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Suicides at Shooting Ranges

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Abstract. *Background:* Some shooting ranges have adopted policies to prevent suicides at their facilities. Little data have been available to guide them. *Aim:* We aimed to describe the incidence and characteristics of suicides at public shooting ranges. *Method:* We conducted text searches of 63,710 firearm suicides in the 16 states participating in the National Violent Death Reporting System from 2004 to 2015 to identify those occurring at public shooting ranges. *Results:* A total of 118 (or 0.18%) occurred at a shooting range, or 0.12 per million population. If that rate held for the nation as a whole, there would have been roughly 35 shooting range suicides per year during the study period. In total, 88% of decedents arrived alone. When gun ownership was noted, 86% of guns were rented from the range. In some cases, people drove to the range and took their lives in the parking lot with their own gun. *Limitations:* Our search strategy may have missed cases, and the data may not be nationally representative. *Conclusion:* Suicides at shooting ranges are rare. Policies that some ranges have adopted – such as allowing rentals only if the person is not alone – are responsive to the actual characteristics of these deaths and could potentially prevent most.

Keywords: firearm suicide, shooting range suicide

In the United States, where roughly one in three homes have firearms (Azrael, Cohen, Salhi, & Miller, 2018), public shooting ranges offer the public an opportunity to learn or improve their shooting skills, engage in recreational or competitive shooting, try new firearms, and socialize. Range masters are responsible for enforcing safe firearm handling rules to avoid unintentional injuries. According to newspaper reports, suicides have occurred at shooting ranges in many parts of the country, leading some range operators to voluntarily adopt new policies regarding who may rent a gun at their facilities (Kyle, 2014; Schuppe, 2018). A large retail chain in Florida ceased all gun rentals in response to a spate of suicides at their ranges (Curtis, 2014). Other ranges have instituted policies allowing people unknown to range personnel to rent guns only if accompanied by another person or if they have proof that they have received gun training. Still others require new customers to provide references from someone who can attest to their mental stability (Dallop, 2010).

We searched the peer-reviewed public health and social sciences literature and were unable to find any papers that estimate the incidence of suicides at shooting ranges or describe their characteristics. These events appear to be rare. A newspaper investigation in California reviewed coroner reports and identified 64 suicides at shooting ranges in the counties of Orange, Los Angeles, and San Diego from 2000 to 2012, for an average annual rate of .31 deaths for every million residents (Kyle, 2014). If that rate applied to the nation as a whole, then roughly 100 suicides per year would occur at shooting ranges, a fraction of the 23,854

firearm suicides recorded nationally in 2017 (Centers for Disease Control and Prevention, 2017). An industry market report estimates that there are over 7,000 public shooting ranges in the US (IBISWorld, 2019).

Like suicides by any method, those at ranges have tragic consequences for the decedent and his or her friends and family. They can also be traumatic for range personnel and other range users, cause temporary shutdowns that are costly to retailers, and expose some ranges to lawsuits. According to studies in the US and Australia, firearms have the highest fatality rate among suicide methods (Spicer & Miller, 2000; Spittal, Pirkis, Miller, & Studdert, 2012) and cause death more quickly than most other methods. Presumably, at least some range suicides occur when a person who does not have access to a firearm uses the gun range as a means of gaining access. Retailers have also conjectured that some individuals choose to end their lives at a shooting range rather than at home in order to insulate family members from the trauma of discovering their bodies.

In recent years, public health groups and firearm retailers have forged partnerships in many states to examine ways in which retailers can help reduce firearm suicides (Barber, Frank, & Demicco, 2017; Henn, Barber, & Hemenway, 2019; Vriniotis, Barber, Frank, Demicco, & New Hampshire Firearm Safety Coalition, 2015). Projects have included distributing suicide awareness information to gun shop customers, at gun shows, in firearm classes, and in publications catering to gun owners. The information provides warning signs for suicide risk and advises storing household guns away from home, or making them inac-

cessible in some other way, until a household member at risk for suicide recovers. One role of public health groups in these efforts is to supply useful and actionable data.

