

Chapter 22

Prevention of Gun-, Knife-, Bomb- and Arson-based Killings by Single Terrorists

Annelies Pauwels

Lone-actor terrorism is an emerging phenomenon that challenges Western law enforcement agencies. This chapter adds to previous research on the prevention and detection of attacks by single terrorists and does so by focusing on limiting their access to weapons. It analyses the weapons that have been most commonly used by lone offenders in Western Europe over the last twenty years: firearms, knives, explosive and incendiary devices. For each of these weapon types a case study of a recent lone-actor attack is analyzed. The chapter concludes that downstream preventive measures aimed at curbing access to weapons and practical training opportunities can be useful. They can direct lone actor terrorists to more readily available weapons, reducing the lethality of their attacks. The research presents recommendations aimed at further restraining access to weapons and limiting online and on-hands training in the use or manufacturing of weapons. Lone-actor terrorism will most probably continue to exist and possibly rise, as it is a direct response to increasing pressure from law enforcement and is actively promoted by terrorist strategists. While a hundred percent safety from lone-actor attacks is probably unattainable, it is possible to diminish their ability to successfully carry out an attack and limit their lethality.

Keywords: lone-actor terrorism, firearms, knives, arson, improvised explosive devices, European Union

Each new wave of terrorism sees the emergence of lone actors: terrorists that plan, prepare, and commit their acts without direction from a wider organization. Lone-actor terrorism is now re-emerging¹ and its threat is increasing, as their attacks often appear near-spontaneous and aimed at causing large numbers of civilian casualties. This phenomenon poses a challenge to existing law enforcement techniques. The apparent lack of coordination and communication with a wider organization makes it harder to spot the perpetrators through usual surveillance and communication interception. The spontaneity of the attacks complicates efforts to monitor the development of the plot and its disruption. Although lone-actor terrorism seems almost unstoppable, previous research has identified measures that can help prevent lone-actor violence, and detect and disrupt their attacks.²

This chapter contributes to that research as it seeks to analyze what can be done to prevent lone-actor terrorists from acquiring their most commonly used weapons. It will do so by examining which weapons were used in lone-actor attacks in Western Europe over the last twenty years. The data presented in this chapter are derived from the Global Terrorism Database (GTD), an open-sourced repository initiated by the University of Maryland. Lone-actor attacks are calculated by the attacks that have been committed by a single perpetrator (variable *nperp*). While the GTD is the most widely used open-source database for calculating the number of lone-actor attacks, it is necessary to also pinpoint its limitations.

First, it is important to note that even when an attack mentioned in the GTD is said to have been perpetrated by a single offender, the perpetrator can have been part of a group. This author filtered out the events that were clearly group-based attacks (i.e., separate attacks occurring on the same day that were part of a larger attack by a group). A clear example hereof is the Brussels attack in March 2016, which is listed in the GTD under two separate entries; one of them by a single perpetrator as the bombing in the Maelbeek metro station was carried out by a single attacker, while the attack at Zaventem airport was registered as a group attack.

Second, data entries in the database only reflect what is known at the moment of inserting the information into the database. This can be altered at a later stage, for instance, when subsequent investigations demonstrate that a single perpetrator had clear links with other individuals or did not act alone.

Third, the GTD contains a large number of unknown perpetrators. Only 17 per cent of the terrorist attacks that took place in Western Europe over the last twenty years have a known number of perpetrators: 279 attacks were committed by a single attacker (*nperp* = 1) and 353 attacks by more than one offender (*nperp* > 1).³

Despite these caveats, the “number of perpetrators” (*nperp*) remains a good indicator to examine single offender attacks, as the GTD offers a large enough sample - 279 lone-actor attacks - for analysis. Another interesting variable would be “unaffiliated individual(s)”

¹ See e.g., Nesser, Petter, “Single Actor Terrorism: Scope, Characteristics and Explanations,” *Perspectives on Terrorism*, Vol. 6, No. 6, 2012; Feldman, Matthew, “Comparative Lone Wolf Terrorism: Toward a Heuristic Definition,” *Democracy and Security*, Vol. 9, No. 3, 2013.

² See e.g., Meloy, J. Reid and Paul Gill, “The lone-actor terrorist and the TRAP-18,” *Journal of Threat Assessment and Management*, Vol. 3, No. 1, March 2016; Fredholm, Michael, “Future Outlook and Response Strategies,” in Fredholm, Michael (Ed.), *Understanding Lone Actor Terrorism: Past Experience, Future Outlook, and Response Strategies*, London: Routledge, 2016.

³ Between 1999 and 2018, the GTD mentions 3637 terrorist attacks that took place in Western Europe. For 3005 of them the number of perpetrators is unknown (*nperp* = 0 or -99 or empty), 279 attacks were committed by a single perpetrator (*nperp* = 1) and 353 attacks were conducted by more than one perpetrator (*nperp* > 1).

(*individual*), which indicates that the attack was carried out by one or more individuals not known to be affiliated with a group or organization. Yet, previous research has shown the difficulties in setting boundaries between affiliated and non-affiliated terrorists.⁴ For instance, a number of jihadi-inspired attackers claimed to be affiliated to or having pledged allegiance to ISIS, when in reality the connections were minimal or non-existent. On the other hand, right-wing attackers have often been mislabeled as lone actors since the degree to which they were connected with an extreme environment was not fully understood.

It should also be noted that the GTD distinguishes itself from some other data collections by its relatively greater even-handedness. Some previous research on lone-actor terrorism has focused mainly on high-profile attacks (e.g., high lethality attacks) or incidents receiving ample coverage in mass media. This possibly gives a distorted image on the type of weapons mostly used by lone offenders.⁵ While GTD is also based on media reports, it strives for objectivity.

Based on the GTD, this chapter presents the main weapons used by lone actors - namely firearms, knives, explosives, and incendiary devices. It will also analyze how lone-actors gained access to and used these weapons, which will be complemented by a specific case study. The case studies will also cover aspects that provide a better view on the profiles of lone-actor terrorists (e.g., background, behavioral and operational aspects, and the radicalization process).

Literature Review

A number of datasets have allowed for empirical, quantitative assessments of lone-actor terrorism in Europe and led to some key findings on which this research builds further. First, there are various types of lone actors. Differences are often related to their ideological background, the degrees of social isolation, alternative pathways to radicalization, pre-attack planning and behavior, and the presence or absence of mental health problems.⁶

Second, despite different profiles, researchers have determined that single terrorists distinguish themselves from group-based terrorists in several ways. In particular, their average age is higher, they are more often confronted with unemployment, despite having a considerable level of education.⁷ Ideology, ideas of justice, and empathy would also be more important for single perpetrators than for members of extremist groups or terrorist organizations.⁸ Lone actors also suffer more often from mental health disorders than group-based terrorists or members of the general population.⁹

⁴ See e.g., Gartenstein-Ross, Daveed and Nathaniel Barr, "The Myth of Lone-Wolf Terrorism," *Foreign Affairs*, 26 July 2016; Hofmann, David C., "How "Alone" are Lone-Actors? Exploring the Ideological, Signaling, and Support Networks of Lone-Actor Terrorists," *Studies in Conflict & Terrorism*, Vol. 43, No. 7, 2018.

