Do Armed Civilians Stop Active Shooters More Effectively Than Uniformed Police?

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April 3, 2025

Abstract

The FBI tracks active shooting cases—where individuals attempt to kill people in public places, excluding those tied to robberies or gang violence. This study is the first to systematically compare how uniformed police and civilians with concealed handgun permits perform in stopping these attacks. Civilians with permits stopped the attacks more frequently and faced a lower risk of being killed or injured than police. Officers who intervened during the attacks were far more likely to be killed or injured than those who apprehended the attackers later.

1. Introduction

Since 2000, the FBI tracked active shooting cases, an event where an individual actively attempts to kill people in a public place, excluding shootings tied to robberies or gang violence. An "active shooting" could be as simple as a single shot fired at a lone human target, even if the shooter misses, to a mass shooting.

Yet, while this data has been collected by the FBI, there have been no studies by the FBI nor academics that systematically examine police performance in stopping these attacks. One approach is to compare police with the alternative: civilians who have permitted concealed handguns. Comparisons can be made in the rate that they stop attacks, whether they increase or decrease the number of casualties, whether they accidentally shoot bystanders, and whether the individuals attempting to stop the attack were wounded or killed by the criminal.

A literature has emerged on mass public shootings where four or more people have been murdered in a public place (see, e.g., Blau et al., 2016, Duwe et al., 2002, Duwe, 2020, Kleck, 2016, 2020, Kovandzic et al., 2002, Gius, 2018, Lott and Landes, 2001, Lott, 2010). These studies have concentrated only on the issues of the rate of attacks in places that allow people to carry permitted concealed handguns or other gun control laws. There have been no studies on the much broader set of active shooting cases and none that focus on the effectiveness of police in stopping attacks.

Civilians will inevitably make mistakes and won't stop every active shooter situation, and most don't receive the same level of training as police. So, it's reasonable to expect that, on average, police might perform better in confronting active shooters. Indeed, it is possible that permit holders could make active shooting attacks worse by getting in the way. But the right comparison isn't against perfection. Police officers often face tactical disadvantages because their uniforms make them easy targets. Attackers who see a uniformed officer can wait for the officer to leave, move on to another target, or strike first knowing the officer is armed.

The concern over these tactical disadvantages is the reason that air marshals on airplanes do not wear uniforms. Ideally, we would also compare non-uniformed officers to officers, but sample of non-uniformed officers is too small, with only a couple cases.

Civilians, by contrast, can intervene when in places they are allowed to carry concealed weapons before an attacker notices them. They also outnumber on-duty police officers by a wide margin. In 2024, 21.5 million Americans—about 8.2% of adults—held concealed handgun permits (Lott et al., 2024). In addition, 29 states allowed Constitutional Carry, which requires no permit at all. Surveys show that 7.2% of likely voters carry all the time, and another 8.4% carry some of the time.[1]

[1] McLaughlin & Associates, "National – Crime Prevention Research Center, General Election Voters," August 22, 2023.

Compare that to the roughly 671,000 full-time sworn law enforcement officers in 2020.[2] If only a third are on duty at any given time, that leaves about 262,522 officers to protect a population of 340 million—less than 0.1% of the population.

Even though police have more training and experience, uniformed officers face greater risks and challenges. They're less likely to be near an attack when it occurs, and when they are, they're more likely to be targeted and killed. This paper is the first to compare outcomes in active shooter events based on whether armed civilians or police intervened, highlighting key differences in effectiveness and risk.

2. Data

The FBI collects data on "active shooter" incidents, i.e., one or more individuals actively engaged in killing or attempting to kill people in a public area.[3] The FBI excludes gang and drug-related violence as well as other criminal acts such as a robbery, as their goal is to focus on those cases that get national news attention where an attacker's sole goal is to murder people in a public place such as mall, school, or movie theater. Since law enforcement agencies don't collect this data in crime reports, the FBI worked with the Advanced Law Enforcement Rapid Response Training Center at Texas State University to collect these cases from news reports. Research done at the Office of Justice Programs and Office of Legal Policy, U.S. Department of Justice points out that while the FBI generally does a good job of identifying active shooting cases, they only include some self-defense cases and misidentify others (Lott, 2021a).[4]

The Crime Prevention Research Center relied on the work done at the Department of Justice to fill in these missing cases, but they went further to fill in the missing data for civilians who stopped attacks from 2014 through 2023. That data was based on Nexis searches and defensive gun use cases from the Heritage Foundation, Defensive Gun Use Tracker, Gun Violence Archive, the American Rifleman, the Daily Signal, and Reddit that met the FBI's definition of an active shooting.[5] As with the Texas State University data, all these cases were based on news reports.

