

Islamist Terrorists in Germany and Their Warning Behaviors: A Comparative Assessment of Attackers and Other Convicts Using the TRAP-18

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The Terrorist Radicalization Protocol 18 (TRAP-18) is tested on a sample of 80 people who were convicted for Islamist activities in Germany between 2006 and 2017. In the study, perpetrators of terrorist attacks will be compared to persons who have been convicted of propagandistic and financial terrorist support and of joining a terrorist organization abroad. Statistical analysis of the results shows that there are significant differences between terrorist perpetrators and persons convicted of nonviolent Islamist activities, both in the number of TRAP-18 items and in the proximal warning behaviors “pathway,” “last resort,” “energy burst,” and “novel aggression.” Subsequent ROC analyses underline both the specificity and sensitivity of the instrument. AUC values range from .83 to .90 for the four different models (TRAP-18 and the warning behavior typology as weighted and unweighted models). The highest discrimination between Islamist attackers and the non-attackers is achieved by the weighted warning behavior typology. The values for sensitivity ($se = .80$), specificity ($sp = .93$), positive predictive value ($p+ = .80$), and negative predictive value ($p- = .93$) are extremely promising.

Public Significance Statement

The study deals with the question of whether TRAP-18 is capable of distinguishing persons who have committed an Islamist act of violence from those who have taken on more supportive, nonviolent roles in the scene. The results show that this is the case. Specific behavioral patterns can be identified that are overly coincidentally common in violent terrorists. Likewise, terrorists show more warning behavior than those who have not committed a violent crime. Against this empirical background, TRAP-18 has proven to be an instrument with a high potential for successful early detection of Islamist-terrorist violence.

Keywords: terrorism, foreign fighters, threat assessment, TRAP-18, targeted violence

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From 2012 to 2016 about 1,050 mostly young people left Germany for Syria and Iraq for Islamist reasons. Across Europe, around 4,000 people turned their backs on their home countries. A large proportion of them set off to join jihadist militias such as the so-called Islamic State or Jabhat al Nusra (Federal Criminal Police Office, Federal Office for the Protection of the Constitution, Hesse Information & Competence Centre Against Extremism, 2017). After the departures due to Islamist motives had reached their peak in 2014—i.e., at the time when the self-appointed Sheikh Abu Bakr al Baghdadi proclaimed his caliphate in Mossul—they decreased rapidly until early 2016, after which they were recorded only sporadically. By this time, the Islamic State had been pushed back militarily to a large extent. However, in order to maintain the semblance of organizational power to sympathizers and enemies, the IS was forced to adjust its strategy to the new situation (Warrick & Mekhennet, 2016).

The new agenda in the fight against the so-called infidels reflected in the replacement of the IS online propaganda magazine “Dabiq” by “Rumiyah.” While in “Dabiq” the IS was still campaigning for young Muslims to migrate from the West to the Caliphate, the followers in “Rumiyah” were explicitly called upon to stop migration and instead commit terrorist attacks in the West (Wignell et al., 2017). Anis A., for example, followed this call when he steered a truck into a crowd of people on Breitscheidplatz in Berlin on December 19, 2016, killing 11 people and injuring 55 others, some of them severely. Obviously, he had chosen his modus operandi following the example of the Nice attack on July 14, 2016, which cost 86 people their lives. Because of the then still unconventional way of carrying out politically motivated violence, this attack was declared the best practice for a promising terrorist plot in “Rumiyah” (Böckler et al., 2017).

The attack on Breitscheidplatz in Berlin was only part of a whole sequence of sudden Islamist acts of violence in Germany. In February 2016, for example, 16-year-old Safia S. unexpectedly stabbed a federal police officer at Hanover central station in the neck based on Islamist motives. A few days earlier she had unsuccessfully attempted to cross the border to enter IS territory (Dearden, 2017). On April 16, 2016, three adolescents carried out a bomb attack on a Sikh temple in Essen using a modified fire extinguisher. Both Safia S. and the three teenagers from Essen were

sentenced to several years in juvenile prison (Faiola & Mekhennet, 2017). Only 3 months later, on July 18, 2016, a 17-year-old unaccompanied refugee severely injured several people with a hatchet and knife in a train in Würzburg. He was shot dead by police in the course of his attack (Meloy & Pollard, 2017). A few days later, a 27-year-old man blew himself up while trying to detonate a bomb at a music festival site in Ansbach (Eddy & Dzhambazova, 2016). Two weeks before the attack at Breitscheidplatz in Berlin, a 12-year-old student made two attempts to detonate a nail bomb at the Ludwigshafen Christmas market (Dearden, 2016). Six months later, on July 28, 2017, a 26-year-old man stabbed a customer in a supermarket shouting “Allahu Akbar” and injured five others, some of them severely. He had previously stolen the murder weapon, a knife, from one of the store shelves (Troianovski, 2017).

Both the considerable increase in the number of people leaving for Syria and Iraq and the condensed timing of Islamist attacks in Germany have led to an increased focus on improving measures for awareness-raising and early detection in the area of Islamist radicalization not only among safety authorities, but also in local authorities, schools, businesses, and other institutions where people get together on a daily basis (Hoffmann, 2017). In the meantime, “radicalization” has become a mythical term, also due to numerous discussions in the media. This has led to stigmatization and panic-driven exaggeration of the danger posed by supposedly radicalized people on the one hand. On the other hand, however, overly rigid and stereotypical hypotheses about religiously motivated radicalization have contributed to the fact that a large number of dangerous individuals have not been recognized as such (Böckler et al., 2017).

