The Feasibility and Utility of The Terrorist Radicalization Assessment Protocol (TRAP-18): A Review and Recommendations

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Conflicts of Interest

The authors have no conflicts of interest to declare. All authors have undergone online training on the TRAP-18 in 2021 by the developer (Dr Reid Meloy) and has the TRAP-18 manual.

Abstract

The ability to accurately predict the risk of an individual committing an act of targeted violence is likely to be impossible given the low base rate of these acts (Goodwill & Meloy, 2019). Nevertheless, prevention is possible if there is a focus on fact-based behaviors, and threat management is in place. The Terrorist Radicalization Assessment Protocol (TRAP-18; Meloy et al., 2015; Meloy & Gill, 2016; Meloy, Habermeyer, & Guldimann, 2015; Meloy, 2017) is a collection of 18 behavior-based warning signs for terror incidents. There are eight proximal characteristics and ten distal characteristics. The aim of this review was to identify studies which have utilized the TRAP-18 either prospectively (operational use) or retroactively or studies which have investigated the validity and reliability of the TRAP-18. A total of 17 relevant papers were identified in the review including six case studies and eleven empirical papers.

Keywords: TRAP-18; Threat Assessment; Targeted Violence; Terrorism; Radicalization; Lone-Actor Terrorist; Warning Behaviours; Terrorist; Risk Assessment; Mass Shootings; Mass shooters; Targeted Violence

Short Statements

- Six case studies were identified in this review which utilized the TRAP-18 retrospectively.

- Eleven studies were identified in this review which utilized the TRAP-18 to retroactively evaluate terrorist incidents.

- The majority of studies in this review has found the focus on 18 empirically based and potentially observable patterns of behavior to be a useful approach for the early detection and case management of radicalization processes.

The Threat Assessment Approach

The ability to accurately predict the risk of an individual committing an act of targeted violence is likely to be impossible given the, thankfully, low base rate of these acts (Goodwill & Meloy, 2019). Nevertheless, prevention is possible if there is a focus on fact-based behaviours, and threat management is in place (Meloy & Hoffmann, 2014; Goodwill & Meloy, 2019). It is also useful to highlight how behavioural threat assessment and management (BTAM) and violence risk assessment differ. They are similar but each focuses on different aspects. The main focus of threat assessment and management is on the identification, assessment, and management of a person of concern (POC) in real time. Particular attention is given to the target, threat enhancers, threat mitigators and the situation. On the other hand, traditional "violence risk assessment" involves the "determination of relative risk in an individual at a particular point in time by determining the base rate of violence for the group within which he or she belongs" (Guldimann & Meloy, 2020, pp. 160). The threat assessment and management approach is often more dynamic and urgent. Although the risk assessment approach is often more focussed on static characteristics (Guldimann & Meloy, 2020), violence risk assessment tools may also consider more dynamic characteristics**.** However, the behavioural threat assessment should always be accompanied by a management strategy, which presents a significant difference between BTAM and traditional violence risk assessment Professionals may employ violence risk assessment instruments and ultimately determine that there is no need to further engage with the client. Professionals employing behavioural threat assessment should employ a management plan regardless of their assessment since the two should always be used together in order to affect the dynamic factors that either enhance or mitigate future violence.

Furthermore, threat assessment differs from risk assessment in that it involves three functions: identify, assess, manage; while violence risk assessment attempts to predict an individual's capacity to react to situations violently (Miller 2014). In short, threat assessment is not intended to simply determine an individual's capacity to violence but to intervene and prevent. Although traditional violence risk assessment tools differ from threat assessment, they are not conflicting. In fact, violence risk assessment used in conjunction with a threat assessment approach may provide a more holistic picture of an induvial of concern, allowing for more informed management strategies that result in positive outcomes. The complimentary nature between the two-hold significant benefit for assessors and prevention practitioners as practitioners require empirically based modes of evaluation that assist them in accurately accessing persons of concern, determining risk factors, determining violent enhancers, identifying risk mitigators, triaging cases, and employing effective management strategies.

In threat assessment, it is important to be open to the wide variety of pathways and different roles in terrorism (e.g., violent actor or supporter) for a person of concern (POC) (Horgan, Shortland, & Abbasciano, 2018 – see also Borum, 2015). There are a variety of ways that individuals can become "involved

in terrorism" and the nature of their involvement can vary. Given this, it may be useful to consider that different individuals may pose different levels of risk depending on different roles/activities (different types of involvement) at different points in time (Borum, 2015). Additionally, Borum (2015) and others have also emphasised the importance of recognizing that large group factors (e.g., age, education) may or may not be applicable to the individual case (Horgan et al., 2018; Goodwill & Meloy, 2019).

As pointed out by Goodwill and Meloy (2019) there have been the development of six instruments which can be used by professionals for the purposes of assessing the risk or threat of terrorist violence. These include: The Extremism Risk Guide (ERG 22+), Islamic Radicalization (IR-46), Identifying Vulnerable People (IVP), Multi-Level Guidelines (MLG Version 2), Terrorist Radicalization Assessment Protocol (TRAP-18), and the Violent Extremism Risk Assessment (VERA Version 2 Revised) (Lloyd, 2019). This paper examines the TRAP-18 and evaluates its practical utility in identifying, assessing, and managing persons of concern.

The Terrorist Radicalization Assessment Protocol (TRAP-18, Meloy, 2017)

The Terrorist Radicalization Assessment Protocol (TRAP-18; Meloy et al., 2015; Meloy & Gill, 2016; Meloy, Habermeyer, & Guldimann, 2015; Meloy, 2017) is a collection of 18 behavior-based warning signs for terror incidents. There are eight proximal characteristics and ten distal characteristics. The eight proximal characteristics are those which typically are exhibited closer in time to the incident. On the other hand, the ten distal characteristics are those which are usually developed over time and are more distantly related to the act for which there is concern (Meloy & Gill, 2016; Meloy et al., 2015). While there is no universally agreed upon definition of terrorism, the term must be defined for the TRAP-18 to be discussed and assessed (Jenkins 1980). This paper uses the United States Federal Bureau of Investigation definition of terrorism in which terrorism is defined as the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives. This definition is used because the definition balances specificity with broadness to capture the varied targets and motivations than an attacker may have. Furthermore, this definition is applicable to many of the cases discussed in the paper and avoids the contentious discussion of state sponsored terrorism (Terrorism 2002-2005, FBI). Finally, the creator of the TRAP-18, Dr Reid Meloy has worked for several years alongside the FBI and acknowledges the effect that this experience may have on his own conception of terrorism. Terrorist threats have evolved from large-group conspiracies toward lone-offender attacks. These individuals often radicalize online and mobilize to violence quickly. Many of the examples explored in this paper focus on lone attackers. This paper uses a working definition of lone actor

terrorists developed during a definitional workshop by the Royal United Services Institute (RUSI). Lone-actor terrorism is defined as "the threat or use of violence by a single perpetrator (or small cell), not acting out of purely personalmaterial reasons, with the aim of influencing a wider audience, and who acts without any direct support in the planning, preparation and execution of the attack, and whose decision to act is not directed by any group or other individuals (although possibly inspired by others)" (Bakker & de Roy van Zuijdewijn, 2015). The distinction that this definition makes is important. Instead arguing that lone-attackers self-radicalize and engage in planned acts of violence uninfluenced by others with shared ideologies, the definition makes it clear that lone-actors do engage with others prior to an attack but are not directed by them or supported materially or logistically.

It is important to emphasize here that the developer of the TRAP-18 definitions outlined below are abbreviated and they should not be used as the basis for threat assessment without training in the use of structured professional instruments and the TRAP-18 manual (Meloy 2017). The eight proximal warning behaviors (Meloy & Gill, 2016; Meloy et al., 2015) include: (1) pathway (attack research, planning, or implementation), (2) fixation (abnormal preoccupation on an individual or cause), (3) identification (self-identification as a fighter/warrior/agent of change), (4) novel aggression (an initial violent action which is unrelated to the target), (5) energy burst (an increase I the frequency or variety of behaviors which are related to the targeted individual or cause leading up to a violent incident), (6) leakage (communication to an outside party of the individual's intent for violence which can be unconscious or conscious), (7) last resort (where the person feels that there is no other way to solve the grievance other than violence, and for that violence to be now – they feel violence is their only option), and (8) directly communicated threat (communication of violence to target or law enforcement before action) (Meloy & Gill, 2016; Meloy & O'Toole, 2011; Meloy, Hoffmann, Guldimann, & James, 2012; Silver, Horgan, & Gill, 2018). The eight warning behaviors capture behavioral or psychological patterns which constitute change and may evidence accelerating risk – they should be considered as patterns for analysis as opposed to being discrete variables (Meloy et al., 2012). They contain dynamic as opposed to static factors. Dynamic factors tend to offer more substantial contributions to the assessment and management of short-term violence which is usually the focus of threat assessment (Douglas & Skeem 2005; Guldimann & Meloy, 2020).

In the TRAP-18, the ten distal characteristics focus on the individual's lone-actor status. The 10 distal characteristics include: (1) personal grievance and moral outrage (confluence of factors shaping an individual to have a strong viewpoint about the targeted individual or cause), (2) framed by an ideology (justifying beliefs for action), (3) failure to affiliate with an extremist group (failure/rejection of individual with desired terrorist or other group), (4) dependence on virtual community (communication using social media and other online vectors with like-minded individuals), (5) thwarting of occupational goals (setback/failure in academic/life pursuits), (6) changes in thinking and emotions (thinking pattern becomes absolute and simplistic), (7) failure of sexual-intimate

pair bonding (individual fails to sexually or intimately bond), (8) mental disorder (historic or present major mental health disorder), (9) greater creativity and innovation (innovative terrorist action or process imitated by others), and (10) criminal violence (past criminal history) (Meloy & Gill, 2016).

It is important to emphasise that the TRAP-18 should not be considered or used as a psychological test or an actuarial risk assessment instrument. The TRAP-18 is a structured professional judgment instrument therefore it does not have empirically derived cut-off scores, norms or scores. The number of indicators which are present in the individual should not be counted to assess risk level. However, there is no requirement that such an instrument cannot have scores or norms to assist in professional judgment. Moreover, it is important to note that labelling an instrument as used for structured professional judgement does not mean its reliability and validity cannot or should not be assessed. For example, a person with distal characteristics, but no proximal warning behaviors, should be monitored, whereas the presence of even one proximal warning behavior would require active case management. This is, in effect, a rudimentary scoring system that can be tested for reliability and validity.

Each of the 18 indicators on the TRAP-18 are coded by the assessor as either present or absent. The assessor can also select 'Unknown' if there is insufficient evidence to determine whether the indicator is present or absent. The eight warning behaviors are coded first as they are believed to be more closely related in time to the act for which there is concern. If there no warning behaviors present, the distal characteristics are then coded. The TRAP-18 behaviors are considered patterns as opposed to being discrete variables (Meloy, 2017).

The developers of the TRAP-18 view it as being a complementary tool as opposed to being a competing product to other well-established instruments such as the VERA-2R (Pressman et al., 2016) or the ERG 22+ (Lloyd & Dean, 2011). The TRAP-18, unlike other risk assessments/tools, addresses behavioral as opposed to static risk factors (which are usually found in a person's life history) (Böckler et al., 2021). The presence of a cluster of TRAP-18 distal characteristics, coupled with the absence of all proximal warning behaviors means that the case should be monitored and reviewed on a regular basis. More active management resources are not yet warranted at this point. However, the presence of any one proximal warning behaviors would mean that active management of the case is required: face-to-face interview with the person of concern (POC) and/or collateral interviews with family or peers; review of records (e.g., employment, military, criminal, residence, driving, police incidents); safety plan development for school, work, home and the community at large; civil commitment, release, and discharge planning; social media monitoring; obtaining signed consents to communicate with the individual's psychotherapist, psychiatrist or case manager to monitor progress if they are receiving mental health treatment (Meloy & Genzman, 2016; Corner & Gill, 2015; Corner et al., 2016; Goodwill & Meloy 2019; Guldimann & Meloy, 2020).

In sum, the purpose of the TRAP-18 is not to predict acts of lone actor terrorism rather to prevent them by efficiently and effectively managing risk. This is a significant distinction. While it is tempting for terrorism prevention professionals to seek a method of effectively predicting acts of future violence, racialization and mobilization to violence is a nuanced, complex, and highly personal experience. The ability to effectively predict future acts of terrorism based on an individual's profile and behaviour is at worst highly unlikely and at best currently unattainable. Instead of providing the absolute of absolute foresight, the TRAP-18 allows for practitioners to analyse a subject of concerns behaviour through identified behavioural warning indicators and distinct characteristics that is repeatable (high inter-rater reliability). Application of the TRAP-18 also facilitates evidenced based practice, helps assessors to identify risk enhancers, informs informed decision making, and assist assessors in effectively managing an individual of concern so as to de-escalate them and move them down the pathway to intended violence. The TRAP-18 helps counterterrorism (CT) professionals. Through the assessment of the presence or absence of proximal warning behaviours and distal characteristics they can identify and prioritize cases (Meloy, 2017) in a more systematic (transparent) way and make any judgments more reliable (Borum, 2015).

Present Review

The aim of this review was to identify studies which have utilized the TRAP-18 either prospectively (operational use) or retroactively or studies which have investigated the validity and reliability of the TRAP-18.

