

RESEARCH NOTE

Investigating Terrorist Use of Improvised Explosive Devices in the United States: Evidence from US Federal Court Cases, 2009 – 2024

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Abstract: Terrorist use of improvised explosive devices (IEDs) remains a persistent and evolving threat within the United States. Until now, few data collection and analysis efforts have focused on the systematic capture of terrorist bombing plots and attacks. Filling this evidence gap, this research note presents and analyses an original dataset of US federal charges associated with terrorism-related IED incidents in the United States observed from 2009 through 2024. The data features 110 related cases, the analysis of which indicates a sample peak in the use of IEDs in terrorist incidents occurred in 2024. Incidents are not siloed to a specific region within the US, but involve cases from coast-to-coast, with crowded spaces remaining the most prominent target. The most common form of device employment observed across the dataset is the person-borne IED, primarily involving pipe bombs and pressure cooker IEDs. Eighty percent of the incidents recorded in the sample were thwarted by intelligence and law enforcement professionals – the remainder either failed due to technical mistakes or were successful. The research note describes notable sources of change in IED threats over time and identifies emerging trends in the methods by which US-based terrorists may continue to utilise IEDs in their efforts to cause death, harm, and destruction. It concludes with implications for theory, study, and practice.

Keywords: Improvised explosive device (IED), terrorism, terrorist innovation, United States

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Introduction

It was only a few hours into the year 2025 when a US Army veteran inspired by the Islamic State ploughed a pickup truck at high speed down Bourbon Street in New Orleans, killing fourteen and injuring dozens. The attacker had planned to use improvised explosive devices (IEDs) as lethal adjuncts to the vehicle ramming assault – multiple IEDs were later found in his vehicle as well as in the immediate area¹. Across its history, the United States has experienced major terrorist attacks facilitated by the use of explosives, resulting in hundreds of casualties. Similar plots have been disrupted by the actions of law enforcement and intelligence professionals. The era of the bomb is not over; terrorists and homeland threat actors based in the United States continue to look to explosives to bring attention to their respective causes, maximise casualties, and cause significant damage.²

This research note presents and analyses an original dataset of more than 100 terrorism-related IED incidents associated with federal charges in the United States from 2009 through 2024. Leveraging hundreds of public federal court documents as primary source material, the data provides an updated, evidence-based baseline for anticipating and understanding terrorist tactical choices and informs future academic study into this phenomenon. Our analysis of the data underscores that the IED threat to US homeland security is persistent and evolving. The highest recorded number of cases within the sample time range was 2024, with a total of sixteen federal charges. Terrorist use of explosives for large- and small-scale attacks is likely to persist, even as threat actors continue to innovate their design and tactical employment of IEDs.

The Terrorist IED Attack: Definitions, Common Forms, and Underlying Logic

Improvised explosive devices vary considerably in their composition and degree of sophistication. The IED threat is generally low-tech in nature. Most IED components are inexpensive, do not require a lot of formal training or knowledge to manufacture, and can be made from locally available materials³ attack planners and plotters, IEDs are highly customizable and, thus, vary widely in their design as well as in their modes of employment or concealment. Ultimately, the final form and component parts of an IED are limited only by the creativity and skill of the bombmaker.⁴

But what counts as an IED? Paul Gill, John Horgan, and Jeffrey Lovelace synthesise nearly 30 different academic and practitioner definitions to argue that “An explosive device is considered an IED when any or all of the following...is modified in any respect from its original expressed or intended function. An IED’s components may incorporate any or all of military grade munitions, commercial explosives or homemade explosives. The components and device design may vary in sophistication from simple to complex, and IEDs can be used by a variety of both state and non-state actors.”⁵

While IEDs reflect the unique skills, needs, resources, and intent of the bombmaker, most modern devices feature five component types: (1) a switch, (2) an initiator, (3) a main charge, (4) a power source, and (5) a container.⁶ Some IEDs also make use of enhancements, such as metal shrapnel, which terrorists may choose to add to a device to increase its physical or psychological effects. This category includes “dirty bombs”, in which terrorists enhance an IED by adding chemical, biological, radiological, or nuclear agents.⁷