However heterogeneous the profiles of terrorist (Desmarais et al., 2017), it is striking that terrorist violence always represents the end point of a developmental path, which is accompanied by characteristic features in the behavior and communication of the later perpetrators. In a study of the pre-attack behavior of 119 individual terrorists, it was shown that in 83% of the cases, people in the social environment were aware that the later perpetrators were becoming radicalized, and, in some cases, that they were even planning an attack (Gill et al., 2014). Evidence from the field of targeted violence at the workplace shows that many people who observed behavioral patterns

relevant to the crime among colleagues or relatives were not aware of the significance of such signals, or that recurring behavior was not identified as a pattern (Hoffmann & Dölitzsch, 2015). There are indications suggesting that similar obstacles also exist for the early detection of radicalization processes (Neo et al., 2018).

A review of behavioral patterns associated with a path to targeted violence offers great opportunities for prevention and intervention. Since 2016, the Terrorist Radicalization Protocol 18 (TRAP-18; Meloy, 2017) has provided a behavior-based assessment tool that supports those involved in prevention in the early detection and risk assessment of radicalization processes. The TRAP-18 developed by Meloy (2017) is a structured template that is sensitive both to warning behaviors that indicate a possible short-term escalation toward terrorist violence and to factors that indicate a solidification of radicalization processes that are medium to long term.

After first discussing the characteristics of TRAP-18 and recent findings on its reliability and validity, we will test the instrument on a sample of 80 people who have been convicted for Islamist activities in Germany. We compare terrorists with persons who have been convicted of propagandistic and financial terrorist support and of joining terrorist organizations abroad.

In the context of this study, we are particularly interested in the still largely unresolved question of the extent to which TRAP-18 is able to distinguish between radicalization that leads to violence and radicalization that results in other criminally relevant behavior.

Terrorist Radicalization Assessment Protocol 18

The TRAP-18 was developed to assess the risk of targeted terrorist violence across all ideological spectrums. The instrument consists of two groups of variables: the proximal factors are eight warning behavior patterns, also known as the warning behavior typology, which was developed before the TRAP-18 (Meloy, Hoffmann, Guldemann, et al., 2012). Its validity and practicability have been confirmed in several studies for a variety of different forms of severe targeted violence, such as school shootings, intimate partner killings (Meloy, Hoffmann, Roshdi, et al., 2014), adult rampage killings (Allwinn et al., 2019), and attacks on public

figures (Hoffmann et al., 2011). The second group of variables comprises 10 behavioral factors characteristic of individual terrorists, which indicate an increasing radicalization. These distal factors, also referred to as distal characteristics, have a greater time distance to the crime (Meloy, 2017). While the presence of distal factors in the TRAP-18 indicates that a case should be monitored continuously, the occurrence of proximal warning factors suggests active case management to reduce the risk of violence. An overview of the proximal and distal factors can be found in Table 1, and the operationalization of the items can be viewed in Meloy and Gill (2016), for example.

The TRAP-18 was not designed as a tool for predicting terrorist acts of violence. Therefore, its risk indicators do not reflect static risk factors. Rather, the TRAP-18 helps practitioners to identify dynamic patterns of behavior that indicate that a person has already taken specific steps on the path to terrorist violence. To explain this assessment logic, Meloy (2018) refers to an analogy drawn by Monahan and Steadman (1996), which highlights the parallels between violence and weather forecasts: “The distal characteristics are metaphorically storm clouds on the distant horizon. We do not know whether they will evolve into an active weather event, and whether they will move toward us. Proximal warning behaviors mean the storm is in our backyard.” (p. 15). The TRAP-18 is an investigative as well as operative tool, which, in addition to risk assessment, helps practitioners identify blind spots regarding information about a given case, set priorities in the processing of cases, and initiate a case management that is appropriate, proportionate, and based on knowledge and facts.

Studies on the Scientific Quality of TRAP-18

The latest findings regarding the scientific quality criteria of the TRAP-18 are promising (Meloy, 2018; Meloy & Genzman, 2016). The interrater reliability of the individual factors was calculated using Cohen’s Kappa and lies between 0.691 and 1.0, with a total of 0.895 (Meloy et al., 2015). The validity of the TRAP-18 has been tested in a series of studies. Initially, the instrument was tested on a European sample of terrorists, including both individual perpetrators ($n = 15$) and members of autonomous cells ($n = 5$) (Meloy et al., 2015). With regard to the eight warning behaviors, no significant differences were found between the two groups.

Table 1
Factors of the Terrorist Radicalization Assessment Protocol 18

Proximal warning behaviors (warning behavior typology)	Distal characteristics
Pathway	Personal grievance and moral outrage
Fixation	Framed by an ideology
Identification	Failure to affiliate with an extremist group
Novel aggression	Dependence on the virtual community
Leakage	Thwarting of occupational goals
Energy burst	Failure of sexual-pair bonding
Direct threat	Changes in thinking and emotion
Last resort	History of mental disorder
	Creativity and innovation
	History of criminal violence

The only significant difference was found for the distal factor “criminal violence” ($p = .0048$, $\phi = .70$). Without exception, the members of autonomous cells had a history of criminal violence ($n = 5$, 100%). However, since the sample consisting of five persons was very small, group differences may have become significant more readily.

This was followed by another study (Meloy & Gill, 2016), in which a significantly larger sample of $N = 111$ was used to test the TRAP-18. The sample included both American and European terrorists, and different ideological groups were compared, namely, Islamist ($n = 38$), right-wing extremist ($n = 43$), and “single-issue” terrorists (animal rights, anti-abortion, environmentalism) ($n = 30$). The groups differed with respect to the factors “personal grievance and moral outrage,” “dependence on the virtual community,” “thwarting of occupational goals,” and “fixation.” Islamist terrorists showed a greater dependence on the virtual community than “single-issue” terrorists. Right-wing extremist terrorists showed significantly less personal grievance and moral outrage, thwarting of occupational goals, and fixation than Islamist and “single-issue” terrorists. The sample was also divided into successful ($n = 67$) and unsuccessful ($n = 44$) perpetrators. Successful perpetrators actually executed their plans and committed terrorist attacks, while unsuccessful terrorists could be stopped by security authorities. Successful terrorists showed significantly more fixation warning behavior, were more creative and innovative, and were less likely to have a sexually intimate relationship (i.e., “failure of sexual-pair bonding”). At the same time, they

showed less identifiable planning and preparation activities (“pathway”) and were less dependent on a virtual community. The effect sizes ranged from small to moderate effects ($\phi = .19-.32$).

