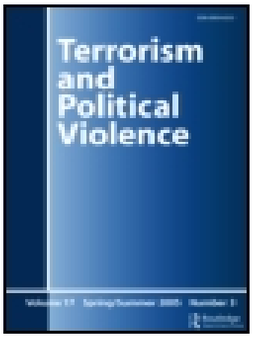

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Measuring terrorism

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ABSTRACT
In the conceptual literature on terrorism, there is no shortage of answers to the question: "What is terrorism?" Indeed, the terrorism literature has been heavily criticized for a deluge of definitions. And yet the booming quantitative terrorism literature generally examines a narrow set of "what is terrorism?": how country-level factors explain variation in the number of terrorist attacks. This article demonstrates the variety of ways in which scholars *currently* operationalize terrorism and compares them to the ways it *could* be operationalized. I replicate studies using alternative operationalizations of terrorism to examine the consequences of the terrorism literature's collective bet to focus on attack counts at the country level. Finally, I discuss the implications of the narrow set of operational choices with an eye towards how a greater variety of approaches would produce a more robust research agenda.

KEYWORDS
Democracy; quantitative methods; measurement; replication

Introduction

The question "what is terrorism?" is deceptively simple and overly complicated. While for decades scholars have argued over *how to define* terrorism,[1,2] relatively less effort has been directed at operationalizing the phenomenon once a definition is established.[3] As such, little is known about the implications of operationalizing terrorism differently. It could be that all operationalizations converge on the same answer; or all may lead to different answers; or, more than likely, the results are mixed. The purpose of this article is to offer a range of ways to operationalize terrorism, such that the operational approaches more closely match conceptual choices and enable us to identify greater empirical variation.

There is not a single way to measure terrorism nor is there a *right* definition. Instead, my more modest ambition is to address why there has been such a high degree of convergence on operational approaches, which stands in marked contrast to a more flexible conceptual literature. Two potentially important questions follow. First, are scholars mapping operationalizations of terrorism to the concepts they seek to explain in a defensible way? Second, if they are mapping concepts to measures well, what are the implications of narrowly focusing on terrorist attacks at the country-year unit of analysis at the expense of other possibilities?

To answer these questions, I first survey the recent terrorism literature and examine how terrorism is operationalized across quantitative studies in 21 journals over more than three decades. After examining conventional practice, I suggest other ways to

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operationalize the concept and note disagreement between better ways to operationalize and the standard operating procedure for measuring the concept of terrorism. I then replicate recent studies from the *Journal of Peace Research* and the *Journal of Politics* that use the standard approach in the literature. These studies were chosen in part as the authors follow replication best practices, a point discussed in more detail, and both are amenable to changing the way terrorism is measured.

A few lessons emerge from this analysis. First, inferences are similar across many different operationalizations of terrorism but there are notable differences. In one replication, political competition has a similar influence on terrorism as measured by numbers of attacks. Results diverge, though, when terrorism is measured by fatalities. Second, when transnational events or fatalities are included in the process of making the variable, the inference may change. Similar to other studies, this suggests a need for different theories, data, and models to navigate different types of terrorism. In the end, I make suggestions for future research and ways to do quantitative terrorism research that move beyond current conventional practice.

Operationalizing terrorism

To create a theory about some entity, we must classify it.[4] Normally, we conceptualize to explain the essential nature (attributes) of the thing. This conceptual definition reduces confusion over what the researcher means by the term. It is also the first step in developing a measure. After a conceptual definition, we offer an operational definition. This operational definition tells us *what* items in the world we will observe, *how* they will be observed, and finally *describes* the operations that we will take to measure the phenomena. In a standard academic paper, the research methods section includes a discussion of variable *operationalization*. In brief, this section answers two questions:

(1) How will we define a variable?
(2) How will we measure a variable?

Scholars who study terrorism, as in most other areas of social research, have made progress in some areas of explaining the phenomenon and not in others. There has been a robust and exhaustive debate over definitions and conceptualization.[5] Recently, after years of debate, a loose consensus has developed in how to conceptualize and define terrorism,[6] which has arguably led to greater progress.[7]

The consensus that developed around some attributes of the concept produced an unspoken agreement on how to define the variable, but less explicit attention has been paid to how we measure the variable.[8] There is not *one* way that terrorism should be operationalized. Rather, depending on how it is conceptualized or what the researcher is trying to explain, there are *more useful* ways to operationalize the concept.

Surveying the quantitative terrorism literature

I surveyed 21 journals[9] to assess the state of the quantitative terrorism literature.[10] As other surveys of terrorism research show,[11] the pace of this literature has increased since 2001 and this pattern holds for the quantitative literature (see Figure 1). Quantitative terrorism research appears regularly in a variety of journals across economics, political science, and terrorism

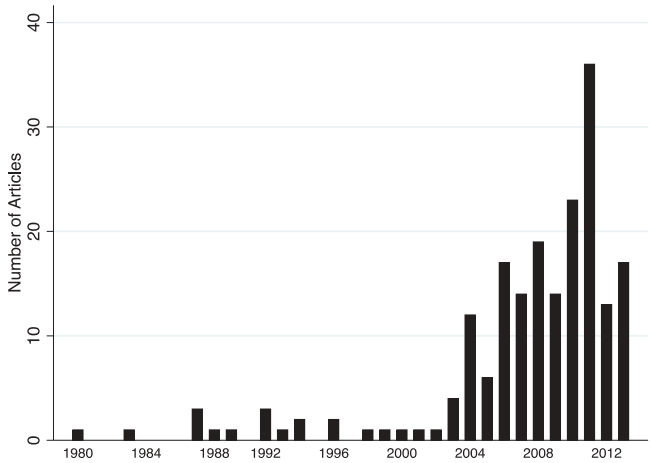

Figure 1. Number of quantitative terrorism articles per year in journal sample.

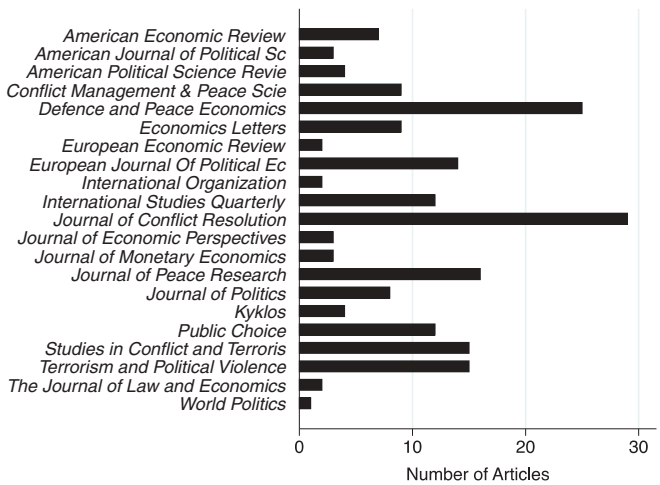

Figure 2. The total number of articles published on terrorism using quantitative methods in 21 journals.

studies. As Figure 2 shows, the *Journal of Conflict Research* and *Defense and Peace Economics* are the most frequent outlets in the sample during this period. The complete journal-year-number data for the sample are provided in Appendix A.

The majority, 66% or 128 out of 195, of the quantitative articles (Table 1) use terrorism (operationalized in some way) as the dependent variable in the study. In other words, a large number of studies attempt to explain causes of terrorism rather than how terrorism influences

Table 1. Use of the variable "Terrorism" in quantitative studies.

Variable Type	# of Articles
Dependent Variable	128
Independent Variable	56
Dependent and Independent Variable	8
Intervening	3

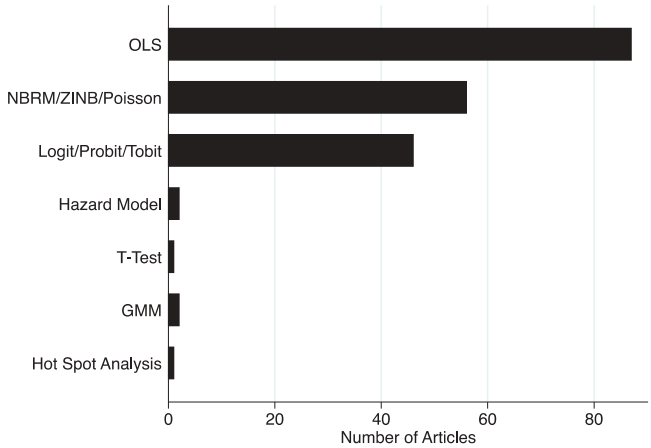

Figure 3. Use of various statistical estimators in the quantitative study of terrorism.

other factors. Few studies, 8 out of 195 or 4%, examine terrorism as an independent *and* dependent variable. Only three articles treat terrorism as an intervening factor between two other variables. Thus, the remaining 29% or 56 of 195 articles treat terrorism as an independent variable. In short, these articles investigate how terrorism influences growth, tourism, and a range of other important outcomes. One consequence of primarily using terrorism as a dependent variable is that we know more about what leads to terrorism than how terrorism influences important social outcomes, like the quality of democracy or elections. A recent piece, for example, by Getmanksy and Zeitzoff[12] examines terrorism in Israel and how it influences voting behavior. Ideally, more research would examine these kinds of questions.

