

15 years of analyzing the Global Terrorism Database: An overview

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Summary

This article provides an overview of research on terrorism using the Global Terrorism Database (GTD). It is an open-source database containing over 200,000 terrorist events, both domestic and transnational. After identifying seven prominent journals of terrorism, data were gathered on 442 articles citing the GTD. All were published between 2008 and the beginning of 2023. An increasing trend was found in the number of articles over the examined period, supporting the growing popularity of the GTD. Popular databases containing control variables were identified in the second part of the analysis. Finally, the most common research topics were introduced through examples. These included spatiotemporal trends, case studies, suicide bombers, and lone-wolf terrorists.

Keywords: Global Terrorism Database, research on terrorism, review, open-source data, empirical analysis

A Global Terrorism Database elemzésének elmúlt 15 éve

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Összefoglalás

Jelen kutatás áttekintést nyújt a nyílt forrású, *Global Terrorism Database* (GTD) nevű adatbázis terrorizmus kutatásában történő felhasználásáról. Az adatbázist 2007-ben tették közzé, ingyenesen elérhető bárki számára. Összesen több, mint 200.000 nemzetközi és belföldi terrorcselekményről tartalmaz adatokat. Az elmúlt 15 évben világszinten az egyik legjelentősebb terrorizmussal kapcsolatos nyilvános adatbázissá vált. A kutatás során először azonosítottam a terület 7 vezető folyóiratát, majd ezekből kigyűjtöttem az összes olyan, 2008 és 2023 eleje között megjelent publikációt, melyek hivatkoznak a GTD-re ($n = 442$). A megjelenési dátumukat elemezve megállapítottam, hogy az évente megjelent, erre az adatbázisra hivatkozó publikációk száma növekvő tendenciát követ. Ez azonban nem volt egyenletes. 2016 előtt lassú növekedés volt megfigyelhető, 2017-re viszont egy hirtelen ugrással elkezdett meredeken emelkedni a cikkek száma.

A 442 publikáció közül 50 nem volt elérhető, az absztrakt alapján pedig nem volt egyértelműen megállapítható a felhasznált adatbázis, vizsgált változók, így ezek nem kerültek bele az elemzésbe. Szintén kivontam az elemzésből a recenziókat, bibliográfiákat, szerkesztői ajánlásokat, konferenciaelőadások összefoglalóit, illetve azokat a cikkeket, ahol a GTD csak a szerző által idézett tanulmányban szerepel. Hatvanhat esetben a szerző (1) illusztrációként használt fel adatot, (2) a GTD terrorcselekmény definícióját idézte, vagy (3) a nyilvánosan elérhető adatbázisok bemutatása során említette meg ezt.

Végezetül 207 olyan publikáció maradt, ahol a szerző a GTD-ből nyert adatokat elemzett. Ezek vizsgálata során először megállapításra került, hogy a megjelenésük a teljes mintával azonos módon mutat növekvő tendenciát. A legtöbb kutatásban több adatbázist használtak a szerzők a GTD mellett, ezek jellemzően szintén nyilvánosan elérhetőek. Innen származnak általában a kontrollváltozók, melyek politikai, kulturális, demográfiai, földrajzi, biztonsági és szociökonomiai területeket fednek le. Néhányan azonban saját adatbázist építettek különböző forrásokból. Követ-

kező lépésként példákon keresztül bemutatásra kerültek gyakori vizsgált témakörök. Ezek közé tartoznak tér- és időbeli tendenciák, terrorista csoportok és azok környezetükkel és egymással való kapcsolatainak elemzése. Szintén megjelentek öngyilkos merénylők, magányos elkövetők, illetve az állam és terrorista csoportok kapcsolatának vizsgálatai. Összességében az elemzés során bizonyosságot nyert, hogy a GTD jelentős hatással van a terrorizmus kutatására.