⁵ See e.g., Gill, Paul, et al., "Bombing Alone: Tracing the Motivations and Antecedent Behaviors of Lone-Actor Terrorists," *Journal of Forensic Sciences*, Vol. 59, No. 2, 2014.

⁶ See e.g., Schuurman, Bart, et al., "End of the Lone Wolf: The Typology that Should Not Have Been," *Studies in Conflict & Terrorism*, Vol. 42, No. 8, 2019.

⁷ See e.g., Spaaij, Ramón, "The Enigma of Lone Wolf Terrorism: An Assessment," *Studies in Conflict & Terrorism*, Vol. 33, No. 9 (2010), pp. 854-870; de Roy van Zuijdewijn, Jeanine and Edwin Bakker, "Analysing Personal Characteristics of Lone-Actor Terrorists: Research Findings and Recommendations," *Perspectives on Terrorism*, Vol. 10, No. 2, April 2016.

⁸ McCauley, Clark and Sophia Moskalenko, "The Psychology of Lone-wolf Terrorism," *Counselling Psychology Quarterly*, Vol. 24, No. 2, 2011.

⁹ De Roy van Zuijdewijn and Bakker, 2016.

Third, lone offenders are not as isolated as the terminology suggests. Lone actors frequently have interpersonal, political, or operational ties to larger networks. They also often radicalize both in online and offline radical milieus and sometimes receive concrete assistance in the preparation for their attacks.¹⁰

Fourth, not all lone actors are the “stealthy and highly capable terrorists the ‘lone wolf’ myth alludes to.”¹¹ They have a lower rate of attack completion and a lower lethality rate when compared to group-based attacks. They also adopt limited operational security measures, and engage in on- and offline “leakage behavior” that provides others with clues about their extremism and their attack plans.¹² However, the lethality of their attacks appears to depend on a number of factors, such as the robustness of counterterrorism efforts, the type of weapon used, and weapon-related training.¹³

This research aims to provide a sense of how the use of weapons by European lone actors has evolved over the last twenty years. Particularly interesting is its focus on cases after 2014, when a significant change in weapon use by lone offenders occurred.

Lone-Actor Attacks in Western Europe by Weapon Type

Between 1999 and 2018, Western Europe has witnessed 353 group-based and 279 lone-actor attacks, with a strong increase in attacks by single terrorists particularly since 2011. Whereas between 1999 and 2011, an average of five lone-actor attacks occurred per year, this number increased significantly to the yearly average of 31 in the following years. Lone-actor violence reached a new high level in 2017, when 58 attacks were perpetrated by single offenders. Despite a general increase in terrorist attacks in Western Europe after 2011, the increase of attacks by lone actors is proportionally higher.¹⁴

Lone actors adhere to various ideologies. However, of the single terrorists operating between 1999 and 2018 whose ideology is known (approx. 65 per cent), most adhere to jihadi (82 attacks) and right-wing (51 attacks) ideologies. Western Europe has also seen a significant amount of separatist (27 attacks) and anarchist (15 attacks) incidents by lone offenders. While separatist attacks have remained rather constant over this twenty-year period, we can see a stark increase in jihadi, right-wing, and anarchist lone-actor attacks since 2011.

Terrorist attacks by lone offenders vary significantly one from another. Many of them are not high-profile attacks and do not lead to high fatalities. One of the main reasons for this disparity is the types of weapons used. The following section will focus on the weapons that are most

¹⁰ See e.g., Malthaner, Stefan and Peter Waldmann, “The Radical Milieu: Conceptualizing the Supportive Social Environment of Terrorist Groups,” *Studies in Conflict & Terrorism*, Vol. 37, No. 12, 2014; Berntzen, Lars E. and Sveinung Sandberg, “The Collective Nature of Lone Wolf Terrorism: Anders Behring Breivik and the Anti-Islamic Social Movement,” *Terrorism and Political Violence*, Vol. 26, No. 5, 2014.

¹¹ Schuurman, et al., 2019.

¹² See e.g., Gill 2014, ; Alakoc, Burcu P., “Competing to Kill: Terrorist Organizations Versus Lone Wolf Terrorists,” *Terrorism and Political Violence*, Vol. 29, No. 3, 2017.

¹³ See e.g., Ellis, Clare et al., “Analysing the Processes of Lone-Actor Terrorism: Research Findings,” *Perspectives on Terrorism*, Vol. 10, No. 2, 2016, pp. 33-41.; Philips, Brian J., “Deadlier in the U.S.? On Lone Wolves, Terrorist Groups, and Attack Lethality,” *Terrorism and Political Violence*, Vol. 29, No. 3, 2017.

¹⁴ The average number of lone-actor attacks increased 6.2 times since 2011, whereas the average amount of group-based attacks per year increased 2.3 times over the same period.

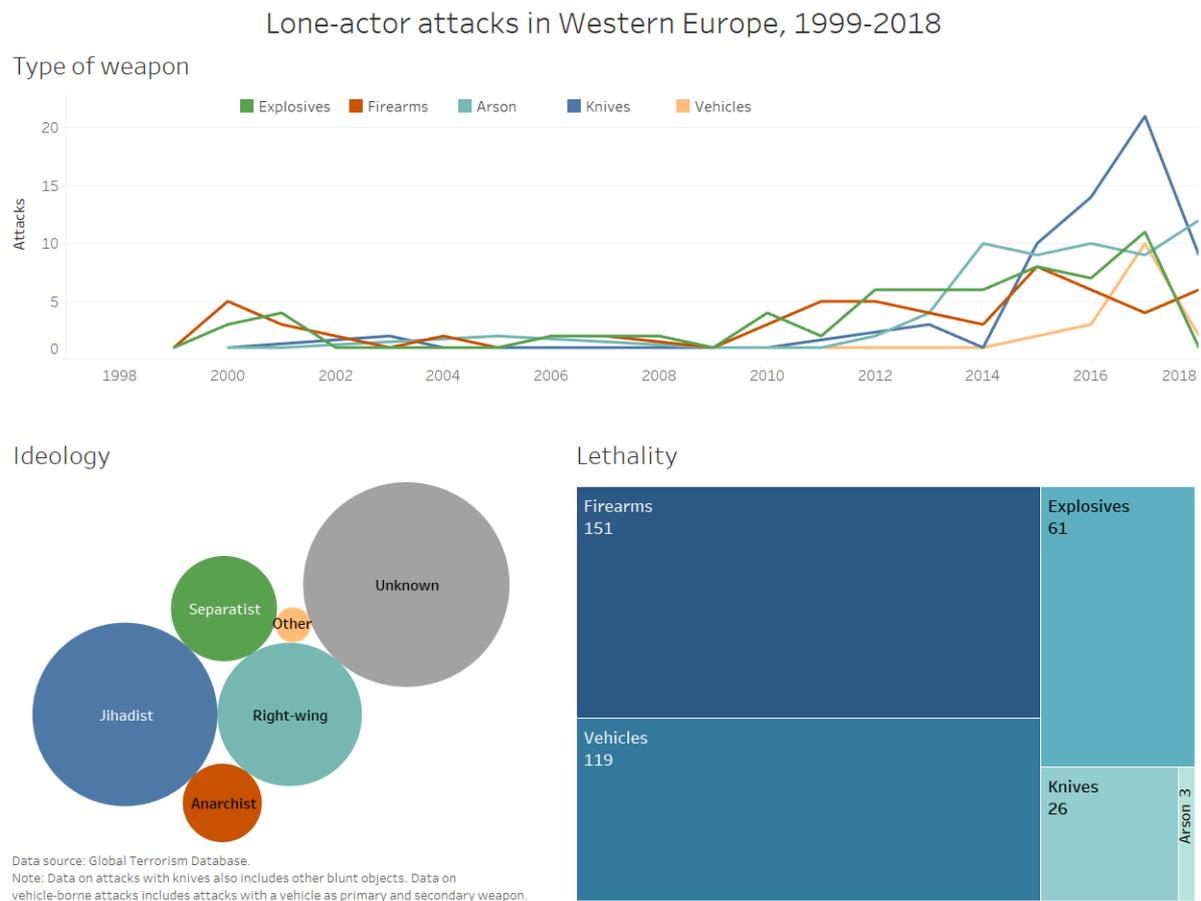


Figure 1: Lone actor attacks in Western Europe, 1999 – 2018.

often used by European lone actors, highlighting what can be done to prevent access to them and limit their lethality rate.