When using estimators to statistically model terrorism, scholars have adopted a variety of techniques. As was common in many areas of social research, ordinary least squares regression was the most frequently employed tool (Figure 3). Since at least Li,[13] the most common technique has been to examine counts of terrorism and thus employ a Poisson or negative binomial estimator. Drakos and Gofas and Findley and Young[14] have suggested using a zero-inflated version of the negative binomial to deal with reporting bias, but the literature is split on this point. Recently, work by Blomberg et al.[15] has used hazard modeling to examine the survival of terrorist groups. While this is less common than modeling event counts, it is a frontier area for research.[16]

To operationalize terrorism, scholars overwhelmingly use counts of events. As Figure 4 demonstrates, in 131 of the articles, terrorism event counts were used. Although this is clearly a common and important way to think about terrorism, at least 18 possible operationalizations have appeared in print and could be used, thus raising the possibility of opportunity costs of focusing so extensively on event counts.

As Figure 5 shows, the most common unit of observation in quantitative studies of terrorism is country-year. With the development of the Correlates of War[17] data decades ago, country-year data use in conflict studies became widespread. The interstate conflict literature increasingly adopted different units of observation, such as dyads and directed-dyads; the terrorism literature has mostly remained at the country-year level.[18]

A turn towards disaggregation in the civil conflict literature has recently begun to filter into terrorism research, evidenced by the increase in lower levels of spatial and temporal

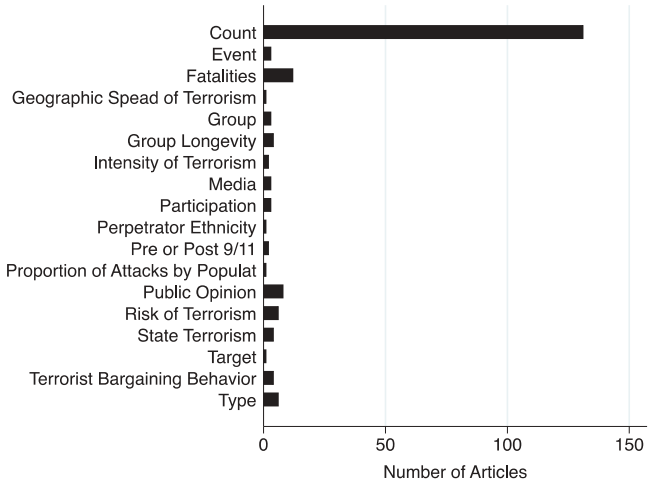

Figure 4. Count of various ways quantitative terrorism articles operationalize terrorism.

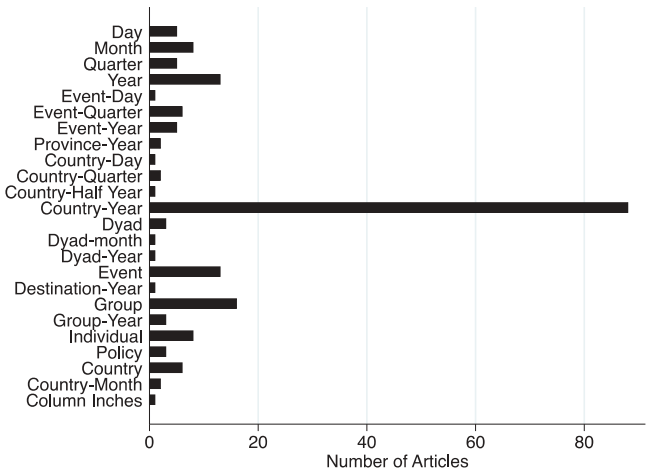

Figure 5. Count of number of quantitative terrorism articles that use each unit of observation.

aggregation.[19] No single common unit, such as district-month, is the norm across recent disaggregated terrorism studies. Given the diversity of questions and proliferation this is likely warranted, but remains an important empirical question. With the increase in the use of events data generally,[20] there appears to be a movement towards having data at the lowest temporal and spatial levels of aggregation such that researchers will be able to target their questions at the appropriate level.[21] That is, if data are at the lowest possible temporal and spatial levels, then scholars can always aggregate up as needed.

Operationalizing terrorism

How do most scholars operationalize terrorism? The number of attacks in a given country year is the most common approach. With the rapid increase in quantitative terrorism

research since the 2001 attacks in the US,[22] we might expect a myriad of ways that scholars operationalize terrorism.[23] An increase in diversity is just starting to appear, but less thought appears to be placed on the implications.

Event counts

Since at least the debate between Sandler and Eubank and Weinberg,[24] terrorism scholars have grappled with the best way to operationalize the concept of terrorism. In the context of understanding whether democracy promotes or inhibits terrorism, Eubank and Weinberg[25] argued that there is a strong link between the presence of groups in the state and whether the state is democratic. They guarded against focusing on events, establishing the concern of reporting bias in underestimating attacks in authoritarian regimes.[26] Sandler[27] claims that using groups may succumb to this underreporting bias more as groups sometimes do not claim credit or even announce their presence in more authoritarian regimes.[28]

Aside from the potential source bias, Sandler[29] is concerned with validity issues as he claims, "[w]hen … terrorism is equated with the appearance of a single event, almost every country … has experienced terrorism … [c]ount data seem the better way to go if events data are used." Subsequent studies examining the link between democracy and terrorism have used event counts almost exclusively.[30]

Today, most quantitative scholars employ event counts to test hypotheses about why terrorism influences a concept or how some phenomenon influences terrorism.[31] Predominantly, these scholars either rely on data from the International Terrorism: Attributes of Terrorist Events (ITERATE) database for transnational attacks[32] or the Global Terrorism Database (START 2013) for all kinds of attacks.[33]

The obvious benefit of this approach is that it has face validity. As we count more attacks in a given time period, they correspond with more violence.[34] It may be a first step in establishing the validity of a construct but likely not the last. For example, during the height of the Shining Path Insurgency in Peru, annual counts of terrorist attacks exceeded 400 in any given year (START 2013). Most scholars of political violence would concur that using counts of terrorist attacks is a reasonable operationalization of terrorism in this case.

By contrast, in the United States in 2001, there were about 40 attacks. Of course, four of these attacks can be attributed to a single bloody day, September 11th. What, in this case, is the best way to make terrorism a measureable variable? Counts of attacks suggest 9/11 was less important or less of an influence on other variables of interest than the dozen or so attacks by the Earth Liberation Front and Animal Liberation Front in that same year. Or comparing back to the Peruvian example, this suggests the attacks of 9/11 are nearly equivalent to another three attacks by the Shining Path in Peru in 2001.[35] Another way to operationalize terrorism, as this example demonstrates, is to count casualties or fatalities.

Casualties and fatalities

Similar to event counts, counting the injured or dead may be a more valid way to measure terrorism than observing the number of groups. As 9/11 illustrates, an event count approach would add only four attacks to the total for the US on September 11, 2011. If we focus on casualties or fatalities, the impacts are much more obvious.[36]

In addition, fatalities are easier to measure than, say, attempted attacks.[37] Where a failed attempt by a rebel group to detonate a bomb in a market may certainly qualify as a terrorist attack, it may not count as it may never be reported.[38]

A similar conundrum faces cross-national studies of the causes of crime. Generally, researchers count or use the homicide rate, as the measure should be comparable and is less sensitive to reporting errors.[39] Fatalities from crime are generally the most reliable cross-national measure as murder is less prone to debate in different contexts and more likely to be reported to police.[40] In the context of terror, fatalities from terrorism are more likely to be reported. And as compared to a failed attack, there is likely less uncertainty over whether the event actually occurred.

A limitation of casualty rates is linked to tactics. For example, as suicide terrorism emerged in the 1980s as a preferred tactic and spread across theaters of conflict, increases in casualty rates might have changed due to social learning or competition, as Bloom argues.[41] She also notes adoption of this tactic could be contingent upon culture, context, and other factors that would need to be accounted for when looking at variation in fatalities. When the measurement strategy for terrorism suggests attempting to differentiate impact across attacks, using fatalities may be a useful way to operationalize the concept with this caveat.