Kulcsszavak: Global Terrorism Database, terrorizmus-kutatás, áttekintés, nyílt forrású adatok, empirikus elemzés

Introduction

Open-source databases containing information about terrorism have been around for quite a long time. The field's history of data collection from unclassified sources and the road to the Global Terrorism Database (GTD) is summarized by *LaFree–Dugan (2007) and LaFree–Dugan–Miller (2015)*. According to their description, collecting data on terrorism became a small industry by the 1970s. Plenty of the people involved had some military background. Data were usually drawn from the media: newspaper articles, government reports, etc. Some examples of these databases include PGIS (Pinkerton Global Intelligence Service), RAND-MIPT (Research and Development-Memorial Institute for the Prevention of Terrorism), ITERATE (International Terrorism: Attributes of Terrorist Events) and the WITS (Worldwide Incidents Tracking System). Today, far more databases are available. Numerous authors have collected, organized, and described these resources (*Bowie 2018, 2020, 2021; Singh 2021*). One of the most comprehensive collections includes 60 databases (*Bowie 2017*). The author describes that the unit of analysis is primarily terrorist incidents or actors (groups). Only some focus on state terrorism or victims. He also highlights that the maintenance of these databases is time-consuming and requires substantial funding. Several have been discontinued due to this fact.

Compared to other types of violence, accessing and collecting data on terrorism is highly difficult (*LaFree–Dugan 2007*). Traditionally, three sources can be identified. First, official data is collected by the government and agencies on their behalf (e.g., police, national security). Second, self-report data is from the offenders themselves (e.g., interviews and questionnaires). Finally, victimization data is collected from the general public through surveys. All three options pose serious challenges (*LaFree–Dugan–Miller 2015*). Official data on terrorism exist in some countries, but they are not accessible to researchers outside the classified environment. The authors also argue that official sources are “regarded with suspicion by many, either because they are influenced by political considerations or because of the fear that they might be so influenced” (*LaFree–Dugan–Miller 2015: 14*). Self-report data can be promising; however, terrorists are rarely willing to participate in interviews and surveys, and if they would, it would be impossible to get a permission. Victimization data is not feasible as terrorist acts are rare (the necessary sample to conduct victim sur-

veys would be enormous) and, in many cases, lethal. As a result of the above, the single option left is open-source information, which is “in many ways a problematic source since it presupposes, among other things, freedom of the press and presence of local journalists or foreign correspondents willing and able to cover terrorist events” (*Bowie 2017: 50*). However, steps can be taken to ensure the quality of the data. The crucial part is resource selection. Which pieces of news, reports, or websites can be trusted? The authors of these databases usually create a complex process that involves both automatization and manual work to classify resources. These processes will be discussed in detail later.

The challenges mentioned above might be a reason behind the low number of empirical studies based on a database and statistical analyses. *Schuurman (2018)* analyzed all articles published between 2007 and 2016 in nine leading journals on terrorism. He found an increasing trend in the use of statistical analyses: from 16.6% in 2007 to 28.0% in 2016. However, he concludes that “overall, [...] 78.1% of the articles studied did not use any kind of statistical analyses” (*Schuurman 2018: 8*). This lack of systematic empirical analysis is not newfound. Other authors came to similar conclusions throughout the years (*Schmid–Jongman 1988; Silke 2001; Lum–Kennedy–Sherley 2006*). In addition, the overreliance on secondary sources is also highlighted (*Schuurman–Eijkman 2013*). These data-related issues are one of many that terrorism research faces; however, discussing them is outside this article's scope (for details, see: *Sageman 2014; Schuurman 2019*).

The emergence of the Global Terrorism Database

The GTD, introduced in 2007 (*LaFree–Dugan 2007*), is one of the largest and most comprehensive databases available. It was initially based on the PGIS, as it contained the largest number of incidents (over 60,000) at the time. Computerizing the PGIS was completed by the end of 2005. The procedure “required extensive training to assure that the computerized values matched the original data” (*LaFree–Dugan 2007: 186*), which is necessary to maintain high data quality.

