Assessment and Review of the Nationwide Suspicious Activity Reporting (SAR) Initiative (NSI) Indicators

DECEMBER 2024

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December 2024

Energizing the Nationwide SAR Initiative

We vowed to *Never Forget* the deadliest terrorist attacks on the Homeland that transpired on September 11, 2001. As suspicious activity reporting (SAR) practitioners, we play a critical role in upholding national security by ensuring the information sharing environment (ISE) is thriving, both among state, local, tribal, and territorial (SLTT) partners and between federal and SLTT partners, while rigorously protecting the privacy, civil rights, and civil liberties of Americans. Since 2008, fusion centers have vetted millions of tips and leads and shared over 56,000 ISE-SARs. Statistics, however, do not convey the immeasurable impact of this work across the United States. Fusion centers are continually sharing success stories and best practices in preventing or mitigating violent extremism, targeted mass violence, and other disruptive activity, such as swatting.

It has been over 16 years since a formalized framework for gathering, documenting, vetting, and sharing terrorism-related SAR information was established via the ISE Functional Standard (FS) for SAR Version 1.0, and 10 years since the last review, version 1.5.5. The threat environment is continuing to evolve, and we must ensure our framework is postured to support SLTT law enforcement partners in combatting these threats.

To ensure that SAR reporting guidance aligns with the current threat environment, the Nationwide SAR Initiative (NSI) is executing a refresh campaign to renew this mission to foster a resilient and enduring ISE. As the cornerstone of this approach, the NSI is eager to provide partners with the report titled, *Assessment and Review of the Nationwide Suspicious Activity Reporting (SAR) Initiative (NSI) Indicators*.

At the onset of the refresh campaign, DHS commissioned an intergovernmental cadre and academic experts to examine the NSI indicators through the lens of international terrorism, targeted violence, and domestic terrorism to ensure the indicators and behaviors retain their relevance along the spectrum of reportable incidents of violence. This product is a compendium of research conducted by the University of Maryland National Consortium for the Study of Terrorism and Responses to Terrorism (START) and the University of Nebraska National Counterterrorism Innovation, Technology, and Education Center (NCITE). As you will see, this report unequivocally validates the utility of the NSI's 16 Indicators and Behaviors relative to acts of terrorism and violent extremism, as well as presents a foundational literature review about the applicability of these indicators to non-ideological targeted violence.

With the completion of this Indicator Review, the NSI will socialize the results with various governance boards and federal and SLTT stakeholders to discuss potential changes to FS 1.5.5 and subsequently, partner with the appropriate governing bodies to pursue agreed upon updates. Following this pivotal step, the NSI will continue to make progress on additional elements of the NSI Refresh Campaign, such as updating the SAR e-Learnings and other resources.

We encourage you to continue sharing terrorism-related SARs with other SLTT law enforcement partners and between SLTT and federal partners via eGuardian. We hope that you will continue utilizing the NSI's suite of SAR e-Learnings to train your agencies and communities about suspicious activity reporting and how to identify threatening and concerning behaviors; in addition, take advantage of the "If You See Something, Say Something®" website for resources available to raise public awareness of reporting suspicious activity. Finally, we strongly encourage you to stay engaged with the NSI, whether it is by participating in the bi-monthly SAR Points of Contact webinars, participating in the SAR Working Group, or reaching out to us directly for support and/or to provide feedback.

December 2024

Thank you for the work you do every day to keep our Nation safe.

Sincerely,

David Carabin
Deputy Under Secretary for Partnerships
Office of Intelligence & Analysis
U.S. Department of Homeland Security

Robert J. Contee III
Assistant Director
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Federal Bureau of Investigation

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Executive Summary

Combined Summary and Analysis

The U.S. Department of Homeland Security (DHS), Office of Intelligence and Analysis (I&A), National Threat Evaluation and Reporting (NTER) commissioned this project as part of its ongoing efforts to evaluate and validate the existing 16 Nationwide Suspicious Activity Reporting (SAR) Initiative (NSI). The project entailed a comprehensive review of the NSI Indicators to 1) ensure that the indicators remain current and account for acts of terrorism; 2) ensure that the indicators adequately address threats from domestic violent extremists (DVE);[1] 3) ensure the NSI Indicators account for acts of targeted violence;[2] and 4) determine if the existing indicators are viable for nonideological targeted violence. To achieve these goals, the project was divided into two parts: 1) a quantitative analysis and 2) an expansive literature review of existing peer-reviewed academic sources and governmental documents. The National Consortium for the Study of Terrorism and Responses to Terrorism (START) housed at the University of Maryland developed the quantitative analysis and the National Counterterrorism Innovation, Technology, and Education (NCITE) Center at the University of Nebraska-Omaha conducted the literature review.

The combined research effort addresses critical questions about indicator effectiveness, applicability across different types of violence, needs for adaptation, and evidence-based recommendations for improvement. This dual approach, utilizing both data analysis and academic research review, provides policymakers and practitioners with an evidence base from multiple perspectives.

The reports are intended to collectively inform program improvements, indicator adaptations, training enhancements, and implementation guidance. Their complementary methodologies and focuses provide a nuanced evaluation of SAR indicator effectiveness and applicability across both ideological and nonideological violence, while offering recommendations for program improvement.

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[1] Domestic violent extremists (DVEs) as defined by the Federal Bureau of Investigation (FBI) and DHS: "An individual based and operating primarily within the United States or its territories without direction or inspiration from a foreign terrorist group or other foreign power who seeks to further political or social goals, wholly or in part, through unlawful acts of force or violence. The mere advocacy of political or social positions, political activism, use of strong rhetoric, or generalized philosophic embrace of violent tactics may not constitute extremism and may be constitutionally protected."

[2] Targeted violence as defined by the FBI and DHS: An unlawful act of violence dangerous to human life or potentially destructive of critical infrastructure or key resources, in which actors or groups intentionally target a discernible population of individuals or venue in a manner that poses a threat to homeland security, based on:

1. An apparent terrorist motive indicated by the population or venue targeted, or by the particular means of violence employed.
2. The significance of actual or potential impacts to the nation's economic security, public health, or public safety, or to the minimal operations of the economy and government.
3. The severity and magnitude of the violence or harm and impact of either upon the capabilities of state and local governments to effectively respond without federal assistance.

The START report, "An Empirical Assessment of the Nationwide Suspicious Activity Reporting (SAR) Initiative (NSI)," and the NCITE report, "Applicability of NSI Indicators to Nonideological Targeted Violence: A Review of the Academic Literature" serve complementary purposes in evaluating the effectiveness and applicability of NSI Indicators across different types of violence. The START report focuses on an empirical assessment of NSI Indicators in terrorism cases from 1990–2021, analyzing operational effectiveness through statistical analysis of indicator presence and outcomes based on incident data from the Profiles of Individual Radicalization in the United States (PIRUS)-Plots dataset.[3] START's analysis provides a broad examination of terrorism cases with an emphasis on real-world application and effectiveness. The NCITE report reviews academic literature from 1999–2023 regarding NSI Indicators, with particular attention to nonideological targeted violence. Through a systematic review of 75 academic studies, the NCITE report evaluates empirical evidence and research validity supporting the indicators' application to targeted violence. Together, these reports provide a multi-pronged evaluation of NSI Indicators across both terrorism and nonideological targeted violence, validated through both data analysis and academic research review. While the START report examines how often indicators appear in actual plots and their correlation with outcomes, the NCITE report evaluates what academic research reveals about indicator validity and applicability to nonideological violence.

Key Findings From the START Analysis

The START report reveals several significant findings regarding the effectiveness and presence of NSI Indicators in terrorist plots from 1990–2022. Most notably, NSI Indicators were present in 80% of terrorist plots and attacks, with events averaging 2.2 indicators per incident. Critical infrastructure plots showed an even higher presence, averaging 3.1 indicators per event.

Of the 16 NSI Indicators and behaviors, the most frequently observed indicators included:

- Expressed/Implied Threats (47.8%).
- Recruiting/Financing (34.2%).
- Observation/Surveillance (31.5%).
- Weapons Collection/Discovery (31.1%).
- Acquisition of Expertise (20.5%).

[3] PIRUS is an individual-level database that contains information on the radicalization characteristics of 3,540 Islamist, far-left, far-right, and single-issue extremists who committed violent and nonviolent crimes in the United States from 1948 through 2021. The companion database to PIRUS—PIRUS-Plots—includes information on the crimes committed by the subjects in PIRUS. It is comprised of successful, failed, and foiled property crimes and violent plots that were linked to domestic violent extremism and homegrown violent extremism in the United States. (The database does not include foreign terrorist attacks committed on U.S. soil, such as the 9/11 attacks.) PIRUS-Plots details the preparatory actions taken by the subjects to carry out their crimes, the outcomes of the events, and the law enforcement strategies that were used to disrupt plots in their planning stages. The database includes information on 1,338 premeditated violent plots and property crimes, that were committed in the United States from 1990–2021. The data in the PIRUS database is derived entirely from open-source information and does not contain investigative case information.

The research illustrates that the presence of these indicators strongly correlated with plot failure. When indicators were present, plots had over an 80% failure rate, and each additional indicator increased the odds of plot failure by 240%.

The analysis also identified significant changes in terrorist behavior over time, particularly in the most recent decade (2011–2021). There was a marked increase in lone actor attacks, rising to 72.7% of incidents compared to 58.8% in the previous decade and just 39.6% in 1990–2000. The research also notes a shift toward less sophisticated attacks, with a decline in plots involving explosives and an increase in firearm-based attacks targeting civilian "soft targets."

Law enforcement typically learned about suspicious activities through three primary channels: bystander tips, informants, and separate investigations. The use of informants notably increased, being present in nearly 40% of cases from 2011–2021 compared to 23.4% in the previous decade.

The report also found that expressed or implied threats increased significantly in the most recent decade, attributed to developments in digital communications technologies, expanded use of informants, and increased reporting from civilians. However, there was a decline in Recruiting/Financing, Materials Acquisition/Storage, and Weapons Collection/Discovery Indicators, correlating with the rise in lone actor attacks and less sophisticated plot methods.

The findings from the START analysis provide empirical support for the NSI program's effectiveness. Given the dynamism of the threat environment and the evolution of technology and tactics by perpetrators, there is a need to re-scope the current definitions of certain SAR indicators, including suspicious behaviors related to firearms acquisition and soft target attacks while maintaining privacy, civil rights, and civil liberties protections. This finding is also supported by the literature review conducted by the NCITE team.

Key Findings From the NCITE Analysis

The NCITE analysis centered on connecting NSI Indicators and behaviors to both terrorism and nonideological targeted violence through a systematic review of academic literature published over the period 1999–2023. The research revealed that different NSI Indicators showed varying levels of empirical support across different types of violence.

Expressed/Implied Threats and Weapons Collection/Discovery emerged as the most empirically supported indicators for both terrorism and nonideological targeted violence. Expressed/Implied Threats was the only NSI Indicator to receive strong academic support across all forms of violence, with multiple studies confirming its presence as a precursor to attacks. The research indicated that threats were often communicated through multiple channels, including direct communications and online platforms.

Preliminary evidence suggests that behaviors related to eliciting information, Observation/Surveillance, Materials Acquisition/Storage, and Acquisition of Expertise may precede nonideological targeted violence, though the academic support was not as strong as for terrorism cases. The research noted that the applicability of certain indicators, particularly those

related to target surveillance and security probing, often depended on the perpetrator's chosen target and attack method.

The NCITE report identified important distinctions in how indicators manifested between ideological and nonideological violence. For instance, recruiting/financing activities were more prevalent in terrorism cases, particularly those involving organized groups, while nonideological attackers were typically self-funded and operated alone. Similarly, indicators related to surveillance and security probing showed less relevance to nonideological attacks due to the tendency to target locations with minimal security measures.

A significant finding was that many warning behaviors identified in academic research either mapped directly to existing NSI categories or did not qualify as indicators on their own. The research suggested that rather than adding new indicators, the focus should be on better understanding how existing indicators manifest in nonideological targeted violence contexts. The NCITE analysis emphasizes the importance of considering behavioral threat assessment frameworks, as complementary tools to the NSI program. These frameworks can help contextualize suspicious activities and provide additional infrastructure for threat assessment and management.

The NCITE analysis did note, however, several limitations in the current academic literature, most particularly regarding the study of nonideological targeted violence. Many indicators had limited empirical examination, with fewer than five studies examining mass violence outcomes for half of the 16 NSI Indicators.

These findings support the relevance of some of the NSI indicators to nonideological targeted violence while highlighting the need for further research into the remaining indicators to determine if they manifest in nonideological targeted violence. The research suggests that focusing on the interaction between the 16 existing indicators and incorporating complementary threat assessment frameworks could improve the overall effectiveness of the NSI program in preventing both ideological and nonideological violence.

Note on Methodology

The START report is a direct empirical analysis of actual terrorism cases using the PIRUS-Plots dataset, which contains 1,201 criminal extremist events, derived from open-source reporting, from 1990–2021. This methodology involved coding each NSI Indicator as a specific variable and analyzing its presence in real terrorist plots, failed attempts, and successful attacks. The analysis was quantitative in nature, using statistical methods to examine correlations between indicators and outcomes, while focusing on operational effectiveness.

NCITE conducted a systematic review of academic literature, examining 75 studies, published over the time period, from 1999–2023, that met specific inclusion criteria. The inclusion criteria included:

1. Studies with topical relevance to any NSI Indicator(s) or other preoperational behaviors and acts of terrorism or nonideologically motivated targeted violence.

2. Studies that used an empirical methodology (i.e., quantitative or qualitative) when examining the connection between any NSI Indicator(s) and acts of terrorism or nonideologically motivated targeted violence. Conceptual pieces or commentaries were not included.
3. Studies published in either (a) peer-reviewed journals or (b) governmental reports. Theses, dissertations, or non-refereed articles were not included.

NCITE's methodology focused on evaluating the quality and findings of existing research rather than analyzing primary incident data. The research team reviewed each study for empirical evidence connecting NSI Indicators to both terrorism and nonideological targeted violence, with particular attention to the strength of academic support for each indicator.

An Empirical Assessment of the Nationwide Suspicious Activity Reporting (SAR) Initiative (NSI)

Final Report to the Department of Homeland Security

December 2024

About This Report

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A Department of Homeland Security Science and Technology Emeritus Center of Excellence Led by the University of Maryland

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About START

Established in 2005 as the U.S. Department of Homeland Security Center of Excellence led by UMD, START uses state-of-the-art theories, methods, and data from the social and behavioral sciences to improve understanding of the origins, dynamics, and social and psychological impacts of terrorism. For more information, contact START at infostart@start.umd.edu or visit www.start.umd.edu.

Citations

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Introduction

The analyses detailed in this report were conducted in support of the Department of Homeland Security's Nationwide Suspicious Activity Reporting (SAR) Initiative (NSI), which provides federal, state, local, tribal, and territorial law enforcement with a standardized process for identifying and reporting suspicious activities that might be tied to terrorism and related crimes.[4] The NSI defines a suspicious activity as an "observed behavior reasonably indicative of preoperational planning associated with terrorism or other criminal activity."[5] For this project, we analyzed the pre-attack characteristics and preparatory behaviors captured by the NSI's 16 SAR indicators for more than 1,200 terrorist plots and extremist crimes that occurred in the United States from 1990–2021. The project was designed to:

1. Determine how often each SAR indicator was present in foiled, failed, and successful terrorist plots from 1990–2021, with a particular emphasis on the most recent decade of data.
2. Assess whether there are noticeable differences in the presence or absence of SAR indicators across different offender types (e.g., Homegrown Violent Extremists [HVEs] versus Domestic Terrorists [DTs]) and different types of terrorist plots (e.g., violent attacks designed to injure or kill people versus property crimes designed to destroy critical infrastructure).
3. Examine whether there is a correlation between successful attacks and the absence of SAR indicators or a correlation between foiled/failed attacks and the presence of SAR indicators.
4. Assess how often suspicious activities are reported to law enforcement by concerned bystanders, family members, co-workers, or acquaintances.
5. Identify if there are observable warning indicators in the preparatory phases of extremist crimes that are not currently captured by the SAR indicators.
6. Provide recommendations for useful improvements to the NSI and SAR indicators.

Data and Methods

This report builds on an earlier study conducted by START that analyzed the SAR indicators for 48 successful terrorist attacks included in the Extremist Crime Database (ECDB) and 303 federal terrorism cases in the American Terrorism Study (ATS) that occurred in the United States through

[4] Nationwide SAR Initiative (NSI). (n.d.). U.S. Department of Homeland Security. https://www.dhs.gov/nationwide-sar-initiative-nsi

[5] About the NSI. (2022, September 28). U.S. Department of Homeland Security. https://www.dhs.gov/nationwide-sar-initiative-nsi/about-nsi

2014.[6] This project provides an update to the earlier START report, utilizing information from a forthcoming open-source dataset of terrorist plots that is a part of the Profiles of Individual Radicalization in the United States (PIRUS) project.[7] The PIRUS project contains deidentified information on the criminal activities, extremist networks, and individual attributes of more than 3,200 violent and nonviolent extremists who committed crimes in the United States from 1948–2021.[8] While the PIRUS data include a similar sample of cases to both the ECDB[9] and ATS,[10] PIRUS-Plots has its own collection procedures, variables, and inclusion standards, which are described below. **Importantly, rather than mapping an unrelated list of pre-attack variables to the 16 SAR indicators, as was done by the ECDB and ATS research teams for the previous report, the PIRUS-Plots dataset includes each SAR indicator as a variable in the database, allowing for easy analysis of the suspicious activities identified by the NSI and ensuring that those indicators are coded consistently for all cases included in the database and subsequent analyses.** Given the use of different data sources, caution should be exercised when comparing the results of this report to those detailed in the 2015 START study. While the focus of this project was to assess the validity of the SAR indicators for terrorist plots that have occurred over the past decade, we evaluated the SAR indicators for all premeditated terrorist plots included in the PIRUS-Plots dataset from 1990–2021 to facilitate longitudinal comparisons using a consistent data source.

The PIRUS-Plots dataset is comprised of 1,201 criminal extremist events that meet the definition of terrorism provided in the Homeland Security Act of 2002.[11] This definition has three constituent parts. First, it requires that an act be dangerous to human life or potentially destructive of critical infrastructure. Second, the act must violate the laws of the United States

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[6] Gruenewald, J., Parkin, W.S., Smith, B.L., Chermak, S.M., Freilich, J.D., Roberts, P., & Klein, B. (2015). *Validation of the Nationwide Suspicious Activity Reporting (SAR) Initiative: Identifying suspicious activities from the Extremist Crime Database (ECDB) and the American Terrorism Study (ATS). Report to the U. S. Department of Homeland Security*. National Consortium for the Study of Terrorism and Responses to Terrorism. https://www.start.umd.edu/pubs/START_ValidationofNationwideSARInitiative_Feb2015.pdf

[7] Profiles of Individual Radicalization in the United States (PIRUS). (n.d.). National Consortium for the Study of Terrorism and Responses to Terrorism. https://www.start.umd.edu/data-tools/profiles-individual-radicalization-united-states-pirus

[8] The PIRUS project requires that an extremist offender radicalize within the territorial jurisdictions of the United States to be included in any of its datasets, including PIRUS-Plots. Thus, terrorist attacks committed in the United States by subjects whose entire radicalization processes occurred outside of the United States (e.g., the 9/11 attacks) are not included in the PIRUS-Plots data.

[9] Freilich, J.D., Chermak, S.M., Belli, R., Gruenewald, J., & Parkin, W.S. (2014). Introducing the United States Extremist Crime Database (ECDB). *Terrorism and Political Violence, 26*(2), 372–384. DOI: https://doi.org/10.1080/09546553.2012.713229.

[10] Smith, B.L., & Damphousse, K.R. (2002). The American terrorism study: Patterns of behavior, investigation and prosecution of American terrorists, final report. U.S. Department of Justice. https://www.ojp.gov/pdffiles1/nij/grants/193420.pdf

[11] Homeland Security Act of 2002, H.R. 5005, 107th Congress (2002). https://www.congress.gov/107/plaws/publ296/PLAW-107publ296.htm

or of any state or subdivision of the United States. Finally, to be considered an act of terrorism, the crime must have been committed to intimidate or coerce a civilian population, influence the policy of the government by intimidation or coercion, and/or affect the conduct of government.[12] In addition to these definitional criteria, **to be included in the PIRUS-Plots dataset, the crime must have been premeditated and its perpetrators must have taken at least one actionable step towards conducting an attack** (e.g., acquiring a weapon or surveilling a target). This means that acts of violence or property damage that occurred spontaneously during public demonstrations or following chance encounters are not included in the dataset. Similarly, incidents in which the perpetrators made threatening statements but took no appreciable steps to carry out an attack (e.g., failing to identify a specific target or attempt to acquire a weapon) are not included in the data, even if the act of making threatening statements resulted arrests or criminal prosecutions.

The PIRUS-Plots data is cross-ideological and is compiled using open-sources, such as publicly available court records, police reports, and news coverage that is of high validity. For this project, we neither used, nor had access to, any internal, non-public NSI data, including reports of suspicious activities made by law enforcement, data related to the work of the National Network of Fusion Centers, or data used by the NSI to inform its technical, policy, or training assistance efforts. This project was an attempt to use external, public data to evaluate the SAR indicators and should not be considered a test or validation of the NSI or its partners, or an appraisal of the effectiveness of the NSI in helping coordinate efforts to prevent future acts of terrorism. Moreover, **the data used in this project only include criminal events linked to failed or foiled terrorist plots and successful terrorist attacks**. The data cannot estimate how often SAR indicators are present in noncriminal or non-terrorism events. Thus, the statistics reported below are not an attempt to determine if the SAR indicators reliably distinguish terrorism from non-terrorism events or to evaluate whether the SAR indicators are useful for detecting other types of crimes.

The PIRUS-Plots data consists of pre-meditated violent crimes and crimes that were intended to destroy critical infrastructure. For this project, we utilized the critical infrastructure categories provided by the Cybersecurity and Infrastructure Security Agency to determine if a crime targeted critical infrastructure and, thus, should be included in the data.[13] The data includes successful terrorist attacks, as well as attacks that failed due to perpetrator error and plots that were foiled by law enforcement in the planning stages. The success of a terrorist event is

[12] Premeditated hate crimes that were designed to spread fear beyond immediate victims and influence public opinion or official policy decisions were determined to meet the requirements of this definition and were included in this study. Events belonging to the broader class of grievance-based targeted violence, such as nonideologically motivated school shootings or workplace attacks, are not included in the PIRUS-Plots data and, thus, are not evaluated in this report.

[13] Critical infrastructure sectors. (n.d.). Cybersecurity & Infrastructure Security Agency. https://www.cisa.gov/topics/critical-infrastructure-security-and-resilience/critical-infrastructure-sectors

measured by whether the perpetrator(s) of the crime successfully deployed a weapon and does not reflect victim casualties or an arbitrary threshold of victim deaths or injuries, or property damage.

Table 1 provides the NSI's descriptions of the 16 SAR indicators, as well as illustrative examples of how the indicators were coded in the PIRUS-Plots data. It is important to note that our research team, rather than NSI representatives, was responsible for operationalizing each of the SAR indicators in the PIRUS-Plots dataset. While we made every effort to ensure that our operationalization of the SAR indicators reflects the definitional intent of the NSI, at times there was ambiguity regarding the actors, weapons, and scenarios that are required to code the SAR indicators in terrorism cases. For instance, it is unclear what quantity of firearms, firearms parts, and ammunition would be considered "unusual" by the average person and should be treated as positive evidence of the weapons collection/discovery and related SAR indicators. The examples provided in Table 1 detail the coding decisions that we made in these types of ambiguous scenarios.

The SAR indicators were only coded as being present if they captured a behavior that the perpetrators took to facilitate a future attack and not if they constituted the attack itself. For instance, a cyberattack targeting a computer system would only be considered evidence of the cyberattack SAR indicator if compromising a computer system was done to facilitate a future violent attack. The cyberattack SAR indicator would not be recorded if compromising a computer system was the only criminal goal of the perpetrators and there were no plans for a subsequent terrorist crime.