In terrorism research, group comparisons have repeatedly been carried out to identify specific personality traits, biographical backgrounds, and warning behavior among violent offenders and terrorists (Knight et al., 2017; Merari et al., 2009). Comparative studies of this kind were also conducted with the TRAP-18: King et al. (2018), for example, discovered on the basis of an analysis on prisoner files from 14 Bavarian penitentiaries that those persons who had an association with terrorist networks were significantly more likely to exhibit warning behaviors than members of the Salafi scene who were not involved in terrorist networks. In a postdictive study of US-domestic terrorists (Challacombe & Lucas, 2018), classified as so-called Sovereign Citizens,¹ the authors distinguished between those who had committed severe violent crimes ($n = 30$) and those who had committed nonviolent criminal acts ($n = 28$). Of the 18 factors, a significant correlation with violence was found for ten. The effect sizes were moderate to large ($\phi = .33-.70$). Proximal factors that distinguished between violent and non-violent offenders included “pathway,” “identification,” “leakage,” and “last resort.” Among the distal factors, “personal grievance and moral outrage,” “framed by ideology,” “thwarting of occupational goals,” and “criminal violence” showed significant results. Negative correlations with respect to violent acts were found for the factors “novel aggression” and “energy burst.” Recent findings are also available regarding the discriminant validity for a North American sample (Meloy et al., 2019).

In this study, individual terrorist offenders ($n = 33$) were compared to individuals who were categorized as national security threats but had not committed an attack ($n = 23$). TRAP-18 proved to be an effective instrument for differentiating between the two groups. The proximal warning behaviors “pathway,” “identification,” “energy burst,” and “last resort” were more frequent among the individual terrorists compared to the control group, while directly communicated threats were less frequent. The distal factors “framed by an ideology,” “changes in thinking

¹ Sovereign citizens do not accept the sovereignty of the current state and its laws and therefore do not respect state authorities and courts.

and emotion,” and “creativity and innovation” also occurred more frequently among the individual perpetrators, whereas mental disorder was registered less frequently (Meloy et al., 2019).

In one of the latest studies Goodwill and Meloy (2019) were able to validate this theoretical model empirically on a database consisting of North American terrorist attackers and nonattackers. The authors showed in a multidimensional scaling study that proximal warning behaviors and distal characteristics differentially cluster. While most of the proximal warning behaviors were present and clustered among the attackers, they were absent among the nonattackers. The authors also found that there was no significant difference and clustering between most distal characteristics which were present in both attackers and nonattackers.

Reviewing the studies published to date, the three warning behaviors “pathway,” “identification,” and “last resort” were the most significant correlates for serious acts of violence (see Meloy et al., 2019).

Focus, Method, and Limitations of the Present Study

In the following section, the TRAP-18 is validated on a German sample of perpetrators who were convicted for Islamist activities between 2006 and 2016. The relevant cases were identified by reviewing all press releases issued by the Federal Attorney General during this period of time. We identified 138 relevant individuals, in respect of which we subsequently requested access to the files.² For cases in which the ruling was not yet final, no access to the files could be obtained. This was particularly applicable to some cases of terrorist violence ($n = 4$) that took place in 2016. For these cases, a detailed case description was created on the basis of intensive media research/official reports. As media coverage was expected to be susceptible to false reports, information was only used if it was published in at least two independent trustworthy sources.

The final sample comprises 80 Islamist extremists. Of the 80 extremists, 76 are male (95%) and four female (5%). The average age at the time of the crime/time of conviction is 21.64 years ($SD = 4.73$), the youngest offender being 14 and the oldest 38 years old.

Even though the information from the investigation and court files was more detailed, there were also large differences in the amount of

information available from case to case. In some cases, only summary investigation reports, prosecution, and sentencing documents were available; in other cases, the data corpus included interrogation, telecommunications surveillance, chat and online activity logs, witness statements, photo folders, surveillance reports, investigation summaries, psychiatric reports, and statements by the defendants.³

According to 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 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%). We have chosen to include the latter into the sample because the content validity of TRAP-18 has also been empirically confirmed for the radicalization of perpetrators belonging to autonomous cells (Meloy et al., 2015). If the persons were involved in several offences, the cases were grouped according to the most serious verified charge.⁴

It can be seen as a potential problem that those who left the country for Islamist motivation were placed into the control (nonattacker group). Of course, there was a potential likelihood that some of these travelers would have conducted violence abroad. In fact, 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. However, it could not be proven in court that these persons were involved in such (attempted) acts of killing, which is why we have assigned them to the nonattacking control group. In a follow-up study, it would certainly make sense to include Islamist-motivated travelers in the

² At that time still current procedures, discontinued procedures with or without conditions, acquittals were excluded.

³ The file material comprised between 13 and 304 pages ($M = 86.85$; $SD = 76.13$). Case summaries based on media reports averaged about seven pages.

⁴ According to their severity (sentence and degree of self-endangerment and danger to others), the Islamist offences were arranged in the following order: 1. acts of financial support, 2. spreading propaganda or recruitment for an Islamist-terrorist group, 3. Islamist-motivated departure, and 4. attempting or carrying out an Islamist-motivated, targeted act of violence.

sample who have demonstrably used or attempted to use deadly violence at their destination.

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.