The Criteria Committee established three criteria and two additional elements that must be met to include an event in the database (for details, see *LaFree–Dugan 2007*). It is also essential that at least two separate sourc-

es verify every possible terrorist act and that the collection “lags behind real-time, helping to avoid erroneous reporting published in the immediate aftermath of an attack, which sometimes includes false identification of alleged assailants. [They] record information about terrorist attacks that is as “settled” as possible once reporting and investigations have progressed” (START 2022: 6). The data collection process is described by LaFree–Dugan–Miller (2015). Maximizing efficiency involves using natural language processing (NLP) and machine learning models to pre-select millions of articles published worldwide. In the end, despite all this, manual review is necessary (processing approximately 15,000 resources monthly). These are huge improvements; however, several limitations emerge. The authors mention four central ones. First, as it is based on pieces of news, it is prone to bias toward newsworthy events. As a result, events from closed regimes and failed terrorist acts often remain hidden. Second, distinguishing acts of terrorism from war-related crimes (e.g., genocide, insurrection) is often tricky, especially in armed conflict. Third, the database lacks information about the individual terrorists or the groups, as it is almost always classified (if known) and never makes it to the news. Finally, maintaining high-quality data collection is time-consuming and requires a substantial amount of money.

In 2023, the GTD contains data on terrorist events from 1970 through 2020 (START 2022). Over 200,000 cases are registered, including both domestic and transnational events. Information is available on eight aspects of terrorist attacks: basic information, location, attack, weapon, target/victim, perpetrator, casualties and consequences, and additional information with sources. It is one of the most popular databases; the introductory article became the second most-cited article in *Terrorism and Political Violence*.¹

The purpose of the present article is to summarize the past 15 years (2008–2023, including the beginning of

2023) of research using the GTD. First, I will focus on the popularity of the database by analyzing the number of publications citing the GTD and the number of citations. Then I will discuss research topics where empirical analyses of the GTD were conducted and present important findings. Overall, I aim to show that the GTD had a considerable impact on terrorism research.

Method

For the analysis, 2008 was selected as a starting point because the article introducing the GTD was published in 2007. Data were collected on articles published in leading journals of terrorism. Out of the nine identified by Schuurman (2018, 2019), seven were selected based on availability: *Terrorism and Political Violence* – TPV, *Studies in Conflict and Terrorism* – SCT (both were included in Silke’s 2001 study), *Perspectives on Terrorism* – PT, *Journal of Terrorism Research* – JTR, *Dynamics of Asymmetric Conflict* – DAC, *Behavioral Sciences of Terrorism and Political Aggression* – BSTPA, and *Critical Studies on Terrorism* – CST. Articles were included in the analysis if they referenced any version of the Global Terrorism Database (START 2022), resulting in 442 articles. Data was collected on the following topics: *meta-data* (journal, volume, issue, publication year, authors, title, number of citations²), *type* (article/book review/bibliography/editorial, empirical analysis presented/not presented), *focus* (research question, research focus, findings), *method* (databases, variables, statistics). Out of the 442 articles, 50 were unavailable. Only metadata were registered in these cases because the abstracts were insufficient to decide whether an analysis was based on the GTD or whether inferential statistics were used. However, it was generally observed; therefore, the full text had to be accessed in all remaining 392 cases to collect information.