Finally, it is important to note that the SAR indicators were coded as present if open sources indicate that the perpetrator(s) engaged in the suspicious activities at any point while plotting a violent attack or infrastructure crime. The coding of the SAR indicators in any case does not necessarily mean that the suspicious activities were (1) observed by parties unaffiliated with the crimes, (2) that the behaviors were reported to law enforcement, or (3) that the reporting of the behaviors to law enforcement was documented, analyzed, or shared as part of the NSI's official SAR process. Without access to internal NSI data or official reports detailing law enforcement investigations of disrupted plots and successful attacks, it is not possible to say with a high degree of certainty if suspicious behaviors were observed by law enforcement or unaffiliated third parties. Rather than speculate based on limited information, we chose not to code the SAR indicators in the PIRUS-Plots data as "present and observed" or "present and unobserved," and instead coded the indicators simply as "present" or "absent."

Table 1: The NSI's Descriptions of the 16 SAR Indicators and Examples

SAR Indicator	NSI Description	Examples of Included Behaviors	Examples of Excluded Behaviors
1. Breach/Attempted Intrusion	Unauthorized personnel attempting to enter or actually entering a restricted area, secured protected site, or nonpublic area. Impersonation of authorized personnel (e.g., police/security officers, janitor, or other personnel).	Impersonating an airport employee to access and take photos of restricted areas.	The breach of restricted area as part of a public demonstration and not in preparation for a future attack.
2. Misrepresentation	Presenting false information or misusing insignia, documents, and/or identification to misrepresent one's affiliation as a means of concealing possible illegal activity.	Individual purporting to be acting on behalf of government officials or law enforcement to gain entry to a restricted building.	Individual purporting to be a member of law enforcement directly following the crime.
3. Theft/Loss/Diversion	Stealing or diverting something associated with a facility/infrastructure or secured protected site (e.g., badges, uniforms, identification, emergency vehicles, technology, or documents [classified or unclassified]), which are proprietary to the facility/infrastructure or secured protected site.	Individual(s) stealing weapons from a military base to be used in a future plot.	Any case where theft was the final goal of the perpetrators and not done to further a subsequent attack.
4. **Sabotage/Tampering/Vandalism**	Damaging, manipulating, defacing, or destroying part of a facility/infrastructure or secured protected site.	No cases included in PIRUS-Plots.	Any case where sabotage, tampering, or vandalism was the final goal of the perpetrators and not done to further a violent plot.
5. Cyberattack	Compromising or attempting to compromise or disrupt an organization's information technology infrastructure.	No cases included in PIRUS-Plots.	Any case where a cyberattack was the final goal of the perpetrators and not done to further a violent plot.

6.	**Expressed or Implied Threat**	Communicating a spoken or written threat to commit a crime that will result in death or bodily injury to another person or persons or to damage or compromise a facility/infrastructure or secured protected site.	Individual(s) expressing a threat to a friend or family member or an informant/undercover agent working on the case.	Posting anti-Semitic, racist, homophobic, or dehumanizing signs, symbols, memes, or language on social media or another public forum, but not in reference to a specific target.
7.	**Aviation Activity**	Learning to operate, or operating an aircraft, or interfering with the operation of an aircraft in a manner that poses a threat of harm to people or property and that would arouse suspicion of terrorism or other criminality in a reasonable person. Such activity may or may not be a violation of Federal Aviation Regulations.	Receiving aviation training for the expressed purpose of committing a subsequent attack.	Receiving aviation training unrelated to planning an attack (e.g., working as a pilot before radicalizing).
8.	**Eliciting Information**	Questioning individuals or otherwise soliciting information at a level beyond mere curiosity about a public or private event or particular facets of a facility's or building's purpose, operations, security procedures, etc., in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.	Individual(s) calling a target to ask about their "most active" days; perpetrator(s) inquiring about specific individuals' presence at a particular event.	Accessing information about a potential target online via publicly accessible information.
9.	**Testing or Probing of Security**	Deliberate interactions with, or challenges to, installations, personnel, or systems that reveal physical, personnel, or cybersecurity capabilities in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.	Attempting to enter a protected facility prior to the attack to test and assess its level of security and/or identify potential access points.	Surveilling a target without trying to enter the facility.

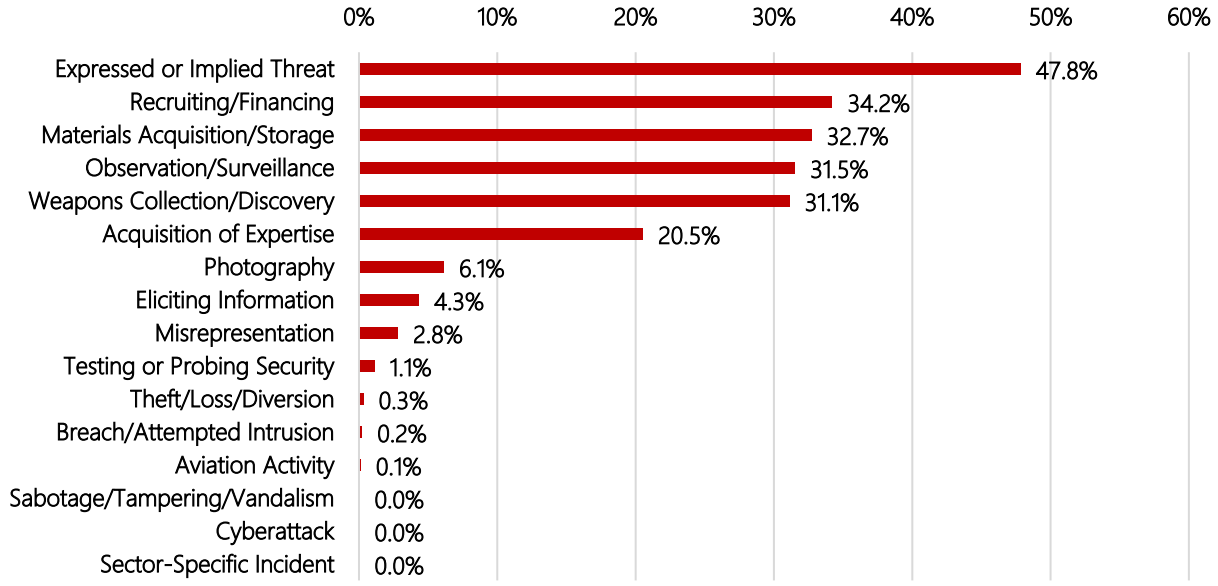
10.	**Recruiting/Financing**	Providing direct financial support to operations teams and contacts or building operations teams and contacts; compiling personnel data, banking data, or travel data in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.	Attempting to recruit co-conspirators online to participate in, or help plan, an attack; engaging in fraudulent activities to raise the funds needed to commit an attack.	Planning an attack with a co-conspirator with whom the individual co-radicalized; self-financing a terrorist plot with personal funds.
11.	**Photography**	Taking pictures or video of persons, facilities, buildings, or infrastructure in an unusual or surreptitious manner that would arouse suspicion of terrorism or other criminality in a reasonable person. Examples include taking pictures or video of infrequently used access points, the superstructure of a bridge, personnel performing security functions (e.g., patrols, badge/vehicle checking), security-related equipment (e.g., perimeter fencing, security cameras), etc.	Taking pictures or videos of a target.	Accessing photographs of a target that exist online or in other public sources.
12.	**Observation/Surveillance**	Demonstrating unusual or prolonged interest in facilities, buildings, or infrastructure beyond mere casual (e.g., tourists) or professional (e.g., engineers) interest and in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person. Examples include observation through binoculars, taking notes, attempting to mark off or measure distances, etc.	Travelling to a target and conducting reconnaissance in preparation for an attack.	Obtaining address or location details about a target information through public sources that are freely available online.

13.	**Material Acquisition/Storage**	Acquisition and/or storage of unusual quantities of materials such as cell phones, pagers, radio control toy servos or controllers; fuel, chemicals, or toxic materials; and timers or other triggering devices, in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.	Possession of the materials needed to make an explosive device or CBRN (chemical, biological, radiological, nuclear) weapon; possessing a viable explosive device or CBRN weapons.	Possessing firearms, firearms parts, or ammunition.
14.	**Acquisition of Expertise**	Attempts to obtain or conduct training or otherwise obtain knowledge or skills in security concepts, military weapons or tactics, or other unusual capabilities in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.	Engaging in military-style training in public areas in preparation for committing an attack; test detonations of explosive devices in open, public areas.	Firearms practice in the backyard of private residence or an officially sanctioned gun range; military experience prior to radicalizing.
15.	**Weapons Collection/Discovery**	Collection or discovery of unusual amounts or types of weapons, including explosives, chemicals, and other destructive materials, or evidence, detonations or other residue, wounds, or chemical burns, that would arouse suspicion of terrorism or other criminality in a reasonable person.	Storage of materials to create an explosive device or CBRN weapon or storage of a viable explosive device or CBRN weapon.	Storing firearms, firearms parts, or ammunition.
16.	**Sector-Specific Incident**	Actions associated with a characteristic of unique concern to specific sectors (e.g., the public health sector), with regard to their personnel, facilities, systems, or functions in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.	No cases included in PIRUS-Plots.	Any case in which a sector-specific incident was the final goal of the perpetrators and not done to further a subsequent attack.

Findings

Overall Prevalence of the SAR Indicators

Figure 1: Percentage of SAR Indicators in PIRUS-Plots Incidents



SAR indicators were present in 80% of the terrorist plots and attacks included in PIRUS-Plots from 1990–2021. On average, an event in PIRUS-Plots involved 2.2 SAR indicators; however, this rate was higher for some terrorist plot types. For instance, plots and attacks targeting critical infrastructure averaged 3.1 SAR behaviors, while plots against civilian targets typically involved less than two. Figure 1 illustrates the prevalence of each of the SAR indicators in the PIRUS-Plots data. The SAR indicators that were most frequently present in the data are expressed or implied threat (47.8%), Recruiting/Financing (34.2%), Observation/Surveillance (31.5%), Weapons Collection/Discovery (31.1%), Acquisition of Expertise (20.5%), and Photography (6.1%). Of the most common SAR indicators in the data, five—Recruiting/Financing, Observation/Surveillance, Weapons Collection/Discovery, Acquisition of Expertise, and Photography—are not inherently criminal in nature and when observed, require additional investigation to determine if they are linked to terrorist activity or related criminal schemes. Expressed or implied threat is the only criminal SAR indicator that was present in a significant number of PIRUS-Plots cases. Expressed or implied threats were often made by the perpetrator(s) of terrorist crimes to persons unaffiliated with the events, such as friends, family members, or civilian bystanders. However, as we illustrate below, expressed or implied threats were also commonly made to informants whose relationships with law enforcement were unknown to the perpetrator(s) plotting the crimes. In other cases, the expression of threats happened on social media or through other types of public digital communications.

Additional SAR indicators that capture pre-attack criminal behaviors, such as theft/loss/diversion or attempted intrusions into restricted facilities, were present in less than 1% of all cases. We did not find evidence in open sources of the presence of the sabotage/tampering/vandalism, cyberattack, or sector-specific SAR indicators in the pre-attack and preparatory phases of the terrorist crimes included in PIRUS-Plots.

The SAR Indicators by Decade

Figure 2: SAR Indicators in PIRUS-Plots by Decade

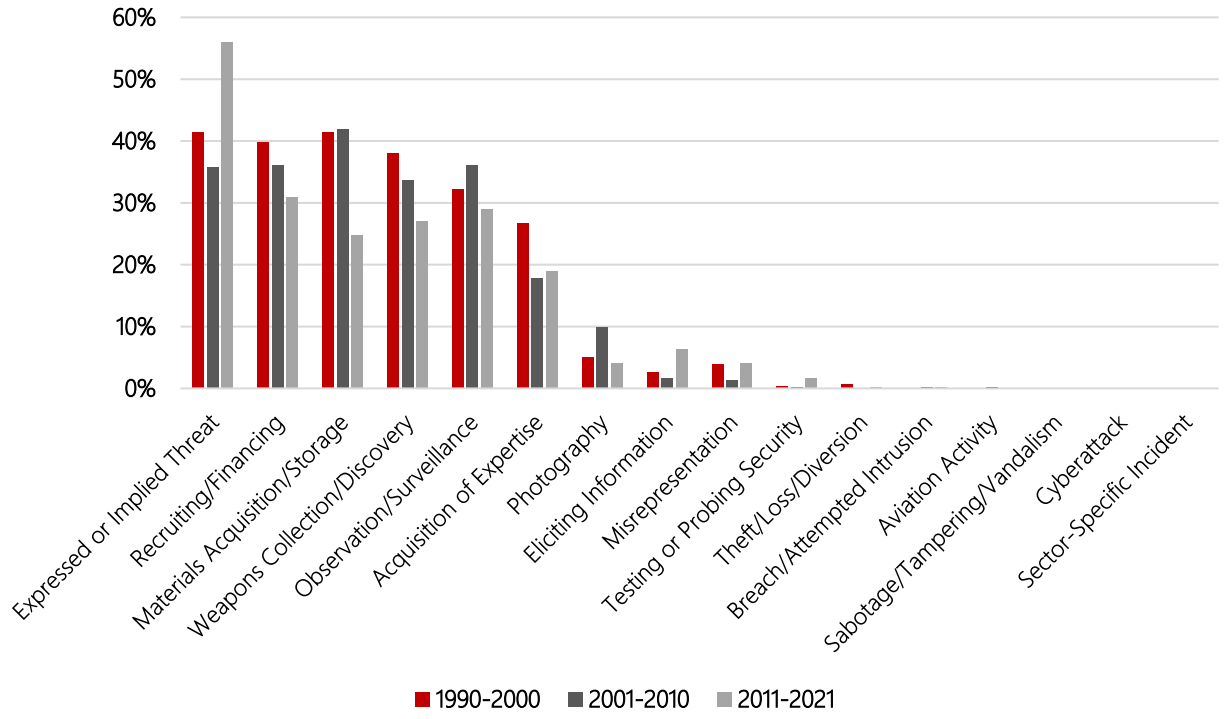
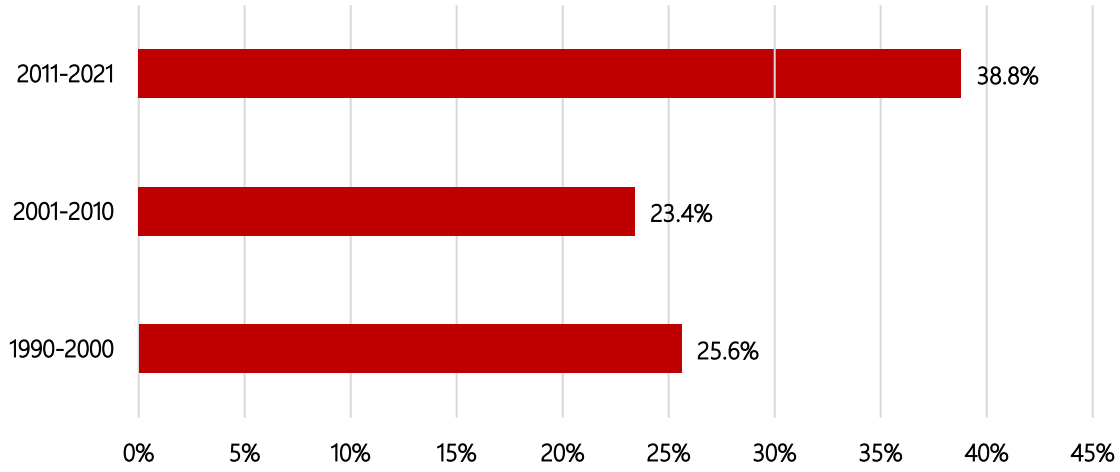


Figure 2 demonstrates that the relative frequencies of the SAR indicators in terrorist plots changed throughout the timespan covered by the PIRUS-Plots data. Importantly, in the most recent decade covering the period from 2011–2021, the rate of expressed or implied threats that were made during the preparatory stages of terrorist plots and attacks increased significantly. As depicted above, the presence of expressed or implied threats increased by over 20% between 2001–2010 and 2011–2021. This increase appears to be the product of recent developments in digital communications technologies, an expansion in law enforcement disruption strategies based on the use of informants, and an increase in community members reporting concerning statements to law enforcement. First, the rapid and massive expansion in the use of social media and online forums by aspiring terrorist offenders has not only provided greater opportunities for individuals to issue public threats, but it has significantly increased the probability that those threats will be observed by law enforcement or concerned members of the public who do not have a direct or meaningful relationship with the offender(s). As previous research has shown, the bystander effect—the hesitation or unwillingness of people to come forward and report

concerning statements or behaviors—is most pronounced among friends and family members of the individuals engaging in suspicious activities.[14] Threats that are made on social media, however, can be observed by members of the broader public who are not deterred from reporting their concerns due to having a personal relationship with the person who made the concerning statements.

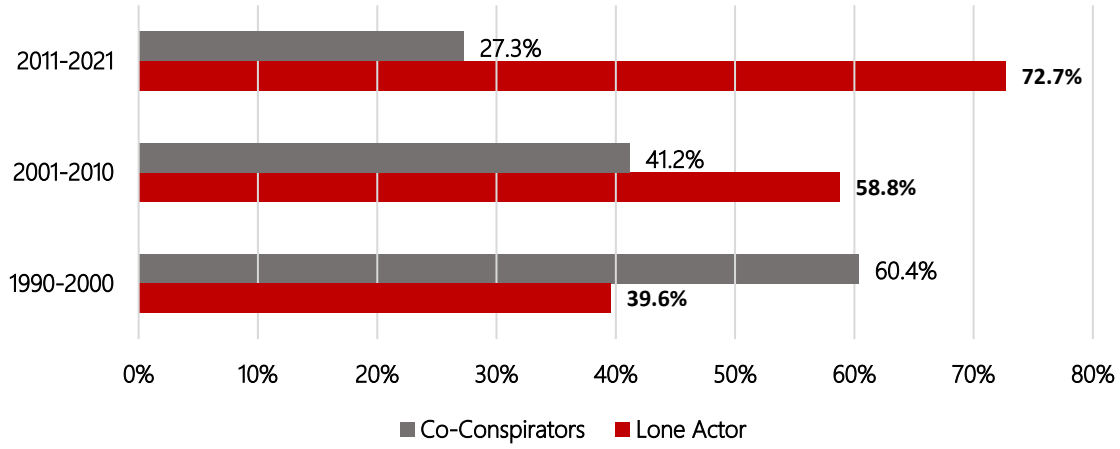
Figure 3: The Use of Informants in Terrorism Investigations by Decade



Second, there has been a notable surge in the use of informants to disrupt terrorist plots in recent years and this has led to increased reporting of explicit or implied threats to law enforcement. As Figure 3 shows, from 2011–2021, informants were present in nearly 40% of the cases in PIRUS-Plots compared to just 23.4% of the cases from 2001–2010 and 25.6% from 1990–2000. Informants can be individuals with known links to extremist communities or past offenders who are in a better position than law enforcement or members of the broader public to hear the expression of concerning statements or witness suspicious behaviors. Informants are often compensated for sharing information with law enforcement, which increases the incentives for them to report what they hear and see.

[14] On the "bystander effect," see Williams, Michael J., John G. Horgan, and William P. Evans. (2016). The critical role of friends in networks for countering violent extremism: Toward a theory of vicarious help-seeking. *Behavioral Sciences of Terrorism and Political Aggression 8*(1), 45–65.

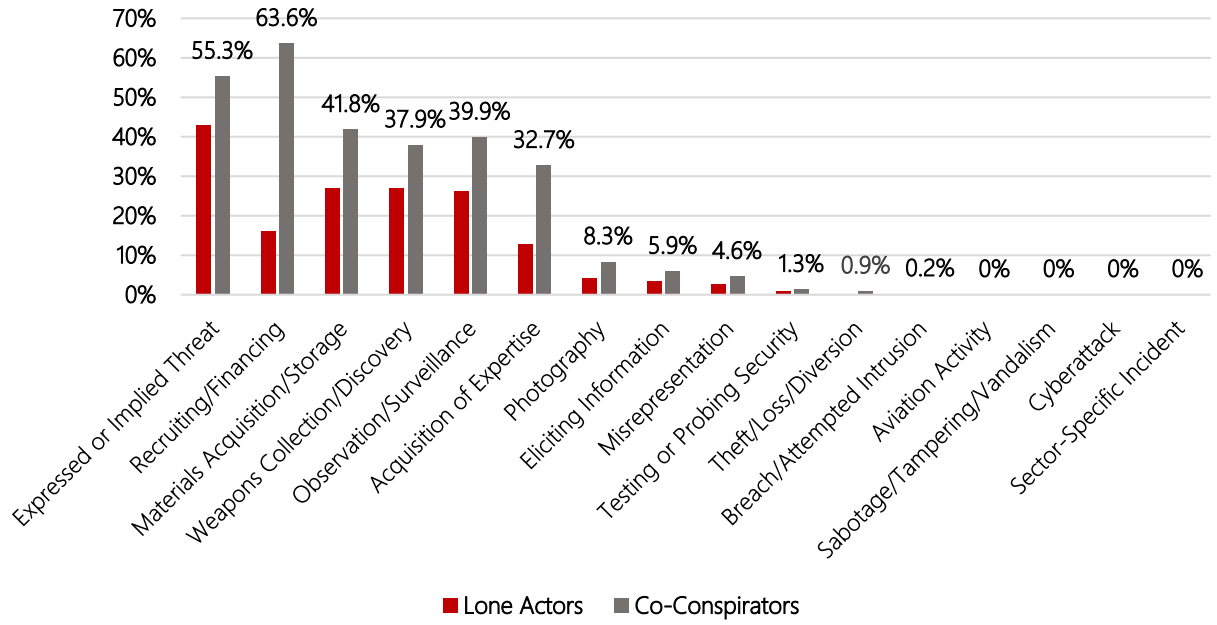
Figure 4: PIRUS-Plots Events Perpetrated by Lone Offenders vs. Co-Offenders by Decade



The most recent decade in the PIRUS-Plots data also shows a decline in the frequency of the Recruiting/Financing, Materials Acquisition/Storage, and Weapons Collection/Discovery SAR indicators in terrorist plots. These changes correlate with an increase in lone actor attacks and less sophisticated terrorist plots involving the use of readily available weapons. For instance, during the most recent decade, perpetrators who planned to commit, or committed, attacks alone were responsible for 72.7% of the crimes included in the PIRUS-Plots data (Figure 4). This represents a notable increase over the previous decade, when lone actors made up 58.8% of the offenders in the PIRUS-Plots data, and a dramatic increase over the period from 1990–2000, when lone actors only accounted for 39.6% of the terrorist plots and attacks in the data. Given their preference for operating without co-offenders or significant direct help, lone actors do not typically engage in extensive recruiting for the purposes of committing terrorist attacks. Indeed, as Figure 5 shows, according to the PIRUS-Plots data, lone actor offenders were less likely to engage in every SAR activity when compared to offenders who co-conspired with others to plan and commit terrorist attacks, but the most dramatic difference between the two types of offenders was in terrorist recruitment.

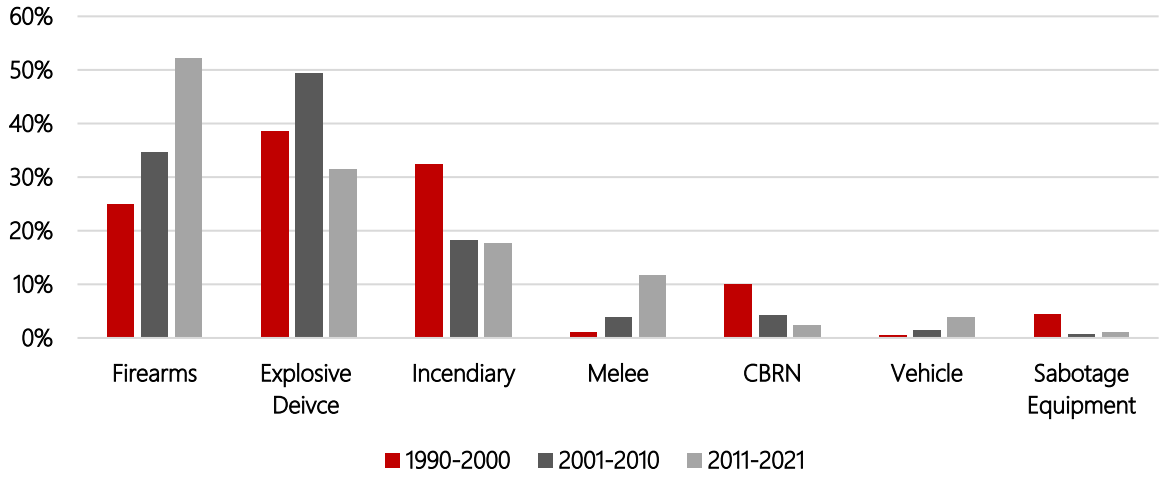
> Lone offenders only made attempts to recruit others to join them in planning or conducting terrorist attacks in 16% of their incidents in the PIRUS-Plots data.