Since good interrater reliability has already been demonstrated for TRAP-18 (Meloy et al., 2015), it was not systematically checked again 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 was simply not available in the data material (“missing”). Comparable difficulties were also discussed by other authors in thematically related studies (Brugh et al., 2020; Gill et al., 2014). In contrast to the operational use of the instrument, retrospective analysis of already existing data corpora does not allow for a corresponding follow-up research or further information collection. For this reason, the research team decided to code factors with “no” in each corresponding case, if the occurrence of these factors could not be proven in the data material or was explicitly denied. The latter was rather rare, since the data corpora were generated for a nonresearch purpose and not for coding with TRAP-18. Thus, a “no” corresponds to the statement that there was no indication in the data material that this factor was present.

The data were analyzed against the background of the current state of research on TRAP-18 with regard to the following hypotheses:

Hypothesis 1: Proximal rather than distal factors distinguish between Islamist attackers and nonattackers.

Hypothesis 2: The factors “pathway,” “identification,” and “last resort” represent significant correlates for severe acts of violence and distinguish between perpetrators and nonperpetrators.

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.

To test for significant differences between the groups (Hypotheses 1–3), Chi² tests, *t*-tests for independent samples, and ANOVAs were performed. Alpha error correction was subsequently performed for all *p* values using the Bonferroni–Holm method (Holm, 1979), since testing multiple variables from the same data set leads to alpha error inflation (Victor et al., 2010). After first determining the respective group mean values of the four groups and then comparing the number of factors among them using post-hoc analyses, the sample was divided into terrorist attackers (experimental group) and nonattackers (control group). The control group included those individuals who had attracted attention because of financial support, spreading propaganda or recruiting, and departing the country out of jihadist motives.

To test Hypothesis 4, a Receiver Operating Characteristic (ROC) analysis was performed and the corresponding area under the curve (AUC) value was determined.⁵ The extent to which the TRAP-18 is able to correctly classify cases from the experimental group (terrorist perpetrators of violence) as high-risk cases (true positive) was tested. The number of cases from the experimental group that were not identified as high-risk (false negative) and the number of cases from the control group that were incorrectly classified as high-risk (false positive) were also of interest.

Results

Figure 1 shows the TRAP-18 factors in the total sample (*N* = 80). The most frequent behavioral patterns found in the sample 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”

⁵ On the one hand, the two populations need not be normally distributed, as is assumed, for example, for Cohen’s *d*, and on the other hand, the possibilities and limitations of the instrument can be illustrated based on its sensitivity and specificity. ROC analyses help to make a positive or negative decision and at the same time show the costs of wrong decisions (Rice & Harris, 2005).

(3%), “mental disorder” (5%), “directly communicated threat” (8%), “creativity and innovation” (13%), “novel aggression” (13%), and “energy burst” (19%).

The comparison between the attackers and the control group, consisting of the financial supporters, propagandists, and those who have left the country, is shown below (Table 2). Significant differences in the proximal warning behaviors (warning behavior typology) 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 the factor “creativity and innovation” ($p = .011$).

Number of Present TRAP-18 Factors Between Groups

The homogeneity of variance was tested using the Levene test. To compare violent and nonviolent offenders, homogeneity of variances can be assumed for proximal warning behaviors ($p = .812$),

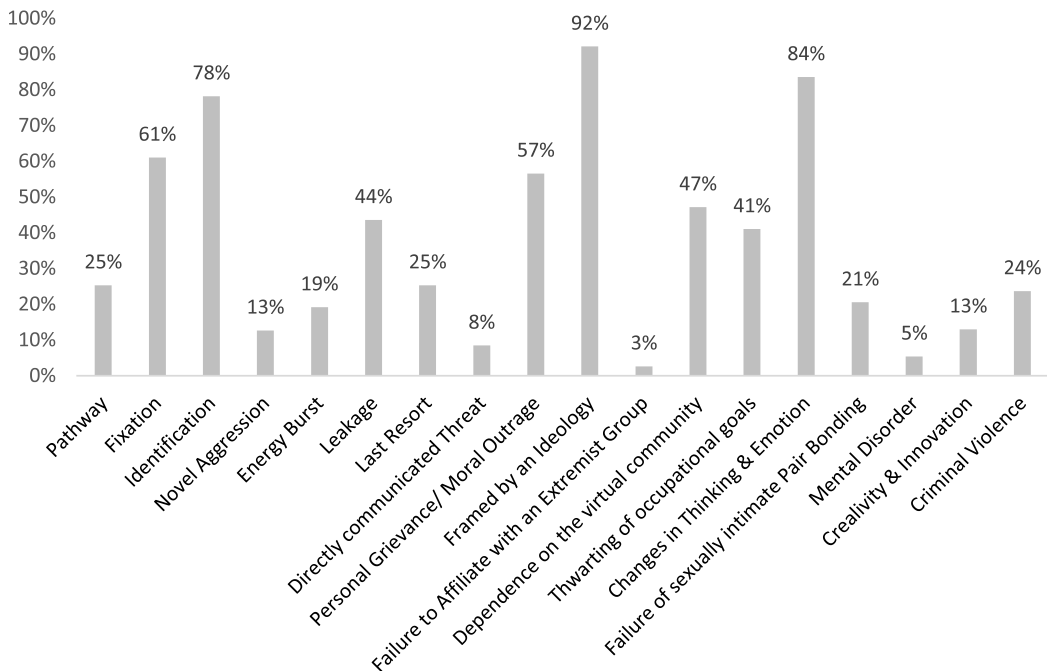
distal characteristics ($p = .848$), and the TRAP-18 as a whole ($p = .529$). For the more detailed group comparison between financial supporters, propagandists/recruiters, travelers, and violent perpetrators, the variances are likewise equal for the warning behaviors ($p = .882$), the distal factors ($p = .826$), and TRAP-18 as a whole ($p = .281$).

The violent offenders differ significantly from the nonviolent 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 ($p < .001$).

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 ($p = .002$). There are no significant group differences with regard to the individual distal characteristics.

