

# Active-shooter events in the workplace: Findings and policy implications

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*Received (in revised form): 4th May, 2017*

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## ABSTRACT

Employees and citizens generally view places of business as inherently safe. Business leaders sometimes make hasty security decisions in hopes of protecting their employees and customers. Leadership should have empirical data to aid in the decision-making process. This paper provides an exhaustive breakdown of active-shooter events in the workplace. The data are disaggregated by business function (eg retail, factory/warehouse, and office space) and include information on the shooter, the event itself, and how the event was resolved. The analyses are followed up by an in-depth discussion of potential policy changes supported by the data.

**Keywords:** active shooter, civilian response, workplace violence

## INTRODUCTION

On 16th September, 2013, a lone gunman fatally shot 12 people and injured three others in a planned attack at the offices for the Naval Sea Systems Command inside the Washington Navy Yard in Washington, DC. The shooter gained access to the

building using a valid contractor ID badge. He had both a handgun and a disassembled shotgun hidden in a backpack. He assembled the shotgun in a restroom before beginning his attack. Over the course of an hour, the shooter attacked multiple floors before he was eventually stopped in a shootout with responding police officers.<sup>1</sup> This event illustrates a subset of active-shooter events (ASEs) — attacks that occur at places of business.

The present paper investigates ASEs at business-related locations in the USA between 2000 and 2015. The aim is to provide business owners, employees, community officials and law enforcement officers with accurate empirical data regarding such events. It hoped that this research will not only help ground policies and procedures in real-world data but also help mitigate the damage caused by future attacks.

## LITERATURE REVIEW

### Active-shooter events

The US federal definition of an active-shooter event is ‘an individual actively engaged in killing or attempting to kill people in a confined and populated area’.<sup>2</sup> It is important to note that active-shooter events are *not* synonymous with mass murder or mass shooting. Mass murders or shootings generally require that a minimum number of people be shot or killed (usually three or four).<sup>3,4</sup> Active-shooter events do not have this requirement. It is often useful to think of them as ‘attempted mass murders’. In some instances, many people are injured. In others, few or even none are injured. It is important to study both high and low-casualty events, however, because lessons can be learned from both.

Despite recent media attention on ASEs, there has been relatively little systematic research on such events. Much of

what exists consists of case studies or collections of events without an explanation regarding how the collections were developed.<sup>5–7</sup> There are, however, a few notable exceptions.<sup>8–11</sup>

To date, the most comprehensive study of recent active shooters is that reported by Blair and Schweit in 2014.<sup>12</sup> This report utilised systematic internet searches and FBI data sources to identify 160 ASEs occurring between 2000 and 2013. Blair and Schweit found that the frequency of these events appeared to be increasing and that at least 1,043 people were injured in ASEs during the timeframe of the study.

### Active-shooter events and businesses

Very little research has focused on active-shooter events in business locations. While Blair and Schweit reported the most complete analysis of recent active-shooter events to date, the data on businesses (called ‘commerce locations’ in the report) were generally grouped together with data from schools, outdoor attacks and other locations. The report did however provide a small section with some details specific to business attacks. The authors divided commercial locations into three categories: businesses open to pedestrian traffic ( $n = 44$ ); businesses closed to pedestrian traffic ( $n = 23$ ); and malls ( $n = 6$ ). Key findings included that the majority ( $n = 30$ ; 68 per cent) of businesses open to pedestrian traffic were attacked by individuals not employed by the businesses and that 96 per cent of businesses closed to pedestrians (22 of 23) were attacked by employees or prior employees. The authors also specified how the events concluded for the three types of commercial locations (eg suicide, apprehension, fleeing, law enforcement shooting suspect).

Beyond the report by Blair and Schweit, there are only anecdotal accounts of active shooter attacks at business locations. For example, Finklestein<sup>13</sup> utilised findings

aggregated from Blair and Schweit<sup>14</sup> to discuss potential physical security best practices. Finklestein used concepts of crime prevention through environmental design such as facility hardening, access control and architectural design to suggest approaches to preventing ASEs. While both aggregate data and anecdotal accounts yield important information, neither provide the detail necessary for informed policy development. Furthermore, the literature on workplace violence does little to address the evolving threat of an active shooter. The focus has been on more common types of threats and aggression. To bolster the discussion regarding active shooter policy, it is essential to provide businesses with data, as such information is currently lacking. This paper seeks to fill this void in the literature.

## METHODOLOGY

The list of ASEs is derived from the list provided by Blair and Schweit as well as their follow-on report on ASEs in 2014 and 2015.<sup>15</sup> In their data set, the authors reported events occurring in places of commerce. These cases were divided into three categories: (1) business open to pedestrians such as retail stores; (2) businesses closed to pedestrians such as offices or factories; and (3) malls. For the purposes of this paper, the definition of businesses was expanded to include healthcare facilities and certain government buildings that function as business locations (eg museums or office buildings housed on federal property). Military bases were not included in this analysis. The additional cases increased the total number of business events to 105.

While it is possible that Blair and Schweit were unable to identify every ASE during the research period, their endeavour provides the most complete list in existence. This list was cross-checked

against others (such as the New York Police Department 2012 report on active shooters) and in no case was the Blair and Schweit collection found to be missing an event. Indeed, additional cases matching the definition of an ASE were identified in the Blair and Schweit data.