Figure 5: Presence of SAR Indicators by Lone Actors vs. Co-Conspirators



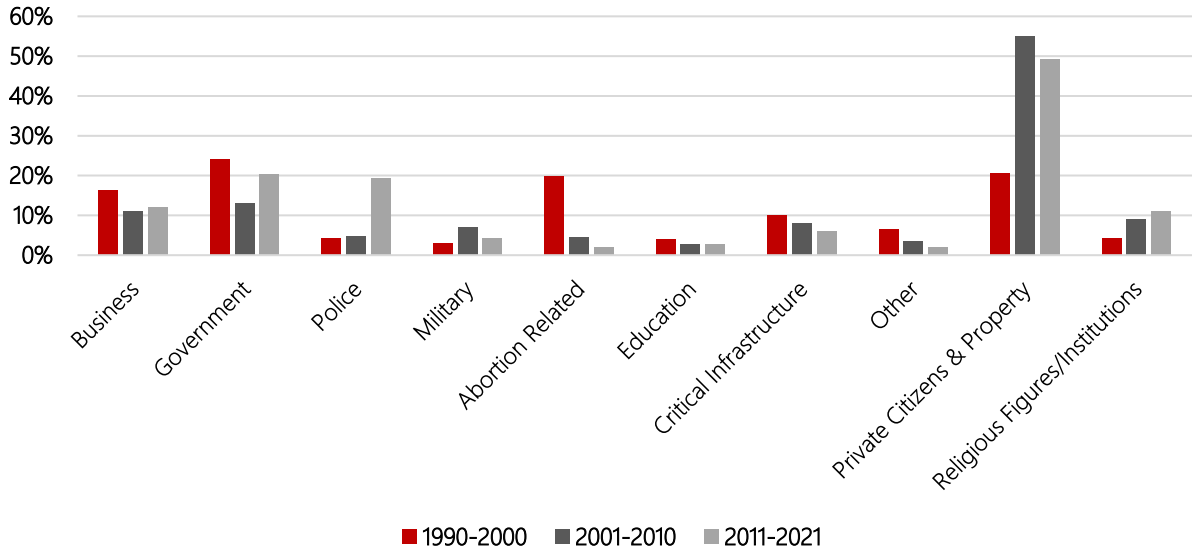
In addition to the rise in lone offender plots and attacks, data from the most recent decade in PIRUS-Plots show a sharp decline in the number of terrorist plots and attacks involving the use of explosives, CBRN materials, and other hard-to-acquire weapons, and a corresponding increase in plots and attacks involving the use of firearms, which in most cases are legal to own and readily available. As Figure 6 shows, plots involving the intended or actual use of explosives declined from a high of nearly 50% of all terrorism-related events from 2000–2010 to 31.5% of incidents in PIRUS-Plots in the most recent decade. **By comparison, plots in which the perpetrators intended to use, or used, firearms nearly doubled from the earliest to most recent decades in the data and now constitute a majority of terrorist crimes committed in the United States.** As they are currently described by the NSI, the Materials Acquisition/Storage and Weapons Collection/Discovery SAR indicators appear designed to capture suspicious behaviors related to the acquisition, assembly, and use of explosives, toxic agents, and other weapons of mass destruction, and they have declined in the data alongside plots involving the use of those materials. It is not immediately clear what, if any, behaviors related to acquiring, storing, and using firearms would constitute the presence of these indicators. While this could indicate a lack of knowledge on our part about how the NSI adapts these indicators to plots involving firearms, it could be the case that law enforcement relying on these SAR descriptions encounter similar identification and classification difficulties.

Figure 6: Primary Weapon Type in PIRUS-Plots by Decade



Other SAR indicators, such as Photography, Eliciting Information, Misrepresentation, and Testing Security, showed less decade-to-decade frequency variation and were comparatively rare in terrorist plots that occurred from 2011–2021. These SAR indicators were present in less than 10% of all cases, which reflects a post-9/11 change in terrorists' preferences toward targets that are present in most U.S. communities, do not require specialized knowledge or credentials to access, and lack significant security deterrents. As Figure 7 illustrates, plots and attacks targeting civilian victims and publicly accessible property rose to 55% of all events in PIRUS-Plots from 2001–2010 compared to 20.6% from 1990–2000. These targets continued to make up approximately 50% of all terrorist plots and attacks in the most recent decade. Other so-called "soft targets," such as businesses and religious figures and institutions, continued to account for significant portions of the victims of terrorist plots and attacks from 2011–2021.

Figure 7: Target Types in PIRUS-Plots by Decade



The SAR Indicators by Type of Extremist Offender

Table 2: Frequency of SAR Indicators by Type of Extremist Offender

SAR Indicator	HVEs (N = 233)	DTs (N = 968)
Breach/Attempted Intrusion	0.9%	0%
Misrepresentation	4.7%	3.1%
Theft/Loss/Diversion	0%	0.4%
Sabotage/Tampering/Vandalism	0%	0%
Cyberattack	0%	0%
Expressed or Implied Threat	**67.4%**	**43.1%**
Aviation Activity	0.4%	0%
Eliciting Information	6.4%	3.8%
Testing or Probing Security	3.0%	0.6%
Recruiting/Financing	**45.5%**	**31.5%**
Photography	13.3%	3.9%
Observation/Surveillance	**47.2%**	**27.7%**
Materials Acquisition/Storage	**33.9%**	**32.4%**
Acquisition of Expertise	**31.8%**	**17.8%**
Weapons Collection/Discovery	**28.3%**	**31.8%**
Sector-Specific Incident	0%	0%

When comparing the rate of SAR indicators by type of extremist offender, the PIRUS-Plots data reveal that HVEs and DTs engaged in similar types of suspicious activities during the planning and preparation phases of their terrorist plots (although, HVEs tended to engage in these behaviors

at slightly higher rates).[15] For example, the expressed or implied threat indicator was present in 67.4% of HVE cases and 43.1% of DT cases in the data. Photography was also present in 13.3% of HVE cases, but only 3.9% of DT cases. The only SAR indicator that was present more often in DT cases was Weapons Collection/Discovery, which was present in 31.8% of DT plots and 28.3% of HVE cases. **Despite slightly different rates, it is important to note that the six most frequently occurring SAR indicators were the same for both HVEs and DTs.**

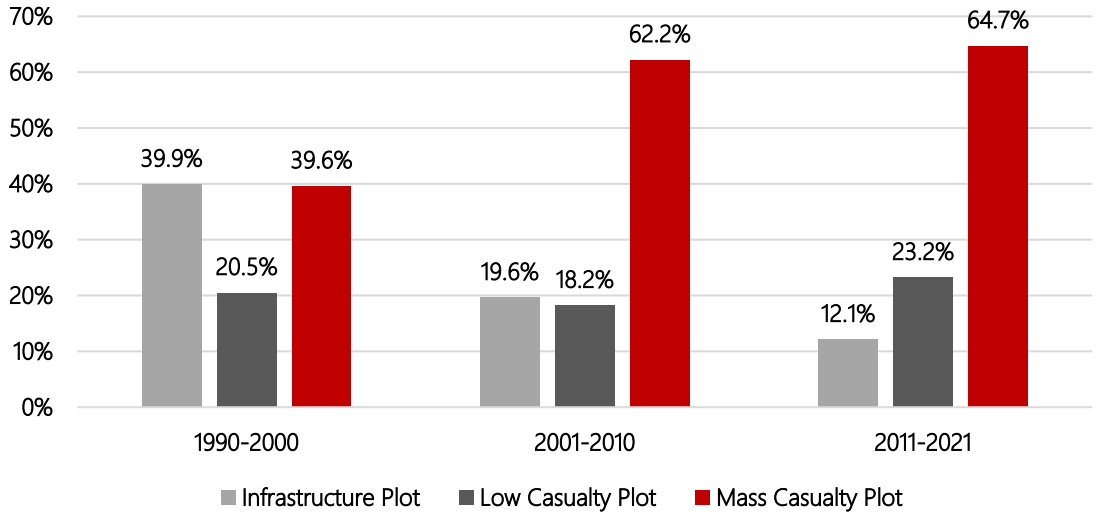
The SAR Indicators by Plot and Target Type

Terrorist plots and attacks can vary considerably based on the perpetrators' operational goals, and the relative frequencies of the SAR indicators are likely to reflect this dynamic. As Figure 8 shows, terrorist plots designed to produce mass casualties have increased sharply over the past 2 decades, growing from under 40% of terrorist plots in the 1990s to nearly 65% of plots today. A mass-casualty plot is defined as an event in which the perpetrator(s) intended to kill or injure four or more victims.[16] By comparison, a low-casualty plot is an event in which the perpetrator(s) intended to kill or injure three or less victims, while an infrastructure plot is an event that targeted property and was not intended to harm people. Infrastructure crimes often involve plots designed to destroy critical property assets related to utilities, telecommunications, transportation and aviation, and the food and water supply.

[15] The Department of Homeland Security (DHS) defines Homegrown Violent Extremists (HVEs) as "a person of any citizenship who has lived and/or operated primarily in the United States or its territories who advocates, is engaged in, or is preparing to engage in ideologically-motivated terrorist activities (including providing support to terrorism) in furtherance of political or social objectives promoted by a foreign terrorist organization, but is acting independently of direction by a foreign terrorist organization. According to DHS, HVEs are "distinct from traditional domestic terrorists [DTs] who engage in unlawful acts of violence to intimidate civilian populations or attempt to influence domestic policy without direction from or influence from a foreign actor." See *Reference Aid: ISIS and al-Qa'ida-Inspired Homegrown Violent Extremists*, Department of Homeland Security, https://www.dhs.gov/publication/reference-aid-isis-and-al-qa-ida-inspired-homegrown-violent-extremists

[16] This definition of a mass casualty event is adapted from https://cops.usdoj.gov/html/dispatch/07-2019/mass_shootings.html

Figure 8: Terrorist Attack Type in PIRUS-Plots by Decade



The SAR indicators that are commonly present in mass-casualty plots are notably different than those that are associated with infrastructure crimes. For instance, the most commonly occurring SAR indicators in mass-casualty plots were expressed or implied threats and materials acquisition, whereas the most common SAR indicators in infrastructure crimes were Observation and Surveillance, Recruiting/Financing, and Acquiring Expertise (see Figure 9). The variation in the presence of these SAR indicators reflects the different operational requirements of the two types of attacks. The most important preparatory steps in perpetrating mass-casualty plots, which typically target private citizens and easily accessible public areas, are often identifying targets and securing weapons that can inflict significant harm. Indeed, the PIRUS-Plots data show that nearly 60% of mass-casualty plots involved perpetrators making explicit or implicit threats and nearly 45% involved the perpetrators acquiring and storing weapons in preparation for the attacks. By comparison, infrastructure targets are often highly secure and not familiar to aspiring terrorists. Thus, planning an infrastructure crime often requires the perpetrator(s) to conduct surveillance of a potential target, identify co-offenders with unique knowledge or operational skills, and acquire the expertise necessary to breach the target's security deterrents, gains access to the facility, and use the appropriate weapons and techniques to destroy complex property assets.

Figure 9: SAR Indicators by Terrorist Plot/Attack Type

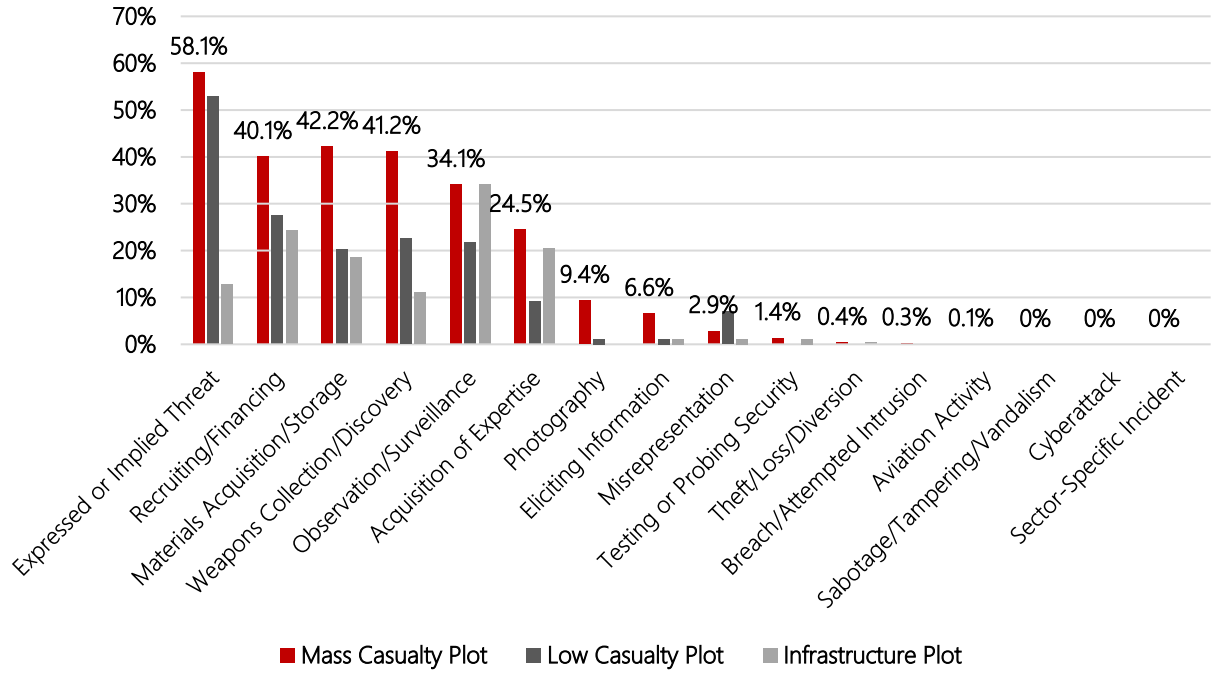


Table 3: SAR Indicators by Target Type

SAR Indicator	Business	Govt.	Police	Military	Abortion-Related	Education	Critical Infrastructure	Private Citizens	Religious Figures
Breach/Attempted Intrusion	0%	0%	0%	0%	0%	0%	2.3%	0.4%	0%
Misrepresentation	2.0%	4.8%	2.0%	3.6%	2.6%	0%	1.1%	4.0%	1.9%
Theft/Loss/Diversion	0.7%	0%	0%	0%	0%	0%	1.1%	0.4%	0%
Sabotage/Tampering/Vandalism	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cyberattack	0%	0%	0%	0%	0%	0%	0%	0%	0%
Expressed or Implied Threat	31.8%	64.2%	54.4%	61.8%	24.0%	44.4%	50.6%	47.1%	48.6%
Aviation Activity	0.7%	0%	0%	0%	0%	0%	0%	0.2%	0%
Eliciting Information	2.0%	9.2%	6.8%	9.1%	0%	0%	5.7%	2.1%	3.7%
Testing or Probing Security	3.3%	0%	2.0%	1.8%	0%	0%	3.4%	1.3%	0%
Recruiting/Financing	21.2%	37.1%	36.1%	49.1%	17.1%	19.4%	63.2%	29.7%	29.9%
Photography	2.6%	8.7%	5.4%	14.5%	3.9%	0%	10.3%	5.1%	7.5%
Observation/Surveillance	38.4%	30.6%	24.5%	61.8%	28.9%	52.8%	47.1%	28.1%	37.4%
Materials Acquisition/Storage	23.8%	35.8%	29.9%	41.8%	19.7%	38.9%	46.0%	31.0%	27.1%
Acquisition of Expertise	22.5%	34.1%	24.5%	25.5%	11.8%	16.7%	28.7%	14.1%	12.1%
Weapons Collection/Discovery	22.5%	36.2%	32.0%	25.5%	13.2%	27.8%	37.9%	31.7%	26.2%
Sector-Specific Incident	0%	0%	0%	0%	0%	0%	0%	0%	0%

These results also reflect a more general trend in the data in which the perpetrators who plotted attacks against "hard," i.e., secure, targets engaged in some SAR activities more often than perpetrators who targeted civilian victims or open, public places (see Table 3). In addition to infrastructure crimes, plots targeting the military, which is among the most secure target types, involve high rates of target surveillance, recruiting and financing, acquiring and storing destructive weapons, and acquiring the expertise necessary to conduct an attack. Interestingly, these SAR indicators were also present at high rates in plots targeting education, which likely reflects the increased security that schools and universities have put in place in the wake of the school shooting epidemic in the United States. Perpetrators who plotted to attack "soft" targets, such as private citizens, businesses, and religious figures and institutions, engaged in these SAR activities at comparatively low rates.

Law Enforcement Identification of Suspicious Activities

When available in public sources, the PIRUS-Plots data records the mechanism through which law enforcement was alerted to the suspicious activities captured by the SAR indicators. While law enforcement can learn about the suspicious activities tied to terrorist plots through a variety of methods, the PIRUS-Plots data suggest that **authorities are most commonly alerted to the presence of SAR behaviors through bystander tips, the use of informants, and separate investigations into related and unrelated crimes** (Table 4). Tips from the public seem to be especially important for law enforcement to learn about the behaviors tied to the Photography, Materials Acquisition/Storage, and Weapons Collection/Discovery SAR indicators. **Informants**, on the other hand, **appear to be primary sources of information about the presence of the activities related to the Recruiting/Financing, Acquisition of Expertise, and Observation/Surveillance SAR indicators.** Interestingly, despite their ties to the perpetrators of terrorist plots, family members and friends *did* alert police to the concerning behaviors captured by the SAR indicators for the events included in the PIRUS-Plots data (although, they did so at a lower rate than bystanders without links to those who planned or committed the attacks).

Table 4: Law Enforcement Identification of the SAR indicators

SAR Indicator	Social Media	Surveillance	Separate Investigation	Family/Friend Tip	Bystander Tip	Bank Tip	Insider Tip	Informant
Breach/Attempted Intrusion	50.0%	0%	0%	0%	0%	0%	0%	50.0%
Misrepresentation	0%	4.3%	30.4%	0%	13.0%	4.3%	0%	39.1%
Theft/Loss/Diversion	0%	0%	50.0%	50.0%	0%	0%	0%	0%
Sabotage/Tampering/Vandalism	0%	0%	0%	0%	0%	0%	0%	0%
Cyberattack	0%	0%	0%	0%	0%	0%	0%	0%
Expressed or Implied Threat	9.6%	1.1%	9.2%	12.8%	28.9%	0%	5.8%	30.9%
Aviation Activity	0%	0%	0%	0%	0%	0%	0%	0%
Eliciting Information	2.3%	2.3%	13.6%	22.7%	15.9%	0%	2.3%	27.3%
Testing or Probing Security	14.3%	0%	14.3%	14.3%	42.9%	0%	0%	14.3%
Recruiting/Financing	6.5%	1.0%	16.2%	11.0%	17.9%	0.3%	8.2%	38.1%
Photography	10.9%	0%	18.8%	9.4%	32.8%	0%	6.3%	20.3%
Observation/Surveillance	6.9%	3.0%	16.3%	13.3%	23.2%	0%	3.4%	31.5%
Materials Acquisition/Storage	4.1%	0.7%	15.7%	11.6%	31.7%	0%	7.1%	28.7%
Acquisition of Expertise	4.1%	1.4%	16.2%	9.5%	18.9%	0%	3.4%	45.9%
Weapons Collection/Discovery	2.7%	0.4%	13.8%	12.3%	31.5%	0%	7.7%	31.2%
Sector-Specific Incident	0%	0%	0%	0%	0%	0%	0%	0%

The SAR Indicators and Plot Success and Failure

Table 5: The SAR Indicators and Plot Success and Fail Rates

SAR Indicator	Foiled/Failed Rate	Success Rate
Expressed/Implied Threat	84.70%	15.30%
Recruiting/Financing	76.40%	23.60%
Materials Acquisition/Storage	83.70%	16.30%
Observation/Surveillance	63.80%	36.20%
Weapons Collection/Discovery	84.20%	15.80%
Acquisition of Expertise	73.60%	26.40%

For this review, we considered whether the presence or absence of the SAR indicators in the preparatory stages of terrorist plots correlates with attack success or failure. The PIRUS-Plots data include two types of unsuccessful terrorism events: plots that were foiled by law enforcement in the planning stages and attacks that failed due to perpetrator error, weapon failure, or a change in target preference. When present, the SAR indicators are highly correlated with attack failure. **As Table 5 shows, when perpetrators engaged in one or more of the six most commonly occurring SAR behaviors, their plots overwhelmingly failed to result in successful attacks. Indeed, perpetrators that expressed or implied threats, attempted to acquire and store weapons capable of producing significant casualties, or who were discovered to be storing unusual amounts of explosives, chemicals, or other destructive devices had an attack fail rate greater than 80%. Of the 240 terrorist events in the PIRUS-Plots data in which no SAR indicators were recorded as being present, nearly 90% resulted in successful attacks.**

Table 6: SAR Indicators and Plot Failure

SAR Indicator	Odds Ratios	Std. Error
(Intercept)	0.22***	0.03
Expressed/Implied Threat	12.42***	2.07
Recruiting/Financing	1.51*	0.27
Observation/Surveillance	0.74	0.13
Materials Acquisition/Storage	4.30***	1.30
Acquisition of Expertise	2.01***	0.43
Weapons Collection/Discovery	2.07*	0.64

p-values: * < .05, ** < .01, *** < .001

A chi-square (χ^2) test of the PIRUS-Plots data reveals a statically significant difference in the expected and observed frequencies of the SAR indicators and plot failure, indicating the co-occurrence of the two is unlikely to be due to random chance. Similarly, Table 6 shows the results of a logistic regression model testing the relationship between the six most frequently occurring SAR indicators in the PIRUS-Plots data and plot failure. All but one indicator (Observation and Surveillance) is a statistically significant predictor of plot failure. Plots in which the five statistically significant SAR indicators were present were 1.5 to 12.4 times more likely to

fail than plots in which they were absent. **Overall, the PIRUS plots data indicates that for each additional SAR indicator that was present in an event, the odds that the plot was classified as a failure in the data increased by 240%.**

Conclusion

The results of this analysis of the PIRUS-Plots data confirm that SAR indicators are often present in terrorist plots and attacks that occur in the United States. Analyzing more than 1,200 terrorist plots and attacks that occurred over 3 decades, we found that at least one SAR indicator was present in 80% of the crimes. SAR indicators that are not inherently criminal in nature, such as Weapons Collection/Discovery and Acquisition of Expertise, appear frequently in the data, suggesting that most suspicious activities in terrorist plots require additional investigation to ensure that they are tied to criminal behaviors.

Importantly, our analysis confirms that not only are the SAR indicators present in the PIRUS-Plots data, but also that they appear to be a key factor in disrupting terrorist plots. The presence of the SAR indicators correlates highly with failed and foiled plots in the data. Indeed, the presence of some of the SAR indicators in terrorist plots, like expressed or Implied Threat and Weapons Collection/Discovery, correspond to failure rates greater than 80%.

While our analysis supports the conclusion that the NSI's SAR indicators remain relevant to detecting terrorism in the United States, we also found the recent changes in the threat landscape warrant additional discussion about how well the SAR indicators are keeping pace with terrorist adaptation. In particular, the last decade has witnessed a sharp turn away from complex and sophisticated attacks against secure targets and toward simple attacks that target civilian victims using readily available weapons. These plots and attacks have mostly involved the use of firearms and the exploitation of insecure "soft" targets. Terrorist perpetrators are less often engaging in the behaviors that are the most suspicious to witnesses and law enforcement, such as breaching security deterrents, falsifying identification documents, or acquiring explosives or other complex weapons, because their goals and tactics do not require them to do so. Attacks targeting business, civilians, and places of worship often require little more than identifying a target, researching its location in public sources, and purchasing a firearm or acquiring it through other means.