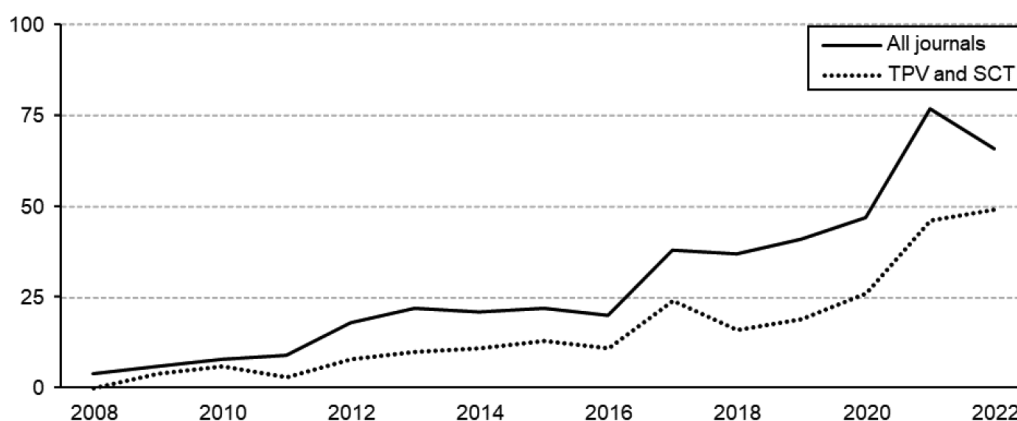


Figure 1 | The number of articles citing the GTD per year
Source: author

¹ As of January 29, 2023.

² According to Google Scholar, on January 29, 2023

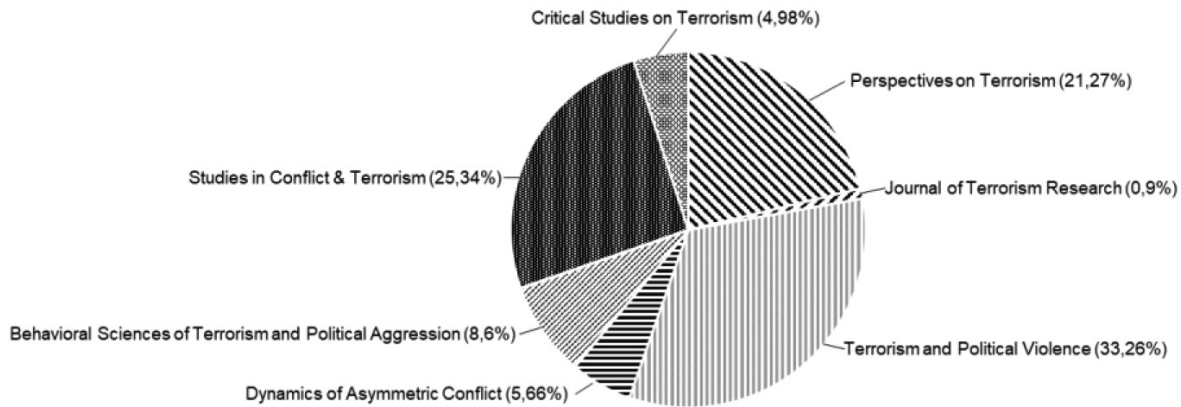


Figure 2 The frequency of articles citing the GTD by journal

Source: author

Results

Overall

The number of articles published in the seven selected journals citing the GTD shows a steady increase (Fig. 1). Besides the rise in popularity, another explanation could be the launch of new journals after 2008 (the latest being JTR, launched in 2011). However, focusing on the two core journals only – TPV and SCT, launched in 1989 and 1977, respectively – the same trend was observed. Based on the results, it seems that 2016 was a turning point. The number of articles per year suddenly increased by 50% and doubled by 2021. It was also found that almost 80% of the papers were published in three of the seven journals: TPV, SCT, and PT (Fig. 2).

Of the 392 articles analyzed, 273 presented some form of data directly from the GTD. After excluding book reviews ($n = 5$), bibliographies ($n = 19$), editorial postscripts/introductions ($n = 3$), and conference summaries ($n = 5$) from the rest, 87 were left that only cited GTD. The 87 articles left only cited GTD as a prominent data source (e.g., Homolar-Rodríguez-Merino 2019), cited articles analyzing the GTD (e.g., Nesser 2012), cited the GTD's definition of terrorism (e.g., Schmid-Forest-Lowe 2021) or the authors mentioned that they have cross-referenced their data with the GTD (e.g., Cragin-Padilla 2017).