Method

A total of five internet-based bibliographic databases were searched. Specifically, Journals@Ovid Full Text June 30, 2021; APA PsycArticles Full Text; APA PsycExtra 1908 to May 14, 2021; APA PsycInfo 1806 to June Week 4 2021 and, lastly, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) 1946 to July 01, 2021. The search on the five databases was carried out on 2nd July 2021. The search was not restricted by date. Search terms were applied to title. The following search criteria were entered into the six databases: TRAP-18 OR "Terrorist Radicalization Assessment Protocol". This search returned a total of 20 articles. Following the removal of duplications (n = 12) there were eight articles remaining, six of which were found to be relevant for the review (two were excluded from this review because they were literature review papers). As well as

the searches carried out on the five databases listed above, a number of permutations of TRAP-18 were entered into Google Scholar and searched for any potentially relevant articles which were not identified in the database searches. For instance, “radicalization assessment protocol”; TRAP-18; trap-18 AND “threat assessment”; trap-18 AND “radicalization assessment protocol”; trap-18 AND “actor”; trap-18 AND “risk assessment”; trap-18 AND terrorism; trap-18 AND “lone actors”; trap 18 AND “exploratory test”; trap 18 AND “multidimensional scaling”; trap 18 AND “reliability and validity”. This resulted in eight further studies which were identified as being relevant to the present review (see Figure 1. For PRISMA Flow Diagram of this process). Therefore, a total of 14 articles were identified in this review. Lastly, because this is a relatively under-researched field, the decision was made for the present systematic review to take an inclusive approach. Therefore, no exclusion criteria were applied. No restrictions were put in place for the year of publication.

On the 25th November 2021 an updated search was carried out on the same five databases used in the initial search. Specifically, Journals@Ovid Full Text November 24, 2021; APA PsycArticles Full Text; APA PsycExtra 1908 to November 08, 2021; APA PsycInfo 1806 to November Week 3 2021; and Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R) 1946 to November 24, 2021. A total of 26 articles were returned. After de-duplication there were 10 articles. Eight of them were found in the initial search, two were new articles and added to the review (Collins & Clark, 2021; Kupper & Meloy, 2021). Another article was identified by one of the reviewers of this manuscript (it did not have TRAP-18 in the title or any other permutation) (King et al., 2018).

Review protocol

To ensure a transparent and comprehensive report of results, this review followed the guideline outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement in order to ensure a thorough and accurate reporting of the methodology and results. (Liberati et al., 2009; Moher, Liberati, Tetzlaff, & Altman, 2009; Page et al., 2021).

Study selection

After carrying out the computerised search of the five databases, two reviewers independently assessed the records one by one and identified any titles which were not related to the focus of this review. In the second stage of the selection, two reviewers worked independently and assessed the records based on their titles and abstracts. The third and final stage involved the full-text screening of the records by both of the reviewers. Upon assessment, each reviewer independently made the decision as to which articles were eligible to be included in the review. There was no disagreement between the two reviewers (see Figure 1 for details of this process).

Results

A total of 17 relevant papers were identified in the review including six case studies and eleven empirical papers.

Case Studies where the TRAP-18 was Applied

Six case studies were identified which utilized the TRAP-18 retrospectively (Böckler, Hoffmann, & Zick, 2015; Böckler, Hoffmann, & Meloy, 2017; Erlandsson & Meloy, 2018; Meloy, Habermeyer, & Guldimann, 2015; Meloy & Genzman, 2016; Collins & Clark, 2021). See Table 1 for descriptive information and findings from each of these six case studies.

[Table 1 about here]

Six case studies examined the presence of the TRAP's eight warning behaviours. Between five and seven warning behaviours were present in each case. Four case studies examined the presence of the TRAP's ten distal characteristics. Between seven and nine indicators were present in each case (see Table 2. Six case studies and the TRAP-18).

[Table 2 about here]

See Table 3 for risk of bias for each of the six case studies.

[Table 3 about here]

Studies which have Utilized the TRAP-18 to Retroactively Evaluate Terrorist Incidents

Eleven empirical studies were identified which utilized the TRAP-18 to retroactively evaluate terrorist incidents (Böckler, Allwinn, Metwaly, Wypych, Hoffmann, & Zick, 2021; Brugh, Desmarais, & Simons-Rudolph, 2020; Challacombe & Lucas, 2019; García-Andrade et al., 2019; Goodwill & Meloy, 2019; Meloy, Goodwill, Meloy, Amat, Martinez, & Morgan, 2019; King et al., 2018; Kupper & Meloy 2021; Meloy & Gill, 2016; Meloy, Roshdi, Glaz-Ocik, & Hoffmann, 2015; Meloy, Goodwill, Clemmow, & Gill, 2021). See Table 4 for descriptive information and findings for each of the eleven empirical studies. Also, see Table 5 for the risk of bias in each of these eleven studies.

[Table 4 about here]

[Table 5 about here]

In their study, Böckler and colleagues (2021) looked at perpetrators of terrorist attacks and compared them to individuals who had been convicted of propagandistic and financial terrorist support and of travelling abroad to join a terrorist organization (Böckler, Allwinn, Metwaly, Wypych, Hoffmann, & Zick, 2021). Significant differences were found by Böckler and colleagues (2021) between the terrorist perpetrators and persons convicted of nonviolent Islamist activities. The significant differences were in the number of TRAP-18 items and also in the proximal warning behaviors, namely, “pathway,” “last resort,” “energy burst,” and “novel aggression.” Their findings indicate that some items on the TRAP-18 may have ‘greater explanatory value for severe targeted

violence' and are more accurate in differentiating between attackers and non-attackers. These items were "pathway" (most notably) as well as "novel aggression," "energy burst" and "last resort". Some potential limitations with their study was discussed by Böckler and colleagues (2021). For instance, those who left the country for Islamist motivation were put into the control (non-attacker group) and it is possible that violence could have been carried out abroad in some of these individuals. Indeed, in the sample of those who left Germany for Islamist motives, there were nine persons involved in acts of war or who used weapons of war. Despite this potential limitation, Böckler and colleagues (2021) made the decision to include these individuals into the non-attacker group (control) as their role in attempted acts of killing could not be proven in court (Böckler et al., 2021).

Findings from the study carried out by Challacombe and Lucas (2019) suggest that, overall, the warning indicators displayed by domestic terrorists (or sovereign citizens) are potentially different from the warning signs exhibited by traditional international terrorists. Additionally, they suggest that the absence of proximal warning behaviour, fixation, may be explained by the fact that it is difficult for raters/assessors to clearly identify fixation behaviours in the non-violent sample based on open source information Challacombe and Lucas (2019) point out one of the main potential limitations with their study, which is due to it being a retroactive evaluated incident, is the lack of information (Challacombe & Lucas, 2019).

The study by Goodwill and Meloy (2019) highlights the issue that because the data collection was conducted retrospectively, the time when proximal warning behaviors or distal characteristics started to present themselves in both groups was unavailable to the coders. This meant that analysis could not be performed looking at the sequence of when the TRAP-18 indicators first presented themselves in the individuals, for example. Time sequencing of these factors is argued to be an important research approach to studying acts of terrorism (Corner, Bouhana, & Gill, 2019). Such research can show the range of causal pathways to an attack. However, it is possible that the assignment of risk factors to distal or proximal could in itself implicitly connote temporality given the "exhaustive nature of the data collection process" (pp. 531). In their study, Goodwill and Meloy (2019) quantitatively showed that with the TRAP-18 there are two superordinate factors, proximal warning behaviors and distal characteristics. They also found in the attackers proximal warning behaviors are present but are largely absent in the non-attackers, while in both the attackers and non-attackers, distal characteristics were present. An interesting finding from this study was that three of the distal characteristics (personal grievance and moral outrage, ideological framing, and changes in thinking and emotion) were found to cluster with the proximal warning behaviors and also the attackers. This indicates that there is a stronger co-occurrence of these three distal characteristics in attackers compared to non-attackers. It is interesting to note here that these three distal characteristics are all related to motivation. These behaviors are also closely associated with political and social action, both violent and non-violent. Political and social motivations are commonly included criteria in defining terrorism as seen in Alex Schmid exhaustive study of the definitional problem of terrorism (Schmid, 2016). This also seemingly reflects a particular

understanding of terrorist violence underpinned by social identity theory and social movement theory. This observation is significant in that the instrument seemingly, intentionally skews towards ideological and identity-based violence. Due to information limitations, threat assessors may initially be unaware of whether a client has constructed a particular social identity and therefore may be unsure as to whether the instrument's use is appropriate. Clustering of these "strong" distal characteristics should indicate the likely presence of proximal warning behaviors to the threat assessor. If these three "strong" distal characteristics are exhibited it would indicate a greater likelihood of there being proximal warning behaviors present than any of the other seven distal characteristics (mental disorder, history of criminality, failure to affiliate with an extremist or other group, greater creativity and innovation, dependence on the virtual community, failure of sexually intimate bonding, and thwarting of occupational goals) (Goodwill & Meloy, 2019).

Meloy and colleagues (2019) found that, in the attackers compared to the non-attackers, the proximal warning behaviors of pathway, identification, energy burst, and last resort were significantly more frequent, and directly communicated threat was significantly less frequent. In the majority of the attackers, each proximal warning behavior was present – with the exceptions being novel aggression (36%) and directly communicated threat (18%). At least one proximal warning behavior was identified in every attacker in the sample. Only two of the proximal warning behaviors (novel aggression and directly communicated threat) occurred in most of the non-attackers. outline some of the potential limitations with their study. There may be issues with regards to representation bias and selection bias as the samples were relatively small and non-random. Also, there was significant time frame and demographic differences between the attackers and the non-attackers (and they were also not matched). Therefore, the possibility that other unknown factors could have contributed to the differences in the TRAP-18 findings cannot be ruled out. There was also not sufficiently reliable data available to determine whether or not the attackers had been risk managed. The sample size was relatively small which meant that any differences between those non-attackers who were successfully risk managed could not be analysed, and those who had no intent to begin with. Meloy and colleagues had to collapse both these two groups into the "nonattack" group (Meloy, Goodwill, Meloy, Amat, Martinez, & Morgan, 2019).

The study by Meloy and Gill (2016) found that the TRAP-18 appears to have utility as an investigative template and organizing tool for threat assessment professionals. One of the findings from this study was that the successful attackers were significantly more fixated, creative, and innovative, and failed to have a prior sexually intimate pair bond when compared to the thwarted attackers. It was also found that they were significantly less likely to have exhibited pathway warning behavior and be dependent on a virtual community of likeminded true believers. This is an interesting finding regarding the differences between the successful versus thwarted attacks. However, Meloy and Gill (2016) point out that these differences need to be considered in light of the possibility that the TRAP indicators which discriminated between the successful versus the thwarted attackers may be a product of artifacts which are currently unknown. Whether

the individual ends up in the thwarted or successful attacker category may be influenced by a range of unknown factors (e.g., pre-emptive policing, tips, luck) and may not be related to the five TRAP indicators which discriminated between the two groups (Meloy & Gill, 2016).

Meloy and colleagues (2015) found good-to-excellent interrater reliability and content validity with the TRAP-18 when applied to a small sample of individual terrorists in Europe—both lone actors and members of autonomous cells. They state that one of the potential limitations with their study is that the information that they gathered was secondary (e.g., Internet search engines, online newspaper articles) and not primary (e.g., court records, psychological assessment report, police investigative reports), which may impact on the reliability and validity of the findings. However, in order to address this, the researchers confirmed all data from a minimum of two independent sources (Meloy, Roshdi, Glaz-Ocik, & Hoffmann, 2015). In their independent study, García-Andrade and colleagues (2019) found that the TRAP-18 could be a useful tool for assessing the risk of terrorist radicalisation in the mentally ill patient, particularly in the group of people with severe mental illness in situations of social exclusion and with a prison record, who have an increased potential risk of terrorist radicalistion as lone-actors. Only two patients (of the 13 repeat offenders) were identified as having carried out a further extremist violent act. Nevertheless, the findings from this study suggest a significant difference in terms of the total score (number of indicators present or absent) on the TRAP-18 (and on the subscales of proximal warning behaviours and distal characteristics) between the groups with and without extremist violence. Specifically, the extremist violence group were found to have significantly higher scores (number of indicators on the TRAP-18 present). Another interesting finding from this study was that the total score of the TRAP-18 was superior to that of the two subscales of proximal warning behaviours and distal characteristics (separately) with regards to predictive precision of for future acts of extremist violence (García-Andrade et al., 2019).

Meloy, Goodwill, Clemmow and Gill (2021) found that nearly of all the distal characteristics are antecedent to the proximal warning behaviors on the TRAP-18. The only single exception to this was the proximal warning behavior of fixation. The indicator Fixation was found to precede the distal characteristic of changes in thinking and emotion. Meloy and colleagues suggest that one possible explanation for this observed temporal reversal may be the due to the fact that both of these indicators reflect cognitive changes in thinking that may be challenging to identify when they first developed (or ended) accurately – the temporal sequence of these indicators, in other words. This study did find that there were roughly similar number of instances of fixation preceding ideology and ideology preceding fixation which indicates that ideological framing may cause a fixation which is pathological or ideology framing may result from a pathological fixation. Meloy and colleagues (2021) also states that their finding would indicate that pathway, leakage, and on in some cases, directly communicated threat may be critical points for intervention. One of the key potential limitation with the study by Meloy and colleagues (2021), which they acknowledge in their paper, is that the sequence analysis they carried out “does not account for mediating variables that could be in the sequence but have not

been measured" (pp. 15). Time sequencing explores the temporal relationship between variables, it does not explore cause and effect. Time sequencing also does not measure the duration which an indicator is exhibited/present length or the time that the presence of an indicators begins and ends. Rather, time sequencing is a "before and after" method which is used to 'quantify data and understand their meaning' (Meloy, Goodwill, Clemmow, & Gill, 2021).

Only one of the eleven empirical papers investigating the TRAP-18 found some potential limitations with it (which will be discussed within the context of the methodological limitations of the study itself) (Brugh et al., 2020). Brugh, Desmarais and Simons-Rudolph (2020) were the first study to investigate the feasibility and applicability of the TRAP-18 to a sample of only jihadism-inspired lone actors and to compare lone actors who endorse the same ideology across two sociopolitical contexts. This study is also the first to investigate the priority recommendations provided by the TRAP-18. Overall, this study indicates that the TRAP-18 indicators are relevant for lone-actor terrorists given the higher number of indicators rated as present compared to absent. However, the finding that there was, on average, a range of indicators rated as present starting at just one and less than half of items rated as present, may suggest some issues regarding the applicability of the TRAP-18 indicators across lone actors. Specifically, findings from this study showed that the majority of the lone actors in this study were still recommended for Active Monitoring or Active Risk Management (the TRAP-18 framework's two priority recommendations) even though a number of the indicators on the TRAP-18 were given a rating of unknown. It could be argued that all individuals in this study should have received at least one of the priority recommendations given that they were all known lone actor terrorists. However, three false negatives were produced following the TRAP-18 framework. False negatives are individuals who were involved in the planning or perpetration of a lone actor terrorist plot but were not recommended for any of the priority categories. One of the possible explanations for these false negatives is that the three individuals in this study had exhibited indicators which are currently not included on the TRAP-18. Another explanation may be that the authors applied too rigorous an interpretation of "clustering" for the Active Monitoring priority recommendation.