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[2] Sean E. Goodison, Local Police Departments Personnel, 2020, Bureau of Justice Statistics, November 2022 (https://bjs.ojp.gov/sites/g/files/xyckuh236/files/media/document/lpdp20.pdf). Connor Brooks, Primary State Law Enforcement Agencies: Personnel, 2020, Bureau of Justice Statistics, January 2024 (https://bjs.ojp.gov/document/psleap20.pdf). Connor Brooks, Federal Law Enforcement Officers, 2020 – Statistical Tables, Bureau of Justice Statistics, September 2022 (https://bjs.ojp.gov/document/fleo20st.pdf).

[3] "Active Shooter Incidents in the United States in 2023," Federal Bureau of Investigation, U.S. Department of Justice, Washington, D.C., 2024, p. 1 (https://www.fbi.gov/file-repository/2023-active-shooter-report-062124.pdf/view). See also https://www.fbi.gov/how-we-can-help-you/active-shooter-safety-resources

[4] See also Lott (2015) for a discussion on pre-2014 data by the FBI and Texas State University.

[5] https://www.reddit.com/r/dgu/
https://twitter.com/DailyDGU
https://www.dailysignal.com/author/amy-swearer/
https://datavisualizations.heritage.org/firearms/defensive-gun-uses-in-the-us/

The data for law enforcement doesn't count law enforcement as stopping the attack if the shooter committed suicide before law enforcement arrived, the shooter remains at large, or armed/unarmed citizens/security guards subdued or killed the attacker. These cases comprise the omitted class for comparison purposes. We also include in the omitted class those cases where law enforcement apprehended the attacker at another location or at a later time. The remaining cases are those that were stopped by armed citizens or by the police.

Examples in the FBI active shooting data where the police responded but did not stop the attack include:

> On January 14, 2014, at 7:30 a.m., 12-year-old Mason Andrew Campbell opened fire with a shotgun at Berrendo Middle School in Roswell, New Mexico. A teacher immediately confronted him and ordered him to drop the gun. Campbell complied. He was held until police arrived. Although no one was killed, he wounded two students and an unarmed security guard. Authorities later took him into custody.
>
> On June 5, 2014, at 3:25 p.m., 26-year-old Aaron Rey Ybarra began shooting inside Otto Miller Hall at Seattle Pacific University in Seattle, Washington. As he reloaded his shotgun, a student pepper-sprayed and tackled him. The student, along with others, restrained Ybarra until police arrived. Ybarra killed one person and wounded three.
>
> On January 20, 2017, at 7:36 a.m., 17-year-old Ely Ray Serna began shooting inside West Liberty-Salem High School in West Liberty, Ohio. After assembling his shotgun in a bathroom, Serna shot a student who walked in and fired at a responding teacher. He also shot through classroom door windows. Eventually, Serna returned to the bathroom, where school staff confronted and subdued him. Law enforcement then took him into custody. He wounded two students but killed no one.

A complete list of cases where civilians have stopped active shooting attacks as well as links to the underlying news stories is available at the Crime Prevention Research Center.[6] For example

> Around closing time at a suburban Indianapolis mall, a heavily armed gunman fired 24 times on a food court within 15 seconds. Several people were shot, three

https://www.gunviolencearchive.org/
https://www.americanrifleman.org/armed-citizen
http://www.gooddiggin.com/-ramblings--smiles/stories-from-june-of-law-abiding-citizens-who-chose-not-to-become-just-another-victim

[6] Staff, "UPDATED: Cases where armed citizens have stopped active shooter incidents," Crime Prevention Research Center, https://crimeresearch.org/2024/07/updated-cases-where-armed-citizens-have-stopped-active-shooter-incidents/ An Excel file that documents where attacks have occurred in places where permit holders are allowed to carry is available here https://crimeresearch.org/wp-content/uploads/2024/07/Cases-where-armed-citizens-have-stopped-active-shooter-incidents_2023-with-FBI-data-and-gun-free-zone-info_updated.xlsx

> of them fatally. Almost as soon as the gunman began firing, a 22-year-old shopper with a concealed carry permit was able to shoot and kill him, stopping further bloodshed. No charges were filed against the armed citizen. Police say the good Samaritan had no police training or military background. Despite this, he was able to save countless lives.
>
> At the Gold Nugget nightclub in Panama City was closing, the suspect walked outside. After being locked out of the business and enraged over lost property, he got a firearm from his car and began firing into the club occupied by multiple patrons and staff. A patron who is a concealed weapon license holder intervened and fired multiple rounds, striking the suspect at least once. Officers said the patron's actions were determined to be in self-defense and the self-defense of others.