Some of the most common IED types appearing in US-based cases include over-pressure devices, pipe bombs, pressure cooker bombs, and mailed packages.⁸ The retrofitted pressure cooker

bomb was made especially popular with violent extremists after instructions for constructing these were provided in the 2010 “Make a Bomb in the Kitchen of Your Mom” article published in the Al-Qaeda-linked *Inspire* magazine. In a homeland context, terrorists’ use of military grade plastic explosives, such as Semtex, in improvised devices is less common; most threat actors find the use of commercial explosives (e.g., smokeless powder) or homemade explosives (e.g., TATP or ANFO) to be more accessible or desirable. Pyrotechnics and fireworks continue to be among the most common explosive charges used in improvised devices.⁹

It is unsurprising that improvised explosive devices are common tools of the trade among a diverse range of terrorists around the world and in the United States.¹⁰ IEDs are affordable, relatively simple to make, difficult to disrupt, and can cause significant harm and damage. For threat actors at an asymmetric capabilities disadvantage, IEDs level the playing field with a credible guarantee of immediate impact. This weapon of choice has been popularised across nearly all threat actor groups, including anarchist violent extremists, racially and ethnically motivated violent extremists, jihadist homegrown violent extremists, and designated transnational criminal organisations.

A Brief Overview of Historic Terrorist IED Incidents in the United States

American militants, terrorists, and violent extremists have long integrated explosives into their operations. The late 1800s saw a surge of political violence enabled by the development, manufacture, and distribution of dynamite. Audrey Cronin writes that, as the first “widely accessible, commoditized, inexpensive, and highly portable high explosive,” dynamite quickly became the weapon of choice of anarchists, revolutionaries, and nationalists (2020, p. 68).¹¹ Recent research finds that more than 216 politically motivated bombing incidents occurred in the US between 1867 and 1934, including the 1920 anarchist bombing of the J.P. Morgan Building on Wall Street.¹² The threat did not end there. Other notable historic attacks include the 6th Street Baptist Church bombing of 1963 and the Weather Underground bombings in the 1970s.¹³ Scholars Jacob Ware and Bruce Hoffman remark on this tumultuous period, “During one 18-month stretch between 1971 and 1972, there were an astonishing 2,500 bombings. Many of which were committed by radical left-wing groups such as the Weather Underground, the Symbionese Liberation Army, and the New World Liberation Front.”¹⁴ The ease of acquiring and using explosive devices to inflict damage and destruction acts as a linking function across these historic attacks, an enabling factor which persists today. Thus, improvised explosive devices remain a prominent choice for violent extremists today, with more recent high-profile attacks.¹⁵ For example, in a comprehensive study on more than 120 jihadist terrorist plots and attacks in the US from 1993 to 2017, Martha Crenshaw and colleagues found that almost half involved explosives.¹⁶ Other bombing incidents occurring during this time period include the 1995 Oklahoma City Bombing and the 2013 Boston Marathon bombing.¹⁷

Limiting the analytic aperture to only major incidents or successful attacks risks painting an incomplete picture of the terrorist IED threat.¹⁸ Many smaller-scale and failed IED incidents occur on a more regular cadence. For instance, in January 2011, a white supremacist affiliated with the National Alliance placed an IED along the route of a Martin Luther King parade in Spokane, Washington. The attacker designed the device – which was identified and rendered safe prior to detonation – to scatter metal fragments covered with rat poison to keep victims’ wounds from coagulating. The IED was discovered less than an hour before the parade started and was subsequently disarmed.¹⁹ In 2018, Cesar Altieri Sayoc was determined to harm elected officials by delivering over 16 IEDs via the mail.²⁰ Fortunately, this plot was thwarted by law enforcement.

Data and Methodology

This research note focuses on 110 identified cases from January 2009 through December 2024 in which an individual was charged with plotting, attempting, or executing an IED attack within the United States in support of a terrorist organisation, network, or cause. Using public court records pertaining to US federal charges, the underlying dataset includes information at the defendant level – with information on their biographic details and their violent extremist affiliation – as well as at the incident level – with information on time, location, and the IED(s) associated with the federal charge. To create the dataset and identify relevant cases, the research team followed a two-stage process. First, a comprehensive case archive was constructed using press releases and public statements from cases across the 94 Federal Court Districts. Second, court records were examined using the Public Access to Court Electronic Records (PACER) system, which is the US Courts’ online repository of court proceedings and documents. The dataset was supplemented with additional information from the Department of Justice press releases and related news reports. The following inclusion criteria were used to determine the cases comprising the final sample.