## Data

The current study utilised the 105 business ASEs identified by Blair and Schweit as well as the subsequent report released by the FBI in 2016.

Three different sources were utilised to gather the data needed for the study. These were reports from the investigating agency or agencies, the supplemental homicide reports (SHRs) produced by the FBI, and news stories. It should be noted that not all sources of data were available for all events. The most current data in the SHR only cover up to 2014, therefore it was not possible to utilise the SHR for events that occurred in 2015. Furthermore, SHR data are not available for the State of Florida. Recent events are generally under ongoing investigations and the investigating agencies do not release these reports. Therefore, events that occurred in the last years of the data set were generally coded (ie relevant data points were extracted) from the most recent news reports.

A primary researcher completed the coding process for all 105 events identified. A second coder independently coded 20 per cent of the cases to ensure reliability ( $n = 21$ ). Agreement between the two researchers was 99 per cent.

## RESULTS

These 105 events can be viewed as a whole or disaggregated into three major categories: factories and warehouses ( $n = 26$ ; 25 per cent), offices ( $n = 29$ ; 27 per cent) and retail ( $n = 50$ ; 48 per cent). The following results show aggregated

(all business locations) and disaggregated (factory/warehouse, offices or retail) findings where appropriate. It is important to note that the data are population-level data. That is, the data comprise all known business-based ASEs in the USA occurring between 2000 and 2015 that were identified by Blair and Schweit and the subsequent 2014–2015 FBI report on ASEs. Certain business locations that were disaggregated in Blair and Schweit, such as medical facilities, were placed into one of the three abovementioned categories that most appropriately represented the location. Because of this, statistical significance tests (other than tests of the normality of distributions) are not reported. The data constitute the population, so there is no need to infer from a sample. It is reasonable to assume that the methodology of Blair and Schweit<sup>16</sup> was not perfect, and could have missed some cases, meaning that the data used in the present study are not a completely accurate reflection of the true population. However, even if this is the case (which it probably is), the missing data are unlikely to be missing at random. In addition, systematic factors (such as the amount of media coverage) are likely to

be at play; therefore, significance testing would still be unjustified.

Figure 1 illustrates the annual frequency of ASEs. A power function provided the best fit to the data ( $y = 1.257x^{0.7324}$ ;  $R^2 = 0.54$ ). While it may appear that business ASEs are increasing, the power function's exponential value of less than one suggests that the trend has reached a plateau. In other words, statistically it appears the number of business-based ASEs in the USA is beginning to level off instead of increasing. Additionally, caution should be taken when interpreting relatively short-term trends, especially when the events in question are infrequent. Because the search strategy primarily utilised newspaper archive services to locate events, it is possible that more recent years were better archived than earlier years. This could also give the appearance of an upward trend when there is not one. Regardless of whether there was an upward trend, there were an average of nine (SD = 3) ASEs at business locations in the last five years of the data.

### Shot and killed

From 2000 to 2015, there were a total of 619 people shot in ASEs at businesses. If

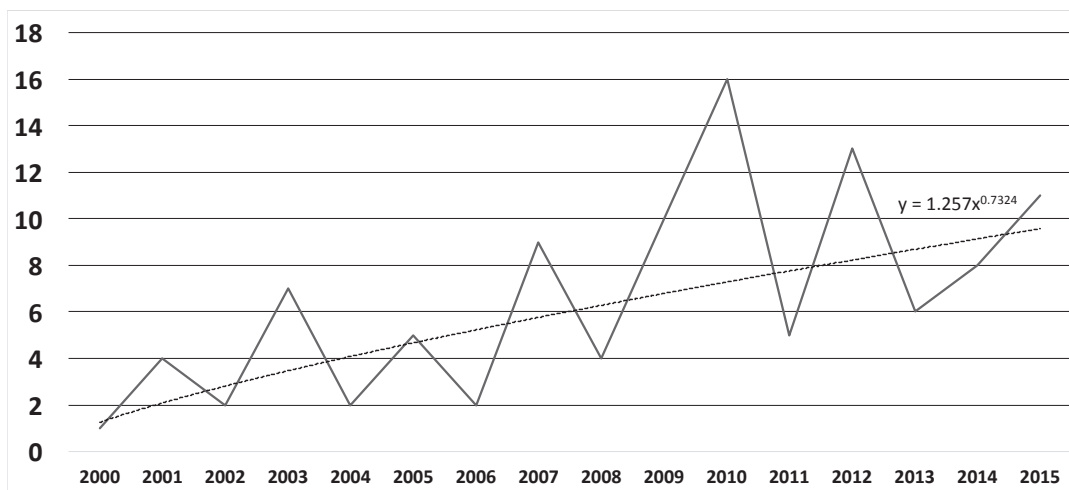


Figure 1 ASEs in businesses by year

the attacker was shot, he or she was not included in this total. Figure 2 shows the number of individuals shot by event. The number of victims shot ranges from 0 to 70. The mean number of individuals shot was 5.9. The data distribution does not appear normal; therefore, a Shapiro-Wilk test of normality was undertaken. These data were found to be non-normal ( $W(105) = 0.46$ ;  $p < 0.001$ ) with a skewness of 6.03 (SE = 0.24), so the median was a better representation of the central tendency of the distribution. The median number of people shot was four.