1. Firearms

Firearms are an important weapon for terrorists, including lone actors. Focusing on limiting access to this type of weapon is important for three main reasons. First, firearms cause a higher lethality than other types of weapons. They make up 23 per cent of lone-actor violence in Western Europe since 1999. Since 2011, the proportion of gun-related attacks by single terrorists has decreased, as many of them have exchanged firearms for more readily available weapons. Yet, lone actors that do make use of firearms cause deadlier attacks. Gun-based attacks by lone offenders cause on average 2.3 deaths,¹⁵ which is more than most other types of weapons surveyed here. The only exception is vehicle-borne attacks, which were on average more than five times as deadly per incident.

Second, the lone actors who did employ firearms, made increasingly use of automatic or semi-automatic rifles. Almost a third of gun-related violence by single terrorists in the last decade has been committed with these types of weapons.

¹⁵ The Nice attack was not included in these calculations. The perpetrator used a firearm and a vehicle in his attack. However almost all fatalities occurred by the vehicle, rather than with the firearm. The fatalities of this attack are included in the lethality rate of vehicle-borne attacks.

Third, firearms often serve as a facilitating tool to enable attacks through other means. Some of the deadliest attacks that were committed with other types of weapons have been facilitated by the use of guns. For instance, the perpetrators of the vehicle ramming in Nice in July 2016 and the Berlin Christmas attack that same year made use of a gun to obtain their vehicles.

Generally, terrorists access firearms in three ways: they can obtain them from the illicit market, procure them through legal means, or manufacture them. The bulk of firearms used by European terrorists are illegally obtained, most probably due to restrictions in place to buy legal weapons. The dynamics within Europe's illicit firearms market are largely based on a certain level of trust between the seller and the buyer. Hence, direct or indirect criminal connections are crucial for lone actors to obtain illicit firearms.¹⁶ Many of the current jihadis, including lone actors, have such connections, as a considerable percentage of them have a criminal background.¹⁷ They could thus use their previous criminal networks to obtain access to firearms. Similar criminal connections also are present in extremist groups of other ideologies. Corsican separatists, for instance, maintain social and operational links with organized crime, which facilitates access to illegal weapons.¹⁸

Lone actors who are not (in)directly connected to any seller of illicit weapons, have more difficulties to get hold of firearms. However, the internet offers them new possibilities since many types of weapons can be bought there. For instance, David Ali Sonboly, who opened fire near a mall in Munich in July 2016, had bought his pistol on the dark web.¹⁹ The internet, thus, serves as an enabler for the trade of illegal weapons that are already on the illicit market; its anonymity increases the safety of both buyers and sellers from prosecution. Nevertheless, acquiring firearms through the internet still bears significant risks for both parties, such as scamming, online detection and monitoring, or the interception of parcels through postal couriers.²⁰

Lone actors can also use a legally obtained weapon; however, such cases have so far been exceptionally rare in Europe.²¹ European firearms legislation restricts access to this type of weapons for lone actors. This becomes evident in comparison with the US, where access to firearms is less regulated. Guns were used in 38 per cent of attacks by US lone offenders since 2011, making it the main weapon of choice for single terrorists. Most of these shootings involved legally obtained weapons.²²

¹⁶ Duquet, Nils and Kevin Goris, "Firearms acquisition by terrorists in Europe. Research findings and policy recommendations of Project SAFTE," Flemish Peace Institute, Brussels, 2018, p. 120.

¹⁷ GLOBSEC, "Who are the European Jihadis? From Criminal to Terrorist and Back. Project Midterm report." September 2018; available at: <https://www.globsec.org/publications/who-are-european-jihadis-from-criminals-to-terrorists-and-back/>.

¹⁸ Crime-Terror Nexus, "The Crime-Terror Nexus in France," 2018; available at: https://crimeterrornexus.com/wp-content/uploads/2018/04/Crime-Terror-Nexus-France_EN_web-1.pdf.

¹⁹ Persi Paoli, Giacomo, "The Trade in Small Arms and Light Weapons on the Dark Web," United Nations Office for Disarmament Affairs (UNODA), Occasional Papers, No. 32, October 2018, p. 1; available at: <https://www.un.org/disarmament/wp-content/uploads/2018/10/occasional-paper-32.pdf>.

²⁰ Persi Paoli, Giacomo et al., "Behind the curtain. The illicit trade of firearms, explosives and ammunition on the dark web," 2017, RAND Corporation, p. 72; available at: https://www.rand.org/pubs/research_reports/RR2091.html.

²¹ Duquet, Nils and Kevin Goris 2018, p. 139.

²² Bahney, Benjamin, "How U.S. Gun Laws allow Mass Shooters to Slip through," *The RAND Blog*, November 15, 2018; available at: <https://www.rand.org/blog/2018/11/how-us-gun-laws-allow-mass-shooters-to-slip-through.html>.

Nevertheless, some European lone offenders did use legally obtained firearms in their attacks. One example is Luca Traini, an Italian right-wing extremist who used a legally-owned weapon to target six African migrants in Macerata in 2018.²³ The use of legally-owned firearms by terrorists could become a more stringent problem with the rise of right-wing extremism. The general fascination with weapons in these circles leads to a considerable presence of extremists possessing legal firearms.²⁴ In 2017, it became known that around 750 right-wing extremists in Germany were in possession of legally acquired guns.²⁵ Also, the presence of members with a military background in the extreme right-wing movement might increase their legal access to (and knowledge of) weapons.²⁶

A third venue for lone actors to obtain firearms is by manufacturing them. This can be done by assembling a weapon from its singular parts, bought either online or offline or manufactured through 3D printing. In October 2019, a German right-wing extremist used homemade firearms, some parts of which were produced with a 3D printer, in his attack on a synagogue and Turkish restaurant in Halle.²⁷ To date, these cases have been very exceptional, as they require specific knowledge. Yet, 3D printed weapons represent a serious risk since they are very difficult to detect: they do not have a serial number and, being made up almost entirely of plastic materials, they can avoid detection by metal detectors.²⁸

The availability of firearms on both the legal and illegal markets is a strong determinant for their use by lone actors. This can also explain the disparity between different countries. The high proportion of legal firearms used by lone actors in the US has already been mentioned above. However, differences can also be found within the EU. For instance, the low level of legal gun ownership in the UK could explain the limited number of lone-actor attacks with firearms in the UK.²⁹ The type of weapons available is also determinant for the choice of firearms by terrorists. For instance, the availability of semi-automatic and automatic rifles on France's illicit market could, in part, explain why the country has seen a relatively high proportion of attacks with such weapons.³⁰

While acquiring firearms is one thing, knowing how to use them is another. Generally, European lone actors have had limited firearms training, which could explain why gun-related violence by lone offenders generally does not cause large numbers of victims.³¹ Particular scrutiny is thus necessary for those extremists who have received (para-)military training.