- **Clear attribution.** Federal court documents and related press releases associated with the IED incident – e.g., a criminal complaint or sentencing statement – must attribute the activity to a named individual or group.
- **Explicit terrorist motivation.** Federal court documents and related press releases associated with the IED incident must clearly state the defendant’s underlying motive as being directly tied to support for a violent extremist ideology or designated terrorist entity.
- **An IED incident.** The federal charge must pertain to an incident – i.e., an active plan, plot, or attack – involving the credible construction and/or use of an improvised explosive device.
- **Homeland target.** Federal court documents and related press releases associated with the IED incident must specify that the IED incident took place or was intended to be used against a target within the United States.

As a result of the inclusion criteria, the dataset does not include: incidents in which direct attribution is unclear; criminal IED incidents not explicitly associated with an ideological motivation; bomb threats and hoax explosive devices; cases of arson, plots or attacks against US facilities, personnel, or citizens abroad; federal investigations that did not result in a charge, or relevant cases in which relevant court documentation remain sealed. Overall, the dataset illustrates a highly representative but non-exhaustive picture of the terrorist IED threat to US homeland security. Thus, the following analysis can be understood to be a conservative but generally accurate estimate of the broader terrorism-related IED threat to US homeland security. In the following section, we analyse the data and discuss our findings.

Analysis: Terrorism-Related IED Incidents in the United States, 2009 - 2024

The analysis provides key insights into 110 recorded terrorism-related IED incidents in the United States from 2009 through 2024. We describe annual trends in related federal charges, the location where attacks occur, the nature of IED employment in identified cases, as well as selected targets, information on the demographics and affiliations of the case defendants, and the distribution of incident outcomes. Overall, the analysis provides evidence of an evolving threat landscape with a concerning recent uptrend in the terrorist IED-related threats across the United States.

Figure 1 illustrates the number of recorded cases by year. Throughout the span of the 16 years of recorded data collected, IED incidents have varied, with as few incidents as two cases (2022) and a high of 16 cases (2024). High levels of IED use are noted in 2015, 2017, and 2019, in which all years saw incident cases over ten per year. In the past five years, 2019 had the second largest number of incidents with 11 cases. In 2020 and 2021, IED incidents stabilised and there were six recorded cases for each year, respectively. In 2022, a downward trend in the use of IEDs was noted, with only two incidents. Since then, there has been an increase in the number of ideologically motivated cases, with 2023 marking a notable increase in incidents, with this pattern continuing into 2024. In the past year, a record high of 16 IED incidents have been recorded, which was also three times the number of cases seen in 2023.

Figure 1. *Federal Charges Associated with Terrorist IED Incidents in the US, 2009 – 2024*