From 2000 to 2015, 282 people were killed during ASEs at businesses. The number killed ranged from zero to 14 (see Figure 3). It should be noted that if the shooter was killed, he or she was not included in this total. The mean number of people killed per event was 2.7. The distribution of people killed was also non-normal ( $W(105) = 0.79$ ;  $p < 0.001$ ) with a skewness of 1.998 (SE = 0.236) making the median a better measure of central tendency. The median number of people killed was two. According to the US federal statute, which defines mass murder

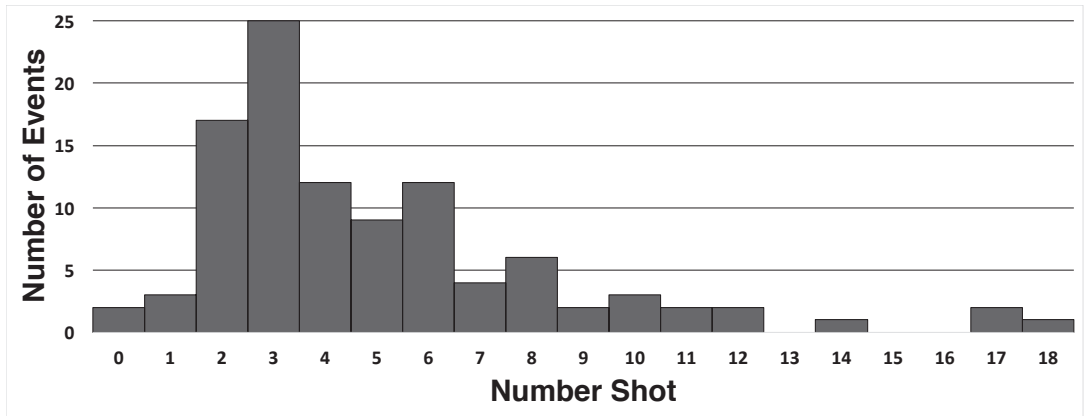


Figure 2. People shot in business ASEs by event  
 Note: Figure 2 includes only cases with 18 or fewer victims; two outlier cases — the Aurora, CO cinema shooting (70 people shot) and the attack in San Bernardino, CA (36 people shot) — contained too many victims to be depicted in the graphic

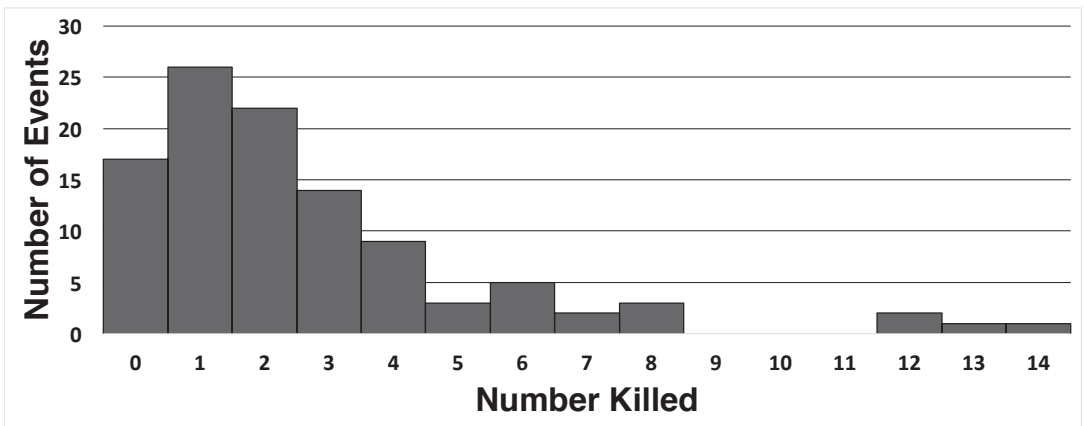


Figure 3 People killed in business ASEs by event

**Table 1: Descriptive statistics of shot and killed by location**

Type of location	Shot			Killed		
	Total	Median	Range	Total	Median	Range
Factory/warehouse	149	6.0	2–14	76	2.0	0–8
Office	161	4.0	1–36	80	2.0	0–14
Retail	309	3.5	0–70	126	2.0	0–13

as three or more people killed, 40 (38 per cent) of these events qualify as mass murders.<sup>17</sup>

More people were shot ( $n = 309$ ) and killed ( $n = 126$ ) in retail locations than in factories/warehouses or offices. Retail businesses had a median of 3.5 people shot (range 0–70). The median number killed was two (range 0–13). Office-based events were in the middle with shot ( $n = 161$ ) and killed ( $n = 80$ ). Offices had a median of four people shot (range 1–36), and a median of two persons killed with (range 0–14). With factory/warehouse sites being the least attacked locations, they had the lowest numbers of people shot ( $n = 149$ ) and killed ( $n = 76$ ). The median number of people shot at a factory/warehouse location was six (range 2–14) while the

median number killed was two (range 0–8).

Figure 4 provides the time the attack started for all of the attacks. The four distinct peaks occurred from 9 to 10 am, 11 am to 12 pm, 3 to 4 pm, and 7 to 8 pm. All but two attacks occurred during normal operating hours for the business. One of these cases involved a business executive calling an after-hours board meeting to discuss a financial dispute. When the board members arrived, he began firing at them, killing three people and wounding one. The second case was a supermarket employee who returned after his shift ended, during the stocking time for the closed store, and killed two co-workers.