Number of groups

In the Southern Poverty Law Center's annual publication, *The Year in Hate and Extremism*,[42]which reports on hate and racist groups in the U.S., they count the number of groups as one measure of terrorism.[43] The number of groups, though, may be less related to the severity of terrorism and just as or more prone to reporting bias.[44] The number could serve as a measure of terrorism potential or built-up stock in society. Another reason to use this measure, like measures of the number of participants in a civil war,[45] is to operationalize how fractionalized the opposition[46] or terror movement is.[47]

In a related report, Aksoy et al.[48] examine the emergence of groups, which is a similar measure. This approach may reduce measurement error as a country-year is coded one where a group emerges and zero otherwise. Some groups may be missed, but it is less likely when the variable is coded zero.

As more data on groups become available, more ways should be explored to operationalize the concept of groups that use terrorism.[49] One of the major challenges is deciding what constitutes a group, as this can lead to different inferences.[50] As some suggest, an organization might be considered a terrorist group if it uses this tactic for as long as it uses this form of violence,[51] or that groups should not be labeled *terrorist* as they make lots of choices that do not define them.[52] As Phillips makes clear, this issue is consequential and often overlooked.[53]

While the number of groups, emergence, or survival time may help address certain questions, there is a need to examine the impact of certain kinds of groups. Blomberg et al.[54] create a Herfindahl index to examine the impact of a group relative to all groups in the terrorist group market.[55] Relatedly, Young and Dugan[56] create a nominal variable, based on their largest share of attacks, to examine the leader's influence in this market. Another limitation of event counts is that we often do not know who the perpetrators of the attack were. This may not be a large issue for aggregated studies at the country-year level, but it is a serious concern for studies that operate at the group level as missingness will likely correlate with actors.[57]

Types

While my purpose is not to develop a complete theory of how different types of terrorism influence or are influenced by other social processes, disaggregating and then operationalizing terrorism given the variation in types may lead to a better match between theory and evidence.

Empirical examinations[58] of both transnational and domestic terrorism suggest some patterns of difference.[59] When determining how to measure terrorism, how one chooses to include or exclude certain attacks likely matters. Suicide attacks may have more symbolic value,[60] and thus more impact than a non-suicide attack with the same number of casualties. For this reason, suicide terrorism is at times studied completely independently of other kinds of attacks.[61] Another way of counting attacks that may change our inferences is including or excluding unclaimed attacks. Wright, Hoffman[62] and others have used quantitative methods to examine why some attacks are claimed while others are not.

In sum, the dominant way to measure terrorism has to do with counting. This counting can be a straightforward operation or it can focus on fatalities, certain kinds of events, groups, or certain qualities of groups. Most research avoids these distinctions and some may influence our inferences about how terrorism affects and is affected by other phenomena. These choices are likely data-driven. The field has several valid and reliable datasets that allow researchers to count events but not weight them or think about their symbolic effect (at least not done so in a widely adopted way yet). In the next section, I replicate two recent studies to examine how these different operational choices influence the inferences we make regarding an independent variable's impact on terrorism.

Replication: Minority discrimination and terrorism

To investigate the choices that different operationalizations have on inferences, I first replicate James Piazza's *Journal of Peace Research* paper, "Poverty, Minority Economic Discrimination, and Domestic Terrorism." In brief, Piazza examines the impact that minority economic discrimination has on domestic terrorism, while controlling for poverty or economic development and a host of other factors.[63]

As Piazza's work demonstrates, the presence of minority economic discrimination consistently has a positive effect on expected counts of terrorism. To operationalize terrorism, Piazza uses Enders et al.'s[64] data on domestic attacks, which are gleaned from the Global Terrorism Database. Piazza justifies this choice "to model domestic, rather than international, terrorism because the literature I use to construct my theoretical link between discrimination and terrorism presumes political violence is directed locally."[65] In the final step for operationalizing terrorism, Piazza collapses the domestic terror events into country-year counts.[66]

I replicate Piazza's original model and also vary it by including only domestic (Piazza's original operationalization), only transnational, only unknown attacks, or all attacks. Similarly, I operationalize terrorism as fatalities and vary the same for attacks by counting domestic, only transnational, only known, or all fatalities. I also count the number of groups. Finally, the number of suicide attacks is used to operationalize terrorism.[67] Based on theory, using only domestic attacks may be quite appropriate. If the government accused of discrimination causes grievances, it stands to reason that those grievances may only apply to domestic violent actors. If the ethnic group in question spills across borders, however, then examining transnational attacks may be appropriate. The point of this exercise is in part to

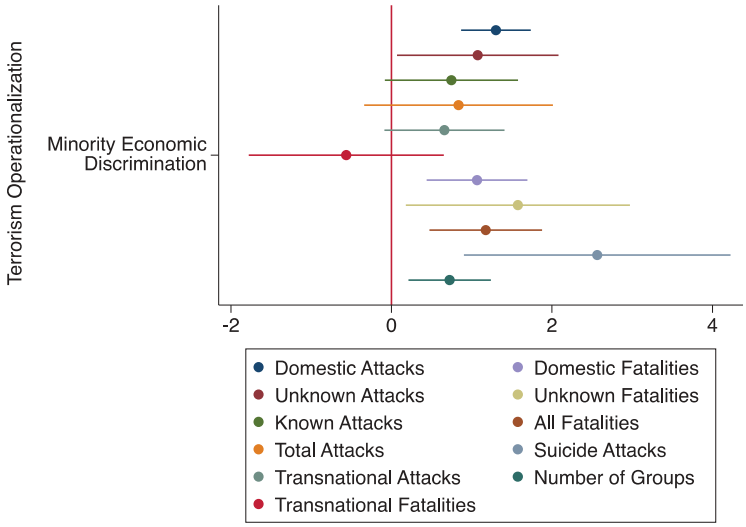

Figure 6. Effect size of minority discrimination on terrorism across different operationalizations.[68]

examine whether these choices are consequential and to match these choices with our theoretical expectations.

Figure 6 shows the coefficient estimates and 95% confidence intervals for these various ways to operationalize terrorism. The vertical red line indicates the place where the coefficient equals zero. If the 95% confidence interval includes this red line, then the results are not statistically significant. In Appendix B, a table of the exact numbers is provided. As with Piazza, these models use the Zero Inflated Negative Binomial[69] estimator. The results somewhat differ when using a simple negative binomial model (see Table B1 and the coefficient plot in Figure B2), a point discussed in the conclusion.

The first model, using domestic attacks as the measure for terrorism, is identical to Piazza's and the results are exactly the same. When the operationalization is changed to domestic fatalities, the results are also quite similar, positive, and statistically significant. Similarly, when terrorism is operationalized as all fatalities (including unknown, transnational, and domestic), all attacks, only unknown attacks, or unknown fatalities the results are positive and statistically significant. In this case, regardless of these operational choices, the inferences remain the same. Interestingly, suicide attacks and the number of groups are also positive and significant. The variance in the effect of suicide attacks, however, is much larger than the other ways to operationalize terrorism.

There were four ways to operationalize terrorism that were not statistically significant: transnational attacks, transnational fatalities, total attacks, and all known attacks (which includes transnational attacks). The coefficient for transnational fatalities was also negative, but this result cannot be distinguished from zero.

In sum, regardless of many operational choices, such as leaving in or out unknown attacks, whether to use attacks or fatalities, whether to count groups or events, or to focus only on suicide attacks, the inferences are the same—the presence of minority economic discrimination increases the expected amounts of terrorism. Only when we consider transnational events alone or in concert with these other kinds of events are the inferences fragile. These empirical differences are in line with previous work disentangling domestic

and transnational attacks.[70] Different logics and thus different explanations for why these two distinct forms of terrorism occur are likely needed.[71] When a violent organization is targeting a foreign government or people, there seems to be a distinct logic from when the conflict is internal. Domestic discrimination may lead to locals using violence in response. It might also mean the government is focused on using more internal violence than external as a possible reason for why transnational fatalities might decline. Other distinctions, such as whether the attacks are suicidal or not, may lead to more or less casualties. They may also be driven by the same reasons for resorting to violence in the first place.

Replication: Political competition and terrorism

Arguably the most debated issue in the study of terrorism is how democracy influences this form of political violence. Erica Chenoweth's *Journal of Politics*[72] paper enters into this argument and suggests intergroup political competition is the driver explaining the variation across different states.[73] Her primary measure of political competition comes from the POLITY IV dataset[74] and ranges from 1 to 10. Increasing values represent more competition allowed by the state.