The number of total TRAP-18 factors differs significantly between the violent perpetrators and the financial supporters ($p = .009$) and

Figure 1
TRAP-18 Factors in the Total Sample (N = 80)



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Table 2
TRAP-18 Factors for Violent and Nonviolent Offenders

Proximal warning behaviors	Violent offenders		Nonviolent offenders		Bonferroni–Holm	ϕ
	<i>N</i>	%	<i>N</i>	%		
Pathway	20	75	59	8	<.001***	.655
Fixation	19	79	58	57	1	
Identification	20	80	58	78	1	
Novel aggression	18	39	53	4	.004**	.445
Energy burst	18	50	55	9	.004*	.386
Leakage	20	55	58	40	1	
Last resort	20	65	55	11	<.001***	.550
Directly communicated threat	20	15	51	6	1	
Distal characteristics						
Personal grievance and moral outrage	20	85	56	46	.079	
Framed by ideology	18	100	58	90	1	
Failure to affiliate	17	11	57	0	.339	
Dependence on a virtual community	16	56	54	44	1	
Thwarted occupational goals	19	53	59	37	1	
Changes in thinking and emotion	16	81	57	84	1	
Failure of sexual-intimate pair bonding	15	40	58	16	.875	
Mental disorder	18	11	56	4	1	
Greater creativity and innovation	19	37	58	5	.011*	.406
Criminal violence	17	24	59	24	1	

the travelers/persons leaving the country ($p = .012$). The respective mean values are shown in Table 3.

ROC Analyses for TRAP-18 and the Warning Behavior Typology

Using the resulting group mean values of the four groups, it appears that a distinction can be made solely on the basis of the number of existing factors. The violent perpetrators show the highest values for proximal, distal, and thus in all TRAP-18 factors, while the financial supporters show the lowest values.

Two risk categories were therefore created by ROC analyses: One category for low to medium

risk and another for high risk. ROC analyses were performed both for the TRAP-18 and for the warning behavior typology. We considered both a low sensitivity and a low specificity to be equally important. To determine the adequate cut-off value based on this premise, the Youden index was calculated, which is composed of sensitivity + specificity – 1. The ideal cut-off value is determined by the maximum value of the Youden index.

First, ROC analyses were performed based on the number of factors present without weighting the individual factors. Then, the analyses were repeated using weighted items, for both the overall TRAP-18 instrument and the warning behavior typology (proximal warning behaviors of TRAP-18) separately.

Table 3
Number of the Respective Proximal, Distal, and Overall TRAP-18 Factors Within the Subgroups

Group	Proximal warning behaviors		Distal characteristics		TRAP-18	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Supporters ($n = 10$)	1.29	1.38	2.67	1.86	4.40	3.21
Propagandists/recruiters ($n = 7$)	3.20	1.48	3.50	1.38	7.00	1.00
Travelers ($n = 43$)	2.92	1.50	3.37	1.42	6.69	2.28
Violent perpetrators ($n = 20$)	4.55	1.70	4.88	1.58	9.82	2.67
Total ($N = 80$)	3.25	1.81	3.92	1.61	7.42	2.88

The distal characteristics were not separately examined using ROC analysis for several reasons. First, they are not discussed as a separate tool in any publication. Second, the findings thus far show that there are no significant differences in the scores of the distal characteristics between the individual groups.

Looking at the instrument as a whole, a Receiver Operating Characteristic Curve results as shown in Figure 2.

The values for sensitivity (se), specificity (sp), positive predictive value (p+), negative predictive value (p-), and area under the curve (AUC) can each range from 0 to 1. Values close to 1 reflect very good results.

For the overall TRAP-18 score with a cut-off value of 8.5 present factors and a maximum Youden index of .60, the following values are found: se = .65, sp = .95, p+ = .81, p- = .89, and AUC = .88. The resulting classification of violent and nonviolent offenders is based on low and high risk as presented in Table 4. The ranges put in parentheses reflect the number of factors present for each tool. The numbers in the fourfold table represent the number of persons assigned to the respective cell.

Figure 3 shows the ROC curve for the eight proximal factors.

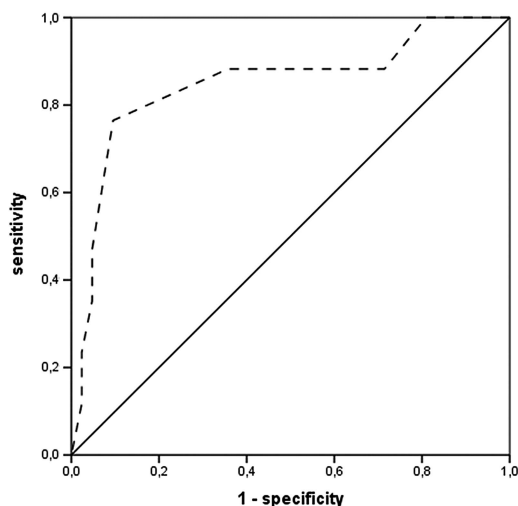
We set the cut-off value for the proximal factors at 3.5. The maximum Youden index is .65, with all persons with a score between 0 and 3 being considered low to medium risk and all persons with a score between 4 and 8 being considered high risk. This results in a classification of violent and nonviolent offenders based on low and high risk as shown in Table 5.

Considering the set cut-off value, ROC analysis yields the following values: se = .80, sp = .85, p+ = .64, p- = .93, and AUC = .84.

ROC Analyses for TRAP-18 and the Warning Behavior Typology Based on Weighted Items

From our results and the findings of previous studies (e.g. Challacombe & Lucas, 2019; Meloy & Gill, 2016; Meloy et al., 2019) it appears that the factors of the TRAP-18 should not all be weighted equally for ROC analysis. Some factors seem to have a greater explanatory value for severe targeted violence and differentiate more accurately between violent and nonviolent offenders than others. Especially “pathway,” but also “novel

Figure 2
ROC Curve for TRAP-18



aggression,” “energy burst,” and “last resort” differ significantly between violent and nonviolent offenders. Therefore, in a second step we have weighted the items based on the previous results and those factors of the TRAP-18 that were significant. In contrast to “novel aggression,” “energy burst,” and “last resort,” which we weighted with a factor of 2, “pathway” was weighted with a factor of 3. This decision resulted in particular from the theoretical consideration that pathway warning behavior indicates specific planning activities for a targeted act of violence and thus signals a particularly urgent need for intervention.