This study uses data from the National Violent Death Reporting System (NVDRS) to estimate the incidence of shooting range suicides and to describe characteristics of the victims and incidents involved – particularly characteristics that may be useful to range operators as they weigh whether, or how, to change their range use policies to avoid a suicide at their facility.

Method

The NVDRS is a state-based reporting system coordinated and funded by the Centers for Disease Control and Prevention. The system began collecting data in 2003, with six states participating, and has gradually expanded to a 50-state system today. The system is described in detail elsewhere (Paulozzi, Mercy, Frazier, Annet, & Centers for Disease Control and Prevention, 2004). Briefly, abstractors from the relevant state VDRS office gather data from the death certificate, law enforcement reports, and coroner/medical examiner reports on every violent death inflicted in their state, whether from homicide, suicide, injury of undetermined intent, or unintentional firearm injury. Abstractors code data on the decedents' demographics, the place where the incident occurred, the substances testing positive in postmortem toxicologic screens, the circumstances preceding the event, and the weapon or suicide method used. These variables are defined in the NVDRS coding manual (Centers for Disease Control and Prevention, 2016). In addition, the abstractor writes two brief incident narratives that summarize the circumstances of the death as reported by law enforcement and by the coroner or medical examiner.

We obtained individual-level Researcher Access Data from the CDC in November 2017. Our use of the NVDRS data for epidemiologic research was approved by the Harvard T. H. Chan School of Public Health Institutional Review Board. We used data from 16 states, including 13 that reported consistently from 2004 to 2015 (Alaska, Colorado, Georgia, Maryland, Massachusetts, New Jersey, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Virginia, and Wisconsin), and three that did not report in 2004 but did so throughout the remainder of the period (Kentucky, New Mexico, and Utah).

Case Definition

We selected cases coded by the NVDRS abstractor as firearm suicides. Because the incident location variable does not have a code for *shooting range*, we conducted a text search in the incident narratives for the phrases *shooting range*, *gun shop*, *gun range*, *rifle range*, *firing range*, *skeet*, *sportsman*, *gun club*, and variants on those phrases. We then read the incident narrative to determine whether the case met our definition. Our intention was to include ranges that rent guns and that are open to the public (vs. open only to members) either all of the time or some of the time. We excluded ranges operated by police, military, or a private club, if the range did not have public shooting access. If the location were referred to as a *shooting range*, we accepted that as meeting our case definition, unless there was counter-evidence indicating that it was exclusively a non-public range. For all other terms (e.g., *gun club*, *skeet*), we applied a higher level of scrutiny and assumed the case was not a public range unless there was evidence to the contrary (e.g., the decedent rented a gun, or a Google search found that the only gun club in the zip code in which the incident occurred advertised public shooting hours). We accepted cases identified from the search term *gun shop* only if the narrative indicated the suicide occurred in a shooting area operated by the shop. Among the 118 cases included in our final data set, 86 included the phrase *shooting range* in the narrative and 32 were located using one of the other terms (usually *gun range* or *firing range*).

Coding

In addition to analyzing the abstractor-coded variables, we created four new variables based on reading the incident narratives: whether the gun was rented from the range, whether the decedent was alone or accompanied, whether he or she fired multiple shots or a single shot, and whether the shooting occurred directly in the shooting area or in an adjacent area like the parking lot. The owner of the gun was coded as either the range, the decedent, other (e.g., a friend or parent with whom the decedent was shooting), or unknown, based on information in three areas: (a) incident narratives, (b) an NVDRS variable that describes the relationship of the decedent to the owner of the gun, and (c) a free-text variable describing how the decedent obtained their firearm. These last two are usually unknown or blank for adult decedents, but occasionally were useful. If there was no mention that the decedent arrived at the shooting range with another person, and there was a detailed description of the incident (e.g., “Man rented a gun at a shooting range; surveillance video indicates that he shot several rounds before shooting himself”), we assumed

he or she was alone. If there was virtually no information about the incident (e.g., “Decedent shot self at a shooting range,”) we coded “Alone or accompanied” as “unknown.”