Figure 5 provides a breakdown of event by day of the week. The day of the week

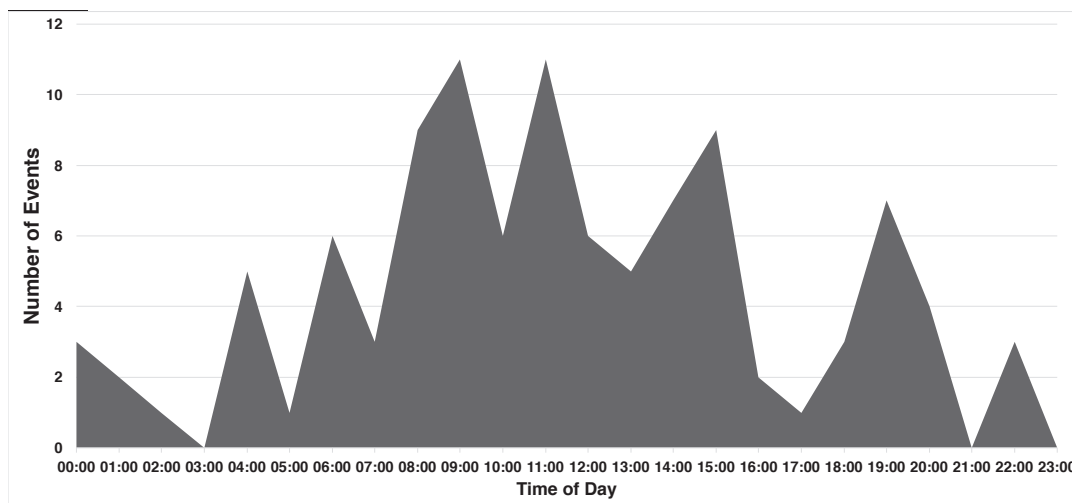


Figure 4 Time of attack for all businesses

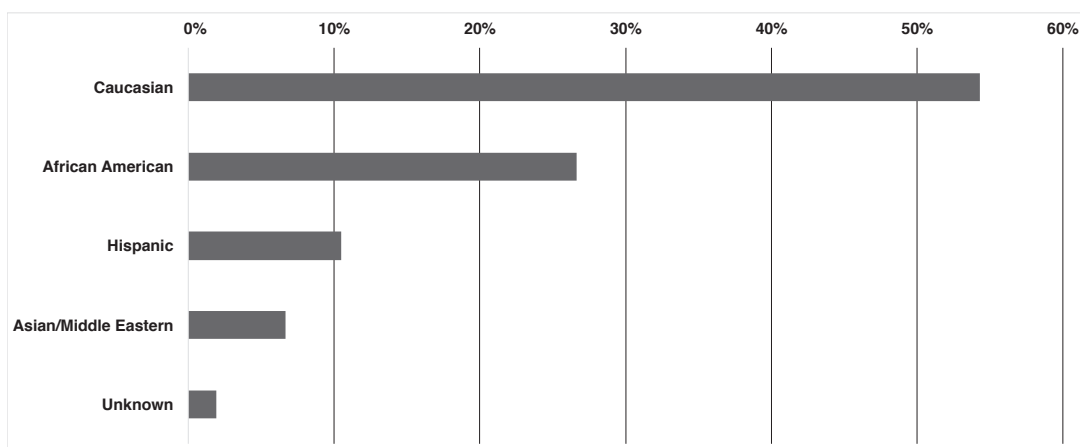


Figure 5 Race of the attacker

Table 2: Number of events by day of the week

Day of the week	Number of events
Monday	19
Tuesday	21
Wednesday	17
Thursday	18
Friday	12
Saturday	7
Sunday	11

with the highest number of business ASEs was Tuesday ( $n = 21$ ; 20 per cent). Monday had the second highest number of events ( $n = 19$ ; 18 per cent). ASEs for the rest of the week, in descending order, are as follows: Thursday ( $n = 18$ ; 17 per cent), Wednesday ( $n = 17$ ; 16 per cent), Friday ( $n = 12$ ; 11 per cent) and Sunday ( $n = 11$ ; 10 per cent). Saturday had the lowest number of events ( $n = 7$ ; 8 per cent).

### The shooters

In all but two business cases there was a single shooter. The only locations to have multiple shooters were the 2014 Las Vegas, NV and the 2015 San Bernardino, CA events. Both of these cases involved one male and one female shooter. In the

remaining events, the majority of shooters were a lone male ( $n = 100$ ; 95 per cent); only five cases (5 per cent) involved a lone female shooter. Three of the lone female shooters attacked factory/warehouses. The other lone females attacked a retail and office location. Figure 5 shows the race of the shooter. Most shooters were Caucasian ( $n = 57$ ; 54 per cent) followed by African American shooters ( $n = 28$ ; 27 per cent) and Hispanic shooters ( $n = 11$ ; 10 per cent). Additionally, three shooters (4 per cent) were classified as Asian while three shooters (3 per cent) were Middle Eastern. In two cases, the race of the shooter was unknown or not listed (2 per cent).

The age of the shooters ranged from 17 to 79. As seen in Figure 6, the distribution is non-normal ( $W(103) = 0.98$ ;  $p < 0.05$ ) and positively skewed (0.257, SE = 0.238); therefore, the median is the best measurement of central tendency. The median age of the shooters was 41.