The present article focuses on studies that performed some kind of statistical analysis using the GTD. Sixty-six articles presented data from the GTD *only as an illustration*. For example, a number of attacks per year graph can show that a given terrorist group's activity is increasing, thus solidifying the need to examine that group closely in the form of a case study (e.g., Al Shabaab: Sjah 2008, Animal Liberation Front: Braddock 2014, Liberation Tigers of Tamil Eelam: Selvadura-Smith 2013, GSPC/AQIM: Skretting 2020). Another instance was the use of GTD to support an example: "while Mexican criminal organizations use a number of types of explosives,

they frequently use hand grenades in particular. (Phillips 2018: 50) [...] Hand grenades have also been used many times by terrorist organizations. A search in the Global Terrorism Database for the phrase 'hand grenade' returns more than 10,000 attacks" (Phillips 2018: 60). The guidelines established were the followings. A given article was not included in the next step if (1) no further analysis was carried out using data from the GTD, it was only presented, and (2) presenting the data was not the primary component that helped the author advance the idea; it only served as an illustration or example.

Analyzing the GTD

After the selection process, 207 articles were left to study (including LaFree-Dugan 2007 and LaFree-Dugan-Miller 2015). An increasing trend in the number of published articles per year was observed focusing only on this sub-sample with the same sudden jump in 2016 (Fig. 3). In addition to the number of publications, the impact and popularity of the GTD were also examined by analyzing the number of citations of these articles.³ The results suggest that almost all of them were cited at

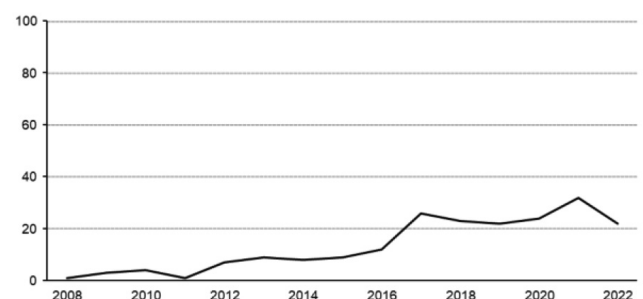


Figure 3 The number of articles analyzing the GTD per year

Source: author

³ According to Google Scholar, on January 29, 2023

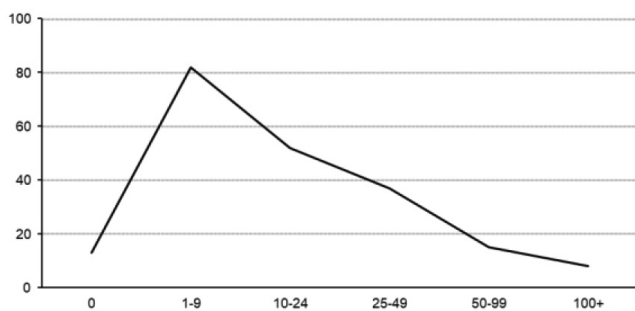


Figure 4 | The number of articles analyzing the GTD by the number of citations
Source: author

least once (94%). A bit less than a third (29%) had 25 or more citations (*Fig. 4*). The two most popular articles were the analysis of terrorist groups' survival (816 citations; *Young-Dugan 2014*) and the introduction of the GTD (810 citations; *LaFree-Dugan 2007*).

Data is available in the GTD regarding several topics, but it has limitations. Therefore, most researchers are forced to draw data from additional sources. Variables from these databases usually serve as control variables: contributors to terrorism identified by numerous studies. These are political, cultural, demographic, geographic, security, and socio-economic factors (*Piazza 2012*). The following databases are commonly studied along with the GTD: POLITY IV, Big Allied and Dangerous, Uppsala Conflict Program, Terrorist Organization Profiles, World Bank, Penn World Tables, ITERATE, and Correlates of War. Despite these options, some authors have decided to create their databases. For example, *Harrow (2010)* collected successful, foiled, and failed Islamist attacks on Western targets (both in and outside the West); *Acosta-Ramos (2016)* used complex methods to fill the 1993 gap in the GTD; finally, *Matesan-Berger (2016)* developed a database of events that meet their definitions of mistakes committed.