²³ Duquet, Nils and Kevin Goris 2018, p. 139.

²⁴ Koehler, Daniel, *Right-wing Terrorism in the 21st Century: The "National Socialist Underground" and the History of Terror from the Far-Right in Germany*, Oxon/New York: Routledge, 2016.

²⁵ Conradis, Brandon, "Report: Spike in number of guns obtained legally by right-wing extremists in Germany," *Deutsche Welle*, 6 May 2017; available at: <https://www.dw.com/en/report-spike-in-number-of-guns-obtained-legally-by-right-wing-extremists-in-germany/a-38736136>.

²⁶ See e.g. *Deutsche Welle*, "Germany: More right-wing extremist soldiers uncovered than previously reported," 6 March, 2019; available at: <https://www.dw.com/en/germany-more-right-wing-extremist-soldiers-uncovered-than-previously-reported/a-47838341>.

²⁷ Europol, "EU Terrorism Situation and Trend Report (TE-SAT) 2020," June 2020, p. 66; available at: <https://www.europol.europa.eu/activities-services/main-reports/european-union-terrorism-situation-and-trend-report-te-sat-2020>.

²⁸ Walther, Gerald "Printing Insecurity? The Security Implications of 3D-Printing of Weapons," *Science and Engineering Ethics*, Vol. 21, No. 6 2015.

²⁹ Ellis, Clare et al., *Countering Lone-Actor Terrorism Series No. 4. Lone-Actor Terrorism Analysis Paper*, Royal United Services Institute for Defence and Security Studies, London: RUSI, 2016, p. 9; available at: https://rusi.org/sites/default/files/201602_clat_analysis_paper.pdf.

³⁰ Duquet, Nils and Kevin Goris 2018, p. 133.

³¹ Schuurman, Bart, et al., "Lone Actor Terrorist Attack Planning and Preparation: A Data-Driven Analysis," *Journal of Forensic Sciences*, Vol. 63, No. 4, 2018, p. 1196.

Particularly dangerous are European foreign fighters of different ideological currents who fought alongside jihadist, Kurdish, and Christian militias in the Middle East or Ukrainian and pro-Russian militias in the conflict in eastern Ukraine.

The possibilities of obtaining firearms training within Europe can also be limited by introducing and maintaining basic obstacles to practice in shooting ranges (e.g., criminal record checks, registration fees). However, lone actors with a criminal background generally have sufficient opportunities to learn how to handle guns. The following case study on the 2015 attack in Copenhagen shows that such “gangster-terrorists” can carry out deadly attacks.

Case Study - 2015 Copenhagen Attack

On 14 February 2015, Omar El-Hussein opened fire at the Krudttønden cultural center in Copenhagen. The target was a public free speech event around a Swedish artist known for his drawings of Prophet Muhammad. Later that evening, the shooter opened fire at a synagogue in the city. The day after he was killed in a shoot-out with the Danish police. The attacker, who had sworn allegiance to ISIS some hours before the first shooting, killed two civilians and wounded five police officers.

The attacker’s criminal connections and skills played a key role in obtaining the weapons used for these attacks, namely an M95 rifle and two old pistols. He had obtained the two pistols through his connections with the gang scene, having been a gang member in his teenage years. He had stolen the rifle from the home of a member of the Home Guard - a volunteer defense organization that supports the Danish military and police. The offender was also familiar with handling weapons as he had been previously sentenced for the possession of an illegal weapon.

The attack also sheds light on how the legal and illegal firearms markets are often interlinked and points to responsibilities carried by legal gun owners. The rifle was a legal firearm, appropriated by the attacker through a targeted robbery. In contrast, the two pistols had entered the illicit market as unregistered weapons, most probably confiscated in an unreported theft.³² The legal firearms market thus offers a number of loopholes that can facilitate access to firearms for European terrorists.

The offender’s criminal profile played a key role in his attack. Following a previous conviction for a knife assault on a train, he had spent time in prison, where he seems to have acquired an extremist religious ideology. The fact that he was released from prison just two weeks before the attack highlights the need to focus on reducing recidivism among common and terrorist convicts.³³ In particular, it is crucial to promote more effective reintegration measures, increase follow-up after release, and improve the exchange of intelligence between prison, law enforcement and intelligence agencies.

The Copenhagen attack seems to undermine the widespread idea of unpredictable and hard-to-prevent lone-actor attacks. The attack was carefully planned and hardly impulsive. The offender

³² Grip, Lina, “Illegal weapons, gangs and violent extremism in Denmark”; in: Duquet, Nils (Ed.), *Triggering Terror: Illicit Gun Markets and Firearms Acquisition of Terrorist Networks in Europe*, Brussels: Flemish Peace Institute, 2018, pp. 152-154.

³³ Schuurman, Bart, Lasse Lindekilde, et al., “Radicalization patterns and modes of attack planning and preparation among lone-actor terrorists: an exploratory analysis,” *Behavioral Sciences of Terrorism and Political Aggression*, Vol. 11, No. 2 2019.

had attempted to rent a flat overlooking the Krudttønden cultural center through Airbnb for the preparation of the attacks. The pre-planned nature of the attack is further supported by police reports that the terrorist looked at layouts, photos and Krudttønden's main website from three different IP addresses prior to the assault.³⁴ The attacker also did not act in complete isolation, as four others, all affiliated with criminal gangs in Copenhagen, were arrested for their assisting role. They helped the offender to dispose of the assault rifle after the shooting, provided ammunition for the pistols, and assisted the shooter in the period between the two attacks.³⁵ El-Hussein was in fact not a loner, but firmly embedded in his community, as demonstrated by the large presence of (mainly) youngsters at his funeral.³⁶

2. Knives

Conducting a successful attack with firearms can be complicated for lone attackers due to firearms restrictions and the risks of detection while acquiring them. For these reasons, terrorist groups such as Al-Qaeda and ISIS have called on their sympathizers to start a “knife revolution,” as knives are extremely easy to acquire and conceal and can nevertheless be quite lethal.³⁷ This type of propaganda has contributed to a stark increase in knife-based attacks by lone actors. While prior to 2011 single terrorists hardly used knives in their attacks, the use of a bladed weapon has increased significantly and, since 2014, has become one of the two primary weapons of choice for lone actors (a position shared with incendiary devices). Stabbings are typically a lone-offender tactic, as group-based attacks with knives remain rare.