I first replicated the impact of competition using the exact dependent variable from Chenoweth. In this case, the dependent variable of terrorism is a count of transnational attacks from the ITERATE database.[75] The result is that political competition, as reported in the paper in Table 1 Model 1, is positively associated with terrorist attacks.[76]

Beyond this original model, I use alternative operationalizations of the dependent variable including only transnational attacks from the Global Terrorism Database, only unknown attacks, or all attacks. As in the previous replication, I operationalize terrorism as fatalities and vary the same for attacks by counting domestic, only transnational, only known, or all fatalities. Again, a count of the number of groups and the number of suicide attacks is utilized to operationalize terrorism.

As Figure 7 shows, nearly all ways to operationalize terrorism based on attacks are positive and significant. Exact coefficient values are provided in Table B2 in the Appendix. Whether we use transnational, domestic, unknown, or all attacks, the results are strikingly similar. By contrast, almost all of the ways to operationalize terrorism that involve fatalities are insignificant. Only transnational fatalities is statistically significant, but just barely (p = .048). All of the coefficients are smaller than attack coefficients, suggesting at least an attenuated effect.

Lastly, suicide attacks switches signs and becomes insignificant. Interestingly, political competition does not seem to increase the likelihood of suicide terrorism contra to the prominent outbidding theory.[77] A count of the number of groups is also quite similar in substance and significance to the ways to count attacks. Potentially the most reliable measures of terrorism, or ways to count terrorism that include fatalities, create the most uncertainty over average effects. Competition may lead to more attacks but have no effect on fatalities, as groups might want to remain in the media or in the general dialogue without raising the stakes by creating more fatalities.

While this is an initial exercise and far from definitive, this replication suggests that the relationship between competition and terrorism is dependent on how we operationalize the dependent variable. Empirically, more work could probe the contours of

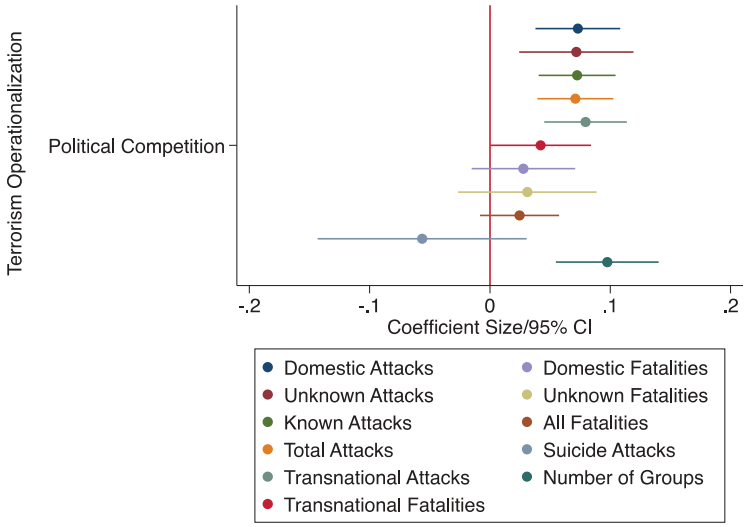

Figure 7. Effect size of political competition on terrorism across different operationalizations.[78]

this relationship. Potentially more useful are precise theoretical expectations that tell us when competition should or should not lead to specific kinds of measurable outcomes.

Conclusions and ways forward

In the survey of journals that publish quantitative studies of terrorism, I find some important patterns. First, while journals are publishing more quantitative articles, they continue to do so using similar approaches. In one sense, this could be viewed as progress. In another, this suggests that some questions may be overlooked as we are confining our analyses to certain questions. For example, many scholars believe that symbolism is a factor individuals consider when selecting a target for a terrorist attack.[79] In fact, some scholars use the symbolic nature of the attack to define terrorism itself.[80] If scholars only examine counts of events and do not weight or use intensity of those events, they will miss the impact of a variety of events.

These initial replications suggest that this choice may or may not be consequential, but more probing of this result is needed. Replicating results helps build a solid empirical foundation and points towards limits of our theories or ambiguity in the precise relationships we think occur. As King[81] argues, we need a stronger norm of replication in the social sciences to build a body of knowledge with solid empirical foundation.[82] Where this choice changes inferences relates to considering transnational and domestic attacks and suggests a need for more studies and theories to explain why and under what conditions this difference matters. Many of the projects surveyed did not use alternative operationalizations. One notable exception, Gaibulloev and Sandler,[83] used counts of the numbers of attacks, a dichotomous measure of presence or absence of terrorism, and an attack rate as alternatives, a strategy which I believe will further improve the precision of how we measure and then link terrorism to other outcomes and whether these choices are consequential.[84]

As Table 1 shows, the quantitative study of terrorism has leveled off as of late. Based on conference papers and recent articles outside the data shown here, the rise in experimental work and focus on causal identification is moving the field in different directions.[85] This work tends to privilege internal validity over external validity and focus on context-specific effects. In my estimation, to understand a complex problem like terrorism, we need a diversity of approaches and these newer ways are helpful.[86] Even with many ways to examine the problem of terrorism, I expect quantitative approaches will remain one of the important academic ways to study the phenomenon.

As the purpose of this article is more about the rules of turning terrorism into a measurable variable, I did not fully examine statistical modeling choices and how this might influence our inferences. As the models in Table B1 in the Appendix show, using alternative estimators can adjust the inferences. Turning to a more theory-driven reason for using a particular estimator is likely a defensible choice. If the differences across estimators are negligible, then the assumptions of each model may not drive any particular outcome and make this point less consequential.

In addition to thinking about different statistical models, we can also think about different models of statistical inference. While Bayesian statistical methods are now becoming common tools for social scientists, their use in the quantitative study of terrorism is less common.[87] Although not all scholarly disciplines were surveyed, there are few examples of Bayesian statistical models in the study of terrorism.[88]

As Schrodt's[89] magnum opus on the deadly sins of quantitative methods makes clear, the overuse of frequentist methods is endemic in the social sciences. He argues that if we want a model that corresponds more closely to reality, is logically coherent, and integrates theory and data, then more Bayesian studies are needed. In brief, a Bayesian approach is statistical analysis that relies on Bayes' theorem, which provides an outline for updating our prior beliefs about parameters of a model given observed data to arrive at posterior beliefs.[90] Bayesian models are particularly attractive when missing data are a serious concern,[91] as they aren't reliant on P values or single point estimates when communicating the range of likely values,[92] can more easily model multilevel data structures,[93] and can be updated and replicated easily in light of new information.[94]

The intensity of computing power was a major barrier to their use in social science. Since at least the 1990s, this barrier has been reduced. To the extent that training and fashion change, we would expect to see more studies in the quantitative tradition on terrorism incorporate this approach. Hard-liners on the Frequentism vs. Bayesian debate[95] claim there is a right or better approach. Similar to arguments by Efron,[96] there is likely a role for each type of inference. A more modest suggestion is that the Bayesian approach is underutilized.

Based on recent work on unknown attacks,[97] I expected to see differences with known attacks. That the choice of counting unknown attacks does not influence the results could be the result of several factors. Most of these unknown attacks are really domestic. Seven out of eight attacks are domestic, as are most unknown attacks.[98] Second, the logic of claiming attacks changes for domestic versus transnational events. Big transnational attacks, such as 9/11 or airline hijackings in the 1970s, are claimed. Ambiguity may not be a strategic asset to the perpetrators in these cases. In the domestic context, the number of competitors may influence claiming or not claiming.[99]

Finally, researchers who study terrorism have been critical of the field for decades.[100] With the advent of new tools, this criticism has not necessarily abated nor should it necessarily. A fundamental challenge is that we study clandestine actors and thus most of our data are filtered through secondary sources, like the media.[101] In the late 1980s, Schmid and Jongman were pessimistic about what we could learn because of this challenge.[102] Silke,[103] on the other hand, suggests that other scholarly endeavors are enriched by a diversity of methods. He suggests the need for more inferential statistics in the study of terrorism, which is exactly what we have seen post 2001 due in part to the availability of data.[104]

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Notes on contributor

Joseph K. Young's research seeks to understand the cross-national causes and consequences of political violence. He has published numerous peer-reviewed articles across academic disciplines, and is also a contributor and editor for the blog *Political Violence @ a Glance.*

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Notes

1. See for example, Martha Crenshaw, "The Causes of Terrorism," *Comparative Politics* 13, no. 4 (1981); Alex P. Schmid and Albert J. Jongman, *Political Terrorism: A Research Guide to Concepts, Theories, Data Bases and Literature* (Amsterdam: North-Holland Publishing Company, 1984); Leonard Weinberg, Ami Pedahzur, and Sivan Hirsch-Hoefler, "The Challenges of Conceptualizing Terrorism," *Terrorism and Policical Violence* 16, no. 4 (2004).
2. Most of this discussion has occurred among positivists who do not necessarily begin with the assumption that terrorism is socially constructed. For an alternative, see Richard Jackson, Marie Breen Smyth, and Jeroen Gunning, eds., *Critical Terrorism Studies: A New Research Agenda* (Abingdon, UK: Routledge, 2009).
3. Weinberg, Pedahzur, and Hirsch-Hoefler (see note 1 above) have one of the more extensive related discussions.
4. Giovanni Sartori, "Concept Misformation in Comparative Politics," *American Political Science Review* 64, no. 4 (1970); Gary Goertz, *Social Science Concepts: A User's Guide* (Princeton, NJ: Princeton University Press, 2006).
5. Schmid and Jongman, *Political Terrorism: A Research Guide to Concepts, Theories, Data Bases and Literature* (see note 1 above); Alex P. Schmid, "The Response Problem as a Definition Problem," *Terrorism and Political Violence* 4, no. 4 (1992); Weinberg, Pedahzur, and Hirsch-Hoefler, "The Challenges of Conceptualizing Terrorism" (see note 1 above).
6. Tore Bjørgo, "Introduction," in *Root Causes of Terrorism: Myths, Reality and Ways Forward* (Abingdon, UK: Routledge, 2004).