Findings from the study by Brugh and colleagues (2020) also showed that two to four of the indicators on the TRAP-18 (Fixation, Energy Burst, Leakage, and Dependence on the Virtual Community) may be more commonly present and potentially of greater relevant for the US lone actors when compared to the European lone actors. This may be explained by the fact that in nine of the US lone actors compared to only one of the European lone actors involved sting operations which produce all of information on various items related to the TRAP-18. Or these difference between the United States lone actors and the European lone actors may be due to the significant influence of Western (most notably, American) researchers in the terrorism field (Brugh et al., 2020). The findings by Brugh and colleagues (2020) also indicated that there are potential challenges in completing the TRAP-18 when only relying on publicly available information. Specifically, they found that only four of the 18 indicators (Pathway, Identification, Personal Grievance, Framed by Ideology) were rated present

more often than absent or unknown. The TRAP-18 indicators were also found to be of more relevance to the United States lone actors, who had a higher average number of indicators rated as being present. This may be due to the way that these cases are reported on in their respective geographical contacts (United States and Europe). Much of the research in this area relies on open-source data which includes the news. In this study, 12 out of the 18 TRAP-18 indicators (half were proximal warning behaviours and half were distal characteristics) were rated as unknown more often compared to present or absent. Generally, these 12 low-feasibility indicators reflected details regarding the mental state of the lone actor (Fixation, Energy Burst, Last Resort, Changes in Thinking and Emotion, and Mental Disorder), prior violence (Novel Aggression and Criminal Violence), vocational success (Thwarting of Occupational Goals), interpersonal relationships (Failure of Sexual-Intimate Pair Bonding and Failure to Affiliate with an Extremist or Other Group) and communications (Leakage, Directly Communicated Threat). Given that there are less proximal warning behaviours (n = 8) compared to distal characteristic (n = 10), it would appear that proximal warning behaviors may be more difficult to rate based on information which is publicly available which is unsurprising given the tendency for distal characteristics to reflect historical information which is typically documented. In this study, indicators which reflect planning or preparation for an attack (Pathway and Creativity and Innovation) and the ideological motivation of the individual (Identification, Personal Grievance and Moral Outrage, and Framed by an Ideology) were coded more easily by assessors. This would indicate that information regarding these elements are more likely to be captured in public records when compared to information about the social and interpersonal context of the individual. This led the authors to suggest that the TRAP-18 may be more suitable for postdictive (retrospective) analyses when there exists a significant amount of information is publicly available (e.g., court document, psychiatric reports, substantial levels of report in the media on the case).

However, there are a number of potential limitations with this study by Brugh and colleagues (2020) that need to be considered in relation to their findings. The focus of this study on jihadism-inspired lone actor terrorists means that lone actors across a range of ideologies was not explored with the TRAP-18 in terms of the relevance of the items and priority recommendations from assessments. Some other limitations which this study include the fact that only information which was publicly available was used to populate the dataset in this study and the information was somewhat restricted to sources which were written in English. These limitations may mean that more accurate coding on all of the TRAP-18 indicators may have been possible if the researchers had access to all of the relevant documents or testimony, for instance. Some of the indicators on the TRAP-18 (such as Changes in Thinking and Emotion) may only be possible to complete as being present or absent (for example) following an interview with the POC or based on information obtained from close family or friends (Brugh et al., 2020).

In terms of risk of bias, four of the six case studies (Böckler, Hoffmann, & Meloy, 2017; Erlandsson & Meloy, 2018; Meloy, Habermeyer, & Guldimann, 2015; Meloy & Genzman, 2016) and six of the eleven empirical studies (Goodwill & Meloy, 2019; Kupper & Meloy 2021; Meloy, Roshdi, Glaz-Ocik, & Hoffmann, 2015; Meloy & Gill, 2016; Meloy, Goodwill, Meloy et al., 2019; Meloy, Goodwill, Clemmow, & Gill, 2021) was co-authored by the developer the TRAP-18 (Dr Reid Meloy). The large number of studies carried out to date involving the developer of the TRAP-18 is reflective of the fact that the TRAP-18 is a relatively newly developed tool and it not as well-known yet amongst various researchers and professionals as a result.

Discussion

Six case studies were identified which utilized the TRAP-18 retrospectively (Böckler, Hoffmann, & Zick, 2015; Böckler, Hoffmann, & Meloy, 2017; Collins & Clark, 2021; Erlandsson & Meloy, 2018; Meloy, Habermeyer, & Guldimann, 2015; Meloy & Genzman, 2016). Eleven studies were identified which utilized the TRAP-18 to retroactively evaluate terrorist incidents (Böckler, Allwinn, Metwaly, Wypych, Hoffmann, & Zick, 2021; Brugh, Desmarais, & Simons-Rudolph, 2020; Challacombe & Lucas, 2019; García-Andrade et al., 2019; Goodwill & Meloy, 2019; King et al., 2018; Kupper & Meloy 2021; Meloy, Goodwill, Meloy, Amat, Martinez, & Morgan, 2019; Meloy & Gill, 2016; Meloy, Roshdi, Glaz-Ocik, & Hoffmann, 2015; Meloy, Goodwill, Clemmow, & Gill, 2021). All studies in this review involved TRAP-18 indicators being assessed and coded based on past events. This retroactive study may result in hindsight or confirmation bias during the application of the TRAP-18 to the case (Goodwill & Meloy, 2019). Another potential limitation of all the studies carried out is the retrospective analysis of data which already exists (non-operational use of the TRAP-18) means that no follow-up research or additional information can be obtained. Future research could explore the utility of the TRAP-18 in operational, prospective, use. Another source of bias with all the studies included in this review is overconfidence that the data are complete.

The majority of studies in this review has found the focus on 18 empirically based and potentially observable patterns of behavior to be a useful approach for the early detection and case management of radicalization processes. Studies identified in this review have also found the TRAP-18 to have excellent interrater reliability (e.g., Challacombe & Lucas, 2018; Meloy, Roshdi,, et al., 2015) and criterion validity on samples of individual terrorists and autonomous terrorist cells (e.g., Meloy & Gill, 2016; Meloy, Roshdi, et al., 2015). The findings from the five case studies published to date has also found the TRAP-18 to have utility (Bockler, Hoffmann, & Meloy, 2017; Bockler, Hoffmann, & Zick, 2015; Erlandsson & Meloy, 2018; Meloy & Genzman, 2016; Meloy, Habermeyer, & Guldimann, 2015).

Only one study identified potential challenges with completing the TRAP-18 when relying only on public information. Specifically, they found that only four of 18 indicators on the TRAP-18 (Pathway, Identification, Personal Grievance, Framed by Ideology) were rated present more often than absent or unknown. Their findings indicated that there is a greater relevance of TRAP-18 items to US lone actors, when compared to the European jihadism-inspired lone actors, who had a higher average number of items rated present (Brugh et al., 2020). The findings by Brugh and colleagues (2020) show that there are potential challenges in completing the TRAP-18 when only relying on publicly available information. Specifically, they found that only four of 18 items (Pathway, Identification, Personal Grievance, Framed by Ideology) were rated present more often than absent or unknown. They also found that there was a higher average number of indicators rated as present in the US lone-actors indicating that the indicators in the TRAP-18 have a greater relevance to this particular population.

As a threat assessment instrument, the TRAP-18 is designed for use with persons who have been identified because of some kind of threatening or concerning behavior. We do not know how this population of individuals would differ from potential terrorists who do not come to the attention of a threat assessment team. One implication of this observation is that retrospective studies of persons who committed a terrorist act are not necessarily comparable to individuals who come to the attention of a threat assessment team.

This review identified six case studies of high profile terrorist attacks in which the TRAP-18 was applied retrospectively. It is important to acknowledge the limitations of this approach since the case study researchers could select cases that seemed to match the TRAP-18 criteria, giving an inflated impression of validity. Another limitation is that most the studies in this review rely on secondary sources such as new reports that might not have detected or revealed some of the proximal warning signs or distal factors - retrospective case studies are vulnerable to hindsight and confirmatory bias. Additionally, all eleven empirical studies identified in this review were retrospective studies that compared persons who committed violence terrorist attacks with a comparison group, typically individuals with similar political or religious views who did not commit a violent attack. The studies use small samples of convenience, with statistical analyses of limited power and without the ability to replicate findings that might be produced by using so many predictors in relatively small samples.

Limitations

Measures were taken to minimise the risk of missing relevant articles. Nevertheless, the possibility of missing eligible articles can never entirely be excluded.

Clinical and Legal Implications

As previously pointed out by Guldimann and Meloy (2020), the application of instruments like the TRAP-18 is just the first stage. For threat management to be effective and successful it requires an interdisciplinary approach involving collaboration and discussion between police, law enforcement, forensic and general mental health professionals as well as other experts. The developers of the TRAP-18 (e.g., Meloy et al., 2015, Meloy, 2017) recommend that it is used in conjunction with other assessment tools, such as the Multi-Level Guidelines for the Assessment and Management of Group-Based Violence (MLG; Cook et al., 2013) and the VERA (Pressman, 2009) as multimethod assessment practice provides increased accuracy (Meloy, Roshdi, Glaz-Ocik, & Hoffmann, 2015).

One of the empirical studies identified in this review (Guldimann & Meloy, 2020) highlighted that any given case is much more complex than is suggested by empirical results or analogies. The clustering of three "strong" distal characteristics (personal grievance and moral outrage, ideological framing, and changes in thinking and emotion) with the proximal warning behaviors in the study carried out by Goodwill and Meloy (2019) would indicate that active management of the case is required even when no proximal warning behaviors are present. This conclusion is significant in that the presence of proximal warning behaviors indicates potential imminence, a determining factor in how to triage cases and determine resource allocation. Furthermore, having an agreed upon method of determining imminence in the management of persons of concern is paramount to the very multidisciplinary collaborative practices that Meloy and colleagues proposed. The strength that multidisciplinary approaches have is that they leverage diverse professional perspectives and methods and means for management. But this instrument has further utility regarding resource allocation in threat investigations and management.

The instruments use of 18 distinct warning behaviours may assist threat investigators and evaluators in determining their data collection requirements. Although there are benefits to collecting as much data as possible on a person of concern as it may aid on providing the most holistic picture of the induvial, their behavioural history, the risk of violence that they pose, their behavioural trajectory, and potential mitigation strategies. However, the amount of data that an evaluator may access through open-source methods, criminal justice databases, financial sources, mental health and medical records can be overwhelming and take significant time to organize and evaluate delaying the implementation of interventions, a significant concern when there is imminent threat to life and danger to public safety. Utilizing the 18 proximal and distal warning behaviours may assist in determining what types of information will be of value and streamline the collection process.

Furthermore, this instrument is not used to provide a clinical diagnosis and is used to identify behaviors and characteristics, making it accessible to mental health professional and public safety officials. Therefore, it lends itself to be widely used across professional disciplines engage in threat management,

especially public safety professionals with limited to no clinical experience. Since clinical experience is unnecessary in the application of the instrument, the findings from an assessment can be produced during clinical proceedings, and the instruments validity ensures that its use is defensible in criminal proceedings.

Future Research Directions

The need for more independent research investigating the utility of the TRAP-18

Research exploring the TRAP-18 is still relatively in its infancy. There is a need for additional research by more independent groups with independent samples in order to further investigated if the TRAP-18 is effective (Meloy, Roshdi, Glaz-Ocik et al., 2015; Meloy & Gill, 2016). Such independent research is encouraged to have larger samples and known outcome (postdictive) designs (Meloy & Gill, 2016) and also larger, prospective research studies (García-Andrade et al., 2019). There is also a need for more studies in which the instrument is evaluated within an operational context such as the 2019 TRAP-18 study involving data from Canada and the United States (Meloy, Goodwill, Meloy et al, 2019). This would require operational entities such as law enforcement and mental health professionals to make their data publicly available while respecting anonymity and client confidentiality.

Need to investigate and identify possible protective factors

One possible limitation of the TRAP-18 is that there is an absence of any possible protective factors (Goodwill & Melo, 2019). Research exploring and identifying some of the key protective factors would be useful and could potentially be integrated into the TRAP-18 assessment. Gill (2015) has also highlighted the lack of understanding around protective factors. Importantly, Gill points out that there is a focus on identifying "risk factors" only and this approach may lead to confirmation bias. Research is required to try and identify the relevant protective factors. Protective factors can be individual factors (e.g., attitudes, self-control, personality factors), peer factors (e.g., close relationships with noncriminal peers, prosocial norms within peer group, number of affective relationships), and family factors (e.g., highly connected to family) (Gill, 2015). Conversely, peer and familial factors demonstrate how potential protective factors may also present as risk factors (high levels of connectivity within unstable homes, trauma bonding within familial violence, familial ties to extremist networks).

Possible unknown and potentially redundant existing indicators on the TRAP-18

Related to the absence of protective factors, there may also exist other factors/indicators (both proximal warning behaviours and distal characteristics) that have been systematically overlooked which are more relevant to European lone actors compared to US lone actors. Research investigating risk factors for engaging in terrorism has, to date, does not appear to explore both 'individual-level and environmental or situational characteristics' which is particularly critical to do in research involving comparisons between terrorist actors across a range of geographic regions. Supporting the importance of addressing this gap in the research, studies have identified in terms of the societal-level drivers of lone-actor terrorism between the US and Europe (Brugh et al., 2020). There may also be variables that contribute as much content validity to understanding the problem of individual terrorism as those within the TRAP-18 that have yet to be identified more generally as well. Meloy and colleagues (2015) have also asserted that there may be redundancy among the 18 variables which is something which needs further exploration (Meloy, Roshdi, Glaz-Ocik, & Hoffmann, 2015).