Researchers are increasingly relying on newspaper articles to create data sets, especially using the Gun Violence Archive, to study gun control. But these studies consistently overlook a key question: Do news articles accurately reflect reality? The media's tendency to focus on dramatic incidents ties directly to the old journalism adage, "If it bleeds, it leads." For example, the media disproportionately covers defensive gun uses when the attacker is killed or wounded versus cases when a gun is simply brandished (Lott, 2021b).

Despite this well-known bias, most academic literature ignores how selective reporting skews our understanding of gun violence. A key strength of our research here is that we make a relative comparison between civilians and police. Even if the media systematically favors stories with higher bloodshed, our initial assumption is that when legally armed civilians and police face equally violent situations, such as whether the officer or armed civilian are murdered, the media will at least provide some coverage of the two types of cases, even if they don't receive the same extent of coverage, so that a news search will still uncover them. In addition, in Section 5, examining the robustness of the results, we go further and separate out subsets of the data where many lives were threatened.

The dataset contains information on both police and armed citizen responses to active shooter events. The continuous and policy variables are summarized in Table 1. Binary and categorical variables are summarized in Table 2.

Table 1: Continuous and policy variables

Variable	Obs	Mean	SD	Min	Max
Year	512	2019.80	2.59	2014	2023
Number killed	512	1.72	4.36	0	58
Number wounded	512	3.76	22.04	0	489
Number casualties	512	5.48	25.18	0	547
Number officers killed	512	0.05	0.33	0	5
Number officers wounded	512	0.19	0.82	0	9
Officers killed by friendly fire	512	0.00	0.06	0	1
Constitutional carry law	512	0.26	0.44	0	1
Percent of population with Right-to-Carry permits	512	8.35	5.43	0	32.49
Population in 100,000 units	512	133.40	108.91	6.47	394.38

Note: Vermont has had a constitutional carry law since 1776, zero concealed carry permits.

Table 2: Binary and categorical variables

Variable	Frequency	Percent
Active shooting incident stopped by police	158	30.86
Active shooting incident stopped by armed citizen	179	34.96
Other	177	34.18
Armed citizen outcome		
(Percentages based on armed citizens responding first, N=179)		
Mass shooting averted	57	31.84
Suspect fired first	115	64.25
Suspect with gun, armed citizen fired first	7	3.91
Shot wrong person	1	0.56
Killed wrong person	0	0.00
Interfered with police	0	0.00
Had gun taken away	0	0.00
Injured	45	25.14

Killed	2	1.12
Police outcome		
(Percentages based on police responding first, N=333)		
Suspect killed at the scene	124	37.24
Suspect apprehended later at another location	103	30.93
Suspect committed suicide after police arrive	34	10.21
Other	72	22.22
At least one police officer killed	18	5.41
At least one police officer wounded	47	14.11
Police officer killed by friendly fire	2	1.28
Percentages based on police attempting to stop attack, N=157		
Police killed wrong person (civilian)	1	0.64
Police shot wrong person (civilian)	2	1.27

Note: in one event, undercover officers shot and killed the wrong person after the shooter had fled.

The first takeaway is, assuming our count is complete, that armed citizens have stopped more active shooter incidents than the police have, although the difference is not significantly different from zero. Also, armed citizens do not appear to interfere with the police or blunder so badly as to get their weapon taken away by the shooter or kill the wrong person. In a later section we test the hypothesis that innocent bystanders are equally likely to be shot by an armed citizen as by a police officer. Finally, according to police, armed citizens have stopped 57 active shooter events which otherwise were likely to have escalated into mass public shootings – where "many" people risked being murdered.