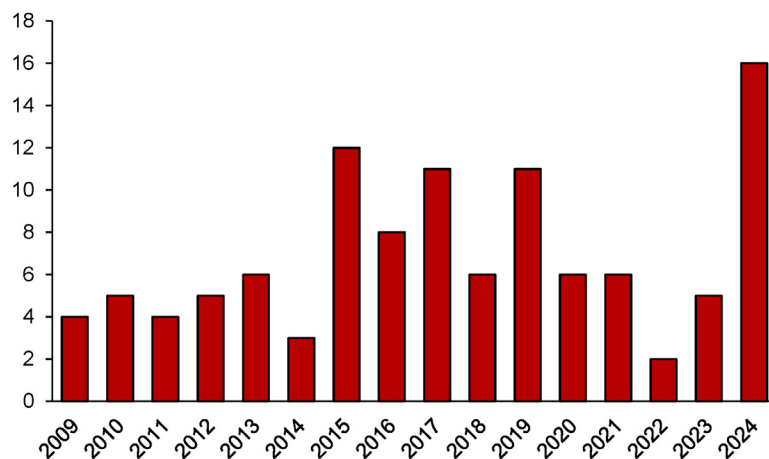
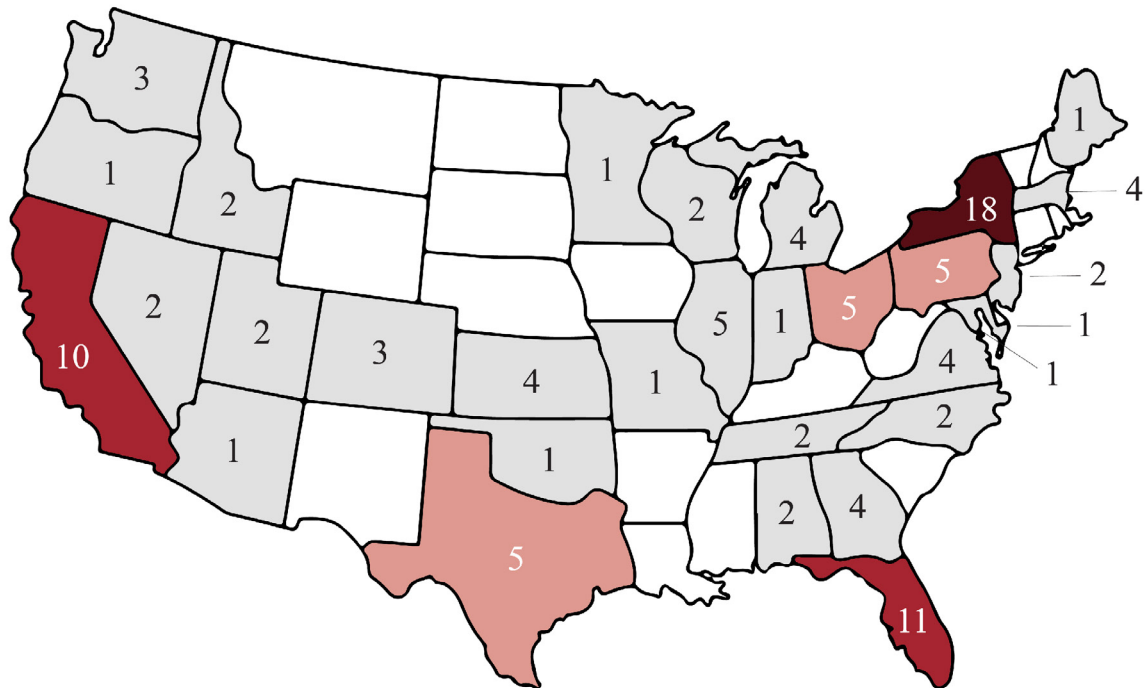
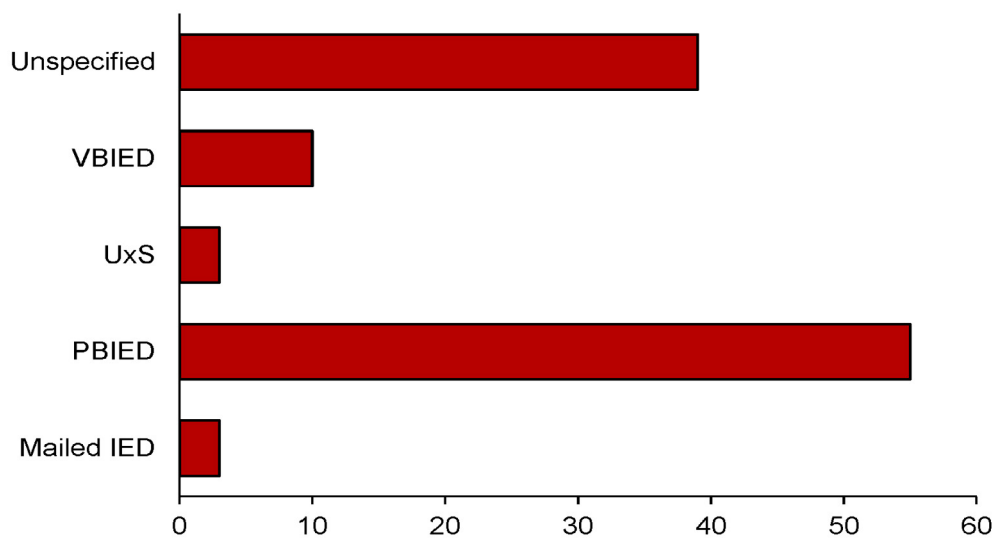


Figure 2 shows a heat map of the location of federal charges associated with terrorism related IED incidents across the continental United States. Terrorism motivated IED incidents are widespread throughout the US, with 31 states experiencing at least one related event over the past 16 years. Twenty-two states saw multiple incidents in that time span. New York stands out as the most targeted state, with 18 incidents being charged. Followed by Florida and California with eleven and ten cases, respectively. When scaled in proportion to the overall state population, the number of cases observed in Kansas, Colorado, and Washington is notable. Kansas, for example, has an estimated population of under 3 million. Michigan – another state in our sample with a recorded total of four terrorist IED-related federal charges – has an estimated population of over 10 million. Overall, terrorism related IED incidents are associated with federal charges in more than 50 percent of the continental US at least once in the recorded time frame, with a high level of geographic dispersion and state-level variance.