Evaluating the utility of the TRAP-18 in the context of routine practice

The feasibility and utility of the TRAP-18 should be further explored when it has been completed by a sample of evaluators in the context of routine practice. To date, research has only tested the feasibility and utility of the TRAP-18 in the context of research (by researchers). If future studies are carried out by researchers they should not only rely on publicly available information (public records) but also other data sources (e.g., collateral informants, interviews with family, friends, co-workers) (Brugh et al., 2020). Studies to date investigating the TRAP-18 have relied predominantly on secondary information (e.g., Internet search engines, online newspaper articles) and to a significantly less extent (if at all) primary information (e.g., court records, psychiatric reports, police investigative reports). The heavy reliance on secondary data reduces reliability and validity of the study.

Exploring how evaluators make decisions about priority recommendations using the TRAP-18

The study by Brugh and colleagues (2020) points to the need for further study to investigate prevalence of the TRAP-18 priority recommendations (how assessors make decisions regarding these) and how others may interpret and apply "clustering". In their paper Brugh and colleagues recommended that one of

the first steps should be to not apply such a rigid definition across all cases (as they did in their own study) in order to afford discretion and reduce the likelihood of a false negative. Research could therefore examine how others interpret and apply "clustering" (Brugh et al., 2020).

Exploring differences in the TRAP-18 indicators depending on variables (e.g., type of terrorism and ideology)

Additionally, empirical research is also needed to explore whether there are differences in TRAP-18 indicators depending on the 'country of origin, sampling or analysis' (Goodwill & Meloy, 2019). The feasibility and utility of the TRAP-18 on a range of types of domestic terrorism is another useful area for further research (Challacombe & Lucas, 2019). Further research also needs to explore whether there are differences in the TRAP-18 depending on the type of ideological framing the individual has embraced. For example, the presence of beliefs that justify the terrorist's intention to act whether a religious or political belief system single issue conflict or an idiosyncrasy (García-Andrade et al., 2019).

Should the three distal characteristics (personal grievance and moral outrage, ideological framing, and changes in thinking and emotion) be included in the proximal warning behavior section?

Goodwill and Meloy's (2019) finding of three distal characteristics (personal grievance and moral outrage, ideological framing, and changes in thinking and emotion) which could be more pragmatically belong with the proximal warning behaviors needs further study (Goodwill & Meloy, 2019).

Cultural and Political Considerations

In examining the utility of the TRAP-18, an area of concern arises. How applicable are the 18 warning behaviours and indicators across cultures, political beliefs, and identities? Assessors and prevention practitioners must assess and manage individuals of concern across a diverse spectrum of cultural backgrounds, political affiliations, and identities (ethnic, racial, gender, and religious). Therefore, in identifying areas for future research, it becomes apparent that the TRAP-18 ability to assess individuals across cultures effectively should be evaluated. Several of the eight proximal warning behaviors question the instrument's ability to achieve this goal. For example, fixation and identification may be the result of an individual's identity, cultural background, and the lived experience of their

identity group. Individuals from nations that were once colonial holdings may fixate on causes such as imperialism and apartheid based on a shared identity and cultural memory. Furthermore, they may identify with anti-colonial figures who engaged in violence to liberate their countries from colonial powers. Individuals may dress like these "heroic figures" due to a sense of national pride rather than displaying an indicator that they are on the pathway to violence. The issue of cultural reference and cultural sensitivity can be observed when examining the ten distal characteristics. Personal grievance, thwarting of occupational goals, and criminal violence may be significantly influenced at the induvial level by societal factors such as intergenerational familial criminal activity and access to employment based on discrimination.

These examples demonstrate challenges that may exist in applying this instrument across cultures and the need for further study. The fact that the instrument is a structured professional judgment should be taken into account when constructing future studies. Some of the concerns might be addressed if the assessor using the TRAP-18 has a high level of cultural competence and sensitivity regarding the individual's culture whom there are accessing. However, conversely, the problem may be made worse if the assessor is not culturally oriented to the individual's identity that they are accessing. Since the population of individuals who have engaged in acts of lone-actor targeted violence and terrorism is diverse, further research in this area is imperative.

Conclusion

The aim of this review was to identify studies which have utilized the TRAP-18 either prospectively (operational use) or retroactively or studies which have investigated the validity and reliability of the TRAP-18. A total of 14 relevant papers were identified in the review including five case studies and nine empirical papers. The majority of studies in this review has found the focus on 18 empirically based and potentially observable patterns of behavior to be a useful approach for the early detection and case management of radicalization processes.

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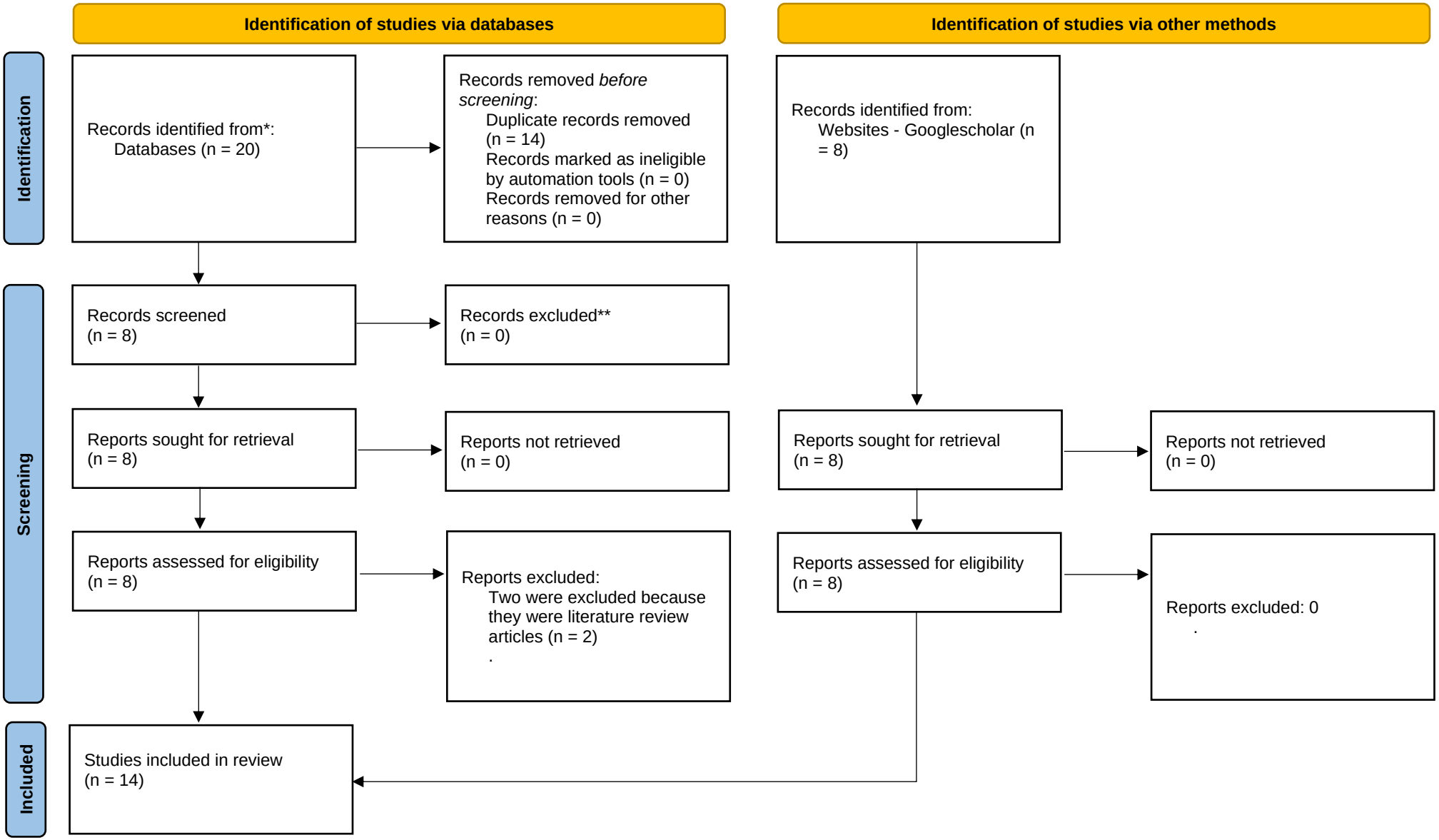
Terrorism 2002-2005. U.S. Department of Justice. Federal Bureau of Investigation. Available: https://www.fbi.gov/stats-services/publications/terrorism-2002-2005

Figure 1.


Identification of studies via databases
Identification of studies via other methods
Identification
Screening
Included
Records identified from*:
Databases (n = 20)
Records removed *before screening*:
Duplicate records removed (n = 14)
Records marked as ineligible by automation tools (n = 0)
Records removed for other reasons (n = 0)
Records identified from:
Websites - Googlescholar (n = 8)
Records screened
(n = 8)
Records excluded**
(n = 0)
Reports sought for retrieval
(n = 8)
Reports not retrieved
(n = 0)
Reports sought for retrieval
(n = 8)
Reports not retrieved
(n = 0)
Reports assessed for eligibility
(n = 8)
Reports excluded:
Two were excluded because they were literature review articles (n = 2)
.
Reports assessed for eligibility
(n = 8)
Reports excluded: 0
.
Studies included in review
(n = 14)

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71. For more information, visit: http://www.prisma-statement.org/

Table 1. Six case studies which have Utilized the TRAP-18 retrospectively.

Authors	**Case**	**Method**	**Main Findings**
Böckler, Hoffmann, & Zick (2015)	Case of the Frankfurt Airport attack in 2011 in which a 21-year-old man shot several U.S. soldiers, murdering 2 U.S. airmen and severely wounding 2 others. "U," who has Kosovan and Serbian citizenship, was born in 1990. He was the second of three children and lived in Germany since he was 5 years old. He was convicted and sentenced to life imprisonment for the murder of U.S. soldiers in two cases as well as	Case study based on an extensive qualitative analysis of investigation and court files. Approx. 8,200 pages of data were analyzed which included testimonies of the perpetrator, family members, friends, acquaintances, and teachers as well as investigation reports and psychological assessments. As the authors coded the material, they focused on: 1. Sequences of biographical events in the perpetrator's life to identify personal crises, turning points, and triggers leading to changes in his thinking, emotions, and behavior. 2. Testimonies and writings of the perpetrator himself to gain insights into his perception,	**Proximal warning behaviors** Pathway (e.g., consumption of jihadist material online; visiting mosques to hear radical preachers; research on ideology and former terror attacks). Fixation (e.g., fixation on personal grievances; fixation on the suffering of Muslims and the evilness of the United States). Identification (e.g., identification with jihadist ideology (duty to Jihad); identification with mujahedeen; identification with ummah). Novel aggression - None Energy burst (e.g., intensification of religious practices and consumption of ideological material; upload of tons of jihadist material on computer and music-player) Leakage (e.g., chat messages which legitimize jihadist violence and glorify martyrdom; writings in chats and forums about stabbing kuffars with a knife or burning them). Direct threat - None Last resort (e.g., action imperative; felt he had to do something after viewing fake rape videos). **Distal characteristics**

	attempted murder in three cases. He had no previous convictions. Based on psychological assessment, he was criminally liable because he had no personality disorder or mental illness.	self-concept, and implicit theories as well as conscious and unconscious motives for behavior. 3. The perpetrator's habits and actions observed by the social environment to discern escalating and warning behaviors in the lead up to the attack. 4. Constant or changing social networks and social reactions that were meaningful to the perpetrator to make out associates and enemies as well as to understand exacerbating and mitigating effects on the perpetrator's behavior, thinking, and emotions.	Personal grievance and moral outrage (e.g., Father's disease, failure in school, disappointment of parents, loss of job, bad financial situation; moral outrage about the occupation of Islamic countries by the West). Framed by an ideology (e.g., turn toward unambiguous radical contents of jihadist ideology). Failure to affiliate with an extremist group (e.g., social fears inhibit establishment of contacts). Dependence on the virtual community (e.g., research on religion and ideology via Internet; exchange about ideology mainly via chat programs and forums). Thwarting of occupational goals (e.g., failure in school; inability to find a proper position as an apprentice; expirations of employment contracts). Changes in thinking and Emotion (e.g., successive socialization toward extremism; adaption of black-and-white thinking with a simultaneous decrease in tensions and ambiguity; increasing commitment to the cause). Failure of sexual-intimate pair bonding and the sexualization of violence (e.g., never had a girlfriend or a sexual relationship; he usually invoked religious reasons as a rationalization). Nexus of psychopathology and ideology (e.g., criminal liability; fragile self-worth; inhibited social assertiveness; fragmented identity; pessimistic sentiment; clinical depression). Greater creativity and Innovation (e.g., deviation from the widespread modus operandi of Al Qaida bombings; military targets in a civilian setting; execution of the attack with a pistol and a knife). Prior criminal violence by history – None.
Böckler, Hoffmann, & Meloy (2017)	Case of 24-year-old Anis A. who killed 12 and injured more than 50 people. On December, 19th, 2016, the perpetrator drove a truck into a Christmas market in Berlin.	The case study is based on an extensive qualitative analysis. The source material includes: An official investigation report which was published by the responsible parliamentary committee on April, 4th, 2017 (Landtag 2017). An official report on the state of knowledge and actions of German	In Anis A.'s case five categories of warning behavior were especially salient. In the following, the authors will take a closer look at them. Identification (e.g., In summer 2015, Anis A. was already a solid part of the Salafist scene around a mosque in Hildesheim which was controlled by one of the most influential ideologists of the Islamic State in Germany: the Iraqi Abu W. Abu W. and his representative Boban S. had the vision to impose Sharia Law in Germany by all means. A. was known as a devoted follower of both leaders). Fixation (e.g., Anis A. spend a lot of time in Doitmund where Abu W. 's representative Boban S. set up a prayer room. In the last months of 2015, Anis focused increasingly more on ideological topics).