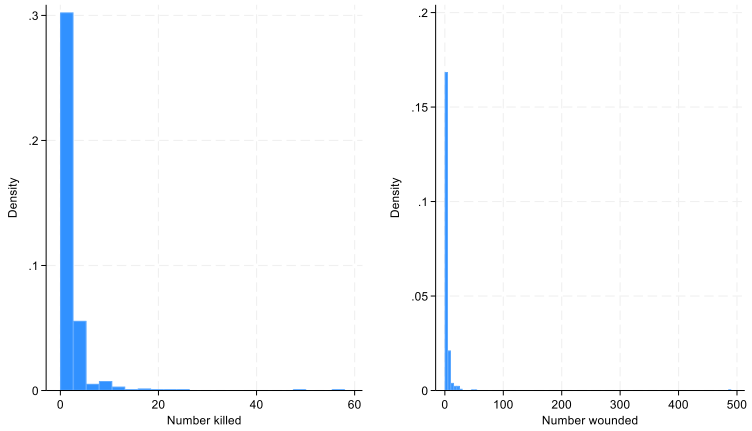
3. Methodology

All of the dependent variables in this study are limited one way or another by the granular nature of the individual observations. There are several choices that can be made concerning how to analyze such data. If the dependent variable is binary and we are willing to assume a normal approximation, then we can test that the difference between two probabilities is equal to zero using Stata's *prtest* command. If we are unwilling to make the normality assumption or want to use control variables, then we have to choose between probit and logit, with the attendant tradeoffs. Since the choice between probit and logit is somewhat arbitrary (Cameron and Trevidi 2010, pp. 459-479), we report the

simple difference between two probabilities and the corresponding probit regression, but we estimated the corresponding logit results in the robustness section.

If the dependent variable is continuous, but has a skewed distribution, like the number of people killed in the active shooter event, then we use a negative binomial regression model, which incorporates and collapses to the Poisson model if the mean and variance are approximately equal. (Cameron and Trividi 1998, pp. 59-85; Cameron and Trevidi 2010, pp. 567-581) Figure 1 shows the histograms for the number killed and the number wounded in active shooter attacks.

Figure 1: Histograms for people killed and people wounded



Obviously, both dependent variables are highly skewed with the majority of values close to or equal to zero with a small number of relatively large outliers. The mean number of people killed is 1.72 while the variance is 19.1. The corresponding values for the mean and variance for number killed are 3.76 and 488.9. These values indicate very large, possibly significant, overdispersion leading us to choose the negative binomial model. Casualties, being the sum of these two variables, will also have a skewed distribution.

4. Results

4.1 Killed, wounded, and total casualties

We estimate two models for each of the categories (killed, wounded, and total casualties). Model (1) is a simple negative binomial regression of the number of people killed on the two variables of interest: was the incident stopped by police or by one or more armed citizens? Model (2) includes two control variables: a dummy variable indicating passage of a constitutional carry law, where a permit is no longer required to carry, and a continuous variable indicating the proportion of the adult population with concealed carry permits. These variables act as proxies for how likely it is that an armed citizen will be present during an attack. The sooner someone with a gun can respond, the fewer people the attacker can kill. In states with constitutional carry laws the percent of the adult

population with permits might not provide a very accurate measure of how many people are carrying. All models include the state population as an exposure variable. A chi-square test of the equality of the coefficients on armed citizens and police is reported in the bottom two rows. Results for the number of victims killed are presented in Table 3.

Table 3: Victims killed in Attacks Stopped by Armed Civilians or Police

Variables	(1) Killed	(2) Killed
Stop by armed citizen	-0. 491***	-0. 495***
	(-6.81)	(-6.86)
Stop by police	0.162***	0.171***
	(3.20)	(3.39)
Constitutional carry law		-0.167**
		(-2.15)
Percent adults with Right-to-Carry permits		0.178
		(0.41)
State and year fixed effects	Yes	Yes
Observations	512	512
Chi2 test that armed citizen and police are equal	91.27***	93.88*
P-value	0.000	0.000

Notes: negative binomial; coefficients are percent changes as the dummy variables go from zero to one; z-statistics in parentheses*** p<0.01, ** p<0.05, * p<0.1; chi-square tests the null hypothesis that the coefficients on armed citizen and police are equal; both models include state population as an exposure variable. As a group the state and year fixed effects are statistically significant.