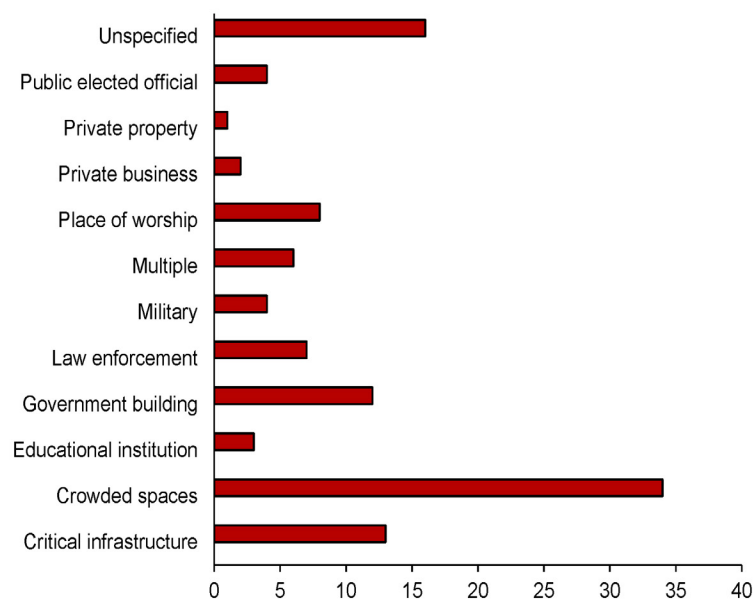
Figure 2. *The Geographic Distribution of Federal Charges Associated with Terrorist IED Incidents in the US, 2009 – 2024*



Once the IED is created, there are myriad ways in which it may be employed – i.e., how a device is delivered to its intended target.²¹ Figure 3 illustrates the forms of employment recorded in our sample. Because some of the cases in the sample were foiled by intelligence and law enforcement in early stages of plot development, information on the intended form of tactical employment is not always reported in court documents. For the 71 recorded incidents with sufficient information available, we find that person-borne IED attacks – i.e., those in which devices are either placed and left by a bomber or carried in a suicide bombing -- are by far the most frequent (N = 55). This includes, for example, the 2013 Boston Bombing. Vehicle-borne IED plots and attacks appear less frequently in our sample, though not insignificant. For example, a homegrown violent extremist was arrested on 26 November 2010 after he attempted to detonate what he believed to be a vehicle bomb at an annual Christmas tree lighting ceremony in Portland, Oregon, in support of al-Qaeda. We also record a handful of federal charges in which defendants intended or attempted to mail IEDs to select targets (N = 3). Tactical employment remains a near-constant source of malevolent innovation.²² Three recorded incidents involve plots using unmanned systems (UxS) to deliver IEDs to a selected target. Finally, corresponding with the incidents that were foiled in early planning stages, we include a “precursors or materials” category, which reflects cases in which requisite materials were acquired but not sufficiently developed to credibly identify the case method of IED employment. This category comprises roughly 35 percent of the sample (N = 38).

Figure 3. *Types of Employment in Terrorist IED Incidents in the US, 2009 – 2024.*

In addition to geographic location, it is worth noting differences in the specific targets at the centre of terrorist bombing plots and attacks. As Figure 4 illustrates, a wide range of targets have been subject to IED incidents across the 16-year recorded period. In general, crowded spaces such as parades, event venues, and other population-dense soft targets have been the most frequently targeted areas, with 34 incidents being planned or taking place. Following these, critical infrastructure (N = 13) – such as energy and transportation – and government buildings (N = 12) have also been among the most frequent targets of IED incidents. It is worth noting that traditionally harder targets, such as military bases, personnel and law enforcement locations, are also not exempt from IED attacks. For instance, in April 2015, a man was taken into custody as he was arming a vehicle-borne IED (VBIED) at a gate in Fort Riley, Kansas. The perpetrator hoped to get into the base undetected so he could detonate the VBIED, killing as many soldiers as possible.