Our analysis does not suggest that new SAR indicators need to be added to the NSI. Indeed, the current indicators are quite comprehensive in terms of the conceptual categories into which terrorist behaviors fall. Rather, **our analysis suggests that the existing SAR indicators should be adapted to the changing reality of terrorism in the United States. Most importantly, the descriptions of the SAR indicators, and the corresponding training that law enforcement receives about the indicators, should clearly articulate what types of behaviors constitute suspicious activities when individuals conspire to use firearms against "soft" targets.** For instance, are there types or quantities of firearms or ammunition that should arouse suspicion in a reasonable person? Does the illegal purchase of unregistered firearms or the manufacture of

3D printed guns constitute suspicious behaviors that could be indicative of a terrorist plot? Are there lessons about "leakage" and other pre-attack behaviors from the literature on nonideological mass shootings that could provide insights into the warning signs of an impending mass casualty terrorist attack?[17] **It is also important to consider the civil rights and civil liberties implications of adapting the SAR indicators to a threat landscape that is predominated by weapons that are legal to own.** However, addressing these questions above would likely improve the SAR indicators and related NSI training, putting counterterrorism officials and law enforcement in a better position to stop the next terrorist attack.

[17] In the mass shooting literature, leakage refers to an individual "intentionally or unintentionally revealing clues to feelings, thoughts, fantasies, attitudes, or intentions that may signal an impending violent act." Lankford, A., Adkins, K. G., & Madfis, E. (2019). Are the deadliest mass shootings preventable? An assessment of leakage, information reported to law enforcement, and firearms acquisition prior to attacks in the United States. *Journal of Contemporary Criminal Justice. 35*(3), 315–341.

Applicability of NSI Indicators to Nonideological Targeted Violence: A Review of the Academic Literature

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About NCITE. The National Counterterrorism Innovation, Technology, and Education (NCITE) Center was established in 2020 as the Department of Homeland Security (DHS) Center of Excellence for counterterrorism and terrorism prevention research. Sponsored by the DHS Science and Technology Directorate (S&T) Office of University Programs, NCITE leads an elite academic consortium of more than 50 researchers at partner institutions across the United States and Europe. Headquartered at the University of Nebraska at Omaha, NCITE is the principal U.S. academic partner for counterterrorism research, technology, and workforce development.

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Summary of Findings

In 2019, the Department of Homeland Security published the *Strategic Framework for Countering Terrorism and Targeted Violence*, constituting the Department's official recognition of terrorism and targeted violence as intersecting phenomena. With this recognition, there is an increasing need to evaluate the applicability of existing counterterrorism programming to nonideologically motivated targeted violence.

The purpose of this report is to review the empirical evidence connecting the Nationwide Suspicious Activity Reporting Initiative 16 indicators, which we will refer to as NSI Indicators, to acts of nonideologically motivated targeted violence. Our goal in conducting this review is to provide a cohesive appraisal of the current academic evidence base on suspicious activity reports (SARs). We identified and analyzed empirical studies (*n*=75) with topical relevance to NSI Indicators and targeted violence to determine (1) whether current academic research supports the applicability of NSI Indicators as preoperational behaviors to acts of terrorism and targeted violence, and (2) if there are additional behavioral indicators that should be included as a NSI Indicator for nonideological targeted violence. To address these questions, we assess the available evidence for each NSI Indicator independently in relation to terrorism and nonideological targeted violence, including mass violence and school violence.

Two indicators, Expressed/Implied Threats and *Weapons Collection/Discovery* were the most studied and supported NSI Indicators in application to acts of terrorism and nonideological targeted violence. Other NSI Indicators, including *Recruiting/Financing*, *Observation/Surveillance*, *Materials Acquisition/Storage*, and *Acquisition of Expertise*, were supported in relation to acts of terrorism. While preliminary evidence indicates *Observation/Surveillance, Materials Acquisition/Storage,* and *Acquisition of Expertise* behaviors can precede acts of nonideological targeted violence, more research is needed to assess this connection. We draw on empirical research on target selection to help contextualize these findings. Additionally, seven out of eight NSI Indicators capturing criminal activity with a nexus to terrorism were not examined or not supported by the available evidence as preoperational indicators of terrorism or nonideological violence.

Based on our review, we conclude that current academic research on terrorism and targeted violence does not support the addition of new NSI Indicators. Studies have identified numerous threatening or concerning behaviors that indicate an individual may be a heightened risk for violence, but these behaviors either do not meet the criteria for a NSI Indicator or can be mapped onto existing NSI Indicator categories. We describe the importance of considering concerning behaviors and aggravating factors in the investigation of SAR. We also highlight the potential for additional threat assessment infrastructure, such as the National Threat Evaluation and Reporting (NTER) *Behavioral Approach to Violence Prevention* or *Threat Assessment and Management Teams*, to augment the SAR process.

Introduction

The Nationwide Suspicious Activity Reporting Initiative (NSI) establishes a national capacity for gathering, investigating, and sharing information on activities related to terrorism or other forms of terrorism-related criminal activity (DHS, 2022). As defined by the Information Sharing Environment-Suspicious Activity Reporting (ISE-SAR) Functional Standard 1.5.5., Suspicious Activity Reports (SARs) are official documentations of "observed behavior reasonably indicative of preoperational planning associated with terrorism or other [terrorism-related] criminal activity" (DHS, 2015: 4).

The SARs process begins with an initial report of suspicious activity to law enforcement. Initial reports can be filed by individuals—including private citizens, government officials, or law enforcement agents—who observe suspicious behavior (DHS, 2015: 13). Suspicious activity that warrants further investigation is classified within 16 SAR categories, or "NSI Indicators." Seven of these indicators capture criminal activity with a possible nexus to terrorism. The remaining nine indicators are potentially criminal or even noncriminal activity that could indicate involvement in terrorism-related activities, but additional context is necessary to determine whether the SAR should be investigated.

Previous work validates the 16 NSI Indicators in relation to acts of terrorism. In 2015, research by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) found most precursor behaviors in terrorist attacks aligned with at least one of the NSI Indicators (Gruenewald et al., 2015). Another study found terrorist plots in the United States (U.S.) involved about two SAR behaviors on average, with attacks against critical infrastructure involving more SAR behaviors than attacks against civilians (Jensen & LaFree, 2024).

The academic evidence base is less developed regarding the applicability of NSI Indicators to acts of nonideologically motivated targeted violence. Unlike terrorism, targeted violence refers to "any incident of violence that implicates homeland security and/or DHS activities in which a knowable attacker selects a particular target prior to the violent attack," and "includes attacks that lack a clearly discernable political, ideological, or religious motivation" (DHS, 2020: i). Accordingly, nonideological targeted violence can include mass violence, school violence, or other forms of directed violence that are not driven by ideological goals (e.g., workplace violence). The Department of Homeland Security (DHS) *Strategic Framework for Countering Terrorism and Targeted Violence* asserts that terrorism and targeted violence are intersecting threats with "some alignment in the tools used to counter them" (DHS, 2019, p. 4). One such tool is SAR, as the Strategy explicitly identifies improving SAR as necessary "to facilitate [DHS] partners' ability to identify, evaluate, and report or share tips and leads associated with targeted violence" (DHS, 2019: 15).

The purpose of this report is to appraise the academic evidence connecting SAR-related behaviors to nonideological targeted violence.[18] We identified and analyzed 75 studies with relevance to this connection to address the following research questions:

1. Does the academic literature support the application of NSI Indicators to acts of nonideologically motivated targeted violence?
2. Are there additional indicators that should be considered for nonideologically motivated targeted violence?

Major Findings

Finding 1: Academic Support for NSI Indicators

1. *Expressed/Implied Threats* and *Weapons Collection/Discovery* are the most frequently studied and empirically supported NSI Indicators in relation to both terrorism and nonideological targeted violence.
2. Preliminary evidence indicates behaviors related to *Eliciting Information, Observation/Surveillance, Materials Acquisition/Storage,* and *Acquisition of Expertise* can precede nonideological targeted violence, but more research is needed to ascertain the strength of this connection.
3. Six of the seven criminal activity NSI Indicators were not examined or not supported in empirical studies on terrorism or nonideological targeted violence.

Finding 2: Applicability of NSI Indicators to Nonideological Targeted Violence

1. While certain NSI Indicators such as *Breach/Attempted Intrusion*, *Testing or Probing Security*, *Observation/Surveillance, Materials Acquisition/Storage, and Acquisition of Expertise* can precede acts of nonideological targeted violence, the behaviors associated with these indicators are often not affiliated with the typical modus operandi of nonideological targeted violence attacks.
2. *Recruiting/Financing* activities may be more applicable to terrorism cases, specifically those that involve organized terrorist groups. Nonideological offenders rarely seek to fund their attacks or recruit other participants into their plot(s).

[18] We use the terms "terrorism," "violent extremism," and "ideological targeted violence" interchangeably in this report.

Finding 3: Additional Indicators for Nonideological Targeted Violence

1. The current academic evidence base does not support the addition of new NSI Indicators to capture aspects of preoperational planning for terrorism or targeted violence plots.
2. Additional behaviors identified by prior research can either (a) be classified within existing SAR categories or (b) do not qualify as an NSI Indicator on their own.
3. NTER's *Behavioral Approach to Violence Prevention* and *Threat Assessment and Management Teams* can provide additional infrastructure that augments the SAR vetting process to increase fidelity in preventing targeted violence.

State of the Academic Evidence

The NCITE research team conducted a systematic review of the academic literature to evaluate the extent to which the empirical evidence supports the relevance of NSI Indicators as precursors to both ideological targeted violence and nonideological targeted violence. Our full review of the literature is presented in later sections of the report. In this section, we summarize the state of the evidence and highlight key considerations for policymakers.

It is critical to keep in mind when assessing validity, that validity exists on a continuum, with a range of validity types (e.g., content, construct, convergent, discriminant, ecological, face) contributing to the broad decision about the validity of a given tool or technique. More directly, academically rigorous studies that empirically link an indicator with an ultimate outcome (i.e., predictive validity) are not the only ways to provide validity evidence, and, in fact, are likely to be less useful in low-base rate areas of investigation such as terrorism. This is compounded by the fact that when threat assessment activities are used to intervene in a case, they should—by design—limit the occurrence of violent outcomes, further decreasing information relevance in assessing validity. This is not to say these tools would lack predictive validity in a higher-base rate context, but rather that predictive validity should not be viewed as the primary means of assessing the validity of NSI Indicators for ideological and nonideological targeted violence for reasons outlined above.

With this consideration in mind, our academic review comprised 75 studies that examined the link between NSI Indicators and instances of terrorism and targeted violence. In addition, given the importance of examining nonideological targeted violence, we also mapped academic evidence of concerning or threatening behaviors underlying different forms of targeted violence (e.g., school violence) to NSI Indicators.

NSI Indicators

Table 1 presents the state of the evidentiary base on NSI Indicators in general based on our review of published academic research. We denote which indicators have been examined in scholarly literature for either ideological or nonideological targeted violence, as well as which indicators lack adequate scientific exploration.

Expressed/Implied Threats and *Weapons Collection/Discovery* are the only two NSI Indicators heavily researched as preoperational indicators for both ideological and nonideological targeted violence. Studies report *Expressed/Implied Threats* frequently precede acts of terrorism, mass violence, and school violence in the form of direct threats to targets as well as communicating plans to third parties. Research also indicates that *Weapons Collection/Discovery* behaviors are common across perpetrators of terrorism and nonideological targeted violence. Scholarly research supports the applicability of multiple NSI Indicators to acts of terrorism, but less academic work has been conducted on nonideological targeted violence.

Table 1. Academic Examination of SAR Indicators Across Ideological (Terrorism and Violent Extremism) and Nonideological Targeted Violence

SAR Indicator	Terrorism/ Violent Extremism	Non-Ideological Targeted Violence
Breach/Attempted Intrusion	○	○
Misrepresentation	○	○
Theft/Loss/Diversion	○	○
Sabotage/Tampering/Vandalism	○	○
Cyberattack	○	○
Expressed/Implied Threat	●	●
Aviation Activity	○	○
Eliciting Information	◒	◒
Testing or Probing of Security	◒	○
Recruiting/Financing	●	○
Photography	○	○
Observation/Surveillence	●	◒
Materials Acquisition/Storage	●	◒
Acquisition of Expertise	●	◒
Weapons Collection/Discovery	●	●
Sector-Specific Incident	○	○

KEY: ● Strong Academic Support ○ No Academic Support ◒ Mixed Academic Support

For instance, terrorist groups often integrate *Recruiting/Financing* activities into their operational structures to support their campaigns. Research indicates nonideological attackers, on the other hand, mostly finance their plots with personal funds, and rarely attempt to recruit others into their plans.

Additionally, differences in modus operandi could help explain differences in academic support for certain NSI Indicators in application to ideological and nonideological attackers. For example, ideologically motivated attackers frequently target locations with symbolic value, while also aiming to minimize risk of apprehension (Clarke & Newman, 2007). Thus, though empirical research did not strongly support *Breach/Attempted Intrusion or Testing/Probing Security* as preoperational indicators of terrorism, the tendency for ideologically motivated actors to potentially weigh symbolic value of a target over target security supports the validity of these indicators. Further, academic research does strongly support *Observation/Surveillance, Materials Acquisition/Storage,* and *Acquisition of Expertise* as precursors to terrorism, as overcoming security measures may require additional skillsets or materials.

Alternatively, nonideological attackers, particularly public mass murderers, mostly attack locations with unrestricted access and little security measures, or "soft" targets (Silva & Greene-Colozzi, 2020). While attacks against symbolic targets may necessitate overcoming certain security measures or obtaining a specific skillset to successfully carry out the attack, attacking softer targets makes those activities unnecessary. These empirical findings may help explain why prior research was unable to support *Breach/Attempted Intrusion* or *Testing/Probing Security* as relevant preoperational indicators to nonideological mass violence, because mass violence attacks often target locations without security measures in place. Differences in target selection may also contextualize the mixed support for *Acquisition of Expertise* and *Materials Acquisition/Storage*, as mass attackers may require less advanced weaponry or skillset to carry out their attack on a target if there is little security to overcome. Additionally, perpetrators who target locations they are already familiar with are unlikely to conduct additional *Observation/Surveillance* activities. This consideration may explain why recent studies report less than 10% of school attackers surveil their target (Alathari et al., 2022), as these attackers are often current or former students at the school they are targeting.

Finally, over half of the NSI Indicators, including six of the seven criminal NSI Indicators, had limited academic examination. Most of these indicators are rarely studied, particularly in the context of nonideological targeted violence. Reported findings indicate preoperational behaviors related to *Breach/Attempted Intrusion, Misrepresentation, Theft/Loss/Diversion, Sabotage/Tampering/Vandalism, Cyberattack, Aviation Activity, Photography*, and *Sector-Specific Incident* seldom reported in terrorist or targeted violence plots.

Additional Indicators

To address our second research question, our review of the scientific literature on NSI Indicators and terrorism and targeted violence also evaluated extant research to determine if there are additional relevant behaviors indicative of preoperational planning of an attack that are not captured by existing NSI Indicators. Overall, the current academic evidence base does not support the addition of new NSI Indicators to capture aspects of preoperational planning for terrorism or targeted violence plots. The behaviors identified by prior research can either (a) be classified within existing SAR categories or (b) do not qualify as a NSI Indicator on their own.

> A wealth of research has explored the pathway to targeted violence and the relevant threatening or concerning behaviors that indicate a person may be mobilizing to violence (Meloy & Hoffman, 2021; Scalora, 2021). Threatening or concerning behaviors, or warning behaviors, indicate an accelerating risk of committing violence, primarily characterized by a change in behavior (Meloy et al., 2012). In this way, NSI Indicators and warning behaviors serve different purposes. NSI Indicators signal a terrorist or targeted violence plot may be ongoing and provide law enforcement with reasonable suspicion to fully investigate the behavior. Because warning behaviors indicate one's risk of mobilizing to violence, they often may not provide the legal clearance to qualify as an NSI Indicator.

NTER's *Behavioral Approach to Violence Prevention* presents 10 threatening or concerning behavior categories based on academic literature, NSI Indicators, and the National Counterterrorism Mobilization Indicators (NCTC, 2021). NTER developed the *Behavioral Threat Assessment and Management (BTAM)-NSI Crosswalk* to illustrate how the behavior categories identified in the *Behavioral Approach to Violence Prevention* may be mapped onto some of the NSI Indicators based on the types of behaviors that could be observed in each category. This crosswalk is presented in Table 2.[19] For example, NTER considers *Preparatory Behavior* as behavior indicating an individual is attempting to gain access or proximity to an attack site. As a result, *Preparatory Behavior* could include behaviors captured in *Breach/Attempted Intrusion*, *Misrepresentation, Eliciting Information, Testing or Probing of Security, Photography*, or *Observation/Surveillance*, depending on the nature of the behavior. Depending on the context, behaviors indicating a pronounced *Interest in Past Attacks* may be influenced by attacks of intrigue. An individual interested in specific attacks could demonstrate a fixation with a particular target or location. Other behaviors map more directly onto NSI Indicators. NTER's *Directly*

[19] The BTAM-NSI Crosswalk is an internal NTER resource provided to the NCITE Research Team for the purpose of this report.

Communicated Threat and Expressed or Implied Threat to Harm categories involve expressing a threat that indicates an individual is planning to harm themselves or others and can also include vague or non-specific threats of violence. These behaviors are exclusively captured by the *Expressed/Implied Threats* NSI Indicator, along with other forms of leakage (Meloy et al., 2012; O'Toole, 2000). NTER's *Unusual Weapons Acquisition or Expertise* directly aligns with the *Materials Acquisition/Storage*, *Acquisition of Expertise*, and *Weapons Collection/Discovery* NSI Indicators.

Table 2. NTER's BTAM NSI Crosswalk

SAR Indicator	Changes in Behavior	Preparatory Behavior	Interest in Past Attacks	Fixation	Unusual Weapons Acquisition or Expertise	Novel Violence/ Aggression	Expressed or Implied Intent to Harm	Directly Communicated Threat	End of Life Planning	Deepening Desperation/ Despair
Breach/Attempted Intrusion	○	●	○	○	○	○	○	○	○	○
Misrepresentation	○	●	○	○	○	○	○	○	○	○
Theft/Loss/Diversion	○	○	○	○	○	○	○	○	○	○
Sabotage/Tampering/Vandalism	○	○	○	○	○	○	○	○	○	○
Cyberattack	○	○	○	○	○	○	○	○	○	○
Expressed/Implied Threat	○	○	○	○	○	●	●	●	○	○
Aviation Activity	○	○	○	○	○	○	○	○	○	○
Eliciting Information	○	○	●	●	○	○	○	○	○	○
Testing or Probing of Security	○	●	○	○	○	○	○	○	○	○
Recruiting/Financing	○	○	○	○	○	○	○	○	○	○
Photography	○	○	○	○	○	○	○	○	○	○
Observation/Surveillence	○	●	○	○	○	○	○	○	○	○
Materials Acquisition/Storage	○	○	○	○	●	○	○	○	○	○
Acquisition of Expertise	○	○	○	○	●	○	○	○	○	○
Weapons Collection/Discovery	○	○	○	○	●	○	○	○	○	○
Sector-Specific Incident	○	○	○	○	○	○	○	○	○	○

KEY: ● **Related to SAR Indicator** ○ **Unrelated to SAR Indicator**

*This table is intended to serve as a reference that shows similarities in documented pre-incident behaviors associated with targeted violence and terrorism.
**The behaviors and factors identified in "NTER's Behavioral Approach to Violence Prevention" may include constitutionally protected activities and life circumstances that are experienced by many people who will never engage in violent activity. Each indicator listed may be, by itself, lawful conduct or behavior and may constitute the exercise of rights guaranteed by the U.S. Constitution.
*** It is important to note that these are only potential similarities in behavior, based on the definitions listed in NTER's Behavioral Approach to Violence Prevention and the NSI's Suspicious Activity Reporting Indicators and Behaviors. Every reported incident must be vetted individually to account for unique circumstances. Furthermore, while all the behaviors in the behavioral approach to violence prevention may be reported to and actioned by a BTAM team, the NSI's SAR Vetting Process must be followed to determine whether a particular incident should be shared as an ISE-SAR (i.e. is reasonably indicative of preoperational planning associated with terrorism).

Many behaviors in NTER's threatening and concerning behavior categories are often worrisome but cannot provide a reasonable indication a violent plot is in motion unless co-occurring with a SAR-related behavior. NSI Indicators are critically designed to capture behaviors reasonably indicative of planning for terrorism or terrorism-related criminal activities, while also balancing citizens' civil liberties and their right to freedom of speech and expression (DHS, 2022). Multiple advocacy groups such as the American Civil Liberties Union critically reviewed the criteria set forth in the ISE-SAR Functional Standard 1.5.5. to ensure citizens' civil rights are not infringed by the collection and investigation of SARs (DHS, 2022), and upholding these rights is an utmost priority of the NSI and DHS. Behaviors that are threatening or concerning, including many of those in NTER's *Behavioral Approach to Violence Prevention*, may also be constitutionally protected, and thus cannot qualify as a SAR on their own. Warning behaviors that reflect changes in attitudes, beliefs, or fascinations without indication of overt and observable planning activities cannot satisfy the legal criteria that is necessary to warrant law enforcement intervention.

NTER's behavioral categories can, however, contextualize SAR-related behavior when it is reported. For instance, if a SAR is filed, reporting someone for stockpiling weapons or training with tactical gear, identifying fixation-related behaviors could alert law enforcement to potential targets. Similarly, if someone is reported for allegedly conducting surveillance on a site, learning about recent changes in behavior such as adopting a "warrior mentality," demonstrating increasingly aggressive tendencies, or engaging in end-of-life planning may help contextualize the threat. In addition to NTER's catalogue of concerning behaviors, academic research also notes multiple aggravating factors that are pertinent to law enforcement investigations of suspicious behaviors, including mental health concerns (Alathari et al., 2023; Corner & Gill, 2016; Scalora et al., 2020), suicidal ideations (Silver et al., 2018), and holding grievances (Alathari et al., 2021; 2023; Silver et al., 2018).

These factors may indicate a heightened risk of committing targeted violence or terrorism or give guidance on which intervention tools are most appropriate. In this way, threatening and concerning behaviors and other aggravating factors can augment law enforcement's investigation of a SAR by providing additional information on the scope of the report.

Moreover, law enforcement may be notified about the potentiality of a threat but cannot enact legal interventions until behavior reasonably indicative of preoperational activities is reported. In these cases, *Threat Assessment and Management Teams* are important resources for proactive detection and intervention of threats before they require law enforcement intervention (DHS, 2021). *Threat Assessment and Management Teams* include professionals from multiple disciplines, including law enforcement, social services, mental health providers, education administrators, and many others (DHS, 2021). These teams can complement the SARs process by identifying and evaluating the threatening or concerning behaviors that characterize an individual's accelerated risk for violence that do not rise to the level of suspicion for a SAR. Intervention plans can then be designed to address the needs of the individual and reduce the threat before law enforcement intervention is necessary.

Systematic Review of the Literature

We conducted a systematic review of the literature to address the stated research questions. To complete our review, we used a multi-step approach for collecting studies to be included. First, we employed a comprehensive search protocol to identify an initial set of potentially relevant studies that had topical relevance to NSI Indicators and terrorism and targeted violence. This process involved directed searches on Google Scholar using a series of keyword phrases.[20] The initial search yielded an initial pool of 143 studies.

Next, we applied a set of discrete inclusion criteria to retain a directed focus on (1) empirical work that (2) focuses on the applicability of specific NSI Indicator(s) to terrorism and targeted violence. The inclusion criteria are as follows:

1. Studies must have topical relevance to any NSI Indicator(s) or other preoperational behaviors and acts of terrorism or nonideologically motivated targeted violence.
2. Studies must have used an empirical methodology (i.e., quantitative or qualitative) when examining the connection between any NSI Indicator(s) and acts of terrorism or nonideologically motivated targeted violence. Conceptual pieces or commentaries were not included.
3. Studies must have been published in either (a) peer-reviewed journals or (b) governmental reports. Theses, dissertations, or non-refereed articles were not included.

Each study was reviewed by at least two members of the research team to determine if all three inclusion criteria were satisfied. After applying these inclusion criteria to the initial pool of 143 studies, 75 studies met all three criteria and were included in the final sample for analysis.[21] Three members of the research team then evaluated the empirical evidence for each study in the sample.