Table 3 shows that armed citizens reduce the number of deaths in active shooter incidents significantly more than the police do. In fact, armed citizens reduce the number of people killed by 49 percent while the police increase the number killed by 16 percent in comparison to the omitted class (shooters who are arrested later or stopped by unarmed citizens or stop of their own accord). This does not mean that calling the police results in more deaths. The police are associated events that are more deadly than either armed citizen response or other action. However, the results indicate that police are less effective than armed citizens in reducing the number of deaths associated with active shooter incidents. The difference is significant at better than the one percent level. Also, states with a constitutional carry law experience 16.7 percent fewer people killed in active shooter incidents, presumably because there are more armed citizens available in public places.

The results for the number of people wounded in these incidents are shown below.

Table 4: Number of people wounded in Attacks Stopped by Armed Civilians or Police

Variables	(1) Wounded	(2) Wounded
Stop by armed citizen	-0.410***	-0.414***
	(-7.66)	(-7.76)
Stop by police	-0.013	-0.016
	(-0.28)	(-0.35)
Constitutional carry law		-0.111*
		(-1.82)
Percent adults with Right-to-Carry permits		0.460
		(1.15)
State and year fixed effects	Yes	Yes
Observations	512	512
Chi2 test that armed citizen and police are equal	63.63***	66.03***
P-value	0.000	0.000

Notes: negative binomial; coefficients are percent changes as the dummy variables go from zero to one; z-statistics in parentheses*** p<0.01, ** p<0.05, * p<0.1; chi-square tests the null hypothesis that the coefficients on armed citizen and police are equal; both models include state population as an exposure variable. As a group the state and year fixed effects are statistically significant.

Armed citizens reduce the number of people wounded in active shooter incidents by 41 percent while the police have no significant effect. This difference in effectiveness is significant at better than the one percent level. Constitutional carry laws reduce the number of people wounded by 11 percent which is significant at the 10 percent level for a two-tailed z-test.

The results for the total number of people killed and injured in active shooter incidents are shown in Table 5.

Table 5: Total Casualties in Attacks Stopped by Armed Civilians and Police

Variables	(1) Casualties	(2) Casualties
Stop by armed citizen	-0.440***	-0.444***
	(-9.58)	(-9.70)
Stop by police	0.059	0.063*
	(1.58)	(1.70)
Constitutional carry law		-0.124**
		(-2.39)
Percent adults with Right-to-Carry permits		0.287
		(0.90)

State and year fixed effects	Yes	Yes
Observations	512	512
Chi2 test that armed citizen and police are equal	125.28***	129.73***
P-value	0.000	0.000

Notes: negative binomial; coefficients are percent changes as the dummy variables go from zero to one; z-statistics in parentheses*** p<0.01, ** p<0.05, * p<0.1; chi-square tests the null hypothesis that the coefficients on armed citizen and police are equal; both models include state population as an exposure variable. As a group the state and year fixed effects are statistically significant.

As might be expected, the results for the total number of casualties show that armed citizens reduce the number of casualties significantly more than the police do. Armed citizens reduce the number of casualties by 44 percent while police response results in a small increase. Constitutional carry states have significantly fewer people killed and wounded in active shooter events than other states presumably because more armed citizens are available to intervene quickly and effectively.

Overall, the results are very similar for all three injury categories. The number of people killed, wounded, or the total number of casualties is significantly reduced if armed citizens stop the attack compared to the situation where the police stop the attack. Constitutional carry states have significantly fewer casualties in active shooter incidents presumably because more armed citizens are present in public spaces.

4.2 Is it more dangerous for armed citizens or police?

In this section we look at the probability of being killed if the person responding is an armed citizen compared to the same risk for a police officer. The dependent variable is a dummy variable indicating that there were one or more deaths among the first responders. In this case we can use the simple difference between two means to see if the probabilities are equal. The result is shown in Table 6.

Table 6: Difference between two probabilities that armed civilians or police are killed or wounded in stopping active shooter events

	Cases	Deaths	Probability
Armed citizen	179	2	0.011
Police	158	26	0.165
Difference			-0.153
Z-score			-5.09
P-value			0.000
	Cases	Injuries	Probability
Armed citizen	179	45	0.251
Police	158	95	0.601
Difference			-0.350
Z-score			-6.50
P-value			0.000

Note: assumes normal distribution.

According to the simple difference between two probabilities analysis, the police are significantly more likely to be killed or wounded in an active shooter event than an armed citizen. For example, the probability of an armed citizen being killed while attempting to stop an active shooter is one percent. The corresponding probabilities for police officers responding to an active shooter incident is 16.5 percent. The result for non-fatal injuries is similar. The corresponding probit regression results are presented in Table 7.