	Anis A. was born in 1992 in the Tunisian province Kairouan, the youngest of nine children. After A. 's birth the family moved to Queslatia where his childhood was marked by severe poverty. His parents were living apart from each other. Religion did not play a big role in the family's life nor did Anis show any interest in the Quran. In October 2012, a dispute escalated; when Anis was drunk, he beat up a social worker and set the beds of the dormitory on fire. He was sentenced to 4 years in prison. He attacked prison officers and fellow inmates when in custody.	authorities in reference to the attacker Anis A. from April, 4th, 2011 to December, 21st, 2016. Findings from a journalism investigation team published on April, 5th, 2017. While coding the material, the authors focused on: (1) Sequences of biographical events in the perpetrator's life to identify personal crises, turning points, and triggers leading to changes in his thinking, his emotions, and his behavior. 2) Self-staging of the perpetrator himself to gain insights into his perception, self-concept, and implicit theories, as well as conscious and unconscious motives for behavior. (3) The perpetrator's habits and actions observed by the social environment to discern escalating and warning behaviors in the run up to the deed. (4) Social networks and social reactions which were meaningful to the perpetrator to make out associates and enemies, as well as to understand exacerbating and mitigating effects on the perpetrator's behavior, thinking, and emotions.	Leakage (e.g., Anis frequently boasted that he "wanted to do something in Germany." He said he was ready to fulfil his duty, that he would not hesitate to commit an attack, and that he would be able to access a Kalashnikov rifle without any problems. About 6 weeks before his attack, A. produced a video in which he vowed his loyalty to the Islamic State). Last resort (e.g., Anis' former lawyer reported that after his imprisonment in 2011, Anis felt desperate because he knew that there would be no more chance for him to get a residence permit in Europe). Pathway (e.g., he had visited the Christmas market at Berlin Memorial Church on November, 22nd, 2016, for the first among 7 times. About 1 week before the attack he also filmed a short sequence with his mobile phone during one of his stays).

Collins & Clark (2021)	This case study examines the violent Incel attack that occurred at a yoga studio in Tallahassee, Florida, on November 2, 2018, in which a 40-year-old man shot and killed two women and injured four others.	This case study was based on extensive qualitative data triangulation, which stresses the importance of multiple data sources. Criminal investigative reports, employment records, and personally recorded video diary entries posted on the internet were all subject to analysis. The analyzed data sets included about 70 pages of employment records and disciplinary reports from Leon and Volusia county school districts in Florida and 51 pages of United States Army records obtained through the Freedom of Information Act. 64 pages of police report data and about 40 pages of supplemental investigative material from the Tallahassee Police Department were obtained and analyzed. These included toxicology findings, detailed crime scene analysis, and personal testimonies of the perpetrator, family members, friends, and acquaintances. Finally, over 2 hr of the perpetrator's online video diary entries were transcribed and analyzed for themes. While great efforts were made to obtain the perpetrator's personal medical and mental health records, the data were unobtainable due to legal issues.	The perpetrator coded affirmatively for 5 of 8 (63%) proximal warning behaviors and 9 of 10 (90%) distal characteristics. **Proximal Warning Behaviors** Pathway (e.g., the perpetrator exhibited pathway warning behavior. He was a former Second Lieutenant in the United States Army with extensive tactical and weapons training and had carefully researched and planned his attack in the months preceding the attack). Fixation (e.g., the perpetrator, like other violent Incels, referenced Elliot Rodger in his online video entries). Identification (e.g., this was evident in his online writings and online video recordings, many of which denigrated women. In reference to women, the perpetrator stated, "I will be successful with females ::: if I can't be successful at being positive, I will be successful at being negative." Statements such as these indicate a progression toward and psychological desire to be a pseudocommando for the violent Incel movement"). Novel Aggression – Absent Energy Burst (e.g., the perpetrator, who was unemployed at the time of the attack, generally lived a relatively sedentary lifestyle. Closer to the time of the attack, the perpetrator drove over 4 hr on October 31, 2018, from his home to Tallahassee, stopping to purchase a yoga mat and ear protection. In the months that preceded the attack, cell phone records indicate that the perpetrator had practiced this drive at least once before the attack). Leakage – Absent Last Resort (e.g., an analysis of Tallahassee Police Department's police report revealed that on November 2, 2018, the perpetrator neatly organized identifying documents that included medical records, psychiatric records, military discharge paperwork, and previous employment records in the trunk of his vehicle and around his hotel room. Presumably, the perpetrator did this because he wanted to be easily identifiable to law enforcement after the attack). Directly Communicated Threat – Absent **Distal Characteristics**

			Personal Grievance and Moral Outrage (e.g., he communicated regularly on the internet about the immorality of women). Framed by an Ideology (e.g., due to the perpetrator's belief in the Incel movement and male supremacist ideologies, he felt justified in his actions). Failure to Affiliate with an Extremist Group (e.g., the perpetrator was honorably discharged from the United States Army on June 9, 2010, after less than 2 years of active service). Dependence on Virtual Community (e.g., he publicly posted his videos, many of which discussed his hatred of women, on YouTube and received praise from others that likely rewarded and reinforced his extremist beliefs). Thwarting of Occupational Goals (e.g., the perpetrator worked as a substitute teacher for two different Florida school districts and was fired from both posts). Changes in Thinking and Emotions – Absent Failure of Sexual-Intimate Pair Bonding (e.g., in a postevent interview conducted by the Tallahassee Police Department with the perpetrator's mother, she reported that the perpetrator was "unsuccessful with romantic relationships" and had "abnormally high" standards and expectations for women). Mental Disorder (e.g., in another postevent interview conducted by law enforcement, an acquaintance of the perpetrator described him as being "autistic." Evidence for anxiety was also indicated by the perpetrator's mother, who reported to law enforcement that the perpetrator had "separation anxiety."). Greater Creativity and Innovation (e.g., the attack at the hot yoga studio marks the first time in history that an act of gender-based targeted violence has taken place at a yoga studio). Criminal Violence (e.g., on December 7, 2012, the perpetrator was arrested and charged with battery after he grabbed the buttocks of two women without consent).
Erlandsson & Meloy (2018)	Case study of Anton Lundin Pettersson (the Kronan School attack) who murdered three people and injured another seriously on	The material for this case report is in large part taken from the first book published about the attack, Det som aldrig fick ske: Skolattentatet I Trollhattan. The first author interviewed more than 80 people, 50 of whom are	**Proximal Warning Behaviors** Pathway (e.g., started to research, plan, and prepare his attack on the Kronan school slightly more than 2 weeks earlier. He studied the route from his home to the school, he looked up when the school was closed for autumn leave, he studied pictures of the building and the facilities, the pupils, and the teachers).

	the 22nd of October 2015. As the offender was shot to death, there was no trial or judgment. Individual was a 21-year-old Swedish citizen. He was born on 22 June 1994 in Trollhattan, Sweden, as the youngest of four siblings, including his oldest brother and two half-brothers with whom the family had little or no contact. The mother worked as an assistant nurse, and the father worked at the Swedish Maritime Administration. They lived in a townhouse in a middle class neighborhood. Pettersson had a type of scoliosis and was ashamed of his deformed chest. He was reticent to change clothes in front of other people and refused	identified by name; 30 wished to remain anonymous. This study, and the book, partially relied on the police investigation, but also the investigative efforts of the first author, including people who were not interviewed by the police and evidence that was not discovered by the police.	Fixation (e.g., was preoccupied with the belief that all the problems in Sweden and his own problems were caused by immigrants. The last two years, when he failed at 80 different job applications, the Muslims became his fixation and his target). Identification (e.g., Pettersson was a thin, young man who looked like a girl. But he idolized and identified with alpha males, Vikings, warlords, and body builders. He loved weapons and hung a samarai sword above his bed). Novel aggression (e.g., would use a melon and practice slicing and stabbing it with his sword). Energy burst (e.g., The last few weeks he was febrile, living in front of his computer, switching between planning for his attack, and surfing porn sites with shemales). Leakage (e.g., He told a young boy who was his relative that he was angry about immigration and that "one should do something." He wrote the digital letter to his Dutch friend to say farewell less than an hour before the attack). Last resort (e.g., Pettersson could not tolerate Sweden anymore. He felt he was being forced to do something. The triggering event was the imminent loss of his temporary employment). Directly Communicated Threat – none. **Distal Characteristics** Met criteria for 8 of 10 distal characteristics. The only two distal characteristics that were absent were a failure to affiliate with an extremist or other group, and a violent criminal history. Personal grievance and moral outrage (e.g., Pettersson never could get a permanent job. He felt humiliated, unfairly treated, and angry. He solely blamed the immigrants that came to Sweden to take the jobs (personal grievance)). Framed by an Ideology (e.g., Pettersson did what the Swedish police call "copy paste:" when one concocts and mixes his own ideology. He combined the beliefs of the Sweden Democrats Party, white power, counter jihad, neo-Nazism, and the ZOG (Zionist Operated Government) conspiracy theory. He studied several mass murderers such as the Columbine killers, Anders Breivik and Elliot Rodger). Dependence on the Virtual Community (e.g., read a lot of comments on 4chan about loneliness, hatred, not being sure of one's sexual identity, and wanting to commit suicide).

	to participate in sports classes in school. His academics were good.		Thwarting of Occupational Goals (Pettersson admired his older brother and went to the same school and received the same education. But unlike his brother, Pettersson failed to develop a career and/or pursue further education). Changes in Thinking and Emotion (e.g., his brother reported to the first author that Pettersson became increasingly angry in the months preceding his attack. He was chronically frustrated and would have angry outbursts, cussing the immigrants). Failure of Sexually Intimate Pair Bonding (e.g., Pettersson never had a girl or boyfriend, and probably never had sexual contact with another person). Mental Disorder (e.g., strong evidence that Pettersson was both clinically depressed and also met criteria for a diagnosis of autism spectrum disorder). Creativity and Innovation (e.g., had made his own uniform and was careful with the details). Criminal History (no criminal records and nothing in the police registers). Failure to Affiliate with an Extremist or Other Group (e.g., There was no evidence of attempts to join an actual group and then being rejected, although he did suffer because he was lonely. He considered joining a shooting club but could not afford it).
Meloy, Habermeyer, & Guldimann (2015)	The crimes and motivations of Anders Breivik on July 22, 2011—the Norwegian lone terrorist who killed 77 people in two separate attacks, a bombing in Oslo and a mass murder on the island of Utøya — were analyzed during his criminal trial in Norway	The sources of data analyzed for this case study included both primary and secondary data. Specifically, the psychiatric reports generated for trial; portions of the trial transcripts; available investigative data; an extract in English of the July 22, 2001, Commission report; the English version of the prosecution indictment; and both print and electronic media. The researchers analyzed Breivik's activities and mental state through the lens of 8	**Proximal warning behaviors** Pathway (e.g., in 2009 he created a company called Geofarm to provide a plausible reason for the purchase of detonation devices, accelerants, and fuel for explosives). Fixation (e.g., during the previous decade before his attacks, Breivik became more and more preoccupied with his cause, and apparently decided to take violent action. His cause was strong opposition to the Islamization of Europe and the multicultural advocacy of liberal politicians and their political dominance within the Norwegian government). Identification (e.g., Breivik took photos of himself for his manifesto posted to the Internet in the hours leading up to the attack. In one, he wears a dress "military" uniform with epaulets and various medals, including his personally designed insignia on his arm). Novel aggression – not present.

	amid a stark debate concerning his diagnosis.	proximal warning behaviors of the TRAP-18.	Energy Burst (e.g., Breivik appears to have become increasingly active during the 2 years before as he became more absorbed in the preparation for his attacks). Leakage (e.g., actual leakage occurred within hours of the attack when he posted his manifesto online containing the details of his preparation and planning—although it did not state his specific targets—and a 12-min-long marketing video on his Facebook page). Last Resort (e.g., he wrote that "the time for dialogue is over" (p. 1377) and quoted Napoleon: "He who saves the country violates no law" (p. 684). During the trial, he exhibited his last resort mentality when he said, "I did this out of goodness, not evil. I acted in self-defense on behalf of my people, my city, my country. I would have done it again" (Breivik Testimony, 2012). Directly Communicated Threat - no publicly available evidence in this case that he communicated a direct threat to anyone before his attacks.
Meloy & Genzman (2016)	Case of a US Army psychiatrist and jihadist, Malik Nidal Hasan, who committed a mass murder at Fort Hood, Texas, in Nov. 2009. He was 39 years old when he carried out his attack. He killed 13 and wounded 32 people. Hasan was apprehended after he was wounded by officers. He was born in Virginia on September 8, 1970. His parents had emigrated from	The authors studied the behaviors and mindset of a lone-actor terrorist, Malik Hasan (who happened to also be a mental health professional and a psychiatrist) through the lens of TRAP-18.	**Proximal Warning Behaviors** Pathway (e.g., on August 1, 2009, he bought an FN Five-Seven semiautomatic handgun. Hasan recorded a video of the store manager giving him in-depth usage and care instructions for his new purchase, and he returned nearly every week after to stockpile ammunition. He completed a concealed handgun course on October 10, 2009). Fixation (e.g., Hasan was an avid reader of online extremist materials. Most notably, the materials online from the radical cleric Anwar al-Awlaki. Awlaki, an American citizen, became a prolific al-Qaeda recruiter, propagandist, and strategist before being killed in a 2011 US drone strike). Identification (e.g., Hasan printed out business cards at some point during his time at Fort Hood (July to November 2009). He identified himself as a "Soldier of Allah" with the abbreviation "SOA" after his name). Novel aggression - no evidence of novel aggression. Energy burst (e.g., 2 days before the November 5 massacre, Hasan visited the shooting range and fired over 200 rounds. In the days and hours before his attack, he performed online searches for terms related to the Taliban and jihad.). Leakage (e.g., a fellow Fort Hood psychiatrist testified that Hasan told her a few weeks before the attack that the Army would pay if he were deployed).