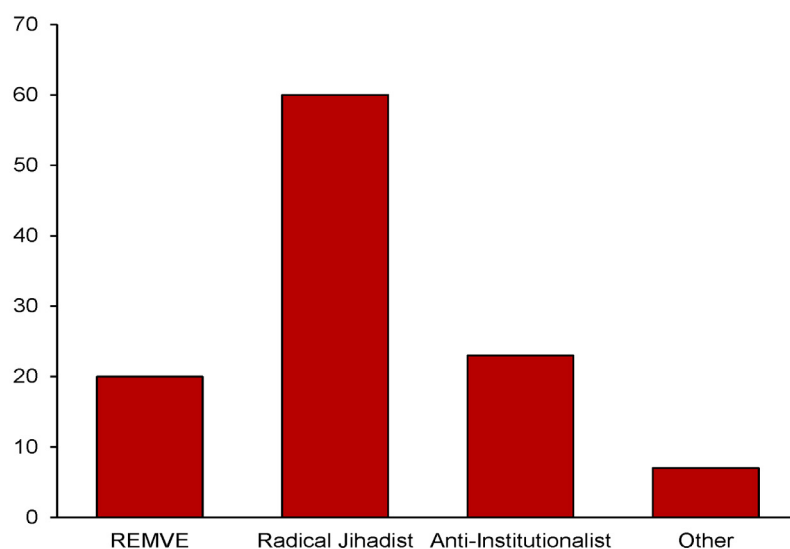
Figure 4. *Targets Associated with Terrorist IED Incidents in the US, 2009 – 2024.*

Next, we summarise available information on the specific individuals involved in the recorded IED incidents and their reported affiliations. Table 1 presents basic demographic information – i.e., gender and age – on the defendants associated with terrorist IED incidents in the United States. The demographic profile of perpetrators using IEDs, the average age of individuals was 31 years old (median = 28 years old) and ranged from as young as 15 to as old as 75. Our dataset includes four incidents where the defendant was a juvenile, being younger than 18 years old. Three out of the four teen-related cases have occurred since 2023, highlighting the growing increase and worsening pattern of youth and juvenile mobilisation to acts of terrorism. An overwhelming majority of defendants charged with using IEDs were male (N = 104), with only six cases involving females. Similar to more general profiles of terrorist defendants, it can be noted that the typical individual engaging in an ideologically motivated IED incident tends to skew towards younger adult males.

Table 1. *Defendants in Federal Charges Associated with Terrorist IED Incidents in the US, 2009 – 2024.*

Gender	Male	Female	Age	15-20	21-30	31-40	41-50	51-60	61-70	71-75
N	104	6	N	24	44	21	12	6	2	1

Figure 5. *Terrorist Ideologies Associated with IED Incidents in the US, 2009 – 2024*



Figures 5 and 6 illustrate the distribution of ideological motives promoted by the defendants as described in the original court documents across the whole sample and across time, respectively. Motivations and affiliations assessed in this data include racially motivated violent extremism (REMVE), anti-institutionalist violent extremism, radical jihadist violent extremism, and other single-issue causes. Based on the data, it is clear that persons enabled and inspired by jihadist foreign terrorist organisations such as the Islamic State in Iraq and Syria (ISIS) and al-Qaeda represent the greatest IED-related threat in the United States over the past 16 years. In 2015, a time during which the ISIS Caliphate campaign in Iraq and Syria was nearing its peak, the number of incidents connected to radical jihadism peaked, with 8 recorded incidents in that year. To be sure, there is a growing trend in individuals associated with other globalised terrorist networks and movements such as REMVE, anti-institutionalism, and single-issue causes. This is illustrated in Figure 7, which shows a breakdown of incidents over time by associated terrorist ideology. In 2024, anti-institutionalist violent extremism – which includes anarchist extremists and others who target public leaders – was the most common motive inducing IED incidents, with roughly 38 percent of cases being tied to this movement. REMVE use of IEDs has also increased in the

past three years, with a steadily growing number of cases in 2023 and 2024. Case in point, in November 2024, a 24-year-old man was arrested during his attempt to use a drone to deliver an IED to disable a Nashville, Tennessee power substation. According to statements by law enforcement officials, the attacker was dedicated to a neo-pagan white supremacist ideology and hoped that his attack would “shock the system,” causing other substations to fail.²³