Table 7: Probit models: Probabilities that armed citizens or police are killed or injured

Variables	(1) Fatality	(2) Injury
Stop by armed citizen	-0.018	0.246***
	(-0.55)	(5.46)
Stop by police	0.094***	0.242***
	(3.12)	(5.27)
Observations	512	512
Chi2 test that armed citizen and police are equal	10.06	0.01
P-value	0.002	0.923

Notes: z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1; chi-square tests the null hypothesis that the coefficients for armed citizens equals that for police; because the probabilities do not depend on the number of armed citizens, we do not include state or year dummies or population. We tried including the year and geographic fixed effects just to see if there were differences in attacks over time or places, but the fixed effects were not statistically significant as a group and did not change the relative results between armed citizens and police officers.

These results corroborate some of the simple analysis above. With respect to the

probability of being killed while intervening in an active shooter event, an armed citizen has a probability close to zero of being killed compared to the police officer's 9.4 percent. This difference is highly significant. However, the probabilities with respect to a first responder being injured is almost exactly the same for both armed citizens and police officers. Overall, it is safer for first responders if they are already on the premises, respond quickly carrying a concealed weapon, and not wearing a uniform.

With respect to unfortunate mishaps, Table 2 shows that armed citizens have shot the wrong person once while police officers have shot the wrong person twice. Table 2 also shows that armed citizens have never killed the wrong person, while the police have killed the wrong person three times including friendly fire. Table 8 shows the result of a simple analysis of the difference between the two probabilities of shooting the wrong person

Table 8: Probability of shooting wrong person

	Cases	Shootings	Probability
Armed citizen	179	1	0.006
Police	158	4	0.025
Difference			-0.020
Z-score			-1.49
P-value			0.13

Note: assumes normal distribution; includes cases where officers were killed by friendly fire.

Although the probability that the police will shoot the wrong person is over 10 times higher that of armed citizens, both probabilities are very small and the difference between them is not significantly different from zero, almost certainly because both events are extremely rare.

4.3 Comparing the risk to police stopping active shooters at the scene of their attacks to cases where they caught these attackers later.

As we noted earlier, the data doesn't credit law enforcement with stopping an attack if officers apprehend the attacker later or at a different location. But this distinction raises an important question: What risks do officers face when confronting an attacker during the crime versus catching the same type of criminal later—when police have the advantage of time, planning, and location?

We looked at 156 cases where law enforcement stopped attacks in progress and compared them to 103 cases where officers arrested the attackers later. The difference in officer fatalities between these two scenarios is striking: 26 officers died when confronting attackers during the crime, while only one officer was killed when making arrests after the fact.

This comparison is especially powerful because it involves similar types of violent offenders. In fact, those who manage to escape and are caught later may be even more dangerous, more cunning or experienced, suggesting they could pose a greater threat to officer safety. Yet the data show that officers face far more risk when they respond to an attack that the shooter initiates than when they make arrests under conditions that they control.

Table 9: Comparing the rates that police are killed when the active shooter initiates the attack versus when the police catch the attacker at a later time

	Cases	Deaths	Probability
Police arrest later	103	1	0.010
Police stop attack in progress	156	26	0.167
Difference			-0.157
Z-score			-3.64
P-value			0.000

Note: assumes normal distribution.

Table 10: Probit models: Probabilities that police are killed when the active shooter initiates the attack or the police initiate the confrontation

Variables	(1) Killed	(2) Injury
Police arrest later	0.333	0.014
	(0.01)	(0.21)
Police stop attack in progress	0.439	0.210***
	(0.01)	(3.73)
Constant	-5.816	-1.732***
	(-0.02)	(-6.55)
Observations	333	333
Chi2 test that police who arrest attackers later and who stop an attack in progress are equal	7.722***	16.96***
P-value	0.005	0.000

Notes: z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1; chi-square tests the null hypothesis that police who arrest attackers later and who stop an attack in progress are equal; because the probabilities do not depend on the number of armed citizens, we do not include state or year dummies or population. We tried including the year and geographic fixed effects just to see if there were differences in attacks over time or places, but the fixed effects were not statistically significant as a group and did not change the relatively results between the two groups of police officers.

The estimates in Table 10 show that officers who stopped attacks were 10 percentage points more likely to be killed and almost 20 percentage points more likely to be injured than officers who caught these attackers later.