Figure 7 illustrates the shooter's relationship to the type of business attacked. In a majority of the retail cases ( $n = 37$ , 74 per cent), the attacker had no connection to the place attacked, while in factory/warehouse cases, all of the attackers (100 per cent) had a connection to the place. Offices fell in between these two, although

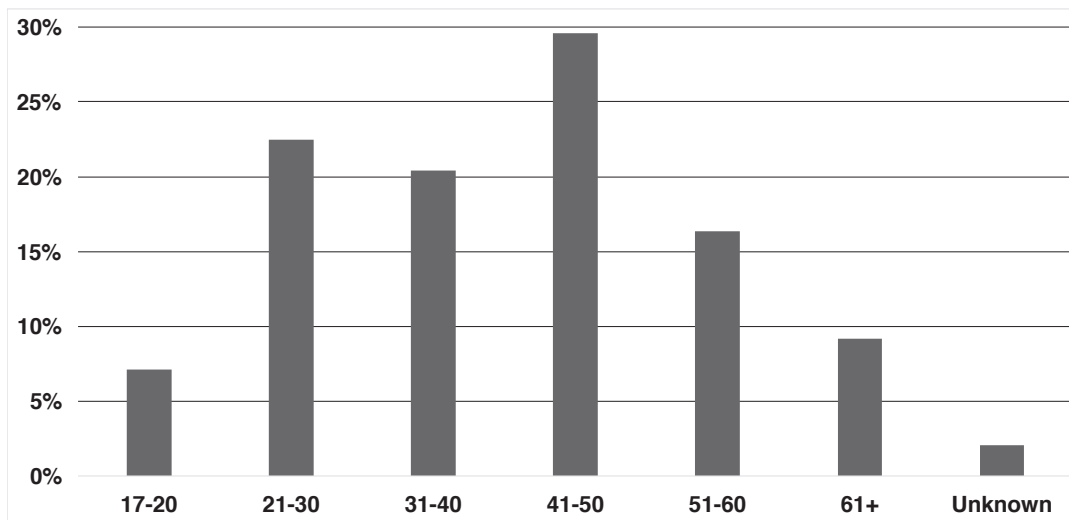


Figure 6 Age of the attacker

a majority had connections with the office ( $n = 16$ ; 55 per cent). While retail businesses are open to the public, offices and factory/warehouses are usually closed to the public. Therefore, it would be expected that offices and factory/warehouses would have higher percentages of shooters with a relationship to the business.

There were 15 cases where a secondary relationship existed between the shooter and the attack location. These secondary relationships included shooters who targeted their ex-wife's/wife's/girl-friend's place of work. Additionally, it included cases where there was a doctor/patient connection or an attorney-client relationship. Secondary relationships are included in the relationship side of the figure because the locations were targeted as a result of that relationship instead of being chosen at random.

The study also examined cases involving employees who were suspended or terminated before beginning their attack. Twelve cases involved a former employee/co-worker who attacked their former place of work. Only one of these cases was a retail location. There were seven

factory/warehouse cases in which a person was either fired that day or had been previously been fired before returning to the workplace for their attack. In one case, a shooter had been fired for plotting to steal from the warehouse in 1994. He was later sentenced for other crimes and served time in prison. Upon release, he was sentenced for the crimes against the business. He attacked the warehouse the day before he was to report to jail. The remaining four cases where the shooter was a former employee/co-worker occurred in offices.

The most powerful weapon used was also studied. The weapons were ordered by their potential lethality (rifles, shotguns, pistols). Pistols were the most powerful weapon used in a majority (61 per cent) of the cases, while shotguns were used the least (12 per cent). Rifles were utilised in 27 per cent of the cases. In 67 per cent of the business cases, only one weapon was used. Multiple weapons were most often used in retail (13 per cent), followed by offices (11 per cent) and factory/warehouses (8 per cent). Explosives were only used in two cases, and body armour was used by the attacker in four cases.

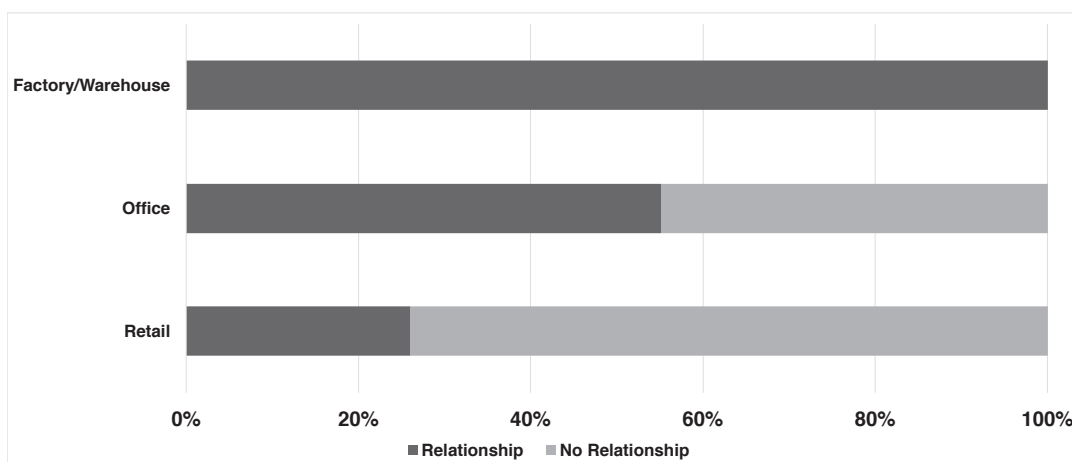


Figure 7 Relationship by business type

### Resolution

Figure 8 depicts how the events at businesses ended. This figure is broken into two parts: events that ended before the police arrived and events that ended after the police arrived. Fifty-five per cent of events ended before police arrived on scene, while 45 per cent ended after police arrived ( $n = 58$  and  $n = 47$ , respectively).