Figure 6. *Terrorist Affiliation Associated with IED Incidents in the US by Year, 2009-2024.*

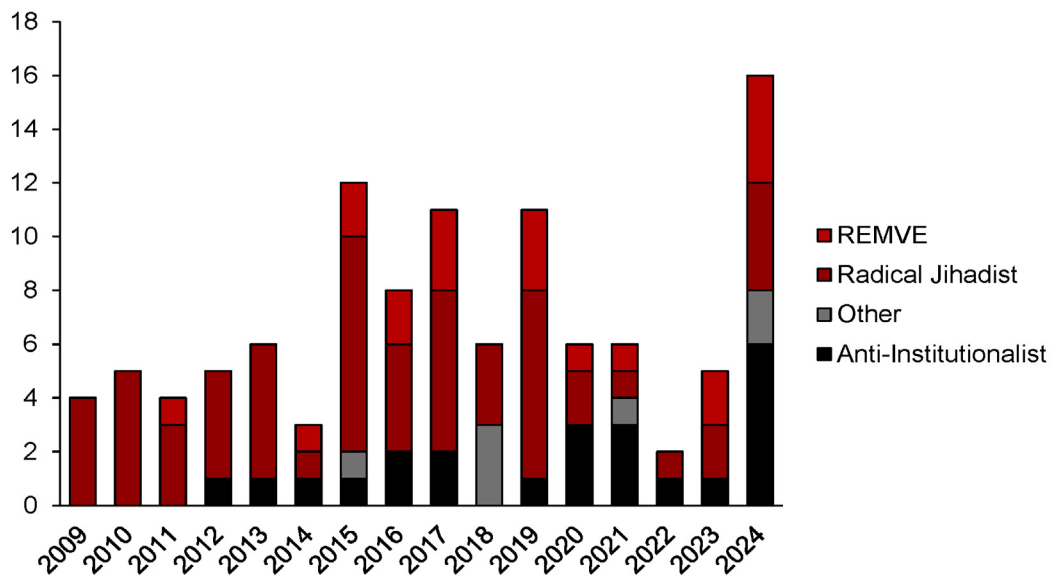
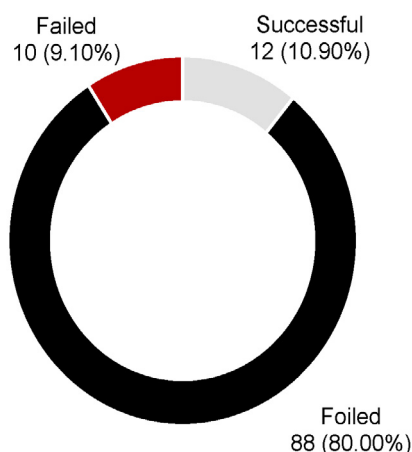


Figure 7 shows the distribution of outcomes associated with the incidents recorded in our sample. We find evidence of varying levels of success. The vast majority of incidents associated with a federal charge - 80 percent – were foiled or disrupted by intelligence and law enforcement professionals before the IED-plotted attack was initiated. Of the incidents recorded in our sample, only about 11 percent were considered successful, and roughly 9 percent failed as the result of a technical or operational failure. The distribution of successful, failed, and foiled IEDs highlights that, within the recorded time span, most terrorist IED incidents associated with a federal charge were thwarted, preventing injury and harm before the incident could be enacted.

Figure 7. *Distribution of Terrorist IED Incident Outcomes in the US, 2009 – 2024.*

