



# Promise and Pitfalls of Terrorism Research

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Using a database of recent articles published in prominent political science journals, we show the rapid increase in terrorism research. Given this increased awareness and attention, we identify several problems that still plague the study of political terrorism including definitional problems that lack empirical tests, not distinguishing among different types of terrorism, and using the wrong unit of analysis when designing research. After identifying these problems—especially as they relate to the quantitative study of terrorism—we suggest some solutions. We then apply these suggestions to investigate whether changing the definition of terrorism, different types of terrorism, or changing the unit of analysis affects key predictors of terror events cross-nationally. One of our tests consists of varying the unit of observation to include directed dyads, which offers the potential to test some of the many strategic models of terrorism. Our analysis suggests that varying definitions of terrorism, such as military vs. non-military targets, might not be that consequential, whereas different types of terrorism, such as domestic vs. transnational, could be driven by fundamentally different processes. We also conclude that modeling transnational terrorism differently using directed dyads yields new and interesting insights into the process of terrorism.

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## Introduction

Since the events of September 11, many conflict scholars have shifted their attention to understanding the causes and consequences of political terrorism. The amount of research on terrorism being published in political science journals has doubled several times over what it was pre-9/11. With increasing interest and activity, we have a better understanding of many aspects of terrorism; on the other hand, with increased activity scholars have also taken research in many directions. One consequence of the proliferation of terrorism research is that integration and cumulation of knowledge has been difficult to achieve.

Given the increased awareness of this form of violence, increased scholarly attention, specifically in political science and international relations, is warranted. Interdisciplinary terrorism scholars have appraised the terrorism literature from time to time, but usually the discussion continues the debate over definitions, conceptualizations, prediction, and other ontological or epistemological considerations in studying terrorism (Schmid and Jongman, 1988; Khalsa, 2004; Ross, 2004; Czwarno, 2006; Ranstorp, 2007; Jackson, Smyth and

Gunning, 2009). It is clear that some of the most salient issues facing political scientists, especially the application of quantitative methods, are severely neglected in most research and even reviews of the terrorism literature. Based on reviews of *Terrorism and Political Violence* and *Studies in Conflict and Terrorism*, Silke (2001, 2004) explicitly highlights the paucity of quantitative terrorism research in the pre-9/11 period and recommends that the imbalance in research methodologies be addressed. A follow-up review of these two journals suggests that the use of quantitative methods in terrorism research has increased since 9/11 (Silke, 2009), but no evaluation of lessons learned appears, and it is unclear how the trends apply in mainstream political science journals. Such an evaluation is necessary given that quantitative research on terrorism is becoming more frequent in leading political science and economics journals than is qualitative research. To our knowledge, there has not been a systematic appraisal of quantitative terrorism research, or how quantitative methods could inform existing debates on terrorism.<sup>1</sup>

In this study, we survey all of the articles in nine of the most prominent journals in political science, ten prominent economics journals, and two interdisciplinary journals devoted exclusively to terrorism from 1980 to present and identify several trends in the literature. Specifically, we evaluate several potential pitfalls that researchers increasingly encounter—especially in quantitative studies of terrorism—including: using minimalist and maximalist definitions of terrorism without empirical testing, not distinguishing among different types of terrorism such as domestic and transnational, and using a unit of observation that does not match the theoretical argument.<sup>2</sup>

We implement some of our suggestions in predicting terror attacks cross-nationally. Using a common set of predictors, we investigate whether adjusting the definition or types of terrorism influences the effects that these predictors have. We also adjust the unit of analysis to use the directed dyad year, rather than the country-year, and show how this change in research design can influence inferences. Changing the unit of analysis allows new possibilities for testing transnational terrorism arguments, which we then discuss before concluding with a summary of what our arguments and analyses suggest for the future of terrorism research.

### Overview of Terrorism Research Since 1980

To gain an understanding about the trends in the political study of terrorism, especially as they relate to the quantitative study of terrorism, we surveyed nine of the most prominent journals in political science that publish international relations and conflict-focused research. We included the three most distinguished general interest journals: *Journal of Politics*, *American Journal of Political Science*, and *American Political Science Review*. Additionally, we examined top international relations and conflict-oriented journals including *International Studies Quarterly*, *World Politics*, *Journal of Conflict Resolution*, *International Organization*, *Conflict Management & Peace Science*, and *Journal of Peace Research*. These nine journals do not cover all outlets that publish terrorism research, but they do represent the major outlets arguably responsible for much of the progress in the terrorism literature.

<sup>1</sup>Even reviews that have focused on a different subset of journals connected to political science—*Foreign Affairs*, *World Politics*, *International Affairs*, *International Studies Quarterly*, *Journal of Strategic Studies*, *International Security*, *Survival* and *Orbis*—have not explicitly attempted to improve quantitative terrorism research (Czwaro, 2006).

<sup>2</sup>Other issues relevant to the quantitative terrorism literature, such as reporting bias (Drakos and Gofas, 2006), have been addressed elsewhere and are beyond the scope of this paper.

We also examined terrorism research from prominent economics or crossover journals including *Defence and Peace Economics*, *Kyklos*, *Public Choice*, *European Journal of Political Economy*, *American Economic Review*, *Journal of Monetary Economics*, *Economic Letters*, *Journal of Economic Perspectives*, and *European Economic Review*. Since the economics and political science literatures are linked in several important ways, we will allude to whether our suggestions/critiques apply equally to both disciplines or are specific to political science. Finally, we surveyed the two most prominent journals that deal primarily with terrorism — *Terrorism and Political Violence* and *Studies in Conflict and Terrorism*.<sup>3</sup> The overwhelming majority of the articles in both of