Looking at the overall instrument with the weighted items, a Receiver Operating Characteristic curve is produced as shown in Figure 4.

The cut-off value was set at 7.5 factors present using a maximum Youden index of .60. It should be noted, however, that values of 8.5 and 9.5 also result in a Youden index of .60. The decision to set the cut-off at 7.5 was made for higher sensitivity at the expense of lower specificity. Otherwise, perpetrators of violence would be falsely classified as having a low to medium risk and thus not be detected. The consequence of this decision, however, is that more nonviolent offenders are wrongly classified as violent offenders. The results for the TRAP-18 overall score based on the weighted values are as follows: se = .75, sp = .85, p+ = .63, p- = .91 and AUC = .83. This results in a classification of violent and

Table 4
Risk Classification of Violent and Nonviolent Offenders Using TRAP-18

	Low to medium risk (0–8)	High risk (9–18)
Nonviolent offenders (<i>n</i> = 60)	57 (true negatives)	3 (false positives)
Violent offenders (<i>n</i> = 20)	7 (false negatives)	13 (true positives)

nonviolent offenders based on low and high risk as shown in Table 6.

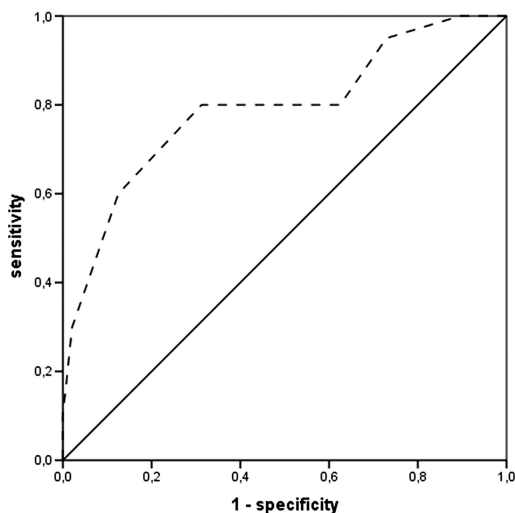
Analysis of the two groups based on the weighted items of the Warning Behavior Typology yields a Receiver Operating Characteristic curve as presented in Figure 5.

Based on the weighted scores, the cut-off value for the proximal warning factors is now set at 5.5 with a maximum Youden index of .73, all persons with a score between 0 and 5 being classified as low risk and all persons with a score between 6 and 13 as high risk (Table 7). This provides the following values of the ROC analysis: $se = .80$, $sp = .93$, $p+ = .80$, $p- = .93$, and $AUC = .90$.

Discussion

The TRAP-18 shows excellent content validity also when tested on a German sample of 80 extremists. In accordance with Hypothesis 1,

Figure 3
ROC Curve for the Warning Behavior Typology



the most significant individual factors that distinguish between violent and nonviolent offenders are proximal rather than distal factors. In four out of eight proximal factors significant differences are found, whereas only one out of ten distal factors differs significantly. This is not surprising, since the distal factors merely indicate a solidifying radicalization process. Only the occurrence of proximal factors—as Meloy (2017) also points out with regard to the underlying theoretical model of TRAP-18—suggests that a person has taken the path toward targeted violence. These theoretical assumptions were empirically supported in this study, which also makes the significantly higher number of proximal warning behaviors among violent perpetrators compared to nonviolent extremists seem plausible.

The only significant difference in distal radicalization factors is found in the factor “Creativity and Innovation.” Taking a closer look at the item, however, we believe that this result should come as no surprise. The item is described as follows: “Evidence of tactical thinking ‘outside the box.’” The planned terrorist act is creative (a major aspect has not been done before in contemporary times) and/or innovative (may be imitated by others)” (Meloy, 2018). Meloy et al. (2019) have also pointed out the difficulty of coding this item for nonviolent offenders. Against this background, in our opinion the item appears to be somewhat out of place in the context of distal factors, since we interpret it rather as part of the pathway warning behavior—a proximal factor—which can hardly be coded without it.

Examining the distribution of proximal warning behaviors with regard to Hypothesis 2, it appears that the warning behaviors “pathway,” “last resort,” “energy burst,” and “novel aggression” are particularly discriminatory in the German sample, whereas this is not the case for “identification.”

The significant difference in “pathway” between perpetrators of violence and nonviolent offenders is quite obvious, since the item reflects specific preparatory activities (research, planning, and preparation) for a violent act.

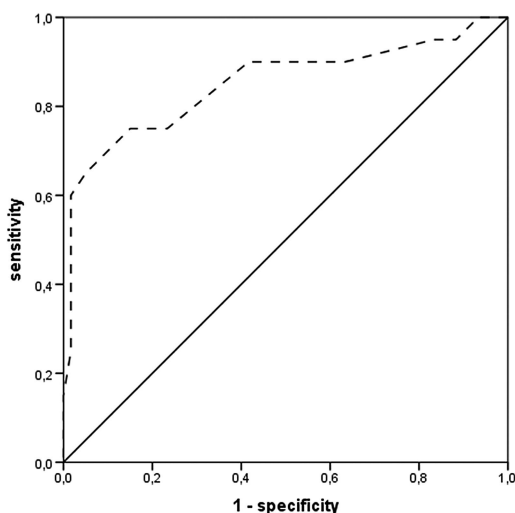
Qualitative analysis of the cases shows that the significantly more frequent occurrence of the “last resort” warning behavior in the majority of violent perpetrators can be explained by the fact that the decision to commit a violent act functions as a kind of “exit strategy” in the subjective logic of the

