our entire five-year study period. However, our data reveal some updates to our understanding of VAO and OIS. First, our data suggest that there are 2.5 times as many assaults against officers than the leading DOJ data indicate. Also, there are over 1000 ($n = 1152$) OIS incidents per year involving officers being shot at, a much bigger number than the 25–70 officers feloniously killed each year. So, while rare, a substantial number of officers and their families will likely need help in addressing trauma from violence. Nevertheless, these dangers officers face should not obscure the fact that they should mostly feel safe in interacting with the public.

In research we tend to focus on the statistically significant predictor variables of our study outcomes. However, sometimes the absence of statistically significant variables is important too. We observed only a small number of significant covariates in our VAO and OIS models, suggesting that VAO and OIS are an across-the-nation problem. We cannot focus on a specific set of agencies with clear distinguishing characteristics that are experiencing these problems. We will therefore need VAO and OIS prevention strategies that have wide applicability across LEAs. Nevertheless, a few significant covariates emerged from our analyses. A higher ratio of officers to citizens was associated with lower VAO rates for our first VAO model, but then the relationship becomes non-significant in VAO Models 2 and 3. At a minimum, what this means is

that even smaller LEAs need to be concerned about VAO and that officers are not safer in smaller communities. We also caution LEAs about officer safety issues in the Southeast and Southern agencies that had three times the OIS rate compared to Northeastern agencies. Finally, our data suggest that the larger agencies are facing greater dangers for OIS than smaller agencies.

Key Takeaways

Police Officers

For front line officers, our work highlights the extent of VAO and OIS based on scientific data. That is, moving past the sensationalism of news accounts of a “war on cops” in the USA, our data suggest that their chances of being a victim of an assault or shooting is highly unlikely. For officers on the front line of our communities addressing the dangers of crime, it is no doubt hard to see past the potential for danger. It is easy to see how regularly observing violence can lead an officer to be concerned that they too will be a victim. However, our data and prior research shines a light on the actual extent of VAO and OIS. We recognize that death and injuries to officers do not only occur during arrests. In fact, officers put themselves at risk any time they put on their uniform and may suffer death or assault by ambush even during a “routine” call for service. However, data from this and past studies suggest that the number of actual incidents per capita for front line officers is small and, thus, the overall risk in general is small. Given such data and the importance of police interactions with the public, officers should feel fairly safe during these interactions.

Conflict Management Trainers

For conflict management trainers, our finding that we observed only a small number of significant covariates in our models can help them understand that VAO and OIS are an across-the-board concern that LEAs of all types might need to be able to address. Also, trauma services will need to be varied to address the many types of officers likely to experience trauma associated with VAO and OIS. Conflict management trainers have a number of referral options for psychological interventions that are evidence-based with a history of helping officers effectively handle police-related trauma (Andersen et al., 2015;

Chopko & Schwartz, 2009; Papazoglou & Andersen, 2014). Also, conflict management trainers will need to consider prevention strategies to keep officers safe that have wide applicability across LEAs.

Police Decision-Makers

For police decision-makers, our findings on significant covariates could be used to promote officer safety. These decision-makers can use our data to make a strong case for hiring and maintaining a higher ratio of officers-to-citizens to promote lower VAO rates. The current shortage of officers in many LEAs can be considered an officer safety issue based on our data. Our results can also be used by police decision-makers in the Southeast and Southern agencies to heighten awareness of the three-fold increase in the OIS rate occurring in their agencies. Also, a case can be made that more resources will be needed for the larger LEAs in the USA who are facing the highest levels of OIS.

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