Terrorist stabbings generally cause a low level of fatalities, despite the fact that jihadist outlets have provided tips to their sympathizers on how to increase the lethality of knife-based attacks.³⁸ Yet, they can cause a high fear effect. Knives are a particularly scary weapon when used by terrorists since they are everyday tools that are readily available. This makes the prevention of the use of knives particularly difficult. Metal detectors can be a useful tool to prevent possible offenders from carrying knives and other sharp objects in crowded places. However, there are loopholes. The three perpetrators at the 2017 London Bridge stabbing, for instance, used 30-cm-long ceramic knives, which could have easily bypassed metal detectors. However, lone offenders do not only use kitchen knives in their attacks: axes, machetes and swords make up a significant percentage of bladed weapons used in lone-actor violence. The following case study illustrates this.

Case Study: Trollhättan School Attack (2015)

On 22 October 2015, 21-year-old Anton Lundin Pettersson entered a high school in Trollhättan, Sweden, where he killed three persons and injured one more with a sword. The attacker had

³⁴ McPherson, Ross, “New information indicates 2015 Copenhagen terrorist attacks were pre-planned,” *The Copenhagen Post Online*, 19 October 2018; available at: <http://cphpost.dk/news/new-information-indicates-2015-copenhagen-terrorist-attacks-were-pre-planned.html>.

³⁵ Billing, Sören, “Copenhagen attacker's alleged helpers go on trial,” *The Local*, 8 March 2016; available at: <https://www.thelocal.dk/20160308/alleged-helpers-of-copenhagen-attacker-go-on-trial>.

³⁶ “Copenhagen gunman's burial attracts hundreds,” *The Local*; available at: <https://www.thelocal.dk/20150220/copenhagen-gunman-funeral-attended-hundreds>.

³⁷ Johnson, Bridget, “ISIS Call for Stabbing Sprees a Nightmare Scenario for Stopping Terror Plots,” 10 June 2016, *New York Observer*; available at: <https://observer.com/2016/10/isis-call-for-stabbing-sprees-a-nightmare-scenario-for-stopping-terror-plots/>.

³⁸ *Ibid.*

never attended this high school himself, but had chosen it as his target because the school was primarily attended by students with an immigrant or foreign background.³⁹

The perpetrator used a Viking sword and carried a Japanese dagger, which he did not use in the assault. He had acquired both weapons online from a legal weapons store in the US shortly before the attack. The weapons, generally sold as collectors' items, can be easily bought online. Therefore, no alarm bell went off with this purchase, which could have alerted Swedish police or security services.

This attack fits the widespread perception of a lone-actor terrorist attack: the offender had a clean criminal record and had not communicated his plan to anyone. However, a closer look at his online behavior could have given a warning. The attacker had been visiting right-wing extremist groups and sites on social media and the internet.⁴⁰ He had also prepared the attack entirely online. In the two weeks prior to the assault, he had consulted online videos on how to use the weapons. In addition, he had bought a black Nazi World War II helmet and a long black coat, which he wore during the attack. He also looked for the other preparatory elements for the attack online: he had studied the route from his home to the school and examined pictures of the building, pupils, and teachers.

The Trollhättan attack is particularly interesting due to the attacker's mental health condition. Like other lone actors, Petterson might have suffered from multiple mental disorders, which were, however, never documented. In addition to an autism spectrum disorder, he might possibly also have suffered a gender identity disorder, this being in strong contrast with his worldview and the fact that he idolized and identified with alpha males.⁴¹ The attacker could also have been depressed and suicidal, mainly due to his unemployment situation, which he blamed on immigrants. Losing a temporary job shortly before the attack could have been the trigger for the massacre. It is well-documented that mental health issues, such as schizophrenia and delusional disorders, are more often present in lone actors than in group-based attackers or in the general population.⁴² However, this should not be used as a pretext to stigmatize mental health patients, as mental health issues alone rarely lead the radicalization process.⁴³ The overwhelming majority of patients with severe mental health illness do not proceed to violence, and are actually more often victims than perpetrators of violence.⁴⁴ Petterson had in his 21-year long life never been diagnosed with a mental disorder. Outreach for suicidal individuals could be useful, as several lone actors have shown a proclivity to commit suicide while taking the lives of others. Here too the attacker appears to have wanted to commit suicide "like a warrior."⁴⁵

A lone-actor attack that seems hard to predict, the Trollhättan assault demonstrates how measures to increase preparedness against such incidents could help in saving lives. The attack

³⁹ Erlandsson, Åsa and J. Reid Meloy, "The Swedish School Attack in Trollhättan," *Journal of Forensic Sciences*, Vol. 63, No. 6, 2018.

⁴⁰ *The Local*, "Killer spent two weeks planning school attack," 8 March, 2016; available at: <https://www.thelocal.se/20160308/killer-spent-two-weeks-planning-school-attack>.

⁴¹ Erlandsson and Meloy 2018.

⁴² O'Connor, Francis P., "The Knife Attack in Hamburg: Lone Actor Violence and Mental Illness"; in: Peace Institute Research Frankfurt (PRIF) Blog, 14 August, 2017; <https://blog.prif.org/2017/08/14/the-knife-attack-in-hamburg-lone-actor-violence-and-mental-illness/>.

⁴³ Ibid.

⁴⁴ Varshney, Mohit, Ananya Mahapatra, et al, "Violence and Mental Illness: what is the true story?" *Journal of Epidemiology and Community Health*, 2016, Vol. 70, No. 3, pp. 223-225.

⁴⁵ Erlandsson, Åsa and J. Reid Meloy 2018.

caused a relatively low number of casualties, considering that it took place in a very crowded location at the beginning of a school day. The high level of preparedness of the school personnel turned out to be key in limiting the casualties. A quick reaction of an employee of the school cafeteria, where the attacker had entered the premises, made it possible to notify the police just two minutes later. In addition, the quick warning of the principal to students and staff to lock themselves up in their classrooms most probably prevented further deaths. The CCTV footage of the school premises show the attacker wandering around the school in search for more victims, but mainly finding empty corridors and locked classrooms. It is also evident that the attack would have resulted in more casualties if the perpetrator had managed to gain access to firearms. Petterson had studied mass shootings, such as the Columbine high school shooting and Anders Breivik's attack. He had also considered joining a shooting club, but abandoned the idea because he could not afford it.⁴⁶ Instead, similar to other lone actors before him had done, he made use of a more easily obtainable weapon.

3. Explosives

Explosives are one of the preferred weapons for both terrorist groups and lone actors. Nevertheless, over the last couple of years lone offenders have partially opted for more readily available tools, such as arson. Prior to 2011 explosives were used in 34 per cent of lone-actor attacks in Western Europe; this number decreased to 21 per cent in the following years.

European terrorists surveyed here, mainly used home-made, rather than commercial, explosive devices.⁴⁷ Curbing access to explosives is particularly complicated for two main reasons. The know-how on manufacturing explosive charges and devices can be easily found in online and hard-copy instructions. They explain how to construct a wide variety of bombs, including pressure cookers, pipe bombs, and time fuses. Detailed instructions on how to fabricate the explosive charge can be found online relatively easily (but these instructions are not infrequently deficient). European terrorists either used ready-made products (such as commercial explosives, military explosives, or pyrotechnics and propellants) or made their own explosive charges from chemical precursors.