For the events that ended before the police arrived, two major resolution types were identified. The attacker spontaneously stopped him or herself or the potential victims stopped the attacker. In 45 per cent of the events, the attacker stopped on his or her own accord, either by committing suicide before the police arrived ( $n = 37$ ; 35 per cent) or leaving the scene ( $n = 10$ ; 10 per cent). Seven of those who left were apprehended at a later time and three were still at large at the time the information was gathered. In the cases where victims stopped the attacker ( $n = 11$ ; 10 per cent), civilians either shot the shooters ( $n = 4$ ; 4 per cent) or physically subdued the shooter until law enforcement arrived ( $n = 7$ ; 6 per cent). In one of the four cases where a civilian shot the shooter, the civilian was an on-duty, non-commissioned security

guard for the business. In another case, the shooting occurred at a retail store where an off-duty police officer was shopping. The final two cases where a civilian shot the shooter involved individuals with valid firearms permits who returned fire after the shooting began. These cases illustrate that what civilians do can impact the outcome of the event.

The right half of the graphic represents the 45 per cent of cases that were resolved after police arrived. The attacker committed suicide 9 per cent ( $n = 10$ ) of the time and surrendered to police only 4 per cent ( $n = 4$ ) of the time. The police shot the attacker in 25 per cent ( $n = 26$ ) of the cases and physically subdued him or her using less lethal force in 7 per cent ( $n = 7$ ) of the events. Another way of looking at these data is to examine only the right side of the graphic. In other words, treat the right half as ASEs that are active when law enforcement arrives. This illustrates what law enforcement may encounter when arriving at an ongoing scene. When law enforcement arrives at such an event, the police shoot the attacker 55 per cent of the time. This may pose an additional risk while employees and customers are attempting to flee.

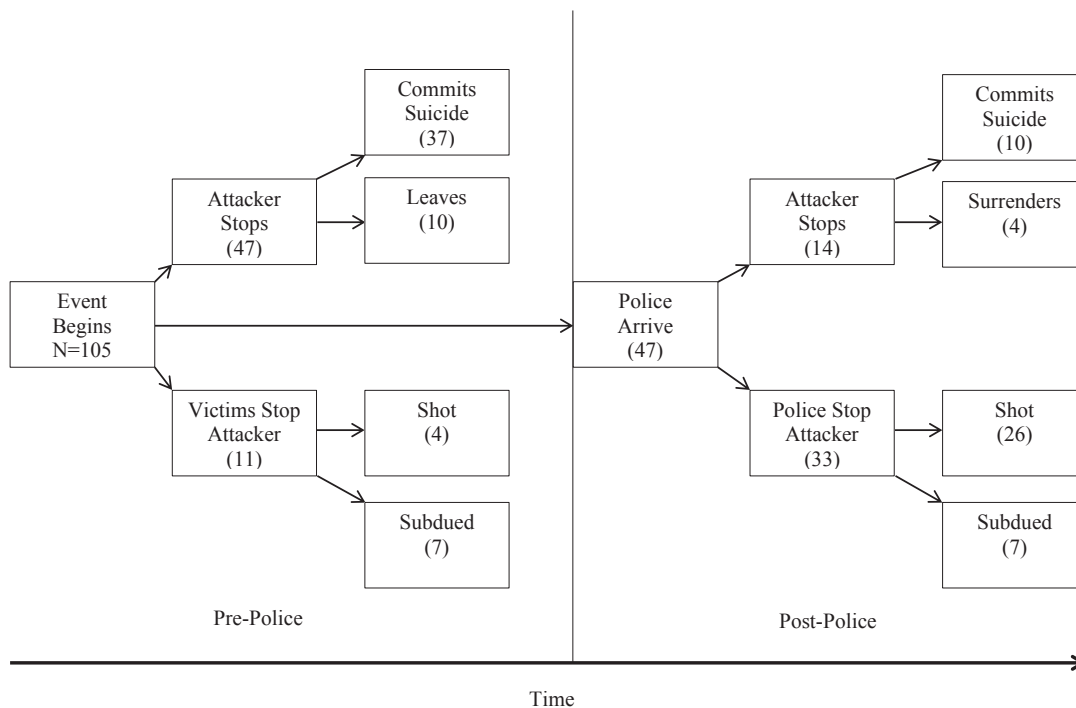


Figure 8 Endings of ASEs in businesses by number

As mentioned above, a majority of the ASEs ( $n = 58$ ; 55 per cent) ended before police arrived. However, these events account for only 47 per cent ( $n = 293$ ) of victims shot, while 51 per cent ( $n = 145$ ) of victims killed. Forty-five per cent ( $n = 47$ ) of cases ended after law enforcement arrived on scene. The events ending after law enforcement arrived account for 53 per cent ( $n = 326$ ) of victims shot and 49 per cent ( $n = 137$ ) of victims killed.