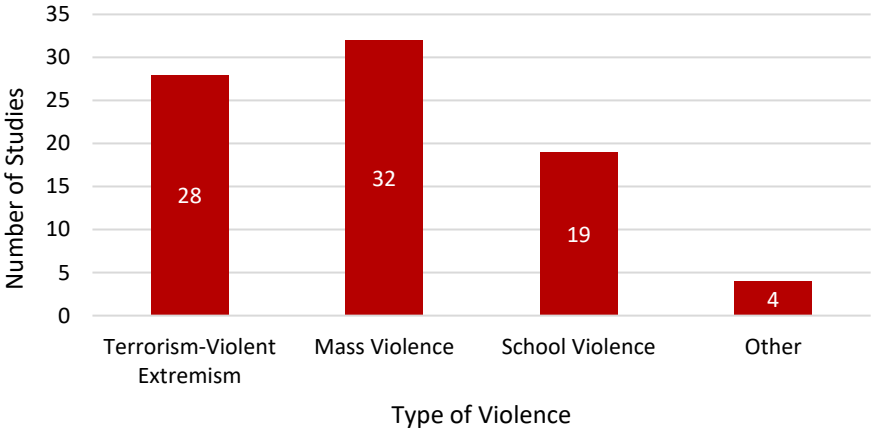
Studies in Our Review

Our systematic review of the literature revealed important insights into the evidentiary base connecting NSI Indicators and targeted violence. We begin by discussing the characteristics of the 75 studies in our review, with a focus on (1) the type of violence studies examined and (2) the methodological approaches leveraged to derive empirical evidence.

[20] See Appendix A for a full list of keyword phrases used.

[21] See Appendix B for a full list of studies included in our review.

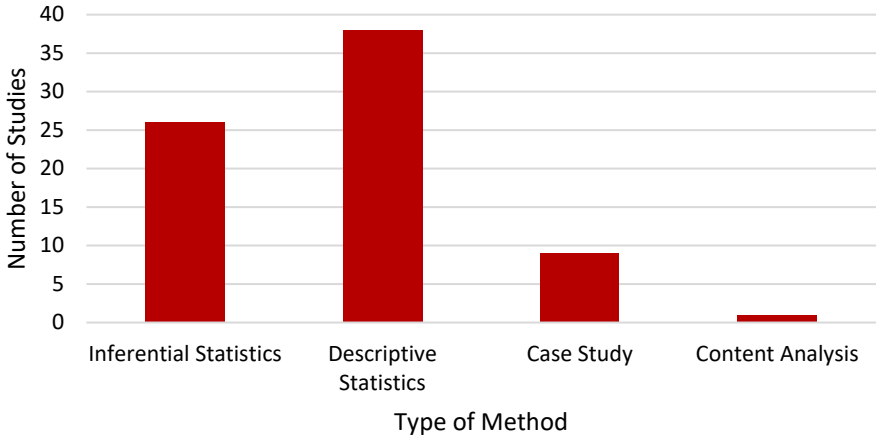
Figure 1. Type of Violence Examined



Methodological Approaches Used

A study's methodology determines the strength of empirical evidence it can provide. Figure 2 shows the methodological approach of each study in our sample. Overall, the strength of the evidence in our review can be described as preliminary but improving. Although most research in this area is limited to descriptive characterizations of data, the occasional use of inferential statistics and rich qualitative analyses improves the evidentiary base by increasing rigor and nuance. The findings reported in succeeding sections should be interpreted with this strength of evidence in mind. A more detailed discussion of the methodological approaches used in the studies that we reviewed can be found in Appendix C.

Figure 2. Type of Methodology Used

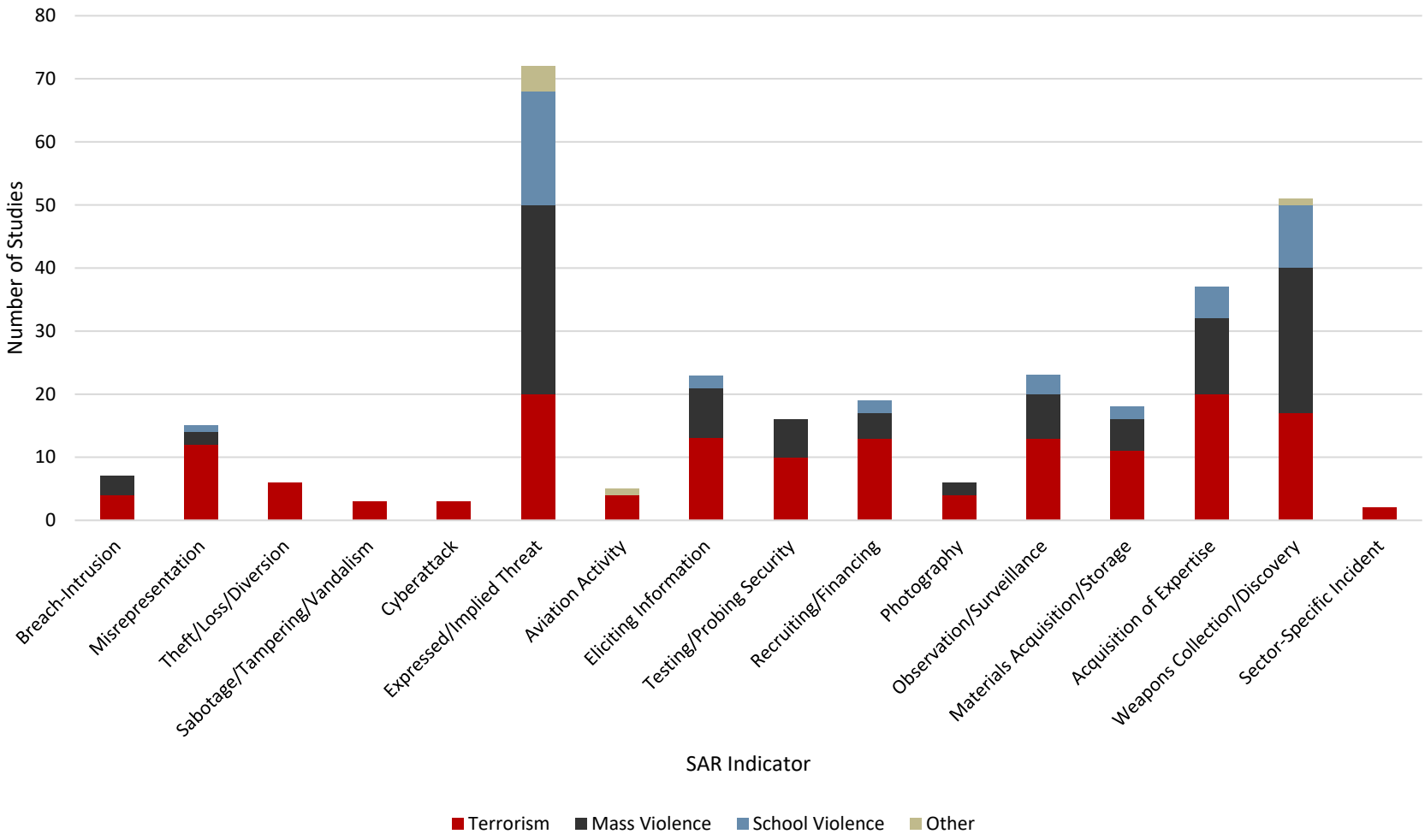


NSI INDICATORS

Of the 16 NSI Indicators, seven capture behaviors that may have a nexus to terrorism while the remaining nine capture behaviors that are potential crimes with a nexus to terrorism but require additional information to determine whether the behavior should be investigated. See Appendix D for a list of all 16 NSI Indicators and associated definitions (DHS, 2023b).

Figure 3 presents the distribution of studies across all 16 NSI Indicators and reports the proportion of studies focused on each type of violence. The following sections provide detailed discussions of the academic evidence for each NSI Indicator independently.

Figure 3. Number of Studies for Each SAR Indicator by Type of Violence



Defined Criminal Activity and Potential Terrorism Nexus Activity

Our review indicates *Expressed/Implied Threats* are widely studied behaviors across all forms of violence, establishing a significant body of evidence to inform its inclusion as an NSI Indicator. The remaining six criminal NSI Indicators are rarely studied in the empirical literature, specifically in relation to nonideologically motivated targeted violence.

Breach/Attempted Intrusion

Of the 75 studies in our review, seven examined a variable(s) that related to *Breach/Attempted Intrusion* behaviors. This NSI Indicator was only studied in relation to acts of terrorism-violent extremism and mass violence. No studies on school violence or other forms of targeted violence considered *Breach/Attempted Intrusion* behaviors. All empirical evidence in our review indicates a weak connection between *Breach/Attempted Intrusion* behaviors and acts of terrorism or mass violence. *Breach/Attempted Intrusion* behaviors rarely preceded acts of terrorism in multiple empirical assessments (Gruenewald et al., 2015; Gruenewald et al., 2019; Jensen & LaFree, 2024).

Target selection may explain the lack of support for *Breach/Attempted Intrusion* in relation to mass violence. Three studies analyzing the preparatory behaviors in three cases of mass violence found attempts to breach security never occurred, as the selected target(s) did not have any significant security systems to be breached (Allely & Faccini, 2018; Allely et al., 2024; Cowan & Lankford, 2024). As a result, *Breach/Attempted Intrusion* behaviors are inapplicable because the location of the attack was an unrestricted area. Research indicates most mass violence is perpetrated against "soft" targets, or targets with little-to-no security in place (Allely & Faccini, 2019; Allely et al., 2024; Capellan & Silva, 2019; Silva & Greene-Colozzi, 2020). Accordingly, the relevance of *Breach/Attempted Intrusion* behaviors as a preoperational indicator for mass violence is contradicted by the characteristics of locations or facilities that are most targeted in mass attacks. While these behaviors could be particularly pertinent in the context of school violence, as most schools restrict access to their facilities, no empirical study examined this connection in our review.

Misrepresentation

Fourteen studies in our review examined *Misrepresentation* behaviors such as using false names or aliases (Schuurman & Eijkman, 2015; Schuurman et al., 2018), producing false documents (Gruenewald et al., 2019; Horgan et al., 2018; Jensen & LaFree, 2024), or engaging in deceptive practices to conceal illegal or preoperational behavior (Alathari et al., 2019). Eleven of these studies assessed outcomes related to terrorism and violent extremism. Empirical evidence on this connection was mostly inconclusive, with 8 of the 11 studies producing results that neither supported nor contradicted the relevance of *Misrepresentation* behaviors as precursors to terrorist attacks.

Three studies offered additional evidence for this connection. One study found the occurrence of *Misrepresentation* behaviors decreased the likelihood a terrorist plot was interdicted by law enforcement (Gruenewald et al., 2019). The authors contextualize this finding as an artifact of restrictions on law enforcement's capacity to investigate domestic terrorism in the 1970s and 1980s and note the success

rate of incidents involving *Misrepresentation* behaviors drops substantially once fewer restrictions were imposed. Nonetheless, other studies find *Misrepresentation* behaviors are rare in samples of terrorist incidents (Clemmow & Gill et al., 2020; Scrivens, 2023).

Few studies examined *Misrepresentation* behaviors in the context of other forms of targeted violence. It may be that the behaviors indicative of *Misrepresentation* are distinct for each type of violence, linked by a common purpose of concealing potentially illegal activities. For instance, Alathari et al. (2019) found 22% of school attackers engaged in deceptive practices to avoid detection and conceal their preparatory activities. While these behaviors are not directly in-line with the definition of *Misrepresentation* presented by the NSI (DHS, 2023b), all these behaviors are committed with the purpose of deceiving an authoritative body to conceal preoperational behavior.

Theft/Loss/Diversion

Theft/Loss/Diversion activities are committed to facilitate the commission of a plotted attack against a facility by increasing access, obtaining information, or diverting focus. Few studies in our review considered *Theft/Loss/Diversion* activities as precursors of terrorism or targeted violence. Six studies examined *Theft/Loss/Diversion* behaviors in relation to terrorism and violent extremism, presenting mixed evidence overall. Specifically, several studies found that less than 5% of terrorist incidents are preceded by these behaviors (Gruenewald et al., 2015; Jensen & LaFree, 2024; Smith et al., 2016), with Gruenewald et al. (2019) offering the most generous estimate at about 10% of incidents. No study in our review examined *Theft/Loss/Diversion* behaviors in the context of nonideologically motivated targeted violence.

Sabotage/Tampering/Vandalism

Only three studies in our review considered variables related to *Sabotage/Tampering/Vandalism* activities, all of which focused on their connection to terrorism and violent extremism. Findings from these studies indicate a weak connection, with behaviors related to *Sabotage/Tampering/Vandalism* rarely preceding terrorist incidents (Gruenewald et al., 2015; Gruenwald et al., 2019; Jensen & LaFree, 2024). Once again, no study in our review evaluated these behaviors as precursors to nonideologically motivated targeted violence.

Cyberattack

Cyberattack was one of the least studied NSI Indicators in our review, with only three studies considering cyberattacks as preoperational behaviors indicative of terrorist or targeted violence plots. All three studies focused on terrorism and violent extremism, consistently finding cyberattacks seldom occur before physical acts of terrorism (Gruenewald et al., 2015; Gruenwald et al., 2019; Jensen & LaFree, 2024).

This weak evidence base may reflect the plausibility for cyberattacks to constitute acts of terrorism or "cyberterrorism," on their own (Weimann, 2005). Historically, terrorists perpetrate cyberterrorist attacks with the purpose of comprising critical infrastructure, inflicting economic losses, or disseminating their ideology through website defacements (Holt et al., 2023). In this way, cyberattacks are often their own plot, which complicates their position as a NSI Indicator that precedes physical acts of terrorism

(Gruenwald et al., 2019). However, conjoint cyber-physical attacks do happen in other countries (Curran et al., 2007; Holt et al., 2023), so it is important to retain this as an indicator based on what we know about terrorism as a phenomenon.

Expressed/Implied Threat

Threats can be communicated in a variety of ways. Some perpetrators communicate threats verbally, through written text, or in online spaces (Peterson et al., 2023; Silva & Greene-Colozzi, 2023). Threats may be communicated directly to the target, or to a third party, known as a form of "leakage" (Meloy et al., 2012; O'Toole, 2000). Across our review, *Expressed/Implied Threats* were the most frequently studied SAR-related behaviors in the empirical literature. Many studies found supportive evidence on the relevance of expressed or implied threats as a preoperational indicator to terrorism and targeted violence.

The evidence base was similarly distributed across all forms of violence in our review. Evaluations of SARs found *Expressed/Implied Threats* were the most prevalent preoperational behaviors across hundreds of terrorist plots (Gruenewald et al., 2015; Gruenewald et al., 2019; Jensen & LaFree, 2024), with other research reiterating how frequently they occur in terrorist attacks (Capellan et al., 2019; Gill et al., 2021). When expressed or implied threats are issued, terrorist plots are more likely to be interdicted by law enforcement (Gruenewald et al., 2019). Other studies reported more inconclusive evidence, finding direct threats account for a small percentage of broader leakage-related activities (Bouhana et al., 2018; Schuurman et al., 2018).

Comparable empirical evidence supports the relevance of *Expressed/Implied Threats* as precursor behaviors to acts of mass violence. Multiple studies found nearly half of mass attackers communicated their intentions to attack a target prior to the event (Alathari et al., 2023; Gibson et al., 2020; Peterson & Erickson et al., 2021), with other studies reporting estimates of up to 80% (Lankford et al., 2019). Some research offers less support, particularly when compared to ideologically motivated perpetrators. Capellan (2015) found only 27% of nonideologically active shooters communicated their plans before an attack, compared to over 60% of ideologically motivated shooters. Research also suggests target choice may influence the decision to issue a threat. Capellan and Silva (2021) found threats were significantly more likely to be communicated if the attacker targeted a nongovernmental than a governmental target. Reasons for this difference may include the security of a target and seeking to avoid alerting security systems.

Regarding school violence, multiple reports by National Threat Assessment Center (NTAC) reported most school attackers communicated their intention to attack the school (Alathari et al., 2019; 2021). Recent evidence indicates most threats are issued in online spaces such as social media or messaging platforms (Peterson et al., 2023). With that said, studies indicate school violence plots where the perpetrator communicated their plan to attack the school are significantly more likely to be averted than completed (Winch et al., 2024), reiterating the importance of heeding and investigating reported threats in school settings.

Finally, *Expressed/Implied Threats* also frequently precede other forms of targeted violence, including assassination attempts (Fein & Vosselkuil, 1999) and workplace violence (Meloy et al., 2013). Overall, the available empirical evidence supports the relevance of *Expressed/Implied Threats* as relevant preoperational activities that signal the intention to carry out an act of terrorism or targeted violence.

Aviation Activity

In our review, five studies considered *Aviation Activity* as precursors to acts of terrorism or targeted violence. Though *Aviation Activity* may precede plots that involve airplane hijacking or bombings (Clutterbuck & Warnes, 2011), these behaviors are hardly ever present in terrorism and targeted violence plots that do not involve the aviation sector (Fein & Vossekuil, 1999; Gruenewald et al., 2015; Gruenewald et al., 2019; Jensen & LaFree, 2024). This may be because most acts of targeted violence, both ideologically motivated and nonideologically motivated, do not involve airplane hijackings or bombings. Rather, firearms are overwhelmingly the weapon of choice in terrorism and targeted violence (Alathari et al., 2021; 2023; Gruenewald et al., 2013; Hamm & Spaaij, 2017). As a result, *Aviation Activity* indicates a niche category of behaviors that precede an exceptionally rare attack strategy, which limits their applicability to other forms of terrorism and targeted violence.

Potential Criminal or Noncriminal Activities Requiring Additional Information During Vetting

Our review found empirical evidence supported *Weapons Collection/Discovery* in relation to both terrorism and nonideological targeted violence. Alternatively, several indicators were supported as precursors to terrorist attacks specifically, including *Recruiting/Financing*, *Observation/Surveillance*, *Materials Acquisition/Storage*, and *Acquisition of Expertise*. Other NSI Indicators, such as *Photography* and *Sector-Specific Incidents*, garnered less support in empirical research. We review the empirical evidence for each of the noncriminal NSI Indicators in the following sections.

Eliciting Information

In our review, 21 studies considered preoperational behaviors related to *Eliciting Information* under this scope, largely in relation to acts of terrorism or mass violence. Three studies found *Eliciting Information* behaviors were relatively uncommon in terrorist plots (Gruenewald et al., 2015; Gruenewald et al., 2019; Jensen & LaFree, 2024), although these studies only assessed behaviors related to questioning personnel about a site and did not include other forms of target research, specifically online sources of information. Indeed, other studies found that, while still uncommon, lone-actor terrorists occasionally used the Internet to obtain information on a target (Lindekilde et al., 2019; Schuurman et al., 2018).

Many empirical studies focused on mass violence and school violence found more supportive evidence for information-seeking activities as preoperational behaviors. Four studies exploring cases of mass violence and school violence incidents found the perpetrators frequently researched target sites prior to their attacks, such as finding building schedules or maps of the location online or developing blueprints of the facility to familiarize themselves with the site (Cowan & Lankford, 2024; Cowan et al., 2024;

Kelly & Alexander, 2022; Schildkraut et al., 2024). When sequencing mass shooters' pre-attack behaviors, Silver and Silva (2022) found researching an attack site occurred immediately before an attack, suggesting such behavior indicates a plot in motion. While this evidence base is largely limited to case studies, it offers preliminary support for *Eliciting Information* behaviors as precursors to nonideological mass violence.

Testing or Probing of Security

Testing or Probing of Security behaviors are often committed during dry runs of attack plans that test aspects of a target's security. Of the studies in our review, 16 included variables indicating behaviors related to *Testing or Probing of Security*, with 10 studies considering these behaviors as precursors to acts of terrorism and six studies focusing on mass violence.

Most empirical studies present mixed evidence on the relevance of security probing behaviors as preoperational indicators of terrorism and violent extremism. Two studies indicate dry runs were only conducted prior to about 30% of lone-actor terrorist attacks (Bouhana et al., 2018; Gill & Corner, 2016). Additionally, Horgan et al. (2018) found that, while most members of terrorist cells do not undertake test runs, those that do are most often directly involved in committing a terrorist attack. Other studies offer less support, finding tests of security measures at a target site rarely occurred before terrorist incidents (Gruenewald et al., 2015; Gruenewald et al., 2018; Jensen & LaFree, 2024; Scrivens, 2023).

Regarding mass violence, there is similarly mixed support in the empirical literature. As discussed above, mass attackers may probe the security of a selected target prior to attacking (Cowan & Lankford, 2024), but there is often little security to be tested because of the tendency to select "softer" targets with greater access and less security systems. Two case studies in our review demonstrate this point, noting there was often minimal security to be probed in specific mass violence incidents (Allely & Faccini, 2019; Allely et al., 2024).

It may be differences in target selection that explain why mass murderers engage in testing security behaviors, particularly dry runs, less often than lone-actor terrorists (Clemmow & Gill et al., 2020; Gill et al., 2021). Terrorists often target locations based on their symbolic value (Clarke & Newman, 2006). If symbolism drives the target selection decision, overcoming target security must be factored into attack planning. For mass murderers, they often factor target security into their target selection process (Allely et al., 2024), aiming to maximize casualties in their attack while minimizing risk of being apprehended (Silva & Greene-Colozzi, 2020; Cappellan et al., 2019). Thus, *Testing or Probing of Security* behaviors may be less relevant for nonideologically motivated targeted violence because there is typically limited security to test at a selected site.

Recruiting/Financing

Terrorist *Recruiting/Financing* is a highly important issue that a wealth of research has directed attention towards (Clutterbuck & Warnes, 2011; Gill et & Corner al., 2017; Lindekilde et al., 2019). Less empirical attention has been directed towards financing and recruiting activities as precursors to nonideologically motivated targeted violence plots. This disparity is reflected in our review, as 13 of the 19 studies considered financing and recruiting behaviors as preoperational activities focused on acts of terrorism and violent extremism.

Most studies support the connection between *Recruiting/Financing* behaviors and terrorism. Gruenewald et al. (2019) found *Recruiting/Financing* activities were the fourth most prevalent NSI Indicator in a sample of terrorist plots from the American Terrorism Study (ATS), and plots with these activities were more likely to be thwarted. Gill et al. (2014) similarly found lone-actor terrorists who attempted to recruit others were more likely to be unsuccessful in their attacks than those that did not attempt to bring others into the plot.

Although Gruenewald et al. (2015) found *Recruiting/Financing* behaviors accounted for a small portion of SAR behaviors observed across terrorist plots, other studies report a high prevalence of *Recruiting/Financing* behaviors (Jensen & LaFree, 2024), with terrorists often using the Internet to carry out these activities (Gill & Corner et al., 2017). However, it is important to note that some members of terrorist groups or cells may only be involved in *Recruiting/Financing* activities (i.e., material support). Horgan et al. (2018) describe these individuals as "supporters" and "facilitators," who contribute to a terrorist group's operations through various activities including securing funds, providing resources, and recruiting new members. These persons, who are frequently involved in *Recruiting/Financing* activities, may have little to no knowledge of ongoing terrorist plots.

The few studies focused on mass violence and school violence offered less conclusive evidence. Several case studies of mass violence indicate some perpetrators consider how to finance their attacks and often use their own funds to do so (Allely & Faccini, 2019; Allely et al., 2024; Slemaker, 2023), but additional evidence is needed to determine how often this occurs. In terms of recruiting, Clemmow & Gill et al. (2020) found mass murderers were seldom connected to a wider network, thus unlikely to attempt to bring others into their plot. Related to school violence, Cowan et al. (2022) noted some school shooters sought to recruit peers to participate in their plotted attack, although these instances are relatively uncommon (Alathari et al., 2019).

Photography

Studies in our review rarely assessed *Photography* as a preoperational indicator of terrorism or targeted violence. Four studies examined *Photography* within the context of terrorist plots, with results from all four studies indicating a weak connection. Specifically, these studies found suspicious photo taking rarely occurred prior in terrorist plots (Gruenewald et al., 2015; Gruenewald et al., 2019; Horgan et al., 2018; Jensen & LaFree, 2024). However, given the sensitive nature of data associated with thwarted investigations, it may be that those who engaged in such overt behavior were thwarted prior to conducting an attack, rendering data projects that rely upon open-source data such as those found at the START Center less instructive.

Regarding mass violence, Allely et al., (2024) offered supportive evidence for *Photography* as a NSI Indicator, detailing the process by which the perpetrator of the Christchurch Mosque mass shooting utilized a drone to take pictures and videos of the mosques in the area to identify potential targets. It is possible the lack of empirical evidence on *Photography* behaviors is symptomatic of its overlap with other NSI Indicators, as some studies position photography as a mode of collecting information on a target (Alathari et al., 2023) or conducting surveillance.