7. For a recent piece on progress made in the analytical study of terrorism, see Todd Sandler, "The Analytical Study of Terrorism: Taking Stock," *Journal of Peace Research* 51, no. 2 (2014): 0022343313491277.
8. For an earlier debate on the issue, see Sandler, "On the Relationship between Democracy and Terrorism," *Terrorism and Political Violence* 7, no. 4 (1995); Leonard B. Weinberg and William L. Eubank, "Terrorism and Democracy: What Recent Events Disclose," *Terrorism and Political Violence* 10, no. 1 (1998).
9. I surveyed journals from political science, economics, and terrorism studies. There are other social science disciplines actively involved in generating quantitative terrorism studies, such as criminology and sociology. I don't, however, have a priori reasons to believe the trends are notably different in these disciplines. If there are explicit theoretical reasons for investigating these disciplines, that could be a task for future research.
10. In Appendix A, I list each journal and the number of quantitative terrorism articles they published each year. There are other articles on terrorism in these journals not listed here that are either qualitative, formal, or do not explicitly use quantitative methods to test hypotheses related to the causes and consequences of terrorism.
11. Sandler, "The Analytical Study of Terrorism: Taking Stock" (see note 7 above); Joseph K. Young and Michael G. Findley, "Promise and Pitfalls of Terrorism Research," *International Studies Review* 13, no. 3 (2011).
12. Anna Getmansky and Thomas Zeitzoff, "Terrorism and Voting: The Effect of Rocket Threat on Voting in Israeli Elections," *American Political Science Review* 108, no. 3 (2014).
13. Quan Li, "Does Democracy Promote or Reduce Transnational Terrorist Incidents?," *Journal of Conflict Resolution* 49, no. 2 (2005).
14. Konstantinos Drakos and Andreas Gofas, "In Search of the Average Transnational Terrorist Attack Venue," *Defence and Peace Economics* 17, no. 2 (2006); Michael G. Findley and Joseph K. Young, "Terrorism, Democracy, and Credible Commitments," *International Studies Quarterly* 55, no. 2 (2011).
15. S. Brock Blomberg, Rozlyn C. Engel, and Reid Sawyer, "On the Duration and Sustainability of Transnational Terrorist Organizations," *Journal of Conflict Resolution* (2009); S. Brock Blomberg, Khusrav Gaibulloev, and Todd Sandler, "Terrorist Group Survival: Ideology, Tactics, and Base of Operations," *Public Choice* 149, no. 3–4 (2011).
16. For example, see David B. Carter, "A Blessing or a Curse? State Support for Terrorist Groups," *International Organization* 66, no. 1 (2012); Khusrav Gaibulloev and Todd Sandler, "An Empirical Analysis of Alternative Ways That Terrorist Groups End," *Public Choice* 160, no. 1–2 (2014); Brian J. Phillips, "Terrorist Group Cooperation and Longevity," *International Studies Quarterly* 58, no. 2 (2014); Joseph K. Young and Laura Dugan, "Survival of the Fittest: Why Terrorist Groups Endure," *Perspectives on Terrorism* 8, no. 2 (2014). A related approach common in criminology is to examine group trajectories (Erin Miller, "Patterns of Onset and Decline among Terrorist Organizations," *Journal of Quantitative Criminology* 28, no. 1 [2012]: 77–101), which is similar to developing time-series factor analysis models.
17. See http://www.correlatesofwar.org.
18. For a related discussion, see Young and Findley, "Promise and Pitfalls of Terrorism Research" (see note 11 above).
19. See for example Michael G. Findley et al., *The Local Geography of Transnational Terrorist Attacks* (Austin: University of Texas at Austin, 2015); Michael G. Findley and Joseph K. Young, "Terrorism and Civil War: A Spatial and Temporal Approach to a Conceptual Problem," *Perspectives on Politics* 10, no. 2 (2012); Stephen C. Nemeth, Jacob A. Mauslein, and Craig Stapley, "The Primacy of the Local: Identifying Terrorist Hot Spots Using Geographic Information Systems," *The Journal of Politics* 76, no. 2 (2014).
20. See for example Gary King and Will Lowe, "An Automated Information Extraction Tool for International Conflict Data with Performance as Good as Human Coders: A Rare Events Evaluation Design," *International Organization* 57, no. 3 (2003); Will H. Moore and David R. Davis, "Ties That Bind? Domestic and International Conflict Behavior in Zaire,"

Comparative Political Studies 31, no. 1 (1998); Philip A. Schrodt and Deborah J. Gerner, "Validity Assessment of a Machine-Coded Event Data Set for the Middle East, 1982–92," *American Journal of Political Science* 38, no. 3 (1994): 825–54.

21. For use of events data in the study of terrorism and nonviolence, see Stephen M. Shellman, Brian P. Levey, and Joseph K. Young, "Shifting Sands Explaining and Predicting Phase Shifts by Dissident Organizations," *Journal of Peace Research* 50, no. 3 (2013).
22. Todd Sandler, "The Analytical Study of Terrorism: Taking Stock" (see note 7 above); Young and Findley, "Promise and Pitfalls of Terrorism Research" (see note 11 above).
23. For an overview of the field post 9/11, see Magnus Ranstorp, "Mapping Terrorism Studies after 9/11," in *Critical Terrorism Studies: A New Research Agenda*, edited by Richard Jackson, Marie Breen Smyth and Jeroen Gunning (London: Routledge, 2009), 13–33.
24. William Lee Eubank and Leonard Weinberg, "Does Democracy Encourage Terrorism?," *Terrorism and Political Violence* 6, no. 4 (1994); Todd Sandler, "On the Relationship between Democracy and Terrorism," *Terrorism and Political Violence* 7, no. 4 (1995).
25. William Lee Eubank and Leonard Weinberg, "Does Democracy Encourage Terrorism?" (see note 24 above).
26. As Conrad et al. note, however, this underreporting bias cannot explain why some autocratic regimes have more terrorism than others. See Courtenay R. Conrad, Justin Conrad, and Joseph K. Young, "Tyrants and Terrorism: Why Some Autocrats Are Terrorized While Others Are Not," *International Studies Quarterly* 58, no. 3 (2014).
27. Sandler, "On the Relationship between Democracy and Terrorism" (see note 24 above), 2.
28. Wright highlights, for example, that credit claiming is decreasing, as from the 1970s to the present the percentage of claimed attacks as a portion of the total has decreased from over 60% to under 15%. See Austin Lee Wright, "Why Do Terrorists Claim Credit? Attack-Level and Country-Level Analyses of Factors Influencing Terrorist Credit-Taking Behavior," *ICPSR Research Paper Competition* (2009).
29. Sandler, "On the Relationship between Democracy and Terrorism" (see note 24 above), 7.
30. Joe Eyerman, "Terrorism and Democratic States: Soft Targets or Accessible Systems," *International Interactions* 24, no. 2 (1998); Li, "Does Democracy Promote or Reduce Transnational Terrorist Incidents?" (see note 13 above).
31. See, for example, Li, "Does Democracy Promote or Reduce Transnational Terrorist Incidents?" (see note 13 above); Navin A. Bapat, "Transnational Terrorism, US Military Aid, and the Incentive to Misrepresent," *Journal of Peace Research* 48, no. 3 (2011); James A. Piazza, "Poverty, Minority Economic Discrimination, and Domestic Terrorism," *Journal of Peace Research* 48, no. 3 (2011): 339–353.
32. Edward Mickolus, Todd Sandler, Jean Murdock, and Peter Flemming, *International Terrorism: Attributes of Terrorist Events (Iterate), 1968–2010* (Dunn Loring, VA: Vinyard Software 2011).
33. For different ways that scholars have extracted domestic attacks from the Global Terrorism Database, see Walter Enders, Todd Sandler, and Khusrav Gaibulloev, "Domestic Versus Transnational Terrorism: Data, Decomposition, and Dynamics," *Journal of Peace Research* 48, no. 3 (2011); Joseph K. Young and Laura Dugan, "Veto Players and Terror," *Journal of Peace Research* 48, no. 1 (2011). Other terrorism databases, such as the RAND MIPT data, which were widely used, are no longer collected, although they do maintain a database of Worldwide Terrorism Incidents. See Victor Asal and R. Karl Rethemeyer, "Dilettantes, Ideologues, and the Weak: Terrorists Who Don't Kill," *Conflict Management and Peace Science* 25, no. 3 (2008). RAND, RAND Database of Worldwide Terrorism Incidents (1968–2009), http://www.rand.org/nsrd/projects/terrorism-incidents.html. The TWEED data collect information related to terrorism in Western Europe: Jan Oskar Engene, "Five Decades of Terrorism in Europe: The Tweed Dataset," *Journal of Peace Research* 44, no. 1 (2007), http://folk.uib.no/sspje/tweed.htm.
34. As pointed out by an anonymous reviewer, another option is to use a dichotomous measure of the presence or absence of terrorism in a particular spatio-temporal unit. The advantage of this is that it allows the observer to calculate the likelihood of an event and likely is less