	Palestine, and he grew up in a moderate Muslim household.		Last resort (e.g., on October 30, Hasan sent an e-mail to his brother, in which he discussed the following: a resolution to a debt; the power of attorney paperwork he had filled out for his brother; and instructions on handling his affairs should he die or be incapacitated). Directly communicated threat - no evidence of a directly communicated threat. **Distal Characteristics** Personal grievance and moral outrage (e.g., Hasan experienced some hostility from his fellow soldiers and complained sharply about the general mistreatment of Muslims in the military). Framed by an ideology (e.g., Hasan idolized Anwar al-Awlaki and raptly consumed the extremist materials Awlaki shared online). Failure to affiliate with an extremist group - no evidence to suggest that Hasan attempted to join a terrorist group or otherwise collaborated with one. Dependence on the virtual community (e.g., Hasan was active online; he was an ardent consumer of Awlaki's materials, frequenting Awlaki's Web site and subscribing to Awlaki's e-mail service). Thwarting of occupational goals (e.g., According to Hasan's cousin, Nader, combat deployment was Hasan's "worst nightmare"). Changes in thinking and emotion (e.g., Hasan isolated himself from family and friends with accusations of religious failures and engaged in heated arguments about Islam with fellow worshipers, debating the meaning of jihad and the significance of being a true Muslim). Failure of sexual-intimate pair bonding (e.g., Hasan had never been in a romantic relationship, despite investing a great deal of time and money in finding a mate). Mental disorder - Hasan did not have a diagnosable mental disorder. Greater creativity and innovation (e.g., Hasan's attack on a US Army base brought about major changes in all branches of the military and several law enforcement agencies, for America had not seen an attack like his before). History of criminal violence - no history of criminal violence was found.

Table 2. Six case studies and the TRAP-18

TRAP-18 Indicators	Frankfurt Airport attack (2011)	Christmas market in Berlin attack (2016)	Kronan School attack (2015)	Bombing in Oslo and a mass murder on the island of Utøya (2011)	Fort Hood, Texas attack (2009)	Attack in yoga studio in Tallahassee, Florida (2018)
Proximal Warning Behaviors						
Pathway	Present	Present	Present	Present	Present	Present
Fixation	Present	Present	Present	Present	Present	Present
Identification	Present	Present	Present	Present	Present	Present
Novel Aggression	**Absent**	**Absent**	Present	**Absent**	**Absent**	**Absent**
Energy Burst	Present	**Absent**	Present	Present	Present	Present
Leakage	Present	Present	Present	Present	Present	**Absent**
Last Resort	Present	Present	Present	Present	Present	Present
Directly Communicated Threat	**Absent**	**Absent**	**Absent**	**Absent**	**Absent**	**Absent**
Distal Characteristics						
Personal Grievance and Moral Outrage	Present	-	Present	-	Present	Present
Framed by an Ideology	Present	-	Present	-	Present	Present
Failure to Affiliate with an Extremist Group	Present	-	**Absent**	-	**Absent**	Present
Dependence on Virtual Community	Present	-	Present	-	Present	Present
Thwarting of Occupational Goals	Present	-	Present	-	Present	Present
Changes in Thinking and Emotions	Present	-	Present	-	Present	**Absent**
Failure of Sexual-Intimate Pair Bonding	Present	-	Present	-	Present	Present
Mental Disorder	Present	-	Present	-	**Absent**	Present
Greater Creativity and Innovation	Present	-	Present	-	Present	Present
Criminal Violence	**Absent**		**Absent**	-	**Absent**	Present

Table 3. Risk of Bias in Case Studies.

Authors	Statement of study funding	Conflict of interest statement	Affiliations of authors
Böckler, Hoffmann, & Zick (2015)	Yes. The study is part of the research network Incident and Case Analysis of Highly Expressive Targeted Violence (TARGET), which is granted by the Federal Ministry of Education and Research (BMBF) under the program Research for Civil Security II.	No statement.	Nils Böckler, Institute for Interdisciplinary Research of Conflict and Violence (IKG), Bielefeld University. Jens Hoffmann, Institute for Psychology and Threat Management, Darmstadt, Germany. Andreas Zick, Institute for Interdisciplinary Research of Conflict and Violence (IKG), Bielefeld University.
Böckler, Hoffmann, & Meloy (2017)	Yes. The study is part of the research network "Analyses of Extremist Aspirations in Social Networks (X-SONAR), which is granted by the Federal Ministry of Education and Research (BMBF) under the program "aspects and measures of counterterrorism."	Yes included: “No competing financial interests exist”.	Nils Böckler, lnstitute Psychology and Threat Management, Darmstadt, Germany. Jens Hoffmann, lnstitute Psychology and Threat Management, Darmstadt, Germany. J. Reid Meloy, Depaitalent of Psychiatry, University of California, La Jolla, California.
Collins & Clark (2021)	Not included (appears unfunded).	Yes included: “No conflicts of interest to be declared”.	Christopher J. Collins, College of Social Work, Florida State University. James J. Clark, College of Social Work, Florida State University.
Erlandsson & Meloy (2018)	Not included (appears unfunded).	Yes included: “*Disclosure: Dr. Meloy is the developer of the TRAP-18 and receives royalties from the training and sale of the instrument”.	Asa Erlandsson, Svensk Polis, Polhemsgatan 30, 112 30, Stockholm, Sweden. J. Reid Meloy, Department of Psychiatry, School of Medicine, University of California, San Diego, 9500 Gilman Drive, La Jolla, CA, 92093.
Meloy, Habermeyer, &	Not included (appears unfunded).	No statement.	J. Reid Meloy, Department of Psychiatry, School of Medicine, University of California, San Diego, and San Diego Psychoanalytic Center, San Diego, California.

Guldimann (2015)		However, does indicate within main text a few times the links author has with the development of the warning behaviors of the TRAP-18. E.g., "We define each of the warning behaviors according to our previously published definitions..".	Elmar Habermeyer and Angela Guldimann, Department of Forensic Psychiatry, University Hospital of Psychiatry, Zurich, Switzerland.

Table 4. Studies which have Utilized the TRAP-18 to Retroactively Evaluate Terrorist Incidents

Authors	**Sample Characteristics**	**Aim of the Study/Hypothesis**	**Findings**
Böckler et al. 2021	German sample of perpetrators who were convicted for Islamist activities between 2006 and 2016. (n = 80) 76 male (95%) and 4 female (5%). Average age at the time of the crime/time of conviction is 21.64 years (SD = 4.73), age range14-38 years old. **Subgroups** Based on their underlying court verdicts the cases were assigned to the following groups: financial support (n = 10, 12.5%), spreading propaganda or recruiting for an Islamist terrorist	Perpetrators of terrorist attacks were compared to persons who have been convicted of propagandistic and financial terrorist support and of joining a terrorist organization abroad. Hypothesis 1: Proximal rather than distal factors distinguish between Islamist attackers and non-attackers. Hypothesis 2: The factors "pathway," "identification," and "last resort" represent significant correlates for severe acts of violence and distinguish between perpetrators and non-perpetrators.	**Overall Sample Findings** Most frequent behavioral patterns found in the sample (n = 80) include "framed by an ideology" (92%), "changes in thinking and emotion" (84%), and "identification" (78%). Among the least frequent behaviors are "failure to affiliate with an extremist group" (3%), "mental disorder" (5%), "directly communicated threat" (8%), "creativity and innovation" (13%), "novel aggression" (13%), and "energy burst" (19%). **Subgroup Findings** [Comparison between the attackers and the control group, consisting of the financial supporters, propagandists, and those who have left the country]. Significant differences in the proximal warning behaviors exist for the factors "pathway" ($p < .001$), "novel aggression" ($p = .004$), "energy burst" ($p = .004$), and "last resort" ($p < .001$), with moderate effect sizes for each factor. A difference between the groups with respect to the distal characteristics was found for "creativity and innovation" ($p = .011$). The violent offenders differ significantly from the non-violent offenders in terms of the number of proximal warning behaviors present ($p < .001$), the number of distal characteristics ($p = .006$), and the number of factors of TRAP-18 as a whole ($p < .001$).

	group (n = 7, 8.8%), departing from the country out of jihadist motives (n = 43, 53.8%), attempting or carrying out a severe targeted act of violence in Germany (n = 20, 25%). The sample of Islamist attackers included both individual terrorists (n = 7, 35%) and offenders who planned and committed their attack as part of autonomous cells (n = 13, 65%). If the persons were involved in several offences, the cases were grouped according to the most serious verified charge.	Hypothesis 3: Terrorist attackers and the control group differ concerning the number of proximal factors present. Hypothesis 4: The TRAP-18 allows a distinction between terrorist attackers and non-attackers with high specificity as well as high sensitivity.	The individual groups (financial supporters, propagandists/recruiters, travelers, and violent perpetrators) differ in regard to the number of proximal warning behaviors, with only the violent perpetrators differing significantly from the financial supporters (p = .002). No significant group differences with regard to the individual distal characteristics. Number of total TRAP-18 factors differs significantly between the violent perpetrators and the financial supporters (p = .009) and the travelers/persons leaving the country (p = .012). The values for sensitivity (se = .80), specificity (sp = .93), positive predictive value (p+ = .80), and negative predictive value (p− = .93) are extremely promising.
Brugh, Desmarais, & Simons-Rudolph (2020)	**Lone actor terrorist dataset** 77 jihadism-inspired lone actor terrorists and reports on the feasibility and relevance of the framework overall and compared between lone actor terrorists in the US (n=35) and Europe (n=38). **US and European Subsamples** Lone actors were included in either the US (N = 34) or European subsample (N = 38) if their primary country affiliation was in the US or Europe. Primary country affiliation was assigned based upon the country in which the individual spent the most time in the 6 months prior to their	This study was guided by three research objectives: 1. To apply the TRAP-18 to a sample of jihadism-inspired lone actor terrorists and report on the feasibility of using the framework with publicly available information. 2. To describe the characteristics of the framework and distribution of ratings across items. 3. To compare lone actor terrorists from the US and Europe in terms of the presence of TRAP-18 items and priority recommendations.	**Feasibility** The number of items rated as unknown per case ranged from just one item (5.6%) to 16 items (88.9%) out of the 18 total possible items. There were no cases for which every TRAP-18 item was rated as either present, absent, or unknown. So, for all cases, there was some distribution of items across the possible ratings. Examining the prevalence of unknown versus absent or present ratings revealed that coders were significantly more likely to mark 12 of the TRAP-18 items as unknown than as present or absent. These indicators were: Fixation, Novel Aggression, Energy Burst, Leakage, Last Resort, Directly Communicated Threat, Failure to Affiliate, Thwarting of Occupational Goals, Changes in Thinking and Emotion, Failure of Sexually Intimate Pair Bonding, Mental Disorder, and Criminal Violence. Among these items, 3 were rated as unknown over 80% of the time (Fixation, Directly Communicated Threat, and Failure to Affiliate). The item Energy Burst was rated unknown in just under half of the cases, which indicates possibility of improving the feasibility of coding this item with minor adjustments to the definition/available information. 9 TRAP-18 items, on average, were rated as unknown by the coders per case. Consideration of items within the subcomponents suggest that Warning Behaviors were more challenging to rate than were Distal Characteristics. Out of the 8 Warning Behaviors, coders rated an

	radicalization or participation in terrorist activity.		average of 5 items—or almost two-thirds (62.5%)—as unknown per case. Number of Warning Behaviors items rated as unknown per case ranged from none to all 8 items (i.e., 0.0% to 100.0%). Out of the 10 Distal Characteristics, coders rated an average of 5 items (50.0%) as unknown per case. Among Distal Characteristics, number of items rated as unknown across all cases ranged from 0 to 9 (0.0% to 90.0%). **Characteristics of TRAP-18 Assessments Overall** Coders rated an average of about 7 out of 18 items as present (38.9%, M = 6.61, SD = 2.71, median = 7.00, mode = 4.00) and about 2 items as absent (11.1%, M = 1.88, SD = 1.15, median = 2.00, mode = 1.00) per case. Number of items rated as present per case ranged from one to 12 (5.5% to 66.6% of the possible 18 items), while the number of items rated as absent ranged from 0 to 7 (0.0% to 38.8%). Among the 8 Warning Behaviors items, coders rated an average of 3 items as present (37.5%, M = 2.96, SD = 1.53, median = 3.00, mode = 3.00) and less than 1 item as absent (12.5%, M = 0.40, SD = 0.67, median = 0.00, mode = 0.00) per case. Among the 10 Distal Characteristics items, coders rated an average of four items as present (40.0%, M = 3.65, SD = 1.79, median = 4.00, mode = 3.00 and 4.00) and one item as absent (10.0%, M = 1.48, SD = 0.80, median = 1.00, mode = 1.00) per case. **Known Groups Comparison: US and European Lone Actors** A significantly higher average number of items were rated as present among US lone actors (M = 7.29, SD =2.55, median = 7.00, mode 7.00, range 1.00-12.00) as compared to European lone actors (M = 5.74, SD = 2.60, median = 6.00, mode = 4.00, range 2.00-11.00). A significant difference was found in the average number of items rated as unknown. Distribution of ratings significantly differed between US and European lone actors on two items: Energy Burst and Leakage. Coders rated Energy Burst as present for a greater percentage of US lone actors (58.8%) than European lone actors (34.2%). Leakage was rated as present for a greater percentage of US lone actors (35.3%) than European lone actors (13.2%). Ratings for 2 other items—Fixation and Dependence on the Virtual Community—showed a similar (but not significant) trend of being rated present more frequently for US lone actors compared to European lone actors. A significant difference was found in the proportion of US lone actors and European lone actors recommended for Active Monitoring. Majority of US lone actors were coded as