The following section is an overview of analyses based on the GTD. Examples of different research topics will be given to illustrate the wide range of options.

One straightforward use case is the study of spatiotemporal trends. Focusing on a specific location and time period, one can examine the changes in different aspects of terrorism. The most popular focuses are the frequency and the lethality of attacks, but weapon choices and attack types are also common. Spatiotemporal descriptive studies using the GTD have examined, for example, the U.S. (1970–2004, *Webb-Cutter 2009*), Europe (2006–2015, *Brady 2017*), and India (1998–2004, *Boroobah 2009*). A clear spatiotemporal pattern was found in the U.S. Based on their results, the authors argued that local, homegrown, U.S. citizen perpetrators were more common than transnational threats. Focusing on Europe, an overall increase was observed in terrorist activity since the outset of the Syrian Conflict. The au-

thor highlighted the relationship between the situation in Syria and security challenges in Europe. Finally, the analysis of Indian terrorism trends showed a clear difference between the three main terrorist groups active in India. Differences were found in attack type, weapons used, and lethality. Identifying and describing general trends is important in gaining insight into the nature of terrorism.

A new tool was developed to elevate spatiotemporal analyses. *Walther et al. (2021)* introduced the Spatial Conflict Dynamics indicator (SCDi), that allows researchers to examine how the geography of conflicts evolves. It measures intensity (e.g., frequency of attacks) and spatial concentration of political violence. They illustrated the use of said indicator by analyzing events in North and West Africa during a 22-year time period based on the ACLED database. Despite using a different database, the authors highlighted that the SCDi can be calculated using any database that includes “information about an event that has as much geographic (and temporal) specificity as possible about precisely where (and when) an event has occurred” (*Walther et al. 2021: 4*). Among others, GTD clearly belongs here.

The second set of examples includes case studies of terrorist groups' activity relying on empirical data. Insight was gained into several terrorist groups. Two Armenian organizations, the ASALA and the JCAG had become highly active by the early 1980s; however, shortly afterward (within eight years), they effectively disintegrated (*Dugan et al. 2008*). Using descriptive statistics and Cox proportional hazards (PH) modeling, the authors studied possible factors behind the decrease in activity. They concluded that overreaching (specifically the attack on Paris's Orly Airport in 1983) heavily reduced the support among diaspora members, which was incredibly impactful since both groups depended on diasporas. The Nigerian terrorist group Boko Haram received substantial attention. Using the GTD, after establishing the timeline of the attacks (*Mantzikos 2014*), the deployment of sexual and gender-based violence (SGBV) was analyzed (*Oriola 2017*) along with the dramatic expansion of the insurgency (*Weeraratne 2017*). Other case studies focused on Ansar al-Sharia in Libya (*Gråtrud-Skretting 2017*), Jemaah Islamiyah (*Oak 2010*), and Al-Shabaab (*Mueller 2018*).

Third, numerous authors studied different aspects of the terrorist groups' environment (e.g., geographical, political, or intergroup relations), structure, and capabilities. The competitive environment plays a crucial role in the operation of terrorist groups. It is an important predictor of group duration (*Young-Dugan 2014; Shkolnik 2021*) and is associated with bluffing strategy (*Mahoney 2020*) and increased activity (*Findley-Young 2012*). *Young-Dugan (2014)* also found that group capabilities play a crucial role in their survival. The key to survival includes more and costly attacks and diversity in target selection and attack type. Other studies have dem-

onstrated the importance of state capacity. Generally, an increase in state capacity means a decrease in terrorist activity. However, sometimes the exact opposite is observed: “in order to respond to increasing state capacity the terror group might produce more terror, and engage in coercive recruitment and fundraising as well as provide public goods to rebuild its operational capabilities and keep its popular support base intact” (Kirisci 2020: 18). Here, the state’s capacity is measured by its ability to penetrate society, gather information, and provide public goods in an efficient and timely manner without major interruptions.