Incidence Rates and Analysis

We calculated incidence rates both for shooting range suicides and for firearm suicides overall in the 16 NVDRS states from 2004 to 2015. For the denominators, we used the CDC WONDER website to obtain population estimates for each applicable demographic group in each participating state and each year in which the state participated in the NVDRS. For the numerator, we based counts on the state in which the incident occurred, rather than the state of the decedent’s residence. We characterized the rural–urban status of the county in which the incident occurred using the National Center for Health Statistics’ “Urban–Rural Classification Scheme for Counties.” We also characterized the level of household gun ownership in the decedent’s state of residence. This was based on 2004 data from the Behavioral Risk Factor Surveillance System, the last year for which there are valid state-level estimates of gun ownership (Okoro et al., 2005). We classified states’ household gun ownership level as low (under 20%), medium (30–39%), and high (40%+).

We tested for differences between firearm suicides overall and those occurring at shooting ranges using the chi-square statistic for categorical variables and the *t* test for mean age. All text searching was done in the SAS Institute JMP Pro Version 13, and analysis was performed in both JMP and StataCorp Stata/IC 15.0.

Results

Among a total of 63,710 people who took their lives with a firearm in participating states over the 12-year period, we identified 118 who did so at a shooting range, or two tenths of 1% of all firearm suicides. The overall incidence rate was 0.12 per million population. Applying that rate to the nation’s population as a whole during the midpoint of the study period would yield an estimated 37 suicides at shooting ranges per year nationally. Applying the proportion of firearm suicides that occurred at a shooting range in the NVDRS states to total US firearm suicides during the study period would yield an estimated 35 shooting range suicides per year.

Decedents at shooting ranges were younger on average (mean age = 39.3 vs. 49.3, $p = .001$) than firearm suicide decedents overall. As noted in Table 1, people ages 50 and over made up roughly half (49%) of all firearm suicides

but only 23% of shooting range suicides. Males made up 86% of both shooting range and overall firearm suicides. A higher proportion of shooting range decedents were an ethnicity other than White non-Hispanic (22% vs. 13%) compared with firearm suicides overall. When comparing by type of county in which the incident occurred, shooting range suicide rates were over 3 times *lower* in rural as opposed to metropolitan counties (0.04/million vs. 0.15/million), whereas overall firearm suicide rates were more than 2 times *higher* in rural counties compared with large metropolitan counties. People living in states with low gun ownership made up only 6% of all firearm suicides, but 21% of shooting range suicides ($p < .001$). Rates were higher in the last 3 years of the study period compared with earlier years for both shooting range suicides and all firearm suicides.

Two thirds of the people who took their lives at a shooting range were divorced, widowed, separated, or single, while a third were married or in a domestic relationship (Table 2); 40% were college graduates or held an advanced degree. There was evidence of a known mental health problem in the NVDRS data for 47% of the shooting range decedents, with depression the most frequent diagnosis (59% of those with mental health problems), followed by bipolar disorder (27%). One in five people (22%) who took their life at a shooting range had made a previous suicide attempt, which is higher than among firearm suicides overall (11%). In total, 62% of the decedents were noted as having had a behavioral health issue including mental illness, substance abuse problem, or previous suicidal thoughts or attempts. As with firearm suicides more generally, the most frequent external precipitating circumstance was a problem with an intimate partner (28%) – often a break-up. Health problems were less frequently noted as contributing to shooting range suicides than among all firearm suicides (7% vs. 23%, $p < .001$).

Most (74%) of the suicides at shooting ranges occurred in or adjacent to the shooting area. However, 13% occurred in the decedent’s car, parking lot, or area next to the range, sometimes after the decedent had finished target shooting. In 23% of cases the owner of the gun was not specifically stated. Among those for whom the information was noted, 86% of the guns were rented from the range and the remainder belonged to either the decedent or, in a few cases, the person accompanying the decedent. When the decedent used his or her own gun, typically they took their life outside the range after a shooting session, or in some cases they drove to the range and never left the parking lot.