Hard-copy manuals teaching how to manufacture explosives often circulate in radical environments. For instance, Timothy McVeigh learned how to fabricate the bomb that killed 168 and injure 680 people in Oklahoma City from hard-copy manuals on bomb-making.⁴⁸ However, the vast majority of bomb-making instructions are available on the internet. For instance, in 2010 Al-Qaeda published in its online magazine *Inspire* an article titled "Make a Bomb in the Kitchen of Your Mom." Other downloadable manuals, such as *The Anarchist's Cookbook* and *The Jolly Roger Cookbook*, have provided instructions for the construction and detonation of explosives.⁴⁹ There are even YouTube videos providing step-by-step instructions on how to construct various types of bombs. On any given day there would be almost 300,000

⁴⁶ Ibid.

⁴⁷ Menning, Dennis and Henric Östmark, "Detection of Liquid and Homemade Explosives: What Do We Need to Know About Their Properties?"; in: Schubert, Hiltmar and Andrey Kuznetsov (Eds.), *Detection of Liquid Explosives and Flammable Agents in Connection with Terrorism*, Dordrecht: Springer, 2008, pp. 57-70.

⁴⁸ Thomas, Jo, "Defendant Tried To Buy Bomb Device, Jury Hears," *New York Times*, 2 May 1997; <https://www.nytimes.com/1997/05/02/us/defendant-tried-to-buy-bomb-device-jury-hears.html?mtrref=www.google.com&gwh=F498CA7E458FFBE2786B44E9E73FFAD7&gwt=pay>.

⁴⁹ Ellis, Clare, et al., Countering Lone-Actor Terrorism Series No. 11. *Lone-Actor Terrorism Final Report*, Royal United Services Institute for Defence and Security Studies, London: RUSI, 2016, p. 13; available at: https://rusi.org/sites/default/files/201604_clat_final_report.pdf.

such videos on YouTube, a vast majority of which would be military-type instructional videos.⁵⁰

Since the material to fabricate explosive charges and devices are commonly used for commercial purposes, it is difficult to curb access to them. Home-made bombs can be made by using common materials, such as switches and battery power sources. A major problem is the availability of chemical precursors used to create home-made charges. For instance, triacetone triperoxide (TATP), an explosive used in various recent terrorist attacks in Europe, can be made from the commonly-available ingredient acetone (found in common household products) and from hydrogen peroxide (which is found in hair bleach and some disinfectants).⁵¹ Another chemical precursor often used in home-made explosives is ammonium nitrate, which is most commonly found in fertilizers. Anders Breivik used ammonium nitrate to create his vehicle-borne bomb that would greatly damage a government building in Oslo. He created a fictitious agricultural company to acquire large quantities of chemicals and fertilizers and produced explosives without arousing suspicion.⁵²

Breivik's attack was exceptional, as most contemporary terrorists who perpetrate attacks in the Western world have switched from the use of large explosive charges, carried by vehicle-borne IEDs, to smaller charges and person-borne IEDs.⁵³ These are easier to construct and use. The acquisition of smaller quantities of precursor substances also arouses less suspicion and can easily fall below security and regulatory thresholds.⁵⁴ A 2013 EU regulation aims to stop "would-be attackers" misusing certain dual-use materials without curbing access for legitimate bona fide users.⁵⁵ It requires member states to ban non-professionals from acquiring certain chemicals that could also be used in producing explosives. It also obliges businesses which sell or supply such chemicals to report suspicious transactions as well as significant losses and thefts. Yet, some loopholes remain due to a fragmented restriction system among various EU member states. This can make it possible for terrorists to obtain precursor materials in member states with fewer restrictions or lower levels of control.⁵⁶

Another challenge that remains, is curbing and controlling internet sales. There is often no good method to verify an online purchaser's identity. In addition, purchasing from various sellers or a combination of retail and internet purchases can avoid raising suspicion. Ahmad Hassan, who in 2017 detonated a TATP-based explosive device on a tube train at Parsons Green in London, had bought the material for his bomb in at least three different venues to avoid suspicion: he

⁵⁰ Counter Extremism Project, "The eGlyph Web Crawler: ISIS Content on YouTube," July 2018; available at: https://www.counterextremism.com/sites/default/files/eGLYPH_web_crawler_white_paper_July_2018.pdf.

⁵¹ Dodd, Henry, "Why is it so easy to buy bomb ingredients?," *BBC News*, 17 March 2018; available at: <https://www.bbc.com/news/uk-42690177>.

⁵² Ranstorp, Magnus, "'Lone Wolf Terrorism'. The Case of Anders Breivik." *Sicherheit und Frieden (SF) / Security and Peace*, Vol. 31, No. 2, 2013, pp. 87–92.

⁵³ National Academies of Sciences, Engineering, and Medicine, *Reducing the Threat of Improvised Explosive Device Attacks by Restricting Access to Explosive Precursor Chemicals*, Washington DC, 2018, p. 26.

⁵⁴ National Academies of Sciences, Engineering, and Medicine 2018, p. 124.

⁵⁵ European Commission, Commission Staff Working Document, Executive Summary of the Impact Assessment, Accompanying the document Proposal for a regulation of the European Parliament and of the Council on the marketing and use of explosives precursors, amending Annex XVII to Regulation (EC) No 1907/2006 and repealing Regulation (EU) No 98/2013 on the marketing and use of explosives precursors, (COM(2018) 209 final) – (SWD(2018) 104 final), Strasbourg, 17 April 2018.

⁵⁶ *Ibid.*

got shrapnel from local supermarkets, had hydrogen peroxide delivered to a friend's address, and bought another ingredient from Amazon.⁵⁷

Instructions and material for creating explosive devices might be widely available, the myth of the highly lethal Do-It-Yourself (DIY) bomb-maker needs some nuancing. In reality, it remains very complicated to manufacture an effective explosive charge and device based only on online training. The numerous failed explosions with TATP-based explosives, generally perceived as the easiest ones to create, demonstrate this: the Gare Centrale plot in Brussels, the above-mentioned Parsons Green bombing, and the Barcelona plotters.⁵⁸ Lone bombers are also quite often detected during their bomb-making process, due to suspicious injuries or careless handling of the materials.⁵⁹ Furthermore, the lethality of those lone actors that actually manage to reach the point of attack is often low. For terrorist groups, bomb attacks are generally the deadliest type of attacks, with a lethality rate of two deaths per attack, whereas the lethality rate of lone-actor bombings is only 0.9 per attack. Of the 68 bomb-based attacks by European lone offenders over the last twenty years, only seven killed individuals other than the attacker himself.

Case Study: Attack in Lyon (2019)

In May 2019, Mohamed Hichem Medjoub left a paper bag containing a parcel bomb in front of a bakery in a shopping street in Lyon. The jihadi-inspired attack injured 13 persons. With his deed, Medjoub hoped to increase the populist vote in the EU elections two days later, provoking thereby to “push Muslims to revolt.”⁶⁰

The attacker had used a remotely controlled detonator to set off the bomb, which was based on a small quantity of TATP surrounded by bolts and metal airsoft balls as shrapnel. He had manufactured the explosive device and the charge in his kitchen. There, the police found after his arrest three bottles of ammonia, hydrochloric acid and oxygenated water. The perpetrator had studied jihadi-materials and bomb-making videos online and purchased the necessary materials in the months preceding the attack, including through Amazon.