susceptible to measurement error. The downside is that we lose variation in the variable and are not able to make claims about more or less. In the civil war literature, the variable operationalizing civil war is often a dichotomous war or not or war onset or not. See Håvard Hegre and Nicholas Sambanis, "Sensitivity Analysis of Empirical Results on Civil War Onset," *Journal of Conflict Resolution* 50, no. 4 (2006).

35. The Global Terrorism Database (START 2013) lists three attacks by the Shining Path in 2001 that led to 16 total fatalities and 9 injuries.
36. The total dead from the 9/11 attacks is still debated. The 9/11 Commission report places the total dead at 2,996, which includes those who immediately died and the 19 hijackers. Regardless of the precise number of dead or wounded, it is easily the most deadly day related to terrorism in human history.
37. One challenge with counting attacks or fatalities or any other event is adding them up assumes each event is equal.
38. Drakos and Gofas argue that this underreporting bias may be influenced by the freedom (or lack thereof) of the press and Drakos and Gofas suggest a two-stage procedure for modeling this underreporting bias. See Konstantinos Drakos and Andreas Gofas, "The Devil You Know but Are Afraid to Face: Underreporting Bias and Its Distorting Effects on the Study of Terrorism," *Journal of Conflict Resolution* 50, no. 5 (2006); Drakos and Gofas, "In Search of the Average Transnational Terrorist Attack Venue" (see note 14 above).
39. Richard R. Bennett and James P. Lynch, "Does a Difference Make a Difference? Comparing Cross-National Crime Indicators," *Criminology* 28, no. 1 (1990).
40. Gary LaFree, "A Summary and Review of Cross-National Comparative Studies of Homicide," in M. Dwayne Smith and Margaret A. Zahn, eds., *Homicide: A Sourcebook of Social Research* (London: Sage, 1999).
41. Mia Bloom, *Dying to Kill: The Allure of Suicide Terror* (New York: Columbia University Press, 2005).
42. See http://www.splcenter.org/home/2013/spring/the-year-in-hate-and-extremism for the 2013 report.
43. They show, for example, a dramatic rise in the number of Patriot and Militia groups since the election of the U.S. President, Barack Obama, in 2008.
44. Sandler, "On the Relationship between Democracy and Terrorism" (see note 24 above).
45. See, for example, David E. Cunningham, "Veto Players and Civil War Duration," *American Journal of Political Science* 50, no. 4 (2006).
46. Kathleen Gallagher Cunningham, "Divide and Conquer or Divide and Concede: How Do States Respond to Internally Divided Separatists?," *American Political Science Review* 105, no. 2 (2011).
47. Michael G. Findley and Joseph K. Young, "More Combatant Groups, More Terror?: Empirical Tests of an Outbidding Logic," *Terrorism and Political Violence* 24, no. 5 (2012).
48. Deniz Aksoy, David B. Carter, and Joseph Wright, "Terrorism in Dictatorships," *The Journal of Politics* 74, no. 3 (2012).
49. The TORG crosswalk Dataset (http://www.albany.edu/pvc/data.shtml), which is compiled and curated by Ken Cousins, kcousins@albany.edu, harmonizes the names of violent groups across data sets.
50. Phillips, "Terrorist Group Cooperation and Longevity" (see note 16 above).
51. Young and Dugan, "Survival of the Fittest: Why Terrorist Groups Endure" (see note 16 above).
52. Charles Tilly, "Terror, Terrorism, Terrorists," *Sociological Theory* 22, no. 1 (2004).
53. Another issue with using groups as the unit of observation is that names change, are spelled differently, or are misreported after an attack. I thank an anonymous reviewer for this point. Phillips, "Terrorist Group Cooperation and Longevity" (see note 16 above).
54. Blomberg, Engel, and Sawyer, "On the Duration and Sustainability of Transnational Terrorist Organizations" (see note 15 above).

55. Similar uses of the Herfindahl index are employed in the study of political parties. See Russell J. Dalton, "The Quantity and the Quality of Party Systems Party System Polarization, Its Measurement, and Its Consequences," *Comparative Political Studies* 41, no. 7 (2008).
56. Young and Dugan, "Survival of the Fittest: Why Terrorist Groups Endure" (see note 16 above).
57. I am grateful to an anonymous reviewer for helping me with this point.
58. Khusrav Gaibulloev and Todd Sandler, "The Adverse Effect of Transnational and Domestic Terrorism on Growth in Africa," *Journal of Peace Research* 48, no. 3 (2011); James A. Piazza, "Types of Minority Discrimination and Terrorism," *Conflict Management and Peace Science* 29, no. 5 (2012); Young and Findley, "Promise and Pitfalls of Terrorism Research" (see note 11 above).
59. One plausible omitted variable explaining the difference between transnational and domestic attacks is terrorist group capabilities. Estimates for rebel group capabilities are notoriously difficult to ascertain. For one attempt, see David E. Cunningham, Kristian Skrede Gleditsch, and Idean Salehyan, "It Takes Two: A Dyadic Analysis of Civil War Duration and Outcome," *Journal of Conflict Resolution* 53, no. 4 (2009). Asal and Rethemeyer use a measure of terrorist group capability, but it is for a limited number of groups and does not vary over time. See Asal and Rethemeyer, "Dilettantes, Ideologues, and the Weak: Terrorists Who Don't Kill" (see note 33 above); "The Nature of the Beast: Organizational Structures and the Lethality of Terrorist Attacks," *The Journal of Politics* 70, no. 2 (2008).
60. Martha Crenshaw, "Explaining Suicide Terrorism: A Review Essay," *Security Studies* 16, no. 1 (2007); Ami Pedahzur, ed., *Root Causes of Suicide Terrorism: The Globalization of Martyrdom* (Abingdon, UK: Routledge, 2006).
61. See for example James A. Piazza, "A Supply-Side View of Suicide Terrorism: A Cross-National Study," *Journal of Politics* 70, no. 1 (2008).
62. Aaron M. Hoffman, "Voice and Silence: Why Groups Take Credit for Acts of Terror," *Journal of Peace Research* 47, no. 5 (2010); Wright, "Why Do Terrorists Claim Credit? Attack-Level and Country-Level Analyses of Factors Influencing Terrorist Credit-Taking Behavior" (see note 28 above).
63. For details, see Piazza, "Poverty, Minority Economic Discrimination, and Domestic Terrorism" (see note 31 above). I am primarily replicating his model 1 from Table 2 (Piazza 2011: 347). In this model, he uses the zero-inflated negative binomial estimator, robust standard errors clustered on country. Since I am only adjusting the dependent variable, the independent variables all remain the same.
64. Enders, Sandler, and Gaibulloev, "Domestic Versus Transnational Terrorism: Data, Decomposition, and Dynamics" (see note 33 above).
65. Piazza, "Poverty, Minority Economic Discrimination, and Domestic Terrorism" (see note 31 above), 343.
66. Ibid., 344.
67. The first stage of the zero-inflated negative binomial models does not include terrorism as a variable. Because of this, I omitted the first stage from the discussion of the results and figures.
68. Plot created using coefplot Stata module from Ben Jann, "Plotting Regression Coefficients and Other Estimates in Stata," *University of Bern Social Sciences Working Papers* 1 (2013).
69. In the quantitative literature, a debate developed over the use of zero-inflated models vs. regular negative binomial models (See Li, "Does Democracy Promote or Reduce Transnational Terrorist Incidents?" [see note 13 above], Drakos and Gofas, "In Search of the Average Transnational Terrorist Attack Venue" [see note 14 above], Findley and Young, "Terrorism, Democracy, and Credible Commitments" [see note 14 above]). Arguments over which is the best estimator given the data generating process are not settled. See Li, "Does Democracy Promote or Reduce Transnational Terrorist Incidents?" (see note 13 above); Drakos and Gofas, "In Search of the Average Transnational Terrorist Attack Venue" (see note 14 above); Young and Findley, "Promise and Pitfalls of Terrorism Research" (see note 11 above).