Decedents were alone in at least 90% of cases. In the few cases where a person was accompanied, often the gun they used belonged to the accompanying person (e.g., a youth using a parent’s gun). Although information about

Table 1. Firearm suicides at shooting ranges vs. all locations by decedent demographics, urbanization level, state gun ownership level, and period: Alaska, Colorado, Georgia, Kentucky,^a Maryland, Massachusetts, Wisconsin, New Jersey, New Mexico,^a North Carolina, Oklahoma, Oregon, Utah,^a Virginia, and Wisconsin, 2004–2015

	Shooting range suicides			All firearm suicides			<i>p</i>
	<i>n</i>	%	rate ^b	<i>n</i>	%	rate ^b	
Total	128	100%	0.13	63,710	100%	64.1	
Male	112	88%	0.24	54,917	86%	115.2	
Female	16	13%	0.03	8,790	14%	17.8	
White (non-Hispanic)	102	80%	0.15	55,269	87%	83.3	**
All other racial/ethnic groups	26	20%	0.08	8,383	13%	25.4	
9–29 years	44	34%	0.16	12,254	19%	45.9	***
30–49 years	54	42%	0.20	20,451	32%	75.9	
50+ years	30	23%	0.10	30,951	49%	100.6	
Type of county where incident occurred							***
Large central metro	24	19%	0.16	6,795	11%	45.3	
Large fringe metro	60	47%	0.17	16,281	26%	45.4	
Medium metro	21	16%	0.10	16,016	25%	75.7	
Small metro	15	12%	0.16	7,502	12%	78.4	
Rural	8	6%	0.05	16,673	26%	107.1	
Household gun ownership in victim's state of residence ^c							***
Low (< 20% of homes have guns)	28	22%	0.14	3,768	6%	19.2	
Medium (20–39 % have guns)	55	44%	0.28	30,052	47%	74.1	
High (≥ 40+% have guns)	43	34%	0.22	29,860	47%	76.3	
Year							*
2004–2006	25	20%	0.11	13,507	21%	60.0	
2007–2009	21	16%	0.09	15,109	24%	62.4	
2010–2012	33	26%	0.13	16,773	26%	67.4	
2013–2015	49	38%	0.19	18,321	29%	71.8	

Note. ^aState did not report data in 2004. ^bRates per million population are based on state in which shooting occurred, regardless of whether the decedent lived in that state. 2.2% of firearm suicide decedents overall (and 12.5% of shooting range decedents) did not live in the state in which they took their lives. ^cClassification is based on decedent's state of residence even if they lived out of state. When excluding out-of-staters from the numerators, rates for shooting range suicides by state gun ownership level were as follows: low states – 0.10, medium states – 0.13, high states – 0.11. Rates for all firearm suicides were: low states – 18.6, medium states – 72.1, high states – 75.0. Source: National Violent Death Reporting System.

p* < .05. *p* < .01. ****p* < .001. Note: *p* values refer to whether the distribution of cases by listed category (e.g., sex, type of county, etc.) differs significantly between shooting range suicides and all firearm suicides.

the number of shots fired before the suicide was frequently not mentioned, in 30% of cases the decedent took at least one shot before the suicide, and sometimes as many as 100 shots. The narrative noted in a few cases that the person had been to the range on at least another occasion.

Discussion

Suicides at shooting ranges are rare events. Still, with perhaps 350 occurring over a decade in the US, many range masters will have experienced one or will know a colleague who has. The policies that some range masters have

instituted to prevent these events – such as requiring that a range user either bring their own gun or, if renting one, be accompanied by another person – are responsive to the characteristics of most range suicides. Most, but not all, are carried out by a person who arrived alone and rented a gun.

Most incident narratives supplied at least some information about the way the incident unfolded at the range and the problems that the decedent faced. Relatively few narratives, however, supplied information about why the decedent chose to die at a shooting range. When this information was noted or alluded to, typically the person was not a gun owner and was seeking access for the purpose of suicide. The fact that 21% of shooting range suicides versus just 6% of overall firearm suicides were among people

Table 2. Characteristics of suicides at public shooting ranges: NVDRS, 16 States, 2004–2015