The attacker is one of the few lone actors in this sample who had managed to construct a functioning bomb and set it off remotely. Medjoub's bomb was effective, yet he had probably hoped to cause a much larger number of casualties from the shrapnel, which is generally used to increase the number of wounded and killed. That not a single individual was killed by his explosion was also due to the small quantity of TATP that was used. Even though the restrictions on chemical precursors most probably deterred him from constructing a deadlier device, the attacker had managed to outsmart restrictions and defy suspicion by ordering the materials from separate places with large time intervals separating the purchases.

⁵⁷ Dodd, Henry, “Why is it so easy to buy bomb ingredients?,” *BBC News*, 17 March 2018; available at: <https://www.bbc.com/news/uk-42690177>.

⁵⁸ Clifford, Bennett, “Trucks, Knives, Bombs, Whatever: Exploring Pro-Islamic State Instructional Material on Telegram,” *CTC Sentinel*, Vol. 11, No. 5, May 2018; available at: <https://ctc.usma.edu/trucks-knives-bombs-whatever-exploring-pro-islamic-state-instructional-material-telegram/>.

⁵⁹ Ellis et al., 2016, p. 9.

⁶⁰ *France Info*, “Attentat à Lyon: le terroriste présumé voulait peser sur les élections,” 31 May, 2019; available at: <https://france3-regions.francetvinfo.fr/auvergne-rhone-alpes/rhone/lyon/attentat-lyon-terroriste-presume-voulait-peser-elections-1678407.html>.

However, the attacker was less careful about other aspects of his planning and preparation. Lone actors often adopt limited operational security measures, as they have not or only poorly been trained in this regard. For instance, they may leave virtual traces, give away clues on their intention to strike or expose their radicalism.⁶¹ The attacker in Lyon left such traces. Police reportedly found evidence of contacts with ISIS operatives on his computer.⁶² He also left online purchase trails for certain materials he could have acquired more safely in a supermarket, such as the batteries and oxygenated water.⁶³ He also displayed a lack of attention for his post-attack security, in particular considering his clear intention of surviving the attack (e.g., he used a remotely-controlled detonator, and never claimed the attack). Police were able through video surveillance cameras to retrace his residence, where he had not disposed of incriminating evidence (e.g., the bottles of acid used to manufacture the charge).

4. Arson

Arson attacks have often been used by terrorist groups of different ideologies. Right-wing extremists, for instance, often use fire as a tactic to spread fear among foreigners. In the 1990s, right-wing arson attacks in Germany were aimed at frightening and harming refugees and immigrants.⁶⁴ Fire also carries a high symbolic value in the far-right scene, reminding some people of the Nazi period. Arson also plays an important role in many of the American Ku Klux Klan's ceremonies. Anarchist and left-wing terrorists as well have conducted incendiary attacks against a variety of targets. They often prefer arson over other types of weapons, in part due to the challenges of investigating this type of attack and tracing evidence back to offenders.

More recently, jihadist groups have also encouraged their sympathizers to use arson as a terrorist tactic. Al-Qaeda and ISIS have in their English-language magazines encouraged sympathizers to use arson as a weapon to ignite buildings, forests, and fields.⁶⁵ They also provided guidance on various methods of conducting such attacks, and issued a fatwa noting that incendiary warfare is religiously permissible.⁶⁶

In recent years, European lone actors have increasingly made use of arson in their assaults. Between 2014 and 2017, there have been more than eight times as many arson attacks as in the previous 16 years combined. Targets varied from banks to private residences, but most of the recent arson attacks were aimed at places of worship and refugee-related targets. Particularly worrying is how easy it is to conduct such an attack. The materials to start a fire are readily available. Even more advanced incendiary compounds, such as thermite, can be obtained or

⁶¹ Neumann, Peter, "Options and Strategies for Countering Online Radicalization in the United States," *Studies in Conflict & Terrorism*, Vol. 36, No. 6, June 2013, p. 451.

⁶² France Info, "Colis piégé à Lyon: le suspect est passé aux aveux devant les enquêteurs," 30 May, 2019; available at: https://www.francetvinfo.fr/faits-divers/explosion-a-lyon/colis-piege-a-lyon-le-jeune-suspect-avoue-avoir-concu-et-depose-la-bombe-au-nom-de-daech_3467281.html.

⁶³ *Le Parisien*, "Explosion à Lyon : de nouvelles photos du suspect bientôt diffusées," 25 May, 2019; available at: <http://www.leparisien.fr/faits-divers/explosion-a-lyon-de-nouvelles-photos-du-suspect-bientot-diffusees-25-05-2019-8079537.php>.

⁶⁴ Koehler 2016, p. 107.

⁶⁵ National Counterterrorism Centre, "Recognizing Arson With a Nexus to Terrorism, Joint CT Assessment Team, First Responder Toolbox," April 2017; available at: https://www.dni.gov/files/NCTC/documents/jcat/firstresponderstoolbox/First_Responders_Toolbox-Recognizing_Arson_With_a_Nexus_to_Terrorism_Originally_Published-14_April_2017_1_May_2019-survey.pdf.

⁶⁶ Scott Stewart, "Fire: The Overlooked Threat," *Stratfor Worldview*, 28 February 2013; available at: <https://worldview.stratfor.com/article/fire-overlooked-threat>.

manufactured at home. Buying materials to do so, does not always raise the same level of suspicion as purchasing explosive precursors.⁶⁷

Arson attacks also require limited know-how and are easier to conduct than explosive-based attacks. Terrorists can ignite fires with jerry cans filled with gasoline or by making Molotov cocktails. Jihadist groups recently shared online instructions with their sympathizers and supporters on how to make Improvised Incendiary Devices (IIDs), such as timed or remotely ignited combustibles.⁶⁸ Detailed instructions on various types of IIDs can also easily be found on open-source websites of other terrorist groups, such as the Animal Liberation Front.⁶⁹ Such devices can cause major damage, but do not always function properly. In July 2006, two bombs made from gas canisters filled with petrol and diesel, which were placed in suitcases on two trains in Germany, failed to go off when the detonators did not manage to ignite the gas.⁷⁰ In another case, a firebomb carried inside the perpetrator's coat into a shop in Belfast in 2013 detonated prematurely, severely injuring the attacker.⁷¹

Arson attacks by lone actors have been significantly less deadly than assaults with other weapons. The 63 incendiary attacks that took place in the last 20 years caused only one fatality and seven injuries, other than those injuring the attacker himself. Yet, fire is mainly a tactical weapon. Pyro-terrorism, regardless of the deaths it causes, can be very effective for terrorist groups since it carries a high fear factor. Pyro-attacks are also able to draw large media attention, due to their visual and sometimes symbolic appeal. For this reason, not all arson attacks are aimed at causing casualties. Recent jihadist propaganda has recommended to target parked vehicles and natural resources as well.⁷² Fire can also aggravate terror attacks that are carried out with other types of weapons, for instance by causing confusion and hindering rescue operations.⁷³

Case Study - Altena Arson Attack (2015)

A substantial number of arson attacks in Western Europe targeted refugees and refugee-related premises. One such attack occurred in October 2015, when two men set fire to a refugee home in Altena, a city in Western Germany. Seven people were in the building at the time of the fire but were alerted by neighbors and managed to escape. The attack caused no casualties, but it generated fear among the direct victims (the residents of the house) and the refugee communities in Germany as a whole.

⁶⁷ Ibid.