## DISCUSSION

The overarching purpose of this study was to provide business owners, management, and law enforcement officers with detailed data regarding ASEs in business settings. The results show that no specific demographic profile can be utilised to identify potential active shooters in business environments. The shooters in the study were overwhelmingly, but not exclusively male.

They came from every major racial/ethnic group in the USA, and they varied widely in age.

There also was not much of a pattern in terms of the time of day or day of the week of the attacks. Attacks were more likely to occur during standard 8 am to 5 pm working hours, but also occurred during other business hours, with a spike at 7pm. Attacks were fairly spread throughout the working week, with the fewest occurring from Friday through Sunday.

Patterns were apparent in other areas. In more than 70 per cent of the attacks that occurred in retail locations, the shooter was an outsider. However, all active shooter attacks at factories and warehouses were carried out by current or former employees. Twenty-eight per cent of office attackers were current or former employees, and 28 per cent had a secondary relationship with the office. This suggests that it may be possible for

an alert employer to intervene and prevent attacks. This will be further addressed in the section on policy implications.

More than half of the events examined ended before the police arrived on scene. These attacks also tended to have fewer people shot but slightly more killed. These events generally did not end because of random chance, but because potential victims took effective actions to protect themselves. In cases where the shooter killed him or herself or left before the police arrived, it appears that the shooter engaged in an initial burst of violence and potential victims reacted by getting away from the attacker or barricading themselves in a safe location. The attacker would then engage in a brief search for more victims. When none were found, the attacker killed him or herself or left. In other cases, where the attack ended before the police arrived, the potential victims physically subdued the attacker. These findings clearly suggest that the actions of potential victims during these attacks are important. This will be further addressed in the section on policy implications.

Many (38 per cent) of the attacks in this study were conducted by employees or former employees. Sixty-two per cent were conducted by people who were not employed by the organisation that was attacked. Both of these findings suggest that physical security (particularly access control) can be important in mitigating the damage caused by such attacks. This is also discussed in the next section.

## **POLICY IMPLICATIONS**

### **Threat assessment in the workplace**

Prior research has shown that ASEs are generally not spontaneous events. Rather, the attacks occur after a downward spiral where the individual's behaviour becomes more extreme over time.<sup>18</sup> One hundred

per cent of factory attacks, 55 per cent of office attacks and 26 per cent of retail attacks came from individuals who were current employees, former employees or had secondary relationships with the attack location. This suggests that it is possible that some of these attacks could have been prevented had efforts been made to identify employees in the early phases of this downward spiral, a process formally known as threat assessment.

Threat assessment is a systematic strategy used to detect, assess and manage threats and potentially violent behaviour. A multi-disciplinary threat assessment team conducts the assessments. Potential team members include employees from human resources, security, legal, management, or representatives from general workforce. The size and composition of the team will depend on the individual company — eg large companies have larger numbers of personnel, potentially in many different departments. Smaller companies may need to seek outside help from law enforcement, mental health and/or social services agencies, while large companies may be able to leverage internal personnel to fill these roles.<sup>19</sup>

Once a concerning behaviour or verbalised threat is reported, the threat assessment team examines the validity of the threat. The team can then develop an appropriate plan of action for each individual case. The FBI's 'Workplace Violence: Issues in Response' report details the important role of threat assessment in maintaining a safe work environment.<sup>20</sup> It is important to consider this as a proactive approach to safety in the workplace. The majority of threats will likely be dismissed and some issues may be resolved. However, the process of evaluating all potential threats may result in saved lives.

The benefits of threat assessment do not end with the interdiction of a possible ASE. In fact, based on the literature on

workplace violence, the process of threat assessment may impact the more common physically and psychologically aggressive behaviours experienced by employees. The effectiveness of the assessment process is dependent on employee participation. Specifically, threats cannot be vetted if the team is not aware of them. Training should be provided to employees on what constitutes a threat and what steps to take once a threat is witnessed. Individual businesses may operationalise what is considered a threat differently in order to meet their needs. For example, some may only be concerned about physical threats and choose to generally ignore other psychological forms of workplace violence.<sup>21</sup>

Management also needs to consider the ramifications of terminating an employee who has exhibited threatening behaviours. Terminating an individual without adequate preparation should be avoided. Ending employment for a disgruntled or agitated individual without a plan may result in the individual taking aggressive actions in the workplace. Steps should be taken to ensure the individual is observed after termination until the individual is off premises. If possible, access cards, pass-codes and keys should be returned and/or changed as appropriate to limit accessibility to the place of business.

### **Training employees to respond effectively**

As suggested previously, the actions of potential victims during an ASE can be critical in mitigating the damage. For example, on 5th August, 2013, a shooter first fired 28 bullets from a .223 calibre rifle at the exterior of the building and then made his way into the building. Once inside the building, he entered a meeting room and opened fire. While he was firing his weapon, two civilians subdued and disarmed him. The shooter was able to kill three and wound three others, but

the actions of the civilians undoubtedly prevented further death and injury from occurring.<sup>22</sup>

Businesses should be proactive in training their employees to respond to an active threat. Individual businesses may have policies in place regarding evacuation procedures in the case of an emergency; however, evacuation practice alone will not be sufficient in a dynamic situation. The above active shooter example would have ended differently had the civilians simply tried to evacuate by going past the shooter. Businesses can, and should, be proactive in establishing policies for their employees. For example, printed material regarding active shooter responses can be displayed alongside mandated building evacuation procedures and general emergency information. Some companies are currently engaged in educating employees about response tactics regarding ASEs. For example, Walmart has developed and active shooter response training video which is being disseminated along with other materials to all of its employees.<sup>23</sup> Businesses should be encouraged to follow this proactive approach to active shooter training.