Characteristics	<i>n</i>	%
Total	118	100%
Victim characteristics coded by NVDRS abstractor		
Education (among those age 23 and over, <i>n</i> = 104)		
High school diploma or less	35	34%
Some college or assoc. degree	23	22%
College graduate	29	28%
Advanced degree	12	12%
Unknown	5	5%
Marital status		
Married/domestic partner	40	34%
Never married/single unspecified	50	42%
Divorced/separated	25	21%
Widowed	3	3%
Suicide circumstances		
Mental health problem	56	47%
Prior suicide attempt	26	22%
Disclosed suicidal thoughts to someone	22	19%
Alcohol problem	8	7%
Drug problem	15	13%
Any above behavioral health issue noted	73	62%
In behavioral health treatment currently	34	29%
Left a suicide note	47	40%
Intimate partner problem	33	28%
Other relationship problem (family or friend)	11	9%
Criminal/legal problem	16	14%
Job problem	18	15%
Financial problem	6	5%
Health problem	8	7%
Shooting range suicide characteristics coded by authors		
Source of the gun		
Rented from range	78	66%
Owned by decedent or companion at range	13	11%
Not stated	27	23%
Decedent was alone or accompanied		
Alone	104	88%
Accompanied	7	6%
Not stated	7	6%
Location of the shooting		
Shooting area	87	74%
Parking lot	11	9%
Other	5	4%
Not stated	15	13%
Multiple shots fired?		
Yes	39	33%
No	10	8%
Not stated	69	58%

Note. NVDRS = National Violent Death Reporting System.

from states where gun ownership is low supports this observation. In isolated cases, the shooting range decedent was a gun owner, but the family had removed their guns out of concern that they might harm themselves. When the decedent used his own gun (nearly all were male), the incident usually took place in the parking lot or outside the range.

Whether a suicide prevented at a range is indeed a life saved or a suicide postponed is impossible to say at the individual level. At the group level, at least some lives can be expected to be saved. Nearly every method that a suicide attempter may substitute for firearms will have lower odds of causing death (Spicer & Miller, 2000). A review of studies following suicide attempters over time found that over 90% did not go on to die by suicide (Carroll, Metcalfe, & Gunnell, 2014); this was true even in a study that followed up people who survived jumping in front of a subway train (O'Donnell, Arthur, & Farmer, 1994). The fact that at least 28% of the people who killed themselves at a shooting range were experiencing intimate partner problems – which, while devastating, can be weathered – and that very few were noted as facing health problems would suggest that, for some, thwarting their access to a gun might buy enough time to allow for the suicidal crisis to pass. A number of studies have indicated that while some suicidal people remain suicidal for long periods, most do not (Drum, Brownson, Burton Denmark, & Smith, 2009).

Limitations

The 16 NVDRS states may not be representative of the nation as a whole, and therefore our estimate of the number of shooting range suicides in the US may not be accurate. In addition, our text-searching strategy may also have failed to identify all cases. The newspaper study that accessed coroner records in San Diego, Orange, and Los Angeles Counties found that shooting range suicides occurred at a rate 2.4 times higher than the rate we observed in NVDRS states (Kyle, 2014). It is unknown whether this is because of regional differences or a shortcoming in our search strategy. Another limitation of NVDRS is that coroners/medical examiners and law enforcement reports from which the NVDRS data are drawn vary in the extent to which the circumstances involved in a suicide are detailed. Therefore reports of the proportion of decedents with diagnosed mental health problems and other precipitating circumstances are likely to be underestimates.

An additional limitation of the study is that we only have access to deaths and not to the numbers and characteristics of public shooting range users in the 16 NVDRS states during the study period. Therefore, our rates are based on

total state population, not on the more relevant denominator, total range users.

Conclusion

Although there were exceptions, most people who took their life at a shooting range arrived alone and used a rented gun. These events are rare, and without a centralized data source like the NVDRS, it would be difficult to identify and describe a large enough sample to provide useful information to range operators. Because shooting range operators are likely motivated to reduce range suicides for both humanitarian and business reasons, it is useful to supply them with actionable data. Grassroots suicide prevention efforts such as those initiated by the New Hampshire Firearm Safety Coalition's Gunshop Project (Vriniotis et al., 2015) have already distributed tip sheets to shooting range operators on how to recognize and respond to potentially suicidal customers. A logical next step is to circulate information on the characteristics of shooting range suicides so that those owners wishing to adopt policies to minimize suicide risk in their facility – such as renting guns only to customers who have shot at the club before or who arrive with another person – can be guided by data.

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