			meeting the criteria for Active Monitoring (n = 29, 85.3%) compared to just under two-thirds of European lone actors (n = 23, 60.5%). No significant difference in the proportion of US and European lone actors recommended for Active Risk Management was found. So, while the differences observed in the present, absent, and unknown item ratings appears to affect Active Monitoring priority recommendation, no such impact on the Active Risk Management priority recommendation.
Challacombe & Lucas (2018)	The sample consists of 58 US based individuals or groups associated with the sovereign citizen movement. Of these, 30 individuals or groups planned or committed violent or dangerous actions, and 28 individuals committed nonviolent criminal actions All incidents occurred between 2004 and 2014. Incidents classified as violent included shootings, standoffs, high-speed pursuits, or threats, and the violent sample represented 10 individuals killed and 15 injured. For nonviolent incidents, the researchers identified individuals who had committed or were believed to have committed a crime of a non-violent nature (e.g., paper terrorism).	The primary research question was whether the TRAP-18 is an effective tool in postdicting violence in incidents involving members of the sovereign citizen movement.	6 proximal warning behaviors and 4 distal behaviors showed significant association to the incidents containing violence. Among the 6 significant proximal behaviors, 4 (pathway, identification, leakage, and last resort) were positively related to violence, and the other 2 (novel aggression and energy burst) were negatively related to violence. Novel aggression showed the weakest effect size, followed by energy burst and then leakage. Pathway and identification showed nearly similar effect sizes and last resort had the strongest effect size. Among the 4 significant distal characteristics, all 4 were positively related to violent incidents. Thwarting of occupational goals had a medium effect size. Framed by an ideology had a strong effect size. Both personal grievance and criminal violence were the strongest of the distal characteristics. Remaining 5 variables were not significant. The TRAP-18 model, in total, was able to distinguish between the individual cases within the sample that were violent and non-violent. The model as a whole explained between 44.2% (Cox and Snell R2) and 59% (Nagelkerke R2) of the variance in the presence of violence, and correctly classified 75.9% of cases. Those with a higher TRAP-18 score were over two times more likely to be involved in a violent incident.
García-Andrade et al. (2019)	44 male patients with a mean age of 42.9 years (SD = 14.0). - patients with severe mental illness in a situation of social exclusion, and with a prison history.	Aim of this study was to examine the predictive validity of TRAP-18 in a sample of patients with severe mental illness in a situation of social exclusion, and with a prison history.	Of the total sample of 44 patients, 13 had committed a further violent act, and 31 had not. Of the 13 recidivists, only 2 had committed a repeat act of violence that was extremist in nature. There was a statistically significant difference in the total score of the TRAP-18 ($t(44) = 5.22$; $p < .001$) between the groups.Those who had committed a new act of violent extremism (average range = 43.0) differed significantly ($p = .004$; $U = 904$) and identically in their scores both in the distal subscale (Distal Characteristics Scale), and the proximal

	Of the total sample, 16 patients (36.4%) were Spanish, 8 (18.2%) were from North Africa, 9 (20.5%) from Sub-Saharan Africa, 7 (15.9%) from Europe (not Spanish), 3 (6.8%) from Asia, and 1 (2.3%) from Central America. Most patients had a diagnosis of schizophrenic spectrum disorder (n = 29; 65.9%), 3 (6.8%) had a diagnosis of delusional ideas disorder, 2 (4.5%) affective disorder, 3(6.8%) personality disorder, 1 (2.3%) organic mental disorder, 4 (9.1%) substance abuse disorder, and 2 (4.5%) personality disorder.	The authors set out to evaluate the capacity of total TRAP-18 scores to predict future extremist acts of violence.	subscale (Proximal Warning Behaviour Scale), compared to the group with no violent extremism (average range = 21.52). **Predictive validity of the TRAP-18** The total score of the TRAP-18 significantly predicted repeat violence extremist in nature (AUC 1.00, p = .018). The distal subscale of the TRAP-18 and the proximal subscale of the TRAP-18 are also significant separate predictors of future repeated violent acts of an extremist nature (with an AUC .98 and p = .021 for both subscales). **Overall** The TRAP-18 has potential validity in predicting future acts of violent extremism by subjects with a prison history.
Goodwill & Meloy (2019)	**Terrorist attack sample** 33 lone actor terrorists – subjects who committed a politically motivated lethal or near-lethal attack against non-combatants in North America between 1993 and 2015. There were 16 extreme right wing, 8 single-issue (usually anti-abortion), and 9 jihadist attackers. This was a non-random sample of convenience. Cases were included if there were sufficient open source data to code the TRAP-18 variables as either present or absent. All attackers were male. Average age: 39 years old (SD = 15.8, range 15–88). Attacks	This study focused on the analysis of data on a sample of North American terrorist attackers and non-attackers using the TRAP-18 using a multivariate statistical approach (multidimensional scaling, MDS) in order to visualize potential clustering (co-occurrence) of TRAP-18 risk factors. This approach will advance the quantitative analysis of operationally relevant and behaviorally observable indicators for use by law enforcement and counterterrorism professionals and their consultants.	The total number of TRAP-18 indicators present between attackers and non-attackers were not significantly different. However, the number of proximal warning behaviors of attackers were found to be significantly different from and greater than [$t(54) = -2.430$, $p < 0.05$] that of the non-attackers. Distal characteristics between attackers and non-attackers were not significantly different. MDS provides a visualization of the relationship between the TRAP-18 indicators and the attacking and non-attacking subjects. The visualization of co-occurrence of all of the TRAP-18 indicators generally supports the theory that proximal warning behaviors will cluster together (co-occur) and are different from most of the distal characteristics, which tend to co-occur less readily with each other. It appears from the MDS analysis that the attackers cluster, and that they cluster closest to 6 of the proximal warning behaviors, with the exception of novel aggression and directly communicated threat which suggests that co-occurrence among the attackers and proximal warning behaviors is strong, which is not as evident in the non-attackers.

	occurred across the US (n = 31) and Canada (n = 2). **No-attack sample** Non-random sample of convenience comprising 23 subjects selected from the caseloads of 2 major metropolitan law enforcement and mental health agencies, one in Canada (n = 10, the no-intent cases) and one in the US (n = 13, the risk-managed cases) between 2012 and 2016. Average age of the non-attackers was 27 years (SD = 11, range 15–58).		The remote location of novel aggression may be due to its low frequency. The very remote location of directly communicated threat may be the result of its negative correlation with attackers and very low frequency. 3 distal characteristics (personal grievance and moral outrage, ideological framing, and changes in thinking and emotion) were found to cluster with both the proximal warning behaviors and the attackers.
King et al. (2018)	In February 2017, we analysed the files of 40 offenders in Bavarian prisons who had been assigned an Islamism-related security label. These labels are primarily assigned on the basis of information from the intelligence services regarding involvement with Salafist or Jihadist networks or on observations made by prison staff, e.g. if materials distributed or symbols used by such groups were found. Files consisted of one female and 39 male inmates (average age 28.83 years, SD = 7.58). In ambiguous cases, an expert on Islamic studies from the Ministry of Justice was consulted for	The main research question was whether prisoners classified as members of the "Salafi scene" and those associated with terrorism are distinct groups and which characteristics differentiates them best, but also to find shared characteristics. The authors aimed to find out how well the current gold-standard risk procedures can be applied to prisoner files if no other source of information is available. The authors extracted indicators from publications on VERA, ERG 22+, and TRAP-18.	Overall, a substantial number of indicators could be coded in only 50% of the cases or less. This was true for 27.8% of the indicators taken from TRAP-18. The average percentage of indicators not assessable from the files (N = 40) for the TRAP-18: TRAP-18 (complete) – Mean = 38.06 (SD = 22.59) Proximal warning behaviour – Mean = 41.25 (SD = 30.51) Distal characteristics – Mean = 35.50 (SD = 22.07) The results suggest that with VERA, ERG 22+, and TRAP-18, there are instruments available that offer a valuable guideline when it comes to assessing risk of violent extremist offending.

	further assessment, which was then used as a basis for the classification.		
Kupper & Meloy (2021)	The final sample consisted of 30 attacks that were carried out by a single protagonist in one or multiple incidents across North America, Europe, or Oceania between 1974 and 2021. United States (n = 25), Canada (n = 1), Germany (n = 2), Finland (n = 1), and New Zealand (n = 1). Methods included shootings, bombings, stabbings, vehicle rammings, an aircraft crash, and a hostage taking. 29 out of 30 lone offenders executed their attacks (97%), while one plot (Jared Cano) was interdicted by law enforcement before the perpetrator could carry out their attack. The final dataset of targeted violence manifestos included written (n = 24) and spoken (n = 6) communications.	The aim of this retrospective study is to examine if a behavior-based threat assessment instrument, such as the TRAP-18, can be applied to a thin slice of data using only language evidence compiled by the perpetrator. In this unique approach, the notion of applying forensic linguistic and threat assessment techniques to the content of a manifesto is tested to identify if it can further validate the proximal warning behaviors and distal characteristics of the TRAP-18.	17 out of 18 TRAP-18 indicators (94%) were able to be coded in the manifestos. Proximal warning behaviors ranged from 2 to 7, with an average of 4.5. The average number of distal characteristics was 3.8 across the sample. 100% of proximal warning behaviors and 90% of distal characteristics, with criminal violence being the only behavior that was not apparent in any manifesto. The most frequent proximal warning behaviors are leakage (100%), identification (93%), fixation (90%), and last resort (87%); the least frequent ones are novel aggression (7%) and directly communicated threat (3%). The most prevalent distal characteristics are changes in thinking and emotion (93%), framed by an ideology (83%), and personal grievance and moral outrage (53%). The least common indicators are failure of sexual pair-bonding (13%), creativity and innovation (13%), mental disorder (10%), and criminal violence (0%). Three perpetrators showed signs of paranoia in their communications. 100% of spoken manifestos were found to include features of research, planning, preparing, or implementing the attack (pathway) compared to 46% of written documents. 92% of written manifestos show evidence of a violent action imperative (last resort). However, 67% of perpetrators signal last resort in verbal recordings. 67% of spoken manifestos allude to having been rejected by an extremist group or humanity in general (failure to affiliate) in contrast to 38% of written narratives. 50% of authors of written communications discuss their use of the internet for virtual learning or interaction prior to the act of violence (dependence of virtual community). 0% of spoken manifestos include this indicator. The only significant difference was between the written and spoken pathway warning behavior
Meloy, Roshdi, Glaz-Ocik,	Sample of 22 individuals who carried out acts of terrorism in Europe between 1980 and 2015.	The aim of this study was to test the interrater reliability and content validity of the	Mean interrater reliability was 0.895 and ranged from good to excellent across all variables. Specificity was not tested because there was no non-terrorist comparison group.

& Hoffmann (2015)	21 (95.5%; n = 22) of the offenders were male, and 1 was female (4.5%). Average age = 31 years (SD = 7.97; n = 22, range 21-50). Among terrorists who acted alone, average age was 30 (SD = 9.14; n = 15, range 21-50 years). Terrorists within the autonomous cells had an average age of 28 (SD = 4.85; n = 7, range 22-38).	TRAP-18 with a small sample of individual terrorists in Europe.	Content validity was suggested by the findings. The majority of individual terrorists who acted alone were positive on 13 of 18 variables (72%) and most of the individual terrorists who acted in autonomous cells were positive for 13 of 18 variables (72%). Only significant difference between the groups was the history of criminal violence among all of the members of the autonomous cells, and only 1 out of 5 of the individual terrorists.
Meloy & Gill (2016)	111 lone actors from the US and Europe who engaged in, or planned to engage in, acts of lone-actor terrorism, and were convicted for their actions or died during the commission of their offenses. This sample spanned a 25-year period (1990–2014), and was further divided according to ideological motivation (radical Islamism, right-wing extremism, and single-issue extremism) and whether the terrorist act was thwarted or successful.	The aim of this study was to present an investigative template which may eventually provide a reasonable assessment of risk of lone-actor terrorism, based upon the recommendations of Monahan (2012, 2016) and incorporating work on proximal warning behaviors for targeted violence and distal characteristics of the lone terrorist.	70% of the lone actor terrorists were positive for at least half or more of the indicators. One individual displayed 16 of the 18 indicators, one scored 15 out of 18, five scored 14 out of 18, another 5 scored 13 out of 18, 11 scored 12 out of 18, 18 scored 11 out of 18, 25 displayed 10 indicators, 12 displayed half of the indicators. When the sample was divided into Islamic extremists, right-wing extremists, and single-issue terrorists, there were no significant differences across all 18 indicators except for 4 (personal grievance and moral outrage, dependence on the virtual community, thwarting of occupational goals, and fixation). Islamic extremist lone actors were significantly more likely to display dependence on the virtual community than the single-issue terrorists. Extreme right-wing lone actors were significantly less likely to exhibit personal grievance and moral outrage, thwarting of occupational goals, and fixation warning behaviors when compared to both the Islamic extremists or the single-issue terrorists. Single-issue lone actors were significantly less likely to display dependence on virtual communities compared to the Islamic extremists. When the sample was divided according to successful versus thwarted attackers, the successful attackers were significantly more fixated, creative, and innovative, and failed to have a prior sexually intimate pair bond. They were significantly less likely to have displayed pathway warning behavior and be dependent on a virtual community of likeminded true believers. Effect sizes were small to medium (0.190 –0.317).
Meloy, Goodwill,	Two non-random samples of convenience.	The study compares a group of individual terrorists who mounted an attack with a	Half the TRAP-18 indicators were found to be significantly different between the samples with medium to large effect sizes (.35–.70).