Discussion

Overall, the analysis of the data reveals a number of notable trends and dynamics. First, the number of recorded terrorist IED incidents associated with federal charges in the US - after gradually receding from a prior peak in 2014 -- saw a sharp recent increase with a sample high of 16 cases in 2024. This underscores the persistent and dynamic nature of this threat. Second, the bomb clearly remains a weapon of choice for many US-based terrorists across the threat actor ecosystem. For instance, while these represent the plurality of cases, it would be incorrect to conceptualise the bomb as being strictly a tool of violent jihadists. Rather, in recent years, the use of explosives has been more evenly distributed across violent extremist actors, including proponents of anarchist violent extremism, nihilist violent extremism, and other extremist causes. Third, we find that the typical individual involved in these cases tends to be male and in their late 20s. However, the growing number of incidents involving radicalised teens and youths is concerning – and could lead to a decrease in the average perpetrator age. Fourth, the threat is widespread across the US homeland, neither confined to population-dense areas of the country nor specific regions. This underscores the importance of federal government engagement with state and local partners as well as key industry stakeholders. Finally, it can be expected that crowded spaces, critical infrastructure, and government buildings will remain popular targets, especially as the ability to infiltrate these spaces becomes easier through technology. Targets such as government buildings and places of worship that had not been the target of an IED plot or attack since 2021 and 2020, respectively, have recorded cases and have come back into the target landscape as areas for potential concern.

Core elements of the IED threat landscape are shifting. As one of the authors writes elsewhere, “A major contributor to—if not a key enabler of—the evolving IED threat is the sharing and dissemination of malign tactics, techniques, and procedures (TTPs) through online platforms and communication channels.” For would-be attackers with minimal prior experience or knowledge, disseminating best practices and novel solutions lowers barriers of entry to building a functional IED. Relatedly, the rising availability of emerging technology and the wide accessibility of precursor and bomb-making materials for purchase have brought additional concerns to light.²⁴ A 2024 IED plot developed by a juvenile in Arizona was foiled when police discovered the 17-year-old intended to make acetone peroxide (TATP), affix it to a remote-control car, and attack the 2024 Arizona Pride parade in support of the Islamic State.²⁵ While the method has been employed for years in foreign battlefields -- e.g., Syria, Iraq, Afghanistan, Ukraine, and Myanmar -- the use of drones to facilitate explosive attacks in the US homeland is a growing concern²⁶. Former FBI Director Christopher Wray reported to a Congressional

committee in 2022 that the Bureau was “investigating, even as we speak, several instances within the US of attempts to weaponise drones with homemade IEDs. That is the future that is here now.”²⁷ In the next section, we conclude with an overview of implications for future academic inquiry.

Conclusion

As revealed in US federal charges and court documents, terrorist use of improvised explosive devices presents a sustained – even growing – threat to US homeland security. An analysis of the data demonstrates that these tools remain a weapon of choice for terrorists and violent extremists, with ideologically motivated IED incidents reaching a five-year annual high in 2024. We find that US-based terrorists see value in using IEDs against a wide range of local targets, especially critical infrastructure and crowded spaces. Moreover, as a tactical instrument, the IED is appealing to would-be attackers across the violent extremist ecosystem. As a scope limitation, our analysis is based strictly on publicly available information on incidents that culminate in a federal charge and with clear attribution to individuals affiliated with a known terrorist organisation, movements, or network. This almost certainly lends itself to a conservative estimate.

This research note lays out the framework of a research agenda for future academic study. First, there is a dual nature to the terrorist IED threat, having both enduring and emerging elements. Some of these are rudimentary in nature, others highly sophisticated. The US Intelligence Community recently assessed, “...although most terrorist attacks will continue to use small arms and improvised explosives for the foreseeable future because these means are sufficient and reliable, terrorists will also seize any opportunity to develop new, more remote attack methods.”²⁸ Future research should aim to understand and explain how the known and basic elements of the terrorist IED threat may be further amplified by the adoption of novel and advanced methods, materials, and technologies²⁹. Second, the scope of this study has focused on what federal court documents can tell us about the terrorist IED threat in the United States. Yet certain elements of our analysis and findings will likely apply to other nations as well. How, for example, might this help efforts to mitigate explosives threats in other Western nations where similar terrorist ideological threats are present? Third, with the United States’ February 2025 designation of several international drug cartels as foreign terrorist organisations -- a set of threat actors well familiar with explosive attacks -- how does this potentially affect the future IED threat to US homeland security? Finally, there is a need to better understand the structural, organisational, and individual factors – including human, social, and technological conditions – which act to either enable or constrain the terrorist IED threat.

Improvised explosive devices and their use in terrorism related cases remain a concern for American communities. Altogether, we find evidence of a recent increase in the number of individuals involved in IED incidents, an expanding target surface on which attackers may focus their operations, and a variety of terrorist networks which use lethal explosives in attacks.

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