⁶⁸ National Counterterrorism Centre, *Recognizing Arson With a Nexus to Terrorism, Joint CT Assessment Team, First Responder Toolbox*, April 2017; available at:

https://www.dni.gov/files/NCTC/documents/jcat/firstresponderstoolbox/First_Responders_Toolbox-Recognizing_Arson_With_a_Nexus_to_Terrorism_Originally_Published-14_April_20171_May_2019-survey.pdf

⁶⁹ The ALF Primer, "A guide to direct action and the animal liberation front"; available at:

<http://www.animalliberationfront.com/ALFront/ALFPrime3.htm>.

⁷⁰ Ulrich, Andreas, "Failed Bomb Plot Seen As Al-Qaida Initiation Test," *Spiegel Online*, 9 April 2007; available at: <https://www.spiegel.de/international/germany/terrorism-in-germany-failed-bomb-plot-seen-as-al-qaida-initiation-test-a-476238.html>.

⁷¹ *BBC News*, "Fire bomb ignites in Belfast city centre shop," 17 December 2013; available at: <https://www.bbc.com/news/uk-northern-ireland-25407830>.

⁷² National Counterterrorism Centre 2017.

⁷³ Pfeifer, Joseph W., "Fire as a Weapon in Terrorists Attacks," *CTC Sentinel*, Vol. 6, No. 7, July 2013; available at: <https://ctc.usma.edu/fire-as-a-weapon-in-terrorist-attacks/>

This attack was highly unsophisticated and committed with the help of readily available materials. The perpetrators had bought the gasoline shortly before the attack at a nearby gas station. Prior to setting fire to the attic of the three-story building (while the residents were sleeping on the ground floor), they had cut the cables of the fire alarm system in the house.⁷⁴ The unsophisticated tactics and near-spontaneous character of such attacks complicate efforts to disrupt them. It is also challenging to adopt measures preventing terrorists from gaining access to inflammable materials, without curbing the general public's access to them.

The Altena arson attack highlights the need for broader preventive measures to lone-actor terrorism, in particular curbing online radicalizing material. In the Altena case, the real-life profiles of the two perpetrators showed a strong contrast with their online profiles. They were not already known to law enforcement (one of the attackers was a fireman who had helped to put the fire out again) and had not engaged in violence or extremist activism before. Their radicalism manifested itself exclusively online, as they showed significant activity in right-wing online platforms. Social media echo-chambers can reinforce radical ideas and thus contribute to the radicalization of lone actors. An interesting study conducted two years after the Altena attacks found that towns where per-person Facebook use was higher than average, such as in Altena, experienced significantly more attacks on refugees.⁷⁵ The internet continues to play an important role in the radicalization process of extremists, including lone actors.⁷⁶ Therefore the increasing amount of terrorist and propagandizing material online should be met with a more intensive policing of the internet space.⁷⁷

Conclusion

This chapter has illustrated how terrorists make use of the weapons that are readily available. European lone actors, due to current restrictions on traditional weapons such as firearms, increasingly make use of readily available tools, which are often less lethal. This means that a sustained and coordinated pressure for limiting the access to weapons is crucial to preventing and countering the deadliest forms of lone-actor terrorism.

Key to reducing access to weapons is the further harmonization of relevant legislation of EU member states. Gaps in legislation and implementation, in particular with regard to firearms and chemical precursors for explosives, create loopholes that allow terrorists to acquire weapons or the materials to manufacture them. There is also a need to increase restrictions and monitoring of purchases of large bladed weapons, which have become the weapon of choice for European lone actors and can still be freely acquired.

The internet has come to play an increasingly important role in providing terrorists with access to weapons. There is, thus, a need to replicate restrictions that currently exist for on-site

⁷⁴ *Deutsche Welle*, "German fireman admits in court to setting fire to refugee house," 31 May 2016; available at: <https://www.dw.com/en/german-fireman-admits-in-court-to-setting-fire-to-refugee-house/a-19296140>

⁷⁵ Taub, Amanda and Max Fischer, "Facebook Fueled Anti-Refugee Attacks in Germany, New Research Suggests," *New York Times*, 21 August, 2018; available at: <https://www.nytimes.com/2018/08/21/world/europe/facebook-refugee-attacks-germany.html>

⁷⁶ Neumann, Peter, "Options and Strategies for Countering Online Radicalization in the United States," *Studies in Conflict & Terrorism*, Vol. 36, No. 6, 2013; available at: <https://www.tandfonline.com/doi/abs/10.1080/1057610X.2013.784568>.

⁷⁷ Smith, Melanie, Sabine Barton, et al, "Lone-Actor Terrorism Policy Paper 3: Motivations, Political Engagement and Online Activity," Countering Lone-Actor Terrorism Series No. 7, Institute for Strategic Dialogue, 2016; available at: https://rusi.org/sites/default/files/201602_clat_policy_paper_3.pdf.

purchases also for web shops, such as those selling chemical precursors. In this regard, it is also necessary to enhance the cooperation with, and support of public and private couriers, to facilitate the detection of parcels containing weapons and hazardous material. Cooperation with key third countries is crucial in this, as many weapons are purchased from websites overseas.

Reducing the general availability of weapons can also be useful, in particular for firearms, which are still a widely used and highly lethal weapon. It remains imperative to counter the trafficking of illicit firearms both within the EU and from third countries. New flows of illicit weapons might arrive in particular from conflict areas in the EU's near neighborhood. Measures should also focus on better registration and monitoring of legally held firearms and impose stricter rules for their storage, as some of these weapons end up on the illegal market.

As terrorists generally use the weapons that are at hand, they will continue to show flexibility and innovation with regard to the weapons they use and how they access them. Therefore, it is necessary to continuously monitor trends in weapon use and update and implement relevant legislations accordingly, including at the EU level.

The lethality of lone-actor attacks is often lower than group-based attacks, partially due to the limited (para-)military training of lone offenders. Therefore, it is crucial to continue imposing obstacles to opportunities to gain weapons training in real life. However, online training has proven to be more important for lone actors. Continued leverage on social media platforms and encryption channels to eliminate and prevent the dissemination of instructional material is therefore necessary. Online monitoring of suspects can be particularly helpful for countering lone-actor terrorism, as they often use the internet for tactical research with limited concern about their operational security.

Nevertheless, lone-actor terrorism is a complex phenomenon. Therefore, a focus on the weapons and know-how should be complemented with a broader preventive focus. The presence of mental health issues and criminal antecedents in a high number of lone-actor profiles also calls for more upstream preventive responses. Actions should include, but not be limited to, improving detection, monitoring and taking care of young people with mental health problems, and rethinking current strategies aimed at reintegrating and rehabilitating those released from prisons.

Annelies Pauwels is a Research Fellow at the Flemish Peace Institute in Brussels, where she focuses on terrorism and violent extremism. Prior to that she conducted research on crime prevention and criminal justice for various international organizations, including the EU Institute for Security Studies (EUISS), the UN Office on Drugs and Crime (UNODC), and the UN Interregional Crime and Justice Research Institute (UNICRI). Her previous research projects have focused on various aspects of international security, including jihadist and far-right terrorism, migration, and organized crime. Annelies holds an LLM in International Criminal Law and an MA in Intercultural Mediation, with a specialization in Arabic and Russian. She is fluent in English, French, Italian, and Dutch and has a working knowledge of Spanish, Arabic, and Russian.

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