Meloy et al. (2019)	Subjects who had carried out a lethal terrorist attack in North America between 1993 and 2016 (n = 33), and subjects who were identified as a national security concern, and were either successfully risk managed for at least 2 years, or determined upon investigation to have no intent to mount an attack, were not risk managed, and did not mount an attack during the same period of time (n = 23). All the attackers were male, and the average age was 39 years old (SD = 15.8; range = 15– 88).	group of individuals who posed a national security concern but did not attack. The null hypothesis was that there would be no significant difference on any of the TRAP-18 indicators between the terrorist attack group and the no attack group. This is a disconfirming hypothesis which challenges the authors' theory that the TRAP-18 indicators would discriminate between attackers and non-attackers and would be a useful structured professional judgment instrument for threat assessors.	The proximal warning behaviors of pathway, identification, energy burst, and last resort were significantly more frequent among the attackers, and directly communicated threat was significantly less frequent. The distal characteristics of ideological framing, changes in thinking and emotion, and creativity and innovation were more frequent among the attackers, and mental disorder was significantly less frequent. **The 5 warning behaviors found to be significantly different between the groups** Pathway – 80% of the attackers were coded on this variable, only 20% of the non-attackers were. Identification – 65% of the terrorists were coded on identification, only 35% of the comparison group were. Energy burst - 74% of the attackers evidenced this, only 26% of the non-attackers did. Last resort – 79% of the attackers evidenced this only 21% of the non-attackers. Directly communicated threat - the non-attackers were more likely to threaten the target than the attackers (82% versus 18%). **The 4 distal characteristics found to be significantly different between the groups** Ideological framing- more frequent among the attackers when compared with the non-attackers (100% vs. 61%). Changes in thinking and emotion - significantly more prevalent among the attackers (100%) than the non-attackers (80%). Creativity and innovation – significantly more frequent among the attackers (53%) than the non-attackers (15%). Mental disorder - significantly less frequent (48%) in the attackers when compared with the non-attackers (94%). **Overall**

			Each proximal warning behavior was present in most attackers - exceptions being novel aggression (36%) and directly communicated threat (18%). Every attacker had at least one proximal warning behavior. Each distal characteristic was present in most of the attackers, with the exception of failure to affiliate with an extremist or other group (12%), mental disorder (48%) and history of criminal violence (43%). Among the non-attackers, only 2 of the proximal warning behaviors occurred in most of the subjects: novel aggression (64%) and directly communicated threat (82%). Most of the distal characteristics were present among most of the non-attackers, with the exception of failure to affiliate with an extremist or other group (32%) and greater creativity and innovation (15%).
Meloy, Goodwill, Clemmow, & Gill (2021)	The sample for this study was based on an existing data set of 125 lone-actor terrorists (Corner et al., 2019). 122 males and 3 females. 61 were US citizens and 64 were non-US citizens.	This study looks at the temporal sequencing of 125 lone-actor terrorists, with purported ideologies ranging from Extreme Right Wing (XRW) to Islamic Jihadist terrorism, in order to add to the current understanding regarding the generalized pathway to acts of targeted violence.	Overall, there was a generalized sequence of indicators moving from distal characteristics to proximal indicators in line with the conceptualization of the TRAP-18 as an individualized threat management tool. Nearly all the distal characteristics, based upon the directionality of the sequencing and the proximity coefficients, were found to be antecedent to proximal warning behaviors. The only exception being fixation (a proximal warning behavior) which precedes the distal characteristic of changes in thinking and emotion. 3 TRAP-18 indicators (energy burst, creative and innovative, and novel aggression) fell below the contingency threshold (≥3) and/or proximity coefficient (>0.5) filter rules adopted in this study and, as a result, were not included in the state transition diagram. However, these 3 indicators may be quite relevant in an individual case. Note: The proximity coefficient quantifies how indicators within a behavior chain occur temporally in relation to one another. In other words, the proximity coefficient describes the “closeness” of two indicators in a sequence.

Table 5. Risk of Bias in Studies which have Utilized the TRAP-18 to Retroactively Evaluate Terrorist Incidents.

Authors	**Small sample Size**	**Possibility of retrospective, hindsight bias and/or confirmatory bias (or availability bias)**	**Blinding of assessors**	**Inter-rater reliability**	**Statement of study funding**	**Conflict of interest statement**	**Affiliations of authors**
Böckler et al. 2021	Yes. The total sample of 80 persons is well suited for statistical analysis, but the number of terrorist attackers (n = 20) is still quite small.	Yes.	Yes. "Using TRAP-18, the data sets were independently rated by four scientists who were familiar with the instrument but **blind to the assignment of cases to the individual groups**. This procedure was intended to reduce especially the number of hindsight and observational bias".	No. It states in the paper that "interrater reliability was not systematically checked in our study. Nevertheless, some coding test runs were performed, which were discussed in the research team afterwards. It turned out that it was sometimes difficult for the coders to decide whether factors were not fulfilled, i.e., to code as "no," or whether the information necessary to evaluate the factor	Yes. This paper is part of the BMBF project X-SONAR ("Extremist Tendencies in Social Media Networks: Identification, Analysis, and Management of Radicalization Processes") with the funding codes 13N14235 to 13N14240. The project is funded as part of the BMBF's "Civil Security—Aspects and Measures of Counter-Terrorism" call for proposals under the	Mentioned in the body of paper… "Although much effort has been made to reduce hindsight and observal bias, confirmatory bias cannot be fully excluded in this study. It should be made clear at this point that our research team was not entirely impartial about the usefulness of TRAP-18 or the warning behavior typology. In particular, the first and last two authors	Institute Psychology and Threat Management, Darmstadt, Germany. Association of European Threat Assessment Professionals, Darmstadt, Germany. Institute for Interdisciplinary Research on Conflict and Violence, Bielefeld University.

				was simply not available in the data material ("missing")".	Federal Government's "Research for Civil Security" program.	of this study have been publishing on both topics for quite some time—including publications with the developer of TRAP-18 itself".	
Brugh, Desmarais, & Simons-Rudolph (2020)	Yes.	Yes.	Not stated.	Yes. "The TRAP-18 was coded for all 77 lone actors. A random subset of 20 lone actors (26.0% of our analytic sample) was assessed by all coders to assess inter-rater reliability. Analyses revealed excellent inter-rater reliability (a = .950)".	Yes. This material is based on work supported in whole or in part with funding from the Laboratory for Analytic Sciences (LAS). Any opinions, findings, conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the LAS and/or any agency or entity of the U.S. Government.	Yes statement included. No potential conflict of interest was reported by the author(s).	Christine Shahan Brugh, Laboratory for Analytic Sciences, North Carolina State University, Raleigh, NC, USA Sarah L. Desmarais and Joseph Simons-Rudolph, Department of Psychology, North Carolina State University, Raleigh, NC, USA
Challacombe & Lucas (2018)	Yes.	Yes.	Not stated.	Yes. "Two raters evaluated the whole sample (N = 58; 1,044 codings) using the TRAP-18 codebook against information from the dossiers. After	Not included.	Not included.	Darin J. Challacombe, Department of Psychology, Fort Hays State University. Paul A. Lucas, Department of Government and Justice Studies, Appalachian State University.

				reviewing Meloy and Gill (2016) and Gruenewald et al. (2013), a psychology graduate student (Ariana Fisher; Rater 2) and the primary researcher (Rater 1) completed the ratings independently. Average Cohen's kappa was good for the proximal characteristics, k= .687, and excellent for the distal characteristics, k= .812. The average for the entire TRAP-18 was excellent, k= .757. For the analyses, Rater 2's codings were utilized".			
García-Andrade et al. (2019)	Yes.	Yes.	Not required - one group only.	Not stated.	Not included.	Yes included. States: "The authors have no conflict of interests to declare".	Programa de Atención Psiquiátrica a Enfermos Mentales Sin Hogar, Madrid, Spain. Instituto de Psiquiatría y Salud Mental, Hospital Clínico San Carlos, Madrid, Spain. Departamento de Medicina Legal y Psiquiatría, Facultad de Medicina, Universidad Complutense de Madrid, Madrid, Spain.

							Instituto de Investigación Sanitaria San Carlos (IdISSC), Madrid, Spain. Centro Penitenciario de Segovia, Segovia, Spain. Centro de Salud Mental Alcorcón, Alcorcón, Madrid, Spain. Centro Penitenciario Madrid VII - Estremera, Madrid, Spain. Servicio de Psiquiatría, Hospital Universitario La Paz, Madrid, Spain. Departamento de Medicina Legal, Facultad de Medicina, Universidad Autónoma de Madrid, Madrid, Spain. Clínica Médico Forense, Madrid, Spain.
Goodwill & Meloy (2019)	Yes.	Yes.	No. **Terrorist attack sample** JRM consulted with the defense, prosecution, or law enforcement in five of the attack cases; and in several other additional cases, the TRAP-18 was coded	Mentioned briefly but not detailed. It states: "…mitigation measures were taken, such as double-coding, **interrater agreement,** case discussions among the researchers…".	Not included.	No statement included. However, the paper does state in the main body that: "TRAP-18 indicators were coded by those who were trained on the instrument by the second author	Alasdair Goodwill, Ryerson University, Toronto, ON, Canada. J. Reid Meloy, University of California, San Diego, CA, USA.

			by the actual investigator on the case, who, post-resolution, provided case data to the research team. JRM worked with Ms. Jacqueline Genzman in the coding of the rest of the terrorist attackers, and any questions were resolved through analysis of each subject's behavioral patterns, and their goodness of fit with the 18 indicator descriptions in the manual (Meloy, 2017) until consensus was reached. **No-attack sample** The Canadian sample was coded by Detective Gwyn Amat and Dr. Melinda Morgan. Consensus was reached on each of the indicators through the same procedure outlined above. The US sample was coded by JRM and Dr. Maria Martinez, and consensus was reached on each of the indicators.			(JRM), either in person or through online training available at gifrinc.com".	

King et al. (2018)	Yes.	Yes.	Not stated.	Yes. TRAP-18 Interrater Reliability Coefficient = 0.83	Yes funding statement provided: "We would like to thank the National Centre for Crime Prevention (NCCP) in Germany (German: Nationales Zentrum f¨ur Kriminalpr¨avention) for the funding of our research project".	None stated.	Sonja King, Department of Psychology, University of Erlangen-Nuremberg, Germany. Johann Endres, Criminological Research Unit of the Bavarian Prison System, Germany. Mariann Schwaß, Mark Stemmler and Lora Lauchs Department of Psychology, University of Erlangen-Nuremberg, Germany. Andreas Armborst German National Centre for Crime Prevention, Germany.
Kupper & Meloy (2021)	Yes.	Yes. It does state the following: "The second author is the developer of the TRAP-18 itself, which could raise concerns of confirmation and hindsight bias. We sought to minimize this with careful assessments,	Not stated.	No.	Not included.	Yes included. "J. Reid Meloy receives income from the training and distribution of the TRAP-18 through license to Multi-Health Systems (www.mhs.com)". Also states within the main body of the article: "The first author of this paper completed the 6-hr TRAP-18	Julia Kupper, Independent Researcher, Los Angeles, California, United States. J. Reid Meloy, Department of Psychiatry, University of California, San Diego, United States.

		discussions, and consensus reached on whether or not the language of the manifestos met the definition of the various TRAP-18 indicators."				online training to become proficient in the use of the instrument, which was developed by the second author and first published in Meloy et al. (2015)".	
Meloy, Roshdi, Glaz-Ocik, & Hoffmann (2015)	Yes.	Yes.	No. One group that was sub-grouped according to: Individual Terrorists and Autonomous Cells.	Yes. Mean interrater reliability was 0.895 and ranged from good to excellent across all variables.	Yes. This article was written as a part of the interdisciplinary project "Incident and Case Analysis of Highly Expressive Targeted Violence" (TARGET), which is sponsored by the Federal Ministry of Education and Research, 2013–2016.	No statement included. However, in the main body of the paper it is stated that the authors were developers of the TRAP-18…. "With these issues in mind, we introduce the Terrorist Radicalization Assessment Protocol (TRAP-18), an investigative template for operational Purposes" and "Other normal cognitive biases may also have influenced the results, such as confirmatory bias	J. Reid Meloy, Department of Psychiatry, School of Medicine, University of California, San Diego. Karoline Roshdi, Justine Glaz-Ocik, and Jens Hoffmann, Institute of Psychology and Threat Management, Darmstadt, Germany.

						on the part of the researchers who coded the cases and interpreted the data, who all have a personal stake in previous publications concerning the warning behaviors".	
Meloy & Gill (2016)	Yes.	Yes.	No. The paper does acknowledge that: "The authors were not unaware of group membership".	No. "There was no independent determination of interrater reliability, only careful discussion and consensus".	No statement included.	No statement included. Although the statement below is included in the 'Limitations' section… "…confirmatory bias may be present in this study given the desire of Meloy to empirically buttress the TRAP-18".	J. Reid Meloy, Department of Psychiatry, University of California, San Diego. Paul Gill, Department of Security and Crime Science, University College London.
Meloy, Goodwill, Meloy et al. (2019)	Yes.	Yes.	No. "The coders were not blind to the group assignments for the subjects, and in some cases were intimately familiar with the subjects, introducing questions of various researcher bias in the study (anchoring, hindsight,	No. "There was no quantitative determination of interrater reliability". "Agreement was reached among coders through discussion and consensus"s.	No statement included.	Yes included. "J. Reid Meloy is the owner and developer of the TRAP-18 and derives income from the sale of the TRAP-18 Manual as well as the trainings for the instrument".	J. Reid Meloy, Department of Psychiatry, University of California, San Diego. Alasdair M. Goodwill, Department of Psychology, Ryerson University. M. J. Meloy, Department of Psychiatry, University of California, San Diego.

			confirmatory, availability, etc.)".	"The US sample was coded by R. Meloy and Maria Martinez, and consensus was reached on each of the indicators".			Gwyn Amat, Calgary Police Service, Calgary, Alberta, Canada. Maria Martinez, Los Angeles County Department of Mental Health, Los Angeles, California. Melinda Morgan, Calgary Police Service. The following statement is also included: "We thank Jacqueline Genzman, Lynne Bibeau, Tony Beliz, Kostas Katsavdakis, Todd Darrah, SSA Jeff Cugno, the Calgary Police Service Counterterrorism Intelligence Detail, and the Los Angeles County Department of Mental Health School Threat Assessment Response Team for their very important contributions to this study".
Meloy, Goodwill, Clemmow, & Gill (2021)	Yes.	Yes.	Not required - one group only.	Yes. "Robust data collection methodologies and provisions to ensure intercoder reliability can mediate many of these concerns, as in the present study".	No statement included.	No statement. However, in the paper previous papers relating to the development of the indicators of the TRAP-18 are referred to. E.g., "More complete elaboration of the proximal	J. Reid Meloy, Department of Psychiatry, University of California, San Diego. Alasdair Goodwill, Department of Psychology, Ryerson University. Caitlin Clemmow, Department of Security and

						warning behaviors and distal characteristics can be found at Meloy (2017), Meloy and Gill (2016), and Meloy and Holzer (in press)".	Crime Science, University College London. Paul Gill. Department of Security and Crime Science, University College London.