70. Gaibulloev and Sandler, "The Adverse Effect of Transnational and Domestic Terrorism on Growth in Africa" (see note 58 above); Young and Findley, "Promise and Pitfalls of Terrorism Research" (see note 11 above).
71. Mike Findley, Alex Braithwaite, Joseph Young, Henry Pascoe, and Josiah Marineau, "The Local Geography of Transnational Terrorism," Paper presented at the *International Studies Association* Annual Meeting, New Orleans, Louisiana, February 2015).
72. Erica Chenoweth, "Democratic Competition and Terrorist Activity," *The Journal of Politics* 72, no. 1 (2010).
73. Chenoweth (see note 72 above) estimates a series of models and varies the independent and dependent variable to address her research question as I advocate here. I extend her probe into other ways to measure terrorism, but she does examine the number of new terrorist groups using slightly different models and multiple ways to operationalize competition.
74. Monty G. Marshall and Keith Jaggers, "Polity IV Project: Political Regime Characteristics and Transitions, 1800–2002" (Maryland: University of Maryland, 2002).
75. These data were from Li, "Does Democracy Promote or Reduce Transnational Terrorist Incidents?" (see note 13 above).
76. The coefficient estimate is 0.061 with a standard error of 0.017, close to what Chenoweth reports with the difference due to rounding.
77. Bloom, *Dying to Kill: The Allure of Suicide Terror* (see note 41 above).
78. Plot created using Jann (2013) coefplot Stata module (see note 65).
79. Victor H. Asal et al., "The Softest of Targets: A Study on Terrorist Target Selection," *Journal of Applied Security Research* 4, no. 3 (2009); Bruce Hoffman, "Terrorist Targeting: Tactics, Trends, and Potentialities," *Terrorism and Political Violence* 5, no. 2 (1993); Mark Juergensmeyer, "Terror in the Name of God," *Current History* 100, no. 649 (2001).
80. McCormick cites Thornton as a classic example. See Gordon H. McCormick, "Terrorist Decision Making," *Annual Review of Political Science* 6, no. 1 (2003); Thomas Perry Thornton, "Terror as a Weapon of Political Agitation," *Terrorism: Critical Concepts in Political Science* 3 (1964). For a more thorough review of defining terrorism and how some observers view symbolism as a critical component of the definition, see Bruce Hoffman, *Inside Terrorism* (New York: Columbia University Press, 2006).
81. Gary King, "Replication, Replication," *PS: Political Science & Politics* 28, no. 3 (1995).
82. For an introduction to a recent symposium on data transparency and access, see Arthur Lupia and Colin Elman, "Openness in Political Science: Data Access and Research Transparency," *PS: Political Science & Politics* 47, no. 1 (2014).
83. Gaibulloev and Sandler, "The Adverse Effect of Transnational and Domestic Terrorism on Growth in Africa" (see note 58 above).
84. Chenoweth (see note 72 above) also uses multiple dependent variables in the same study, numbers of attacks and numbers of new groups.
85. Andrew W. Bausch, Joao R. Faria, and Thomas Zeitzoff, "Warnings, Terrorist Threats and Resilience: A Laboratory Experiment," *Conflict Management and Peace Science* 30, no. 5 (2013); James A. Piazza, "Terrorist Suspect Religious Identity and Public Support for Harsh Interrogation and Detention Practices," *Political Psychology* 36, no. 6 (2015).
86. Formal modeling is not as new as experiments are to terrorism research, but it is another important tool. See Todd Sandler, "Terrorism & Game Theory," *Simulation & Gaming* 34, no. 3 (2003).
87. Nate Silver's popular book, *The Signal and the Noise*, advocates for a Bayesian approach to inference and devotes a chapter to terrorism. See Nate Silver, *The Signal and the Noise: Why So Many Predictions Fail—But Some Don't* (New York: Penguin, 2012).
88. See for example Patrick T. Brandt and Todd Sandler, "What Do Transnational Terrorists Target? Has It Changed? Are We Safer?," *Journal of Conflict Resolution* 54, no. 2 (2010); Konstantinos Drakos and Cathérine Müller, "Terrorism Risk Concern in Europe," *Economics Letters* 112, no. 2 (2011); Minjung Kyung, Jeff Gill, and George Casella, "New Findings from Terrorism Data: Dirichlet Process Random-Effects Models for Latent Groups," *Journal of the Royal Statistical Society: Series C (Applied Statistics)* 60, no. 5 (2011); Will H. Moore, Ryan

Bakker, and Daniel W. Hill, "How Much Terror? Dissidents, Governments, Institutions and the Cross-National Study of Terror Attacks," SSRN Working Paper (2011).

89. Philip A. Schrodt, "Seven Deadly Sins of Contemporary Quantitative Political Analysis," *Journal of Peace Research* 51, no. 2 (2014).
90. Simon Jackman, "Bayesian Analysis for Political Research," *Annual Review of Political Science* 7 (2004).
91. James Honaker, Gary King, and Matthew Blackwell, "Amelia II: A Program for Missing Data," *Journal of Statistical Software* 45, no. 7 (2011).
92. John K. Kruschke, "What to Believe: Bayesian Methods for Data Analysis," *Trends in Cognitive Sciences* 14, no. 7 (2010).
93. Andrew Gelman and Jennifer Hill, *Data Analysis Using Regression and Multilevel/Hierarchical Models* (Cambridge, UK: Cambridge University Press, 2006).
94. John K. Kruschke, "Introduction to Special Section on Bayesian Data Analysis," *Perspectives on Psychological Science* 6, no. 3 (2011).
95. See for example Simon Jackman, *Bayesian Analysis for the Social Sciences*, vol. 846 (Chichester, UK: John Wiley & Sons, 2009).
96. Bradley Efron, "Bayesians, Frequentists, and Scientists," *Journal of the American Statistical Association* 100, no. 469 (2005).
97. Hoffman, "Voice and Silence: Why Groups Take Credit for Acts of Terror" (see note 62 above); Wright, "Why Do Terrorists Claim Credit? Attack-Level and Country-Level Analyses of Factors Influencing Terrorist Credit-Taking Behavior" (see note 28 above).
98. Gary LaFree and Laura Dugan, "Introducing the Global Terrorism Database," *Terrorism and Political Violence* 19, no. 2 (2007).
99. Hoffman, "Voice and Silence: Why Groups Take Credit for Acts of Terror" (see note 62 above).
100. Schmid and Jongman, *Political Terrorism: A Research Guide to Concepts, Theories, Data Bases and Literature* (see note 1 above); Andrew Silke, "The Devil You Know: Continuing Problems with Research on Terrorism," *Terrorism and Political Violence* 13, no. 4 (2001).
101. Silke, "The Devil You Know: Continuing Problems with Research on Terrorism" (see note 100 above).
102. Schmid and Jongman, *Political Terrorism: A Research Guide to Concepts, Theories, Data Bases and Literature* (see note 1 above).
103. Silke, "The Devil You Know: Continuing Problems with Research on Terrorism" (see note 100 above).
104. Sageman has been critical of the growth of terrorism research post 2001. He claims that new researchers are not "truly scholars" and cannot be relied upon to advance the field as they are "more advocates than objective scholars" (566). Interestingly, he cites little of the work discussed or shown here. See Marc Sageman, "The Stagnation in Terrorism Research," *Terrorism and Political Violence* 26, no. 4 (2014).