Currently, several professional organisations have produced training programmes and advice on how to respond properly to an attack. Many of these programmes instruct civilians how to respond based on the situation at hand. For example, the Advanced Law Enforcement Rapid Response Training (ALERT) Center at Texas State University has long taught a system called 'Avoid, Deny, Defend', which helps individuals evaluate how and when to use each option. Civilians are trained to try and *avoid* the shooter (eg get away) as their first option. If avoiding the shooter is not an option, the civilian should *deny* the shooter access to the area that the civilian is in (eg lock or barricade a door). If all else fails, civilians should be

prepared to *defend* themselves. It is important for everyone to know that they have the right to defend themselves in a life-or-death situation. Examples of defending include, but are not limited to, swarming the shooter or using any available object to attack the shooter.

The City of Houston has likewise produced a six-minute video called 'Run, Hide, Fight'. This video was adopted as the federal standard response programme in 2013. Many private companies have developed systems, and there are many options available. Business owners and management are encouraged to consider these various training models. Businesses should consider how they might modify their plans, policies and procedures to include a more comprehensive training and operations plan to deal with ASEs.

### **Physical security opportunities**

Physical security changes to buildings may also have an impact on the survivability of civilians. Case studies of ASEs have shown that denying entry can protect lives.<sup>24</sup> If the shooter cannot gain access to potential victims, he or she is unable to inflict the intended harm. However, access control can be difficult when one considers many business locations. There are two distinct areas in which access control warrants further consideration: exterior and interior.

#### *Exterior access control*

The idea of concentric access control is well established in the world of physical security. That is, the innermost areas are the most secure. In order to access the inner area, one must gain access through various layers of security. Therefore, exterior control mechanisms are warranted where possible. The term 'exterior control' is used here as a blanket term to denote any security feature utilised to keep a potential threat out of the building. These mechanisms include, but are not limited to,

fences, controlled parking for employees and guests, guard posts and lockable exterior doors. The type of business location will determine the extent to which one can implement exterior control. For example, fences, guards and locked doors would not be feasible in a public shopping centre. However, these mechanisms could fit well within a factory/warehouse or private office building.

Exterior access doors can be equipped with keys, access cards and/or keypad locks. Locations that receive a high volume of packages and/or visitors may implement a buzzer system or use a security vestibule to regulate outside access. A security vestibule is a secured room entered immediately upon entering the exterior door. These are sometimes utilised as reception areas with a business representative behind a secure window. The representative generally controls access to the rest of the facility. A security vestibule acts as a transition from exterior access to interior access within the building.

#### *Interior access control*

If exterior access control does not work, or is not in place, the shooter will gain access to the interior of the building. Once the shooter is inside, it is still possible to limit the attacker's ability to move freely. One essential method of access control is simply locking doors. In the USA, no active shooter has successfully breached a locked door. There are a variety of door lock options (eg push button, key, thumb-turn or deadbolt). The use of deadbolt locks that do not require a key is recommended for two reasons: first, a deadbolt is better able to resist attacks than many other type of locks; secondly, when people are under life-threatening stress, they frequently lose fine motor skills and near vision.<sup>25,26</sup> The loss of fine motor skills and near vision would make it difficult for an individual to lock a door with keys.

### Credentials

A key aspect of both exterior and interior security is the implementation of business-wide employee credentials. Many businesses and schools have implemented policies that require students and staff to display valid credentials at all times. Furthermore, visitors are required to check in with the receptionist and receive a visitor's pass. Students and staff are trained to look for, and report, individuals without the proper credentials. This type of practice has already been adopted by many businesses and any that have not yet implemented such a policy are encouraged to consider it. Credentials can also be integrated with access control through the use of RFID chip enabled badges or key fobs. This process would give employees fast access to secured areas. Additionally, if an employee is terminated, management can easily restrict his or her access to the facility without having to change keys and/or keypad combinations.

### LIMITATIONS AND FUTURE RESEARCH

Like all studies, this one was limited by the quality of the available data. While the data examined for this study were the most comprehensive available, it is possible that relevant events were not found and that these undiscovered cases could change the findings. The data sources used to code the cases were also incomplete and imperfect. Some of the coded details may therefore be incorrect and these errors or omissions could also affect the results. Despite these limitations, the study makes a substantial contribution to the understanding of business-related ASEs.

Future research should continue to expand upon the descriptive work reported here. The development of a typology of attacks is a potential next step. Such a typology would also be useful in beginning

to develop a theoretical framework from which these events can be examined.

### NOTE

The authors disclose receipt of financial support for research conducted at ALERRT under BJA Grant # 2016-VI-BX-K004. The views and opinions expressed in this article are those of the authors and do not reflect the official policy or position of the Bureau of Justice Assistance (BJA) or any other US government agency.

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