Observation/Surveillance

Plotters may conduct *Observation/Surveillance* on multiple targets to identify softer targets (Gill et al., 2018), or on a selected target to tailor attack plans based on target characteristics (Clutterbuck & Warnes, 2011). Twenty-one studies in our review examined behaviors related to *Observation/Surveillance* of potential targets as an indicator of attack planning for terrorist and targeted violence attacks. These behaviors are estimated to occur in about 20–30% of terrorist plots (Gruenewald et al., 2019; Horgan et al., 2018; Jensen & LaFree, 2024), although estimates range from below 15% (Capellan, 2015) to more than 40% (Lindekilde et al., 2019; Schuurman et al., 2018). Gruenewald et al. (2019) also found plots involving *Observation/Surveillance* behaviors were more likely to be thwarted by law enforcement.

Related to mass violence, multiple case studies of mass violence attacks found perpetrators conducted *Observation/Surveillance* activities in the preoperational planning phase of their attacks (Allely & Faccini, 2019; Allely et al., 2024; Cowan & Lankford, 2024). However, other research suggests surveillance is more common in terrorist attacks than nonideologically motivated mass violence (Capellan, 2019; Capellan et al., 2019). Reported estimates indicate less than 8% of mass attackers conduct surveillance prior to their attack (Capellan, 2019; Capellan & Silva, 2019), with even lower estimates for perpetrators of school violence (Capellan et al., 2019). Because perpetrators of school violence are typically current or former students of the targeted location, the attackers are familiar with the layout, schedule, and various security operations of the school, rendering most *Observation/Surveillance* activities unnecessary (Alathari et al., 2019; 2021).

Materials Acquisition/Storage

In our review, 19 studies provided empirical evidence on the connection between *Materials Acquisition/Storage* related to suspicious materials and acts of terrorism or targeted violence. Smith et al., (2016) found that *Materials Acquisition/Storage* accounted for 32% of the observed preparatory behaviors in a sample of terrorist plots, with other studies reporting similar results (Gruenewald et al., 2015). These findings may reflect the visibility that accompanies acquiring suspicious materials, as these activities may be less discrete than other NSI Indicators. Although *Materials Acquisition/Storage* activities are one of the most common NSI Indicators in terrorist plots (Jensen & LaFree, 2024), there is no evidence that their occurrence increases the chances a plot is thwarted by law enforcement (Gruenewald et al., 2019). Additionally, about 30% of members of terrorist cell attempted to obtain materials for an attack (Horgan et al., 2018). These members mostly supported and facilitated terrorist attacks but were typically not involved in the carrying out the plot themselves. Thus, the applicability of *Materials Acquisition/Storage* may depend on the modus operandi of a plotted attack and the individuals' role in the plot.

Alternatively, limited studies connected *Materials Acquisition/Storage* behaviors to mass and school violence. The reason for this paucity may be that the NSI definition for *Materials Acquisition/Storage* almost exclusively relates to materials that are used in explosive devices (e.g. pagers, chemicals, triggering devices), but these materials do not represent the materials used in the current threat environment for nonideological targeted violence. For example, three case study analyses found

acquiring materials such as protective or body armor, military gear, electronic devices, and other materials often preceded mass violence plots (Allely et al., 2024; Cowan & Lankford, 2024; Meloy et al., 2015). Less support was found in the context of school violence, with Alathari et al. (2021) reporting only 7% of school attackers acquired gear other than firearms for their attacks. Silva et al. (2023) did find behaviors related to *Materials Acquisition/Storage* immediately preceded the commission of an attack, often following acquiring and training with firearms. These findings indicate school violence plots that involve these behaviors may present an imminent threat, as this may be the final stage in the planning process for these plots.

Acquisition of Expertise

Acquiring Expertise may indicate an individual is seeking to increase their capacity to successfully carry out a plotted attack. In some studies, *Acquiring Expertise* was indicated by attendance at in-person trainings, whereas other attackers sought to acquire expertise by learning about specific tactics virtually. Of the studies in our review, 37 included a variable related to *Acquiring Expertise* in a terrorism or targeted violence plot.

Most of the empirical evidence on *Acquiring Expertise* behaviors in relation to acts of terrorism and violent extremism supports the connection. Gill and Corner et al., (2017) found these activities were conducted in about 80% of right-wing extremist attacks as a preoperational behavior. Various forms of learning were used to acquire expertise, including in-person firearm and explosive training, and viewing online bomb-making instruction videos and training manuals. However, other studies estimate closer to 30–40% of terrorists engage in *Acquiring Expertise* activities prior to an attack (Bouhana et al., 2018; Clemmow & Gill et al., 2020; Schuurman et al., 2018). While these estimates are less supportive, several studies suggest ideologically motivated attackers were more likely to engage in training than nonideologically motivated attackers (Capellan, 2015; Capellan et al., 2019; Osborne & Capellan, 2017).

The empirical evidence was mixed for studies focused on mass violence and school violence. Three case study analyses found *Acquiring Expertise*, mostly through firearm or combat training, was a key part of the planning process for mass violence attacks (Allely et al., 2024; Kelly & Alexander, 2022; Meloy et al., 2015). However, Greene-Colozzi & Silva (2022) found only about 15% of mass attackers trained before their attack, with similar estimates found for school attackers (Alathari et al., 2019; 2021). These disparate findings may reflect how target selection influences the need for an attacker to acquire additional expertise. Capellan and Silva (2021) found public mass public shooters who target government institutions or individuals were significantly more likely to train or practice prior to the attack, likely due to the higher level of security at a governmental facility (Capellan & Silva, 2019). Similarly, findings from Gill and Corner's (2016) study indicate lone-actor terrorists learn through online sources more frequently when targeting high-value targets than general targets. In this way, the characteristics of the selected target determine whether an attacker needs to train for an attack.

Weapons Collection/Discovery

Studies in our review frequently validated *Weapons Collection/Discovery* as a relevant indicator of attack planning for both ideologically motivated and nonideologically motivated targeted violence. Six studies found *Weapons Collection/Discovery* behaviors such as weapons or firearms acquisition, access and stockpiling weapons, and having others procure weapons were important preparatory activities in terrorist events (Bouhana et al., 2018; Capellan, 2015; Clemmow & Schumann et al., 2020; Gruenewald et al., 2015; Kelly & Alexander, 2022; Lindekilde et al., 2019; Schuurman & Eijkman, 2015). Findings from other research was less clear (Clutterback & Warnes, 2011; Smith et al. 2016). For example, Jensen and LaFree's (2024) evaluation found *Weapons Collection/Discovery* activities were observed in only about 31% of terrorist plots. Gruenewald et al. (2019) reported these activities were present in 60 out of 333 (18%) terrorist plots, and occurrence of these behaviors were unrelated to whether the attack was thwarted or not.

Regarding mass violence and school violence, much of the evidentiary base includes case studies of mass violence incidents detailing the process by which mass attackers obtained weapons for their attacks (Allely & Faccini, 2019; Allely et al., 2024; Cowan & Lankford, 2024; Kelly & Alexander, 2022; Meloy et al., 2015; Schildkraut et al., 2024). While these studies are instructive, there is limited empirical evidence considering how frequently *Weapons Collection/Discovery* behaviors precede mass and school violence attacks. Greene-Colozzi and Silva (2022) found that 31% of mass attackers obtained weapons prior to their attack, with research on school shooting indicating closer to 70 to 85% of school shooters acquired a firearm for their attack (Alathari et al., 2019; 2021).

Multiple studies have, however, compared acts of terrorism and nonideological targeted violence (Capellan, 2015; Capellan et al., 2019; Capellan & Silva, 2019; Clemmow & Gill et al., 2020; Gill et al., 2021; Kelly & Alexander, 2022). While Gill et al.'s (2021) study found 52% of lone-actor terrorists stockpile weapons compared to 32% of mass murderers, most findings from these studies indicate behaviors were similarly prevalent across both forms of violence, (Capellan, 2015; Capellan & Silva, 2019; Kelly & Alexander, 2022). Clemmow and Gill et al. (2020) also found lone actors and mass murderers were equally likely to be designated as "equipped," or having a stockpile of weapons (p. 567). Capellan et al. (2019) revealed the largest discrepancy, finding nearly 80% of school shooters acquire firearms before an attack, compared to 51% of ideological mass shooters and about 30% of other forms of targeted violence. Ultimately, the empirical evidence in this area supports the relevance of *Weapons Collection/Discovery* behaviors as an NSI Indicator for terrorism and targeted violence but suggests certain actors may be more inclined to acquire weapons than others.

Importantly, there is also limited empirical evidence on how weapons are typically acquired for terrorist plots. Research reiterates the frequency in which attackers purchase their firearms legally (Kelly & Alexander, 2022; Lankford et al., 2019). Other estimates indicate firearms are acquired illegally in about 30% of ideologically motivated mass shootings (Silva, 2023). More evidence is available on how mass and school attackers obtain their weapons, with multiple studies investigating modes of acquisition for these perpetrators. Research indicates most school attackers acquire weapons for their attack from their homes, particularly when the weapons are unsecured and accessible (Alathari et al., 2019; 2021).

Mass attackers, alternatively, often purchase firearms legally (Kelly & Alexander, 2022; Slemaker, 2023). It is also possible attackers already own weapons prior to planning their attack, meaning they do not have to go out of their way to acquire them. While access to weapons does not warrant a SAR, it could be an aggravating factor when co-occurring with other NSI Indicators.

Sector-Specific Incident

Sector-Specific Incidents were rarely studied as preoperational behaviors to acts of terrorism or targeted violence. Only two studies in our review examined variables indicating *Sector-Specific Incidents*, all of which focused on their connection to terrorism and violent extremist activities (Gruenewald et al., 2019; Jensen & LaFree, 2024). Despite examining hundreds of terrorist plots in the United States, both studies found no plot was preceded by a *Sector-Specific Incident*.

Review Summary

Our review of the literature connecting SAR-related behaviors to terrorism and targeted violence offers useful insight into the strength of existing empirical evidence in this area and the shortcomings in our knowledge base. In this section, we report the potential limitations of our review and summarize the key takeaways that emerged from our assessment of the literature.

Potential Limitations

We made extensive efforts to bolster the rigor of this systematic review of the literature. However, there are key limitations to our process which should be considered when interpreting our results. First, while our protocol for identifying relevant empirical research was comprehensive, it is possible other relevant studies exist that were not captured. The keywords we used to identify studies in Google Scholar were extensive, but if articles did not include those keywords in their text, they were not returned as possible results and thus not included in our sample of studies. Additionally, our inclusion criteria were strict. By limiting our results to published empirical research, we ensured each study in the sample contributed empirical evidence to this area of work. However, in doing so, we also excluded many commentaries and conceptual pieces relevant to our review. While these articles cannot provide empirical evidence per se, they can offer thoughtful discussions on the issues pertinent to the field.

Second, empirical scholarly research on NSI Indicators relies on openly available data. Many studies in our review utilized open-source data, relying on information that is publicly reported and accessible. Yet, it is possible that these NSI Indicators are found with greater prevalence in classified or other publicly unavailable data. Research using closed-source data from law enforcement agencies or fusion centers, especially data on filed SAR reports specifically, could provide instructive evidence on the frequency and utility of specific indicators in the SARs process.

Finally, across our review, most NSI Indicators have few studies connecting them to terrorism and targeted violence. Though some studies have examined these linkages, more evidence is needed to ascertain the probabilistic relationship between these preoperational behaviors and acts of terrorism and targeted violence. For example, fewer than five studies examined mass violence outcomes for half of the 16 NSI Indicators. Empirical evidence for school violence was scarcer, with fewer than five studies identified for 14 NSI Indicator categories, eight of which were never studied for this form of violence. Terrorism was the only form of violence examined across all 16 NSI Indicators, owing to the numerous evaluations of SAR-related behaviors in terrorist plots (Gruenewald et al., 2015; Gruenewald et al., 2019; Jensen & LaFree, 2024; Smith et al., 2016), but still included less than five studies for six SAR categories.

In addition to the limited number of studies connecting each NSI Indicator to each form of violence, the strength of the existing empirical evidence remains preliminary. Most studies in our review used descriptive analyses that focus on characteristics of data but cannot speak to the acute connections that exist. Additionally, several studies focused on mass violence incidents employed case studies which, while useful for understanding the context of certain behaviors, provide a narrow scope for generalizing to other instances of targeted violence. There was a substantial portion of studies employing inferential statistical analyses or rich qualitative assessments, which offered instructive insights into SAR-related behaviors and their connection to terrorism and targeted violence. However, more research using advanced methodologies is needed to enhance the quantity and quality of the existing evidence base in this area.

Key Findings

Three key findings emerged from our review which represent the current state of the literature on SARs and terrorism and targeted violence. We describe each finding and its relevance to the broader field of counterterrorism research and practice.

Finding #1: Academic Support for NSI Indicators

Several NSI Indicators garnered empirical support in our review. *Expressed/Implied Threats* was the only criminal NSI Indicator to be supported by empirical research across all forms of terrorism and nonideological targeted violence. Specifically, many studies in our review found threats communicated either directly to a target or to a third party often precede acts of terrorism, mass violence, school violence, and other forms of targeted violence. Accordingly, the academic evidence strongly supports the inclusion of *Expressed/Implied Threats* as relevant preoperational indicators of terrorism and nonideological targeted violence.

Additionally, *Weapons Collection/Discovery* behaviors were supported as preoperational indicators for all forms of terrorism and nonideological targeted violence. However, the extent to which these behaviors occur may be affected by someone's pre-existing access to weapons. In some cases, people could already own weapons prior to hatching their violent plot, and thus acquiring or collecting weapons may not be a necessary preparatory activity. Nonetheless, multiple studies support the inclusion of *Weapons Collection/Discovery* as a NSI Indicator, as such behaviors could indicate a person is preparing to carry out a violent attack.

Academic research on other NSI Indicators offered evidence supporting their nexus to terrorism, but findings were less clear in relation to forms of nonideological targeted violence. Several studies indicated behaviors related to *Eliciting Information*, *Observation/Surveillance*, *Materials Acquisition/Storage*, and *Acquisition of Expertise* were relevant preoperational activities for acts of terrorism. However, much of the evidence for these indicators in the context of nonideological targeted violence was limited to singular case studies and could not offer strong empirical support. More research on precursors to nonideological targeted violence is needed to better inform policy decisions about these indicators.

Finding #2: Applicability Concerns for NSI Indicators and Nonideologically Motivated Targeted Violence

Overall, our review of the literature indicates similar evidence bases for most NSI Indicators across both terrorism and nonideologically motivated targeted violence outcomes. However, our review did suggest certain NSI Indicators were more relevant to acts of terrorism than nonideologically motivated targeted violence. Specifically, terrorist groups and cells may engage in *Recruiting/Financing* activities more than nonideologically motivated targeted violence. Terrorist attacks are often carried out by groups, whereas mass violence and school violence are typically plotted by a single individual. While many domestic violent extremist attacks in the United States are carried out by lone actors rather than groups (Kenyon et al., 2023), studies show that even lone-actor terrorists are more connected to wider ideological networks than mass murderers (Clemmow & Gill et al., 2020). Thus, terrorist groups often establish processes for financing their operations and recruiting members to join (Horgan et al., 2018; Schuurman & Eijkman, 2015). Perpetrators of nonideological targeted violence occasionally finance their attacks from their own funds (Allely & Faccini, 2019; Allely et al., 2024; Slemaker, 2023), and seldom attempt to bring other people into the plot (Alathari et al., 2021; Cowan et al., 2022). As such, *Recruiting/Financing* activities may be less applicable to other forms of targeted violence besides terrorism.

Similarly, whereas terrorists often select targets based on symbolic value (Clarke & Newman, 2006), mass attackers commonly select targets with less security and unrestricted access to maximize the number of casualties (Silva & Greene-Colozzi, 2020). While terrorists do factor the security of a target into their decision-making (Clarke & Newman, 2006), it may be secondary to the symbolism of the location. Thus, NSI Indicators like *Breach/Attempted Intrusion and Testing* or *Probing of Security* may be less relevant to mass violence plots because perpetrators frequently seek to avoid targets with restricted access or security systems.

Moreover, school violence is unique in that most perpetrators are current or former students at the school, so *Observation/Surveillance* behaviors can be unnecessary because perpetrators are already familiar with the location. This may also be the case for perpetrators of workplace violence. While some attackers may conduct surveillance, their familiarity with the facility obviates this requirement in their planning process.

To be clear, we are not suggesting nonideologically motivated targeted violence plots cannot involve these NSI Indicators. Instead, we are highlighting the empirical research that identifies potential differences between terrorist plots and nonideological targeted violence that could render some NSI Indicators less applicable than others.

Finding #3: Additional Indicators for Nonideological Targeted Violence

As described in earlier sections, the academic literature does not support the addition of new NSI Indicators. Behaviors identified as threatening or concerning in prior research are either captured in existing SAR categories or do not qualify as a SAR on their own. SARs must reflect preoperational behavior that is reasonably indicative of terrorism or terrorist-related criminal activity is being committed. This threshold is necessary for safeguarding the civil rights and liberties of the American public. Some warning behaviors that signal a heightened risk for terrorism or targeted violence meet the criteria of a SAR, but many are constitutionally protected behaviors that are not reasonably indicative of preoperational activities on their own.

With that said, the SARs process can be complemented by other threat assessment infrastructure to capture concerning behaviors not accounted for in the existing NSI Indicator catalogue. The NTER *Behavioral Approach to Violence Prevention* can augment the SARs process by highlighting additional behaviors that may indicate an accelerating or imminent threat but do not qualify as a SAR on their own. Threat assessment and management teams can also improve prevention efforts by detecting and intervening with individuals that are potentially mobilizing towards violence before law enforcement intervention is required.

Conclusion

The purpose of this report was to review and appraise the existing empirical evidence on NSI Indicators and their relevance to acts of terrorism and targeted violence. Our findings indicate several NSI Indicators are supported by the available evidence, but more empirical research on the entire slate of NSI Indicators is needed to validate their relevance to nonideological targeted violence. Enhancing the quality of evidence, in addition to the quantity of evidence, is a necessary step to building a stronger evidentiary base. Policymakers, practitioners, and researchers alike should view this review as a checkpoint to establish a collective understanding of where we are, where we need to be, and how we can effectively get there.

References

Alathari, L., Drysdale, D., Driscoll, S., Blair, A., Mauldin, D., Carlock, A., McGarry, J., Cotkin, A., Nemet, J., Johnston, B., & Vineyard, N. (2021). Averting targeted school violence: A U.S. Secret Service analysis of plots against schools. U.S. Secret Service (USSS) – National Threat Assessment Center (NTAC). https://www.secretservice.gov/newsroom/reports/threat-assessments/schoolcampus-attacks/details-0

Alathari, L., Drysdale, D., Driscoll, S., Blair, A., Mauldin, D., Carlock, A., McGarry, J., Cotkin, A., Nemet, J., Johnston, B., Vineyard, N., Foley, C., & Bullwinkel, J. (2019*).* Protecting America's schools: A U.S. Secret Service analysis of targeted school violence. U.S. Secret Service (USSS) – National Threat Assessment Center (NTAC). https://www.secretservice.gov/sites/default/files/2020-04/Protecting_Americas_Schools.pdf

Alathari, L., Drysdale, D., Driscoll, S., Carlock, A., & Cutler, M. (2023). Mass attacks in public spaces: 2016–2020. U.S. Secret Service (USSS) – National Threat Assessment Center (NTAC). https://www.secretservice.gov/sites/default/files/reports/2023-01/usss-ntac-maps-2016- 2020.pdf

Allely, C. S., & Faccini, L. (2019). Clinical profile, risk, and critical factors and the application of the "Path toward intended violence" model in the case of mass shooter Dylann Roof. *Deviant Behavior*. *40*(6), 672–689. https://doi.org/10.1080/01639625.2018.1437653

Allely, C. S., Wicks, S. J., & McLaren, S. A. (2024). The application of the path to intended violence model and the TRAP-18 in the case of the Christchurch Mosque shooter. *Journal of Threat Assessment and Management. 11*(1), 32–47. https://doi.org/10.1037/tam0000211

Almond, M. F. E., Nicholls, T. L., Petersen, K. L., Seto, M. C., & Crocker, A. G. (2023). Exploring the nature and prevalence of targeted violence perpetrated by persons found not criminally responsible on account of mental disorder. *Behavioral Sciences & the Law*. *41*(2–3), 124-140. https://doi.org/10.1002/bsl.2626

Bouhana, N., Corner, E., Gill, P., & Schuurman, B. (2018). Background and preparatory behaviours of right-wing extremist lone actors: A comparative study. *Perspectives on Terrorism*. *12*(6), 50–163. https://www.jstor.org/stable/26544649

Capellan, J. A. (2015). Lone wolf terrorist or deranged shooter? A study of ideological active shooter events in the United States, 1970–2014. *Studies in Conflict & Terrorism*. *38*(6), 395–413. https://doi.org/10.1080/1057610X.2015.1008341

Capellan, J. A., Johnson, J., Porter, J. R., & Martin, C. (2019). Disaggregating mass public shootings: A comparative analysis of disgruntled employee, school, ideologically motivated, and rampage shooters. *Journal of Forensic Sciences*. *64*(3), 814–823.

Capellan, J. A., & Silva, J. R. (2019). An investigation of mass public shooting attacks against government targets in the United States. *Studies in Conflict & Terrorism*. *44*(5), 387–409. https://doi.org/10.1080/1057610X.2018.1551294

Clarke, R. V., & Newman, G. R. (2006). *Outsmarting the terrorists.* Portsmouth, NH: Greenwood Publishing Group.

Clemmow, C., Gill, P., Bouhana, N., Silver, J., & Horgan, J. (2020, February 19). Disaggregating lone-actor grievance-fueled violence: Comparing lone-actor terrorists and mass murderers. *Terrorism and Political Violence*. *34*(3), 558–584. https://doi.org/10.1080/09546553.2020.1718661

Clemmow, C., Schumann, S., Salman, N. L., & Gill, P. (2020, May). The Base Rate Study: Developing base rates for risk factors and indicators for engagement in violent extremism. *Journal of Forensic Science*. *65*(3), 865–881. https://doi.org/10.1111/1556-4029.14282

Clutterbuck, L., & Warnes, R. (2011). Exploring patterns of behavior in violent Jihadist terrorists: An analysis of six significant terrorist conspiracies in the U.K. RAND Corporation – Europe. https://www.rand.org/content/dam/rand/pubs/technical_reports/2011/RAND_TR923.pdf

Corner, E., & Gill, P. (2015). A false dichotomy? Mental illness and lone-actor terrorism. *Law and Human Behavior*. *39*(1), 23–34. https://doi.org/10.1037/lhb0000102

Cowan, R. G., & Lankford, A. (2024). The Virginia Beach municipal center mass shooting: A retrospective threat assessment using the WAVR-21. *Journal of Threat Assessment and Management*. *11*(2), 83–105. https://doi.org/10.1037/tam0000203

Cowan, R. G., Tedeschi, P. J., Corbin, M., & Cole, R. F. (2022, April). A mixed-methods analysis of averted mass violence in schools: Implications for professional school counselors. *Psychology in the Schools*. *59*(4), 817–831. https://doi.org/10.1002/pits.22647

Curran, K., Concannon, K., & McKeever, S. (2007). Cyber terrorism attacks. In IBI-Global, *Cyber Warfare & Cyber Terrorism*. Chapter 1, 1–8.