5. Robustness tests

We re-estimated the models presented above in a substantial number of ways. In this section, we describe the robustness tests. We do not present the results to conserve space and because all the tests confirmed the results presented above. All results, programs, and data are available in the online appendix.

If there are too many zeros in the dependent variable, a negative binomial model can be biased, inconsistent, and overestimate the standard errors. A zero-inflated negative binomial or zero-inflated Poisson model is preferred (Greene 1994, Lambert 1992). Since the number of people killed had just over 50 percent (50.49) zeros, we did a Vuong (1998) test. This tests the difference between the log-likelihood values of the negative binomial and the zero-inflated negative binomial regressions. We found no significant difference (equal to zero within 8 decimal places). We, therefore, prefer the standard negative binomial model. However, we estimated zero-inflated negative binomial models despite the results of the Vuong test and once again found that the probability of death or injury was significantly lower for armed citizens than for police officers.

We also found that the log of the dispersion parameter in the negative binomial was significantly greater than zero, indicating severe overdispersion for all of the regressions reported in Tables 3-5. For that reason, we chose the negative binomial over the Poisson model. Nevertheless, the Poisson model is more efficient than the negative binomial model if the overdispersion is not too bad. For that reason, we estimated Poisson and zero-inflated Poisson models for all three of our outcome variables: killed, wounded, and total casualties (Cameron and Trevidi 1998 pp. 59-85). In every case we analyzed, armed citizens who stopped active shooter events significantly reduced the chances of victim injury or death compared to when police intervened. Also, our models use population as an exposure variable, assigning it a coefficient of one in the negative binomial and Poisson models. When we removed that exposure variable from the negative binomial and Poisson regression models, the results stayed the same across all three measures of death and injury.

We considered whether police involvement in higher victim counts might stem from a few mass shootings in the dataset—events with exceptionally high numbers of victims—that were stopped by the police. The maximum number of people killed, wounded, and total casualties for the cases stopped by armed citizens are 26, 20, and 46. The same maxima for police cases are 49, 53, and 102. We, therefore, limited the analyses to the maxima for armed citizens and re-estimated the negative binomial and Poisson regressions. The results were unchanged. Active shooter events stopped by armed citizens have significantly fewer deaths and injuries than those stopped by the police despite the higher death and injury tolls associated with the latter.

Finally, we compared the likelihood that a first responder would be killed during a mass public shooting—defined as an incident where four or more people were killed, excluding the shooter. We found 57 cases where an armed citizen likely stopped a mass shooting and 38 cases where police actually intervened to prevent one. Armed citizens were killed in 2 of those 57 cases, while 13 police officers lost their lives in the 38 police-response cases. The difference in probabilities was highly significant.

6. Discussion

The results favor intervention by armed citizens. Unlike uniformed police officers, armed citizens are already on the scene and don't stand out as obvious threats to a shooter. In contrast, police face significant disadvantages. They rarely happen to be present when an attack begins, and if a potential attacker sees an officer nearby, he's likely to either wait for the officer to leave the area or move on to a new target. Shooters who decide not to alter their plans will likely choose to attack the visible uniformed officers first. While taking on an officer may not be easy, it becomes the first objective when the shooter sees that the officer is armed and in uniform.

Off-duty, undercover, or plainclothes officers share the same tactical advantages as armed civilians. It would be valuable to compare their effectiveness directly to that of civilians. However, we found only two cases where shooters interacted with non-uniformed officers, so we can't yet test whether uniforms themselves make it harder for police to intervene effectively. That comparison will have to wait for more data.

Our findings show that armed citizens are significantly more effective than uniformed police at stopping potential mass shootings. This result isn't a criticism of law enforcement, it simply reflects the tactical realities they face. Their uniforms make them visible targets, and longer response times give attackers more opportunity to cause harm. These results also suggest a broader conclusion: having armed citizens dispersed throughout public spaces improves public safety. Conversely, gun-free zones are likely to be counterproductive, a view supported by other research showing that the overwhelming majority of mass public shootings happen in such zones (Lott, 2010, Crime Prevention Research Center, 2025).

Armed citizens are not trained like police officers as to the correct response to an active shooter event. Consequently, they could make the situation worse by inserting themselves into the event. Our analysis soundly rejects that idea. In fact, we find the opposite to be true: armed citizens do not interfere with police, and in active shooter situations, they reduce deaths and injuries significantly more effectively than the police.

All results, programs, and data are available in the online appendix.

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