Table 5
Risk Classification of Violent and Nonviolent Offenders Using the Proximal Factors

	Low to medium risk (0–4)	High risk (5–8)
Nonviolent offenders (<i>n</i> = 48)	51 (true negatives)	9 (false positives)
Violent offenders (<i>n</i> = 20)	4 (false negatives)	16 (true positives)

perpetrator. In light of a seemingly hopeless situation, the act enables the perpetrator to make a glorious exit from life. In the publications by Böckler et al. (2015)—an analysis of Arid U.'s attack on American soldiers at Frankfurt Airport in 2011—as well as Böckler et al. (2017)—an individual case study of the radicalization of the Berlin Christmas market terrorist Anis A.—this aspect can be comprehended well. While Arid U. had built up a construct of lies toward his family over the years and was also worried about losing his financial livelihood facing imminent job loss, Anis A. knew that he was on the death list of an Arab clan after an escalation of violence in the drug milieu. An escape from Germany was not possible for him. Furthermore, Anis A. knew that he was on the radar of security authorities and would have no chance of asylum in Europe due to his criminal past. In other cases, it was pressure from security authorities or peer

Figure 4
ROC Curve for Weighted TRAP-18 Factors



pressure that created a last resort situation for the perpetrators.

It also seems plausible that the factor “energy burst” is significantly more prevalent among violent offenders. In the cases analyzed, this factor describes the increase in frequency or diversity of any behavior that is related to a perceived mission. The perpetrators commit to their acts and gradually lose empathy with the target enemy group. Arid U., for example, downloaded vast amounts of jihadist propaganda material from the Internet a few weeks before the attack, most of which focused on the obligation of violent jihad, while Anis A. almost exclusively subordinated his actions to ideological rules about 3 months before the attack and visited some 15 different radical mosques—in some of them he even served as a prayer leader (Böckler et al., 2015, 2017).

“Novel aggression” indicates that a person approaches his or her social environment in a noticeably more confrontational manner starting at a certain point in time. This can have various reasons: On the one hand, “novel aggression” can be an emotional expression of an absolute enemy image or rigid world view and/or can be interpreted as a defensive behavior against those who try to question their ideologically shaped identity. In this sample, it can be seen that the violent attackers in particular had hardly any religious education, but at the same time viewed themselves as defenders of the “ummah,” the global Muslim community. Thus, their religiousness being questioned by their social environment was evaluated by some as an existential threat and answered with reactance.

Taking a look at the proximal factor “identification”, which in other studies (Challacombe & Lucas, 2019; Meloy et al., 2019) differentiates between violent and nonviolent offenders, it appears for the present sample that although at 78% it was frequently coded, it does not significantly distinguish between the groups. The factor “identification” is defined as follows: “A psychological desire to be a pseudocommando or have a warrior mentality; closely associate with weapons or other military or law enforcement paraphernalia; identify with previous attackers or assassins; or identify oneself as an agent to advance a particular cause or belief system” (Meloy, 2018). Accordingly, the factor was coded not only when a person identified with another perpetrator, but also when he or she was intensively preoccupied

Table 6
Risk Classification of Violent and Nonviolent Offenders Using the Weighted TRAP-18

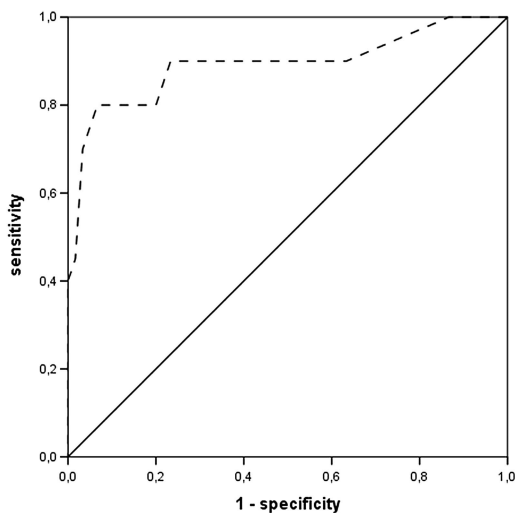
	Low to medium risk (0–8)	High risk (9–18)
Nonviolent offenders (<i>n</i> = 60)	51 (true negatives)	9 (false positives)
Violent offenders (<i>n</i> = 20)	5 (false negatives)	15 (true positives)

with the image of the “mujahedeen,” the jihadist fighter. Especially those who traveled toward Syria and Iraq wanted to fight with weapons on the front lines and were therefore interested in military, weapons, and fighter myths. All in all, the intensive involvement with such contents in the overall sample is very high.

In accordance with [Hypothesis 3](#), however, terrorist perpetrators of violence and the control group differ particularly with regard to the number of proximal factors. Thus, we were able to demonstrate discriminant validity with respect to the overall quantitative distribution of the TRAP-18 factors. Perpetrators of violence reach a significantly higher score than persons from the nonviolent control group.

Testing [Hypothesis 4](#), ROC analyses show that the creation of a risk score allows a high degree of differentiation between violent and nonviolent

Figure 5
ROC Curve for the Weighted Warning Behavior Typology



perpetrators. By an empirically based weighting of the factors “pathway,” “novel aggression,” “energy burst,” and “last resort” the performance could be further enhanced.

Our analyses thus underline the good specificity and sensitivity of TRAP-18: AUC values above .9 are considered to be excellent, those between .8 and .9 as good and those between .7 and .8 as acceptable ([Janssen & Laatz, 2016](#)). In practice, however, the results should not tempt one to follow a purely statistical evaluation logic when using this tool. On the one hand, when interpreting the results, it should be critically appraised that the decision on the proper weighting of the factors and the verification of their specificity and sensitivity was made using the identical data set. On the other hand, we have so far postulated both low sensitivity and low specificity as equally important in our calculations and set the cut-off values accordingly. Although the tendency is promising from a research point of view and a shift of the cut-off values would lead to a further reduction of false-negative classifications, it should be kept in mind that this would always be at the expense of specificity, i.e., more false-positive classifications would occur.