Appendix A. Number of quantitative articles on terrorism by journal and year

To establish a list of published work using different operationalizations of terrorism, I searched journals in economics, political science, and terrorism studies. The temporal domain is the time period from 1980 to 2013. This corresponds to the rapid increase in what Sandler (2014; see note 7) calls the *analytical study of terrorism*. Articles for the sample were collected from the following 21 journals: *American Economic Review, American Journal of Political Science, American Political Science Review, Conflict Management & Peace Science, Defence and Peace Economics, Economics Letters, European Economic Review, European Journal of Political Economy, International Organization, International Studies Quarterly, Journal of Conflict Resolution, Journal of Economic Perspectives, Journal of Monetary Economics, Journal of Peace Research, Journal of Politics, Kyklos, Public Choice, Studies in Conflict and Terrorism, Terrorism and Political Violence, The Journal of Law and Economics*, and *World Politics*.

Table A1. Number of quantitative articles on terrorism by journal and year.

Journal Name	Year	Articles
American Economic Review	1988	1
American Economic Review	2003	1
American Economic Review	2006	2
American Economic Review	2008	2
American Economic Review	2012	1
American Journal of Political Science	1994	1
American Journal of Political Science	2005	1
American Journal of Political Science	2013	1
American Political Science Review	1987	1
American Political Science Review	1993	1
American Political Science Review	1994	1
American Political Science Review	2008	1
Conflict Management & Peace Science	2005	1
Conflict Management & Peace Science	2007	3
Conflict Management & Peace Science	2008	1
Conflict Management & Peace Science	2010	2
Conflict Management & Peace Science	2012	1
Conflict Management & Peace Science	2013	1
Defence and Peace Economics	1990	1
Defence and Peace Economics	1992	2
Defence and Peace Economics	2001	1
Defence and Peace Economics	2003	1
Defence and Peace Economics	2006	3
Defence and Peace Economics	2007	4
Defence and Peace Economics	2008	2
Defence and Peace Economics	2009	2
Defence and Peace Economics	2010	3
Defence and Peace Economics	2011	4
Defence and Peace Economics	2012	1
Defence and Peace Economics	2013	1
Economics Letters	2008	3
Economics Letters	2011	5
Economics Letters	2013	1
European Economic Review	2008	1
European Economic Review	2010	1
European Journal of Political Economy	2004	6
European Journal of Political Economy	2011	8
International Organization	2010	1
International Organization	2012	1
International Studies Quarterly	1980	1
International Studies Quarterly	1983	1
International Studies Quarterly	1999	1
International Studies Quarterly	2002	1
International Studies Quarterly	2006	3
International Studies Quarterly	2007	1
International Studies Quarterly	2008	1
International Studies Quarterly	2009	1
International Studies Quarterly	2011	2
Journal of Conflict Resolution	1996	1
Journal of Conflict Resolution	2000	1
Journal of Conflict Resolution	2003	1
Journal of Conflict Resolution	2004	2
Journal of Conflict Resolution	2005	4
Journal of Conflict Resolution	2006	3
Journal of Conflict Resolution	2007	3
Journal of Conflict Resolution	2009	2
Journal of Conflict Resolution	2010	6
Journal of Conflict Resolution	2011	4
Journal of Conflict Resolution	2013	2
Journal of Economic Perspectives	2003	1
Journal of Economic Perspectives	2006	1

(*Continued*)

(Continued).

Journal Name	Year	Articles
Journal of Economic Perspectives	2007	1
Journal of Monetary Economics	2004	3
Journal of Peace Research	2008	1
Journal of Peace Research	2009	2
Journal of Peace Research	2010	2
Journal of Peace Research	2011	6
Journal of Peace Research	2012	2
Journal of Peace Research	2013	3
Journal of Politics	2008	2
Journal of Politics	2010	2
Journal of Politics	2012	3
Journal of Politics	2013	1
Kyklos	1987	1
Kyklos	1992	1
Kyklos	1996	1
Kyklos	2008	1
Public Choice	2006	2
Public Choice	2008	1
Public Choice	2009	2
Public Choice	2011	5
Public Choice	2013	2
Studies in Conflict and Terrorism	1998	1
Studies in Conflict and Terrorism	2007	1
Studies in Conflict and Terrorism	2008	3
Studies in Conflict and Terrorism	2009	2
Studies in Conflict and Terrorism	2010	3
Studies in Conflict and Terrorism	2011	1
Studies in Conflict and Terrorism	2012	1
Studies in Conflict and Terrorism	2013	3
Terrorism and Political Violence	2004	1
Terrorism and Political Violence	2006	3
Terrorism and Political Violence	2007	1
Terrorism and Political Violence	2009	3
Terrorism and Political Violence	2010	2
Terrorism and Political Violence	2012	3
Terrorism and Political Violence	2013	2
The Journal of Law and Economics	1987	1
The Journal of Law and Economics	2010	1
World Politics	2011	1

Appendix B. Sensitivity analyses

Table B1. The effect of minority discrimination on terror attacks given different estimators and coding of the dependent variable.

Estimator	Dependent Variable	Minority Discrimination Coef. (Standard Error)
ZINB	Domestic Attacks	1.302* (0.222)
ZINB	All Fatalities	1.175* (0.358)
ZINB	Unknown Attacks	1.075* (0.513)
ZINB	Known Attacks	0.747 (0.424)
ZINB	All Attacks	0.846 (0.600)
ZINB	Unknown Fatalities	1.575* (0.712)
ZINB	Transnational Attacks	0.660 (0.382)
ZINB	Transnational Fatalities	−0.564 (0.620)
ZINB	Domestic Fatalities	1.066* (0.320)
ZINB	Suicide Attacks	2.564* (0.848)
ZINB	Number of Groups	0.724* (0.262)
Negative Binomial	Domestic Attacks	1.457* (0.234)
Negative Binomial	All Fatalities	1.621* (0.323)
Negative Binomial	Unknown Attacks	1.663* (0.360)
Negative Binomial	Known Attacks	1.080* (0.300)
Negative Binomial	All Attacks	1.122* (0.302)
Negative Binomial	Unknown Fatalities	2.287* (0.432)
Negative Binomial	Transnational Attacks	0.793* (0.332)
Negative Binomial	Transnational Fatalities	0.362 (0.396)
Negative Binomial	Domestic Fatalities	1.693* (0.319)
Negative Binomial	Suicide Attacks	1.217* (0.567)
Negative Binomial	Number of Groups	1.026* (0.248)

Note. Robust standard errors clustered on country are in parentheses next to coefficient estimates. Two-tailed tests, $^*p < .05$.

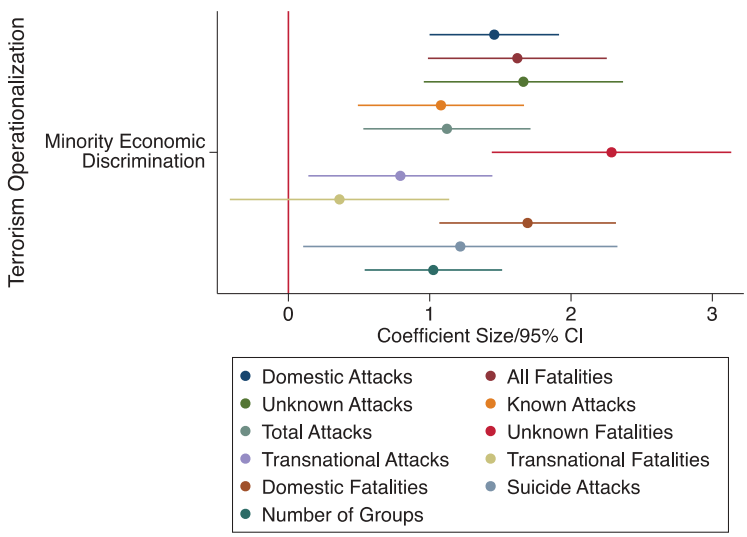

Figure B1. Effect size of minority discrimination on terrorism across different operationalizations using a negative binomial estimator. Plot created using Jann (2013) coefplot Stata module (see note 68).

Table B2. The effect of political competition on terror attacks given different coding of the dependent variable.

Estimator	Dependent Variable	Political Competition Coef. (Standard Error)
Negative Binomial	Domestic Attacks	0.074* (0.018)
Negative Binomial	All Fatalities	0.024 (0.017)
Negative Binomial	Unknown Attacks	0.072* (0.024)
Negative Binomial	Known Attacks	0.072* (0.016)
Negative Binomial	All Attacks	0.071* (0.016)
Negative Binomial	Unknown Fatalities	0.031 (0.029)
Negative Binomial	Transnational Attacks	0.079* (0.018)
Negative Binomial	Transnational Fatalities	0.042* (0.021)
Negative Binomial	Domestic Fatalities	0.028 (0.022)
Negative Binomial	Suicide Attacks	−0.056 (0.044)
Negative Binomial	Number of Groups	0.098* (0.022)

Note. Robust standard errors clustered on country are in parentheses next to coefficient estimates. Two-tailed tests, $^{*}p < .05$