In addition to the examples above, different forms of terrorism have also received substantial attention. Among others, suicide attacks were associated with the regime and target type (Nilsson 2018), an increase in media coverage (Jetter 2019), lethality (Mroszczyk 2019), and claims (Kearns 2021). Lone wolf terrorists were found to be targeting civilian targets in a familiar area (Becker 2014). Compared to organizations, the lethality and impact of the attacks are less potent in the case of lone-wolf terrorism (Alakoc 2017). Several authors focused on the emergence of far-right terrorism. Based on empirical analysis, far-right terrorism can be considered a distinctive wave of terrorism as its different aspects fulfilled Rapoport’s distinctive wave conditions (Collins 2021). It was also established that the nature of far-right terrorism could only be understood within the given country’s economic, social, and political context and historical trends (Doering—Davies 2019).

The final examples include studies focusing on state-terrorist group interaction (action–reaction). Repression by the state is generally associated with an increase in terrorist activity (Piazza 2017). The repression can come in many forms, for example, pro-government militias (Akins 2021). Studying different types of repression, Piazza (2017) highlighted the importance of disaggregation when analyzing the relationship between repression and terrorism activity. He described different mechanisms that increase the repressive country’s vulnerability. Other studies focused on the state’s answer to terrorism and its effects. For example, a short-term decrease in terrorism followed President Trump’s travel ban; however, the trend quickly reversed (Hodwitz—Tracy 2020). The analysis of twelve different restrictive immigration policies’ effects resulted in similar findings: not all restrictive policies yield the intended results (Choi 2018). Different countries chose different answers. Important factors of the government’s strategy choice were the size of the insurgent group, the extent of violence used, and previous decisions (Asal—Fisher—Young 2020). Terrorist attacks also have an impact on the people living in the state. Social trust can be severely impaired by the fear of future attacks (Godefroidt—Langer 2020).

Discussion

Since 2007 the GTD has become one of the most prominent data sources in terrorism research. The findings of this study strongly supported this. However, the increase in popularity was far from gradual. The results showed an increase of 50% in the number of articles citing the GTD from 2016 to 2017. Keeping the length of the publishing process in mind, this turning point was around the migration crisis (Almustafa 2021) and the November 2015 Paris attacks. After reviewing over 3,000 articles carefully, Schuurman (2019) concluded that terrorism research remained mainly event-driven. These events around 2015 could be a factor behind the sudden increase; however, empirical data was unavailable to support this claim.

Despite the availability of databases (e.g., GTD, ITERATE), several authors had to draw data from multiple sources for their analyses. Combining databases manually, often more than two at a time can lead to errors. Some authors have published their resulting databases, but these focus on different aspects of terrorism. As a result, more and more partly overlapping databases emerge. Integrating multiple databases could be an important step in accelerating the development of empirical terrorism research.

In this study, an attempt has been made to highlight the importance of an open-source database in terrorism research. Despite being available for over fifteen years, its popularity increased considerably six years ago. Nevertheless, the number of articles published and the wide range of use cases show the impact of the GTD. The observed trends are promising as more and more authors draw data from open-source databases and support their claims with empirical analyses. An important step forward could be a similar analysis focusing on other prominent databases. This step is needed to generalize the trends observed here.

Limitations

Similar to Schuurman (2018), a limitation of the study is restricting the data source to seven journals. Numerous studies citing the GTD are published in other journals, which is evident after comparing the sample size and the introductory article’s number of citations (LaFree—Duggan 2007) – keeping in mind that the database itself could have even more. Books were also excluded from the sample upon selecting journals as the data source.

Another limitation is the data collection method. Despite the established guidelines, a certain degree of subjectivity was present mainly in deciding whether an article used data from the GTD as an illustration/example only or performed an analysis on the same data. The distinction was necessary as the focus of the study was

empirical research using the GTD. In addition, the selection of research topics had a subjective element; however, the aim was to give an overview. The collection of topics cannot be comprehensive, as only seven journals were selected.

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