From a practical point of view, it should be kept in mind that the mere presence of a proximal factor of the warning behavior typology makes it necessary to monitor and actively manage a case. The eight types of warning behavior in themselves already represent red flags, which require threat managers to find adequate intervention measures in order to actively reduce the risk of a violent act. A detailed and prudent professional judgement of a threat management expert remains indispensable when considering suitable measures for effective case management and the individual nature of each case. The various factors should be assessed and analyzed individually for each specific case—in other words, the logic of structured professional judgement should be followed.

Limitations

One of the strengths of the study is the comparative design with a broad spectrum of German Islamist offenders (see [Table 3](#)). The total sample of 80 persons is well suited for statistical analysis, but the number of terrorist attackers (*n* = 20) is still quite small, which is a limitation of the study. Some further problems that arose in the

Table 7
Risk Classification of Violent and Nonviolent Offenders
Using the Weighted Proximal Factors of TRAP-18

	Low to medium risk (0–5)	High risk (6–13)
Nonviolent offenders (<i>n</i> = 60)	56 (true negatives)	4 (false positives)
Violent offenders (<i>n</i> = 20)	4 (false negatives)	16 (true positives)

underlying research design have already been made transparent in Methods section.

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 of this study have been publishing on both topics for quite some time—including publications with the developer of TRAP-18 itself (for example Allwinn et al., 2019; Böckler et al., 2017; Meloy et al., 2015).

Conclusion and Prospects

Germany, like many other European countries, is currently confronted with the task of keeping an eye on a large number of individuals who potentially pose a threat of terrorist violence, and returnees from the former IS areas, and assessing the security risk they pose. The TRAP-18 has so far been validated on various samples and also proved to be a promising instrument when tested on the present German sample, consisting of violent perpetrators, travelers, as well as financial and propagandistic terror supporters, which can assist those responsible in systematically prioritizing cases using a knowledge-based risk assessment.

Particularly through the establishment of the lone actor strategy by terrorist organizations, which aims to keep the communication of terrorists before an attack at a minimum by dissolving chains of command, security authorities now also increasingly have to rely on reports from civilian institutions where critical radicalization is observed. It is both empirically confirmed and obvious that even lone perpetrators show relevant communication with their social environment in the lead-up to their attack, since radicalization

always has an identity-forming and identity-stabilizing function. Personal identity concepts only ever become efficacious and tangible in social interaction (Schlenker, 2003).

Against this background, the focus on 18 empirically based and potentially observable patterns of behavior appears to be a promising approach, especially for security, crisis, and threat management teams in civilian institutions such as schools, authorities, companies, and refugee shelters, which can improve the early detection and case management of radicalization processes. The risk assessment using TRAP-18 follows triggering events, i.e., threatening behavior of a person. Particularly when security forces do not (yet) have the authority to act, for example, because the behavior of a radicalized person does not have criminal relevance, the institutions themselves are usually called upon to keep a case of concern on their radar, reassess it periodically, and, based on that assessment, find appropriate intervention measures.

The developers of the TRAP-18 do not see the tool as a competing product to other established instruments like VERA-2R (Pressman et al., 2016) or ERG 22+ (Lloyd & Dean, 2011). Rather, it should be regarded as a complementary tool. TRAP-18 differs from other risk instruments in that it addresses behavioral rather than static risk factors. The latter is usually found in a person's life history and are therefore often unavailable to those institutions that have to carry out the risk assessment. Behavior and communication, however, can be observed in a social environment that has a certain level of awareness and, if reporting routes are clear, can be brought together as information for threat management teams.

Particularly in light of alternating or escalating waves of terrorism (Rapoport, 2002), the cross-ideological applicability of TRAP-18 appears to be exceptionally timely. Islamist attacks in Europe and America as well as refugee flows resulting from the unrest in the Middle East and North Africa have led to a massive increase in right-wing populist political tendencies in many Western countries. As a result, right-wing terrorism has also found a breeding ground on which it could flourish and grow. What is new about this situation is that it is no longer locally rooted as it was in the past, but now also thinks and acts globally in response to international Islamist terrorism.

Right-wing terrorist attacks by perpetrators that are connected online and who stage themselves in

the spirit of an anti-Jihad movement, such as the perpetrators of Christchurch and Halle, are examples of this new type. The need for another TRAP-18 study concerning extreme right-wing samples in Germany is therefore obviously. On the one hand, it would supplement the findings of studies in which TRAP-18 have already been tested on right-wing extremist perpetrators in Europe and the USA (Challacombe & Lucas, 2018; Meloy & Gill, 2016). On the other hand, such further studies would also be interesting from the perspective of basic research in order to better understand the parallels and specifics of Islamist and right-wing extremist radicalization and to adapt preventive case management strategies accordingly. It is highly probable that the increasing presence of right-wing terrorism will in turn lead to a rise of left-wing terrorism. We are already observing radicalization tendencies in the global eco-movement, which is being infiltrated by both right-wing and left-wing forces. A tool that is directed at general radicalization mechanisms rather than focusing on ideological content will help threat managers to better adapt to new phenomena of targeted violence in the future. A look at the case anatomy of current Islamist and right-wing extremist attacks reveals some elements that are familiar from school shooting and rampage killing research. This intertwining was also evident, for example, in the attack at the Olympia shopping center in Munich in 2016, where the perpetrator not only referenced the terrorist Anders Breivik and right-wing extremist organizations, but also identified with the Columbine shooters and other school shooters. But also in the cases of Christchurch and Halle, in which the perpetrators staged their attacks in the manner of first person shooter games, clear parallels to rampage shootings could be seen. The application of the warning behavior typology (proximal warning behaviors of the TRAP-18), which has shown its informative value in many areas of targeted violence, will probably become even more relevant in the field of terrorism in the future.

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