Domestic terrorism: Definitions, terminology, and methodology. (2020, November). Federal Bureau of Investigation (FBI) & Department of Homeland Security (DHS). U.S. Department of Justice (DOJ) – Office of the Director of National Intelligence (ODNI). https://www.fbi.gov/file-repository/fbi-dhs-domestic-terrorism-definitions-terminology-methodology.pdf/view

Strategic Intelligence Assessment and Data on Domestic Terrorism (2022, November). Federal Bureau of Investigation (FBI) & Department of Homeland Security (DHS). Office of the Director of National Intelligence (ODNI). https://www.fbi.gov/file-repository/fbi-dhs-domestic-terrorism- strategic-report-2022.pdf/view

Fein, R. A., & Vossekuil, B. (1999, March). Assassination in the United States: An operational study of recent assassins, attackers, and near-lethal approachers. *Journal of Forensic Sciences. 44*(2), 320–333. https://www.secretservice.gov/sites/default/files/2020-04/ecsp1.pdf

Flyvbjerg, B. (2006, April). Five misunderstandings about case-study research. *Qualitative inquiry*, *12*(2), 219–245. https://doi.org/10.1177/1077800405284363

Freilich, J. D., Chermak, S. M., Connell, N. M., Klein, B., & Greene-Colozzi, E. (2021, August). Understanding the causes of school violence using open-source data. National Institute of Justice (NIJ). https://www.ojp.gov/pdffiles1/nij/grants/301665.pdf

Geck, C. M., Grimbos, T., Siu, M., Klassen, P. E., & Seto, M. C. (2017). Violence at work: An examination of aggressive, violent, and repeatedly violent employees. *Journal of Threat Assessment and Management*. *4*(4), 210–229. https://doi.org/10.1037/tam0000091

Gerard, F. J., Whitfield, K. C., Porter, L. E., & Browne, K. D. (2016, March 25). Offender and offence characteristics of school shooting incidents. *Journal of Investigative Psychology and Offender Profiling*. *13*(1), 22–38. https://doi.org/10.1002/jip.1439

Gibson, K. A., Craun, S. W., Ford, A. G., Solik, K., & Silver, J. (2020). Possible attackers? A comparison between the behaviors and stressors of persons of concern and active shooters. *Journal of Threat Assessment and Management*. *7(*1–2), 1–12. https://doi.org/10.1037/tam0000147

Gill, P., & Corner, E. (2016). Lone-actor terrorist target choice. *Behavioral Sciences & the Law*. *34*(5), 693–705. https://doi.org/10.1002/bsl.2268

Gill, P., Corner, E., Conway, M., Thornton, A., Bloom, M., & Horgan, J. (2017). Terrorist use of the Internet by the numbers: Quantifying behaviors, patterns, and processes. *Criminology & Public Policy*. *16*(1), 99–117. https://doi.org/10.1111/1745-9133.12249

Gill, P., Horgan, J., & Deckert, P. (2013, December 6). Bombing alone: Tracing the motivations and antecedent behaviors of lone-actor terrorists. *Journal of Forensic Sciences*. *59*(2), 425–435. https://doi.org/10.1111/1556-4029.12312

Gill, P., Marchment, Z., Corner, E., & Bouhana, N. (2018, February 18). Terrorist decision making in the context of risk, attack planning, and attack commission. *Studies in Conflict & Terrorism*. *43*(2),145–160. https://doi.org/10.1080/1057610X.2018.1445501

Gill, P., Silver, J., Horgan, J., & Corner, E. (2016). Shooting alone: The pre-attack experiences and behaviors of U.S. solo mass murderers. *Journal of Forensic Sciences*. *62*(3), 710–714. https://doi.org/10.1111/1556-4029.13330

Gill, P., Silver, J., Horgan, J., Corner, E., & Bouhana, N. (2021, July 13). Similar crimes, similar behaviors? Comparing lone-actor terrorists and public mass murderers. *Journal of Forensic Sciences*. *66*(5), 1797–1804. https://doi.org/10.1111/1556-4029.14793

Greene-Colozzi, E. A., & Silva, J. R. (2022, May 31). Mass outcome or mass intent? A proposal for an intent-focused, no-minimum casualty count definition of public mass shooting incidents. *Journal of Mass Violence Research*. *1*(2), 27–41. https://doi.org/10.53076/JMVR63403

Gruenewald, J., Chermak, S., & Freilich, J. D. (2013). Distinguishing "loner" attacks from other domestic extremist violence: A comparison of far-right homicide incident and offender characteristics. *Criminology & Public Policy*, *12*(1), 65–91.

Gruenewald, J., Klein, B. R., Drawve, G., Smith, B. L., & Ratcliff, K. (2019). Suspicious preoperational activities and law enforcement interdiction of terrorist plots. *Policing: An International Journal*. *42*(1), 89–107. https://emeraldinsight.com/1363-951X.htm

Gruenewald, J., Parkin, W. S., Smith, B. L., Chermak, S. M., Freilich, J. D., Roberts, P., & Klein, B. (2015). Validation of the nationwide Suspicious Activity Reporting (SAR) Initiative: Identifying suspicious activities from the Extremist Crime Database (ECDB) and the American Terrorism Study (ATS). A report to the U.S. Department of Homeland Security (DHS) Science & Technology (S&T) Division from the National Consortium for the Study

of Terrorism and Responses to Terrorism (START). https://www.start.umd.edu/sites/default/files/publications/local_attachments/START_Validation ofNationwideSARInitiative_Feb2015.pdf

Hamm, M. S., & Spaaij, R. (2017). The age of lone wolf terrorism. Columbia University Press.

Holt, T. J., Chermak, S. M., Freilich, J. D., Turner, N., & Greene-Colozzi, E. (2023). Introducing and exploring the Extremist Cybercrime Database (ECCD). *Crime & Delinquency*. *69*(12), 2411–2436. https://doi.org/10.1177/00111287221083899

Horgan, J., Shortland, N., & Abbasciano, S. (2018). Towards a typology of terrorism involvement: A behavioral differentiation of violent extremist offenders. *Journal of Threat Assessment and Management*. *5*(2), 84–102. https://doi.org/10.1037/tam0000102

Jensen, M., & LaFree, G. (2024, January). The mobilization puzzle: How individual, group, and situational dynamics produce extremist outcomes. National Institute of Justice (NIJ). https://www.ojp.gov/pdffiles1/nij/grants/308549.pdf

Kane, R. A., Lopez, B. E., & Haskins, P. A. (2023). Public mass shootings research. National Institute of Justice (NIJ). https://nij.ojp.gov/library/publications/nij-special-report-public-mass-shootings-research

Kelly, R. F., & Alexander, D. C. (2022, June). Insights from comparing pre-attack variables in the Las Vegas mass shooting with ideologically motivated violent extremist attacks. *Perspectives on Terrorism*. *16*(3), 37–49. https://www.jstor.org/stable/27140395

Kenyon, J., Baker-Beall, C., & Binder, J. (2023). Lone-actor terrorism–a systematic literature review. *Studies in Conflict & Terrorism*. *46*(10), 2038–2065.

Krouse, W. J., & Richardson, D. J. (2015, July 13). Mass murder with firearms: Incidents and victims, 1999–2013. Congressional Research Services (CRS). https://sgp.fas.org/crs/misc/R44126.pdf

Kupper, J., & Meloy, J. R. (2021). Trap-18 indicators validated through the forensic linguistic analysis of targeted violence manifestos. *Journal of Threat Assessment and Management*. *8*(4), 174–199. https://doi.org/10.1037/tam0000165

Langman, P. (2013). School shooters on college campuses. *Journal of Campus Behavioral Intervention*. *1*, 6–39. https://doi.org/10.17732/JBIT2013/1

Lankford, A., Adkins, K. G., & Madfis, E. (2019, April 2). Are the deadliest mass shootings preventable? An assessment of leakage, information reported to law enforcement, and firearms acquisition prior to attacks in the United States. *Journal of Contemporary Criminal Justice*. *35*(3), 315–341. https://doi.org/10.1177/1043986219840231

Lindekilde, L., O'Connor, F., & Schuurman, B. (2019). Radicalization patterns and modes of attack planning and preparation among lone-actor terrorists: An exploratory analysis. *Behavioral Sciences of Terrorism and Political Aggression*. *11*(2), 113–133. https://doi.org/10.1080/19434472.2017.1407814

Meloy, J. R., Goodwill, A., Clemmow, C., & Gill, P. (2021). Time sequencing the TRAP-18 indicators. *Journal of Threat Assessment and Management*. *8*(1–2), 1–19. https://doi.org/10.1037/tam0000157

Meloy, J. R., Hempel, A. G., Mohandie, K., Shiva, A. A., & Gray, B. T. (2001, June). Offender and offense characteristics of a nonrandom sample of adolescent mass murderers. *Journal of the American Academy of Child & Adolescent Psychiatry*. *40*(6), 719–728. https://doi.org/10.1097/00004583-200106000-00018

Meloy, J. R., & Hoffman, J. (Eds.). (2021). *International handbook of threat assessment, 2nd Edition*. Oxford University Press.

Meloy, J. R., Hoffmann, J., Guldimann, A., & James, D. (2011). The role of warning behaviors in threat assessment: An exploration and suggested typology. *Behavioral Sciences & the Law*. 30(3): 256-279. https://doi.org/10.1002/bsl.999

Meloy, J. R., Mohandie, K., Knoll, J. L., & Hoffmann, J. (2015). The concept of identification in threat assessment. *Behavioral Sciences & the Law*. *33*(2–3), 213–237. https://doi.org/10.1002/bsl.2166

Meloy, J. R., & O'Toole, M. E. (2011). The concept of leakage in threat assessment. *Behavioral Sciences and the Law*. *29*(4), 513–527. https://doi.org/10.1002/bsl.986

Meloy, J. R., White, S. G., & Hart, S. (2013, July 18). Workplace assessment of targeted violence risk: The development and reliability of the WAVR-21. *Journal of Forensic Sciences*. *58*(5), 1353–1358. https://doi.org/10.1111/1556-4029.12196

Oksanen, A., Kaltiala-Heino, R., Holkeri, E., & Lindberg, N. (2015, July 3). School shooting threats as a national phenomenon: Comparison of police reports and psychiatric reports in Finland. *Journal of Scandinavian Studies in Criminology and Crime Prevention*. *16*(2), 145–159. https://doi.org/10.1080/14043858.2015.1101823

Osborne, J. R., & Capellan, J. A. (2017, July 20). Examining active shooter events through the rational choice perspective and crime script analysis. *Security Journal*. *30*, 880–902. https://doi.org/10.1057/sj.2015.12

O'Toole, M.E. (2000). The school shooter: A threat assessment perspective. Federal Bureau of Investigation (FBI) – Critical Incident Response Group – National Center for the Analysis of Violent Crime (NCAVC). https://www.fbi.gov/file-repository/stats-services-publications-school- shooter-school-shooter/view

Peterson, J.K., & Densley, J.A. (2021). The Violence Project database of mass shootings in the United States, 1966–2019 (Version 4). The Violence Project. https://www.theviolenceproject.org/wp-content/uploads/2019/11/TV-Mass-Shooter-Database- Report-Final-compressed.pdf

Peterson, J., Densley. J., Erickson, G., Fay. E., Higgins. S., Jensen. A., Janssen. M., Klumb. H., Knapp. K., Lindgren. J., McMahon. G., & Peterson. H. (2021, September). A multi-level, multi-method investigation of the psycho-social life histories of mass shooters. National Institute of Justice (NIJ). https://www.ojp.gov/pdffiles1/nij/grants/302101.pdf

Peterson, J., Densley, J., Riedman, D., Spaulding, J., & Malicky, H. (2024). An exploration of K–12 school shooting threats in the United States. *Journal of Threat Assessment and Management*. *11*(2), 106–120. https://doi.org/10.1037/tam0000215

Peterson, J., Erickson, G., Knapp, K., & Densley, J. (2021). Communication of Intent to Do Harm Preceding Mass Public Shootings in the United States, 1966 to 2019. *JAMA Network*

Open. *4*(11), e2133073 (1–9). https://doi.org/10.1001/jamanetworkopen.2021.33073
Scalora, M. (2021). Electronic threats and assessment: A dominant role in threat assessment. In J.R. Meloy & J. Hoffman (Eds.). *International Handbook of Threat Assessment. 2nd Edition*, pp. 268–282. Oxford University Press.
Scalora, M., Hawthorne, D., Pellicane, T., & Schoeneman, K. (2020). A glimpse of threat assessment and management activity performed by the United States Marshals Service. *Journal of Threat Assessment and Management*. *7*(1–2), 85–97. https://doi.org/10.1037/tam0000149
Schildkraut, J., Connell, N., Barbieri, N., & de Azeredo, R. (2022, November 7). American uniqueness revisited: A comparative examination of two school shootings using the path to intended violence. *International Journal of Comparative and Applied Criminal Justice*. *48*(2), 143–158. https://doi.org/10.1080/01924036.2023.2221751
Schuurman, B., & Eijkman, Q. (2015). Indicators of Terrorist Intent and Capability: Tools for Threat Assessment. *Dynamics of Asymmetric Conflict*. 8(3): 215-231. https://doi.org/10.1080/17467586.2015.1040426
Schuurman, B., Bakker, E., Gill, P. & Bouhana, N. (2018), Lone actor terrorist attack planning and preparation: A data-driven analysis. *Journal of Forensic Science*. *63*, 1191–1200. Paper presented in part of a workshop at Hebrew University in Jerusalem, Israel (December 9, 2016) and Aarhus University in Copenhagen, Denmark (April 27, 2017). https://doi.org/10.1111/1556-4029.13676
Scrivens, R. (2022). Examining online indicators of extremism among violent and non-violent right-wing extremists. *Terrorism and Political Violence*. *35*(6), 1389–1409. https://doi.org/10.1080/09546553.2022.2042270
Silva, J. R. (2023). Ideologically motivated mass shootings: A crime script analysis of far-right, far-left, and Jihadist-inspired attacks in the United States. *Journal of Policing, Intelligence and Counter Terrorism*. *18*(1), 1–23. https://doi.org/10.1080/18335330.2022.2039402
Silva, J. R., & Greene-Colozzi, E. A. (2023). Assessing leakage-based mass shooting prevention: A comparison of foiled and completed attacks. *Journal of Threat Assessment and Management*. Advance Online Publication. 1–15. https://doi.org/10.1037/tam0000205
Silva, J. R., Silver, J., & Greene-Colozzi, E. A. (2023, March 31). A behavioral sequence analysis of mass school shooters examining stressors, antisocial behaviors, mental health issues, and planning and preparation activities. *Deviant Behavior*. *44*(10), 1480–1497. https://doi.org/10.1080/01639625.2023.2210730
Silver, J., Horgan, J., & Gill, P. (2018). Foreshadowing Targeted Violence: Assessing Leakage of Intent by Public Mass Murderers. *Journal of Aggression and Violent Behavior*. *38*, 94–100. https://doi.org/10.1016/j.avb.2017.12.002

Silver, J., Simons, A., & Craun, S. (2018). A study of the pre-attack behaviors of active shooters in the United States between 2000 and 2013. Federal Bureau of Investigation (FBI). https://www.fbi.gov/file-repository/pre-attack-behaviors-of-active-shooters-in-us-2000-2013.pdf/view

Slemaker, A. (2023). Studying mass shooters' words: Warning behavior prior to attacks. *Journal of Threat Assessment and Management*. *10*(1), 1–17. https://doi.org/10.1037/tam0000198

Smith, B. L., Gruenewald, J., Damphousse, K. R., Roberts, P., Ratcliff, K., Klein, B. R., & Brecht, I. (2016*).* Sequencing terrorists' precursor behaviors: A crime specific analysis. National Institute of Justice (NIJ) from the Terrorism Research Center at the University of Arkansas's Department of Sociology and Criminology. https://www.ojp.gov/pdffiles1/nij/grants/256017.pdf

Sutanapong, C., & Louangrath, P.I. (2015). Descriptive and inferential statistics. International *Journal of Research & Methodology in Social Science*. *1*(1), 22–35.

U.S. violent mobilization indicators. (2021). The National Counterterrorism Center (NCTC). *Office of the Director of National Intelligence*. Retrieved from: https://www.dni.gov/files/NCTC/documents/news_documents/Mobilization_Indicators_Booklet_2021.pdf

Information Sharing Environment (ISE) – Suspicious Activity Reporting (SAR) Functional Standard, Version 1.5.5. (2015, February 23). U.S. Department of Homeland Security (DHS). https://www.dhs.gov/sites/default/files/publications/15_0223_NSI_ISE-Functional-Standard- SAR.pdf

Department of Homeland Security strategic framework for countering terrorism and targeted Violence. (2019). U.S. Department of Homeland Security (DHS). https://www.dhs.gov/sites/default/files/publications/19_0920_plcy_strategic-framework- countering-terrorism-targeted-violence.pdf

Threat assessment and management teams. (2021, December). U.S. Department of Homeland Security (DHS). Center for Prevention Programs and Partnerships (CP3). https://www.dhs.gov/publication/threat-assessment-and-management-teams

National SAR Initiative (NSI): About the NSI. (2022, September 23). U.S. Department of Homeland Security (DHS). https://www.dhs.gov/nationwide-sar-initiative-nsi/about-nsi

Suspicious activity reporting indicators and examples. (2024, April). U.S. Department of Homeland Security (DHS). https://www.dhs.gov/sites/default/files/2024-04/24_0424_NSI_SAR- Indicators-Examples-final.pdf

Vossekuil, B., Fein, R. A., & Berglund, J. M. (2015). Threat assessment: Assessing the risk of targeted violence. *Journal of Threat Assessment and Management*. *2*(3–4), 243–254. https://doi.org/10.1037/tam0000055

Weimann, G. (2005). Cyberterrorism: The sum of all fears? *Studies in Conflict & Terrorism*, *28*(2), 129–149. https://doi.org/10.1080/10576100590905110

Winch, A. T., Alexander, K., Bowers, C., Straub, F., & Beidel, D. C. (2024). An evaluation of completed and averted school shootings. *Frontiers in Public Health*. *11*, 1305286, 1–9. https://doi.org/10.3389/fpubh.2023.1305286

Appendix

Appendix A: Keywords Used in Search Protocol

Outcomes

"Mass shooting"

"School Shooting"

"Mass Violence"

"Active Shooter"

"Targeted Violence"

"Terrorism"

"Violent Extremism"

SAR Descriptives

"Planning"

"Pre-attack Indicators"

"Preoperational" + "indicators"

"Precursors"

"Suspicious Activity Reports"

"Expressed threats"

"Implied threats"

"Acquisition of Expertise"

"Training"

"Aviation" + "activity"

"Cyberattack"

"Eliciting information"

"Material acquisition"

"Material storage"

"Misrepresentation"

"Observation"

“Surveillance”

“Photography”

“Recruiting”

“Financing”

“Sabotage”

“Tampering”

“Vandalism”

“Sector-Specific Incident”

“Testing Security”

“Probing security”

“Theft” + “Loss” + “Diversion”

“Stealing” + “Diverting”

“Weapons” + “collection” + “stockpiling” + “acquiring” + “obtaining” + “storing”

Appendix B: Studies in Our Review

Abel, M. N., Chermak, S., & Freilich, J. D. (2022). Pre-attack warning behaviors of 20 adolescent school shooters: A case study analysis. *Crime & Delinquency*. *68*(5), 786–813. https://doi.org/10.1177/0011128721999338

Alathari, L., Drysdale, D., Driscoll, S., Blair, A., Mauldin, D., Carlock, A., McGarry, J., Cotkin, A., Nemet, J., Johnston, B., & Vineyard, N. (2021). Averting targeted school violence: A U.S. Secret Service analysis of plots against schools. U.S. Secret Service (USSS) – National Threat Assessment Center (NTAC). https://www.secretservice.gov/newsroom/reports/threat-assessments/schoolcampus-attacks/details-0

Alathari, L., Drysdale, D., Driscoll, S., Blair, A., Mauldin, D., Carlock, A., McGarry, J., Cotkin, A., Nemet, J., Johnston, B., Vineyard, N., Foley, C., & Bullwinkel, J. (2019*).* Protecting America's schools: A U.S. Secret Service analysis of targeted school violence. U.S. Secret Service (USSS) – National Threat Assessment Center (NTAC). https://www.secretservice.gov/sites/default/files/2020-04/Protecting_Americas_Schools.pdf

Alathari, L., Drysdale, D., Driscoll, S., Carlock, A., & Cutler, M. (2023). Mass attacks in public spaces: 2016–2020. U.S. Secret Service (USSS) – National Threat Assessment Center (NTAC). https://www.secretservice.gov/sites/default/files/reports/2023-01/usss-ntac-maps-2016-2020.pdf

Allely, C. S., & Faccini, L. (2018). Clinical profile, risk, and critical factors and the application of the "Path toward intended violence" model in the case of mass shooter Dylann Roof. *Deviant Behavior. 40*(6), 672–689. https://doi.org/10.1080/01639625.2018.1437653

Allely, C. S., Wicks, S. J., & McLaren, S. A. (2024). The application of the path to intended violence model and the TRAP-18 in the case of the Christchurch Mosque Shooter. *Journal of Threat Assessment and Management. 11*(1), 32–47. https://doi.org/10.1037/tam0000211

Almond, M. F. E., Nicholls, T. L., Petersen, K. L., Seto, M. C., & Crocker, A. G. (2023, May 3). Exploring the nature and prevalence of targeted violence perpetrated by persons found not criminally responsible on account of mental disorder. *Behavioral Sciences & the Law*. *41*(2–3), 124–140. https://doi.org/10.1002/bsl.2626

Bondü, R., & Scheithauer, H. (2015). Kill one or kill them all? Differences between single and multiple victim school attacks. *European Journal of Criminology*. *12*(3), 277–299. https://doi.org/10.1177/1477370814525904

Bouhana, N., Corner, E., Gill, P., & Schuurman, B. (2018, December). Background and preparatory behaviours of right-wing extremist lone actors: A comparative study. *Perspectives on Terrorism*. *12*(6): 50–163. https://www.jstor.org/stable/26544649

Capellan, J. A. (2015). Lone wolf terrorist or deranged shooter? A study of ideological active shooter events in the United States, 1970–2014. *Studies in Conflict & Terrorism*. *38*(6), 395–413. https://doi.org/10.1080/1057610X.2015.1008341

Capellan, J. A., Johnson, J., Porter, J. R., & Martin, C. (2019). Disaggregating mass public shootings: A comparative analysis of disgruntled employee, school, ideologically motivated, and rampage

shooters. *Journal of Forensic Sciences*. *64*(3), 814–823. https://doi.org/10.1111/1556-4029.13985

Capellan, J. A., & Silva, J. R. (2019). An investigation of mass public shooting attacks against government targets in the United States. *Studies in Conflict & Terrorism*. *44*(5), 387–409. https://doi.org/10.1080/1057610X.2018.1551294

Clemmow, C., Gill, P., Bouhana, N., Silver, J., & Horgan, J. (2020). Disaggregating lone-actor grievance-fueled violence: Comparing lone-actor terrorists and mass murderers. *Terrorism and Political Violence*. *34*(3), 558–584. https://doi.org/10.1080/09546553.2020.1718661

Clemmow, C., Schumann, S., Salman, N. L., & Gill, P. (2020). The base rate study: Developing base rates for risk factors and indicators for engagement in violent extremism. *Journal of Forensic Science*. *65*(3), 865–881. https://doi.org/10.1111/1556-4029.14282

Clutterbuck, L., & Warnes, R. (2011). Exploring patterns of behavior in violent Jihadist terrorists: An analysis of six significant terrorist conspiracies in the U.K. RAND Corporation – Europe. https://www.rand.org/content/dam/rand/pubs/technical_reports/2011/RAND_TR923.pdf

Cowan, R. G., & Lankford, A. (2024). The Virginia Beach municipal center mass shooting: A retrospective threat assessment using the WAVR-21. *Journal of Threat Assessment and Management*. *11*(2), 83–105. https://doi.org/10.1037/tam0000203

Cowan, R. G., Tedeschi, P. J., Corbin, M., & Cole, R. F. (2022). A mixed-methods analysis of averted mass violence in schools: Implications for professional school counselors. *Psychology in the Schools*. *59*(4), 817–831. https://doi.org/10.1002/pits.22647

Dudenhoefer, A., Niesse, C., Görgen, T., Tampe, L., Megler, M., Gröpler, C., & Bondü, R. (2021). Leaking in terrorist attacks: A review. *Aggression and Violent Behavior*. *58*(101582), 1–12. https://doi.org/10.1016/j.avb.2021.101582

Duwe, G. (2020). Patterns and prevalence of lethal mass violence. *Criminology & Public Policy*. *19*(1), 17–35. https://doi.org/10.1111/1745-9133.12478

Fein, R. A., & Vossekuil, B. (1999). Assassination in the United States: An operational study of recent assassins, attackers, and near-lethal approachers. *Journal of Forensic Sciences*. *44*(2), 320–333. https://www.secretservice.gov/sites/default/files/2020-04/ecsp1.pdf

Freilich, J. D., Chermak, S. M., Connell, N. M., Klein, B., & Greene-Colozzi, E. (2021). Understanding the causes of school violence using open-source data. National Institute of Justice (NIJ). https://www.ojp.gov/pdffiles1/nij/grants/301665.pdf

Geck, C. M., Grimbos, T., Siu, M., Klassen, P. E., & Seto, M. C. (2017). Violence at work: An examination of aggressive, violent, and repeatedly violent employees. *Journal of Threat Assessment and Management*. *4*(4), 210–229. https://doi.org/10.1037/tam0000091

Gerard, F. J., Whitfield, K. C., Porter, L. E., & Browne, K. D. (2016). Offender and offence characteristics of school shooting incidents. *Journal of Investigative Psychology and Offender Profiling*. *13*(1), 22–38. https://doi.org/10.1002/jip.1439

Gibson, K. A., Craun, S. W., Ford, A. G., Solik, K., & Silver, J. (2020). Possible attackers? A comparison between the behaviors and stressors of persons of concern and active shooters. *Journal of Threat Assessment and Management. 7*(1-2), 1–12. https://doi.org/10.1037/tam0000147

Gill, P., & Corner, E. (2016). Lone-actor terrorist target choice. *Behavioral Sciences & the Law*. *34*(5), 693–705. https://doi.org/10.1002/bsl.2268

Gill, P., Corner, E., Conway, M., Thornton, A., Bloom, M., & Horgan, J. (2017). Terrorist use of the Internet by the numbers: Quantifying behaviors, patterns, and processes*. Criminology & Public Policy. 16*(1), 99–117. https://doi.org/10.1111/1745-9133.12249

Gill, P., Horgan, J., & Deckert, P. (2014). Bombing alone: Tracing the motivations and antecedent behaviors of lone-actor terrorists. *Journal of Forensic Sciences*. *59*(2), 425–435. https://doi.org/10.1111/1556-4029.12312

Gill, P., Marchment, Z., Corner, E., & Bouhana, N. (2018). Terrorist decision making in the context of risk, attack planning, and attack commission. *Studies in Conflict & Terrorism*. *43*(2), 145–160. https://doi.org/10.1080/1057610X.2018.1445501

Gill, P., Silver, J., Horgan, J., & Corner, E. (2017). Shooting alone: The pre-attack experiences and behaviors of U.S. solo mass murderers. *Journal of Forensic Sciences*. 62(3): 710-714. https://doi.org/10.1111/1556-4029.13330

Gill, P., Silver, J., Horgan, J., Corner, E., & Bouhana, N. (2021). Similar crimes, similar behaviors? Comparing lone-actor terrorists and public mass murderers*. Journal of Forensic Sciences*. *66*(5), 1797–1804. https://doi.org/10.1111/1556-4029.14793

Greene-Colozzi, E. A., & Silva, J. R. (2022). Mass outcome or mass intent? A proposal for an intent-focused, no-Minimum casualty count definition of public mass shooting incidents*. Journal of Mass Violence Research*. *1*(2), 27–41. https://doi.org/10.53076/JMVR63403

Gruenewald, J., Klein, B. R., Drawve, G., Smith, B. L., & Ratcliff, K. (2019). Suspicious preoperational activities and law enforcement interdiction of terrorist plots. *Policing: An International Journal. 42*(1), 89–107. https://emeraldinsight.com/1363-951X.htm

Gruenewald, J., Parkin, W. S., Smith, B. L., Chermak, S. M., Freilich, J. D., Roberts, P., & Klein, B. (2015). Validation of the Nationwide Suspicious Activity Reporting (SAR) Initiative: Identifying suspicious activities from the Extremist Crime Database (ECDB) and the American Terrorism Study (ATS). A report to the U.S. Department of Homeland Security (DHS) Science & Technology (S&T) Division from the National Consortium for the Study of Terrorism and Responses to Terrorism (START). https://www.start.umd.edu/sites/default/files/publications/local_attachments/START_ValidationofNationwideSARInitiative_Feb2015.pdf

Hempel, A. G., Meloy, J. R., & Richards, T. C. (1999). Offender and offense characteristics of a nonrandom sample of mass murderers*. Journal of the American Academy of Psychiatry and the Law. 27*(2), 213–225. https://jaapl.org/content/jaapl/27/2/213.full.pdf

Hendrix, J. A., Planty, M. G., & Cutbush, S. (2022). Leakage warning behaviors for mass school violence: An analysis of tips reported to a state school safety tip line*. Journal of Threat Assessment and Management*. *9*(1), 33–51. https://doi.org/10.1037/tam0000171

Holkeri, E., Oksanen, A., & Räsänen, P. (2015). Crime and context: Comparing conventional and ICT-

related school shooting threats. *European Journal on Criminal Policy and Research*. *21*, 407–423. https://doi.org/10.1007/s10610-014-9258-2

Horgan, J., Shortland, N., & Abbasciano, S. (2018). Towards a typology of terrorism involvement: A behavioral differentiation of violent extremist offenders. *Journal of Threat Assessment and Management. 5*(2), 84–102. https://doi.org/10.1037/tam0000102

Huffman, M. C., & Amman, M. A. (2023). Violence in a place of healing: Weapons-based attacks on health care facilities. *Journal of Threat Assessment and Management*. *10*(3), 151–187. https://doi.org/10.1037/tam0000190

Jensen, M., & LaFree, G. (2024). The mobilization puzzle: How individual, group, and situational dynamics produce extremist outcomes. National Institute of Justice (NIJ). https://www.ojp.gov/pdffiles1/nij/grants/308549.pdf

Kelly, R. F., & Alexander, D. C. (2022). Insights from comparing pre-attack variables in the Las Vegas mass shooting with ideologically motivated violent extremist attacks*. Perspectives on Terrorism*. *16*(3), 37–49. https://www.jstor.org/stable/27140395

Kupper, J., & Meloy, J. R. (2021). Trap-18 indicators validated through the forensic linguistic analysis of targeted violence manifestos. *Journal of Threat Assessment and Management*. *8*(4), 174–199. https://doi.org/10.1037/tam0000165

Langman, P. (2013). School shooters on college campuses*. Journal of Campus Behavioral Intervention*. *1*, 6–39. https://doi.org/10.17732/JBIT2013/1

Lankford, A., Adkins, K. G., & Madfis, E. (2019). Are the deadliest mass shootings preventable? An assessment of leakage, information reported to law enforcement, and firearms acquisition prior to attacks in the United States. *Journal of Contemporary Criminal Justice*. *35*(3), 315–341. https://doi.org/10.1177/1043986219840231

Lankford, A., & Silver, J. (2020). Why have public mass shootings become more deadly? Assessing how perpetrators' motives and methods have changed over time. *Criminology & Public Policy*. *19*(1), 37–60. https://doi.org/10.1111/1745-9133.12472

Lindberg, N., Oksanen, A., Sailas, E., & Kaltiala-Heino, R. (2012). Adolescents expressing school massacre threats online: Something to be extremely worried about? *Child Adolescent Psychiatry and Mental Health. 6*(1), 1–13. https://doi.org/10.1186/1753-2000-6-39

Lindekilde, L., O'Connor, F., & Schuurman, B. (2019). Radicalization patterns and modes of attack planning and preparation among lone-actor terrorists: An exploratory analysis. *Behavioral Sciences of Terrorism and Political Aggression*. *11*(2), 113–133. https://doi.org/10.1080/19434472.2017.1407814

Meloy, J. R., Goodwill, A., Clemmow, C., & Gill, P. (2021). Time sequencing the TRAP-18 indicators. *Journal of Threat Assessment and Management*. *8*(1–2), 1–19. https://doi.org/10.1037/tam0000157

Meloy, J. R., Hempel, A. G., Mohandie, K., Shiva, A. A., & Gray, B. T. (2001). Offender and offense characteristics of a nonrandom sample of adolescent mass murderers. *Journal of the American Academy of Child & Adolescent Psychiatry*. *40*(6), 719–728. https://doi.org/10.1097/00004583-200106000-00018

Meloy, J. R., Mohandie, K., Knoll, J. L., & Hoffmann, J. (2015). The Concept of identification in threat assessment. *Behavioral Sciences & the Law*. *33*(2-3), 213–237. https://doi.org/10.1002/bsl.2166

Meloy, J. R., White, S. G., & Hart, S. (2013). Workplace assessment of targeted violence risk: The development and reliability of the WAVR-21. *Journal of Forensic Sciences*. *58*(5), 1353–1358. https://doi.org/10.1111/1556-4029.12196

Oksanen, A., Kaltiala-Heino, R., Holkeri, E., & Lindberg, N. (2015). School shooting threats as a national phenomenon: Comparison of police reports and psychiatric reports in Finland. *Journal of Scandinavian Studies in Criminology and Crime Prevention. 16*(2), 145–159. https://doi.org/10.1080/14043858.2015.1101823

Osborne, J. R., & Capellan, J. A. (2017). Examining active shooter events through the rational choice perspective and crime script analysis. *Security Journal*. *30*, 880–902. https://doi.org/10.1057/sj.2015.12

Peterson, J., Densley. J., Erickson, G., Fay. E., Higgins. S., Jensen. A., Janssen. M., Klumb. H., Knapp. K., Lindgren. J., McMahon. G., & Peterson. H. (2021). A multi-level, multi-method investigation of the psycho-social life histories of mass shooters. National Institute of Justice (NIJ). https://www.ojp.gov/pdffiles1/nij/grants/302101.pdf

Peterson, J., Densley, J., Riedman, D., Spaulding, J., & Malicky, H. (2023). An exploration of K–12 school shooting threats in the United States. *Journal of Threat Assessment and Management. 11*(2), 106–120. https://doi.org/10.1037/tam0000215

Peterson, J., Erickson, G., Knapp, K., & Densley, J. (2021). Communication of intent to do harm preceding mass public shootings in the United States, 1966 to 2019. *JAMA Network Open. 4*(11), e2133073 (1–9). https://doi.org/10.1001/jamanetworkopen.2021.33073

Rocque, M., Gerdes, M., Fox, J. A., Duwe, G., & Clark, M. (2023). Averting tragedy: An exploration of thwarted mass public shootings relative to completed attacks. *Criminal Justice Review. 48*(3), 277–299. https://doi.org/10.1177/07340168221117107

Rose, M. M., & Morrison, J. (2021). An exploratory analysis of leakage warning behavior in lone-actor terrorists. *Behavioral Sciences of Terrorism and Political Aggression. 15*(2), 179–214. https://doi.org/10.1080/19434472.2021.1900325

Sarteschi, C. M. (2016). An examination of thwarted mass homicide plots and threateners. *Journal of Aggression and Violent Behavior. 30*, 88–93. https://doi.org/10.1016/j.avb.2016.06.010

Scalora, M., Hawthorne, D., Pellicane, T., & Schoeneman, K. (2020). A glimpse of threat assessment and management activity performed by the United States Marshals Service. *Journal of Threat Assessment and Management. 7*(1–2), 85–97. https://doi.org/10.1037/tam0000149

Schildkraut, J., Connell, N., Barbieri, N., & de Azeredo, R. (2024). American uniqueness revisited: A comparative examination of two school shootings using the path to intended violence. *International Journal of Comparative and Applied Criminal Justice. 48*(2), 143–158.

https://doi.org/10.1080/01924036.2023.2221751
Schuurman, B., & Eijkman, Q. (2015). Indicators of terrorist intent and capability: Tools for threat assessment. *Dynamics of asymmetric conflict. 8*(3), 215–231. https://doi.org/10.1080/17467586.2015.1040426
Schuurman, B., Bakker, E., Gill, P. & Bouhana, N. (2018). Lone actor terrorist attack planning and preparation: A data-driven analysis. *Journal of Forensic Science. 63*, 1191–1200. Paper presented in part of a workshop at Hebrew University in Jerusalem, Israel (December 9, 2016) and Aarhus University in Copenhagen, Denmark (April 27, 2017). https://doi.org/10.1111/1556-4029.13676
Scrivens, R. (2023). Examining online indicators of extremism among violent and non-violent right-wing Extremists. *Terrorism and Political Violence. 35*(6), 1389–1409. https://doi.org/10.1080/09546553.2022.2042270
Silva, J. R. (2022). Ideologically motivated mass shootings: A crime script analysis of far-right, far-left, and Jihadist-inspired attacks in the United States. *Journal of Policing, Intelligence and Counter Terrorism. 18*(1), 1–23. https://doi.org/10.1080/18335330.2022.2039402
Silva, J. R., & Greene-Colozzi, E. A. (2023). Assessing leakage-based mass shooting prevention: A comparison of foiled and completed attacks. *Journal of Threat Assessment and Management. Advance Online Publication.* 1–15. https://doi.org/10.1037/tam0000205
Silva, J. R., Silver, J., & Greene-Colozzi, E. A. (2023). A behavioral sequence analysis of mass school shooters examining stressors, antisocial behaviors, mental health issues, and planning and preparation activities. *Deviant Behavior. 44*(10), 1480–1497. https://doi.org/10.1080/01639625.2023.2210730
Silver, J., Horgan, J., & Gill, P. (2018). Foreshadowing targeted violence: Assessing leakage of intent by public mass murderers. *Journal of Aggression and Violent Behavior. 38*, 94–100. https://doi.org/10.1016/j.avb.2017.12.002
Silver, J., & Silva, J. R. (2022). A sequence analysis of the behaviors and experiences of the deadliest public mass shooters. *Journal of Interpersonal Violence. 37*(23–24), NP23468-NP23494. https://doi.org/10.1177/08862605221078818
Silver, J., Simons, A., & Craun, S. (2018). A study of the pre-attack behaviors of active shooters in the United States between 2000 and 2013. Federal Bureau of Investigation (FBI). https://www.fbi.gov/file-repository/pre-attack-behaviors-of-active-shooters-in-us-2000-2013.pdf/view
Slemaker, A. (2023). Studying mass shooters' words: Warning behavior prior to attacks. *Journal of Threat Assessment and Management. 10*(1), 1–17. https://doi.org/10.1037/tam0000198
Smith, B. L., Damphousse, K. R., and Roberts, P. (2006). Pre-incident indicators of terrorist incidents: The identification of behavioral, geographic, and temporal patterns of preparatory conduct. National Institute of Justice (NIJ). https://www.ojp.gov/pdffiles1/nij/grants/214217.pdf

Smith, B. L., Gruenewald, J., Damphousse, K. R., Roberts, P., Ratcliff, K., Klein, B. R., & Brecht, I. (2016). Sequencing terrorists' precursor behaviors: A crime specific analysis. National Institute of Justice (NIJ) from the Terrorism Research Center at the University of Arkansas's Department of Sociology and Criminology. https://www.ojp.gov/pdffiles1/nij/grants/256017.pdf

Strom, K. J., Hollywood, J. S., & Pope, M. (2016). Terrorist plots against the United States: What we have really faced, and how we might best defend against it. RAND Corporation. https://www.rand.org/pubs/working_papers/WR1113.html

Vossekuil, B., Fein, R. A., & Berglund, J. M. (2015). Threat assessment: Assessing the risk of targeted violence. *Journal of Threat Assessment and Management. 2*(3–4), 243–254. https://doi.org/10.1037/tam0000055

Winch, A. T., Alexander, K., Bowers, C., Straub, F., & Beidel, D. C. (2024). An evaluation of completed and averted school shootings. *Frontiers in Public Health. 11*, 1305286, 1–9. https://doi.org/10.3389/fpubh.2023.1305286

Appendix C: Additional Methodological Details Types of Violence Studied

Mass violence was the most frequently studied form of targeted violence in the empirical literature, with (N=32) studies examining SAR-relevant variables as precursors to mass attacks. Importantly, mass violence is the broadest category of violence considered here, which may explain why it is so often subject to empirical investigation. Unlike acts of terrorism and violent extremism, which require an ideological motivation to be classified as such (FBI & DHS, 2020; 2022) mass violence is defined solely by the action itself. For example, the Congressional Research Service (Krouse & Richardson, 2015: 10) defines public mass shootings as:

> *"a multiple homicide incident in which four or more victims are murdered with firearms—not including the offender(s)—within one event, and at least some of the murders occurred in a public location or locations in close geographical proximity (e.g., a workplace, school, restaurant, or other public settings), and the murders are not attributable to any other underlying criminal activity or commonplace circumstance (armed robbery, criminal competition, insurance fraud, argument, or romantic triangle."*

Numerous studies on mass violence heed this definition when composing their studies' sample (Capellan et al., 2019; Kane et al., 2023; Peterson & Densley, 2021; Peterson, Densley & Erickson et al., 2021; Peterson & Erickson et al., 2021), and multiple other studies leverage similarly broad definitions that could encompass a wide range of targeted violence acts, including terrorist attacks, mass shootings, and school shootings, dependent on the modus operandi and casualty counts of the attack (Alathari et al., 2023; Lankford et al., 2019). Though we made efforts to distinguish results directly related to terrorism/violent extremism from nonideologically motivated targeted violence, the scope of this inclusion definition did not allow for such discernment in most studies examining mass violence. Thus, the Mass Violence category in this review should be interpreted as a combinative category which can include acts of both ideologically motivated and nonideologically motivated targeted violence.

Terrorism/Violent Extremism was the second most examined type of outcome in our review. Approximately (N=28) studies considered the connection between SAR-related activities and acts of terrorism and violent extremism. While there were a variety of definitions used to operationalize terrorism and violent extremism across these studies, terrorism and violent extremism was generally defined as the threatened or actual use of violence or crime to advance an ideological goal. Some studies directly focused on certain types of terrorists, such as lone actors or Jihadist ideologues (Gill et al., 2014; Lindekilde et al., 2017; Meloy et al., 2019; Schuurman et al., 2018), while others considered a wide slate of terrorists using large-scale datasets such as the American Terrorism Study (ATS; Gruenewald et al., 2015; Gruenewald et al., 2019; Smith et al., 2016), Extremist Crime Database (ECDB; Gruenewald et al., 2015), or the Profiles of Individuals Radicalized in the U.S. (PIRUS) dataset (Jensen & LaFree, 2024).

Third, (N=19) studies focused on School Violence, particularly school shootings in response of the Safe School Initiative in 2000 by the Secret Service's National Threat Assessment Center (NTAC). Most studies focused on shootings within a K–12 school facility (Alathari et al., 2019; Alathari et al., 2021; Capellan et al., 2019; Freilich et al., 2021; Gerard et al., 2016; Silva et al., 2023), though some research did consider shootings on college campuses as well (Langman et al., 2013; Silva et al., 2023). While most

research in this area examined characteristics of school shooting incidents and their perpetrators, several studies also evaluated outcomes tangential to school shootings, such as school shooting threats (Oksanen et al., 2015; Peterson et al., 2023), that provided evidence directly related to specific NSI Indicators.

Finally, (N=4) studies examined outcomes that were classified as Other, in that their focus was on forms of nonideologically motivated targeted violence that was not mass or school violence. Specifically, one study examined targeted violence in the workplace (Meloy et al., 2013), two analyzed targeted violence against public officials (Fein & Vossekuil, 1999; Vossekuil et al., 2016), and one evaluated general targeted violence in Canada (Almond et al., 2023).

Methodological Approaches Used

Most studies in our sample (N=38) conducted descriptive quantitative analyses. These studies investigated the frequency of SAR-related behaviors in samples of targeted violence events or perpetrators. Studies using descriptive analyses can provide preliminary insight into the relative prevalence of SAR-related variables, which is an essential step to building a robust evidentiary base in this area.

While descriptive statistics cannot draw correlational or causal inferences, they lay the foundation for such pursuits (Sutanapong & Louangrath, 2015). Of the 75 studies in our review, (N=26) analyzed outcomes using inferential statistics. Both bivariate and multivariate inferential analyses were leveraged. In doing so, these studies explore statistical relationships between SAR-related behaviors and targeted violence and terrorism outcomes, providing a deeper understanding of their connection while bolstering analytic rigor.

Case studies were the third most frequently utilized methodology in our review, with (N=9) studies evaluating the occurrence of SAR-related behaviors in specific cases of terrorism and targeted violence. Case studies are useful analytic tools that can provide rich information on a particular SAR-related behavior, including the details of the behavior and the context in which it occurred. While case studies often lack generalizability to broader populations, they compensate in their detailed descriptions of social phenomena (Flyvberg, 2006). In this way, case studies provide a degree of qualitative nuance to the evidence base connecting NSI Indicators and terrorism and targeted violence.

Finally, two studies in our review utilized qualitative designs other than case studies. Rather, both studies conducted qualitative content analyses. Slemaker (2023) sought to identify and explore pre-attack warning behaviors demonstrated by (n=23) mass shooters by analyzing their manifestos. Alternatively, Gill et al., (2018) studied how terrorists plan and commit attacks by assessing the text of (n=49) autobiographies published by individuals who were involved in at least one terrorist event. In addition, Scrivens (2023) conducted a large-scale content analysis to examine online posts of violent and nonviolent right-wing extremists of white supremacist-based forum, Stormfront Canada, based on the FBI's Homegrown Violent Extremist Mobilization Indicators. By studying the words of terrorists and mass shooters, these studies explore the decision-making processes that underly attack planning and preparation activities at a granular level.

Overall, the strength of the evidence in our review can be described as preliminary but improving. Although most research in this area is limited to descriptive characterizations of data, the occasional use of inferential statistics and rich qualitative analyses improves the evidentiary base by increasing rigor and nuance. The findings reported in succeeding sections should be interpreted with this strength of evidence in mind.

Appendix D: NSI Indicators and Their Definitions

Table A1. NSI Indicators and Their Definitions

Defined Criminal Activity & Potential Terrorism Nexus Activity

NSI Indicator	*Definition*
Breach/Attempted Intrusion	Unauthorized personnel attempting to enter or actually entering a restricted area, secured protected site, or nonpublic area. Impersonation of authorized personnel (e.g., police/security officers, janitor, or other personnel).
Misrepresentation Behaviors	Presenting false information or misusing insignia, documents, and/or identification to misrepresent one's affiliation as a means of concealing possible illegal activity.
Theft/Loss/Diversion	Stealing or diverting something associated with a facility/infrastructure or secured protected site (e.g., badges, uniforms, identification, emergency vehicles, technology, or documents {classified or unclassified}), which are proprietary to the facility/infrastructure or secured protected site.
Sabotage/Tampering/Vandalism	Damaging, manipulating, defacing, or destroying part of a facility/infrastructure or secured protected site.
Cyberattacks	Compromising or attempting to compromise or disrupt an organization's information technology infrastructure.
Expressed or Implied Threat	Communicating a spoken or written threat to commit a crime that will result in death or bodily injury to another person or persons or to damage or compromise a facility/infrastructure or secured protected site.
Aviation Activities	Learning to operate, or operating an aircraft, or interfering with the operation of an aircraft in a manner that poses a threat of harm to people or property and that would arouse suspicion of terrorism or other criminality in a reasonable person. Such activity may or may not be a violation of Federal Aviation Regulations.

Potentially Criminal or Noncriminal Activities Requiring Additional Information During Vetting

NSI Indicator	*Definition*
Eliciting Information	Questioning individuals or otherwise soliciting information at a level beyond mere curiosity about a public or private event or particular facets of a facility's or building's purpose, operations, security procedures, etc., in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.
Testing/Probing Security	Deliberate interactions with, or challenges to, installations, personnel, or systems that reveal physical, personnel, or cybersecurity capabilities in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.
Recruiting/Financing	Providing direct financial support to operations teams and contacts or building operations teams and contacts; compiling personnel data, banking data, or travel data in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.
Photography	Taking pictures or video of persons, facilities, buildings, or infrastructure in an unusual or surreptitious manner that would arouse suspicion of terrorism or other criminality in a reasonable person. Examples include taking pictures or video of infrequently used access points, the superstructure of a bridge, personnel performing security functions (e.g., patrols, badge/vehicle checking), security-related equipment (e.g., perimeter fencing, security cameras), etc.

Observation/Surveillance	Demonstrating unusual or prolonged interest in facilities, buildings, or infrastructure beyond mere casual (e.g., tourists) or professional (e.g., engineers) interest and in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person. Examples include observation through binoculars, taking notes, attempting to mark off or measure distances, etc.
Materials Acquisition/Storage	Acquisition and/or storage of unusual quantities of materials such as cell phones, pagers, radio control toy servos or controllers; fuel, chemicals, or toxic materials; and timers or other triggering devices, in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.
Acquisition of Expertise	Attempts to obtain or conduct training or otherwise obtain knowledge or skills in security concepts, military weapons or tactics, or other unusual capabilities in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.
Weapon Collection/Discovery	Collection or discovery of unusual amounts or types of weapons, including explosives, chemicals, and other destructive materials, or evidence, detonations or other residue, wounds, or chemical burns, that would arouse suspicion of terrorism or other criminality in a reasonable person.
Sector-Specific Incident	Actions associated with a characteristic of unique concern to specific sectors (e.g., the public health sector), with regard to their personnel, facilities, systems, or functions in a manner that would arouse suspicion of terrorism or other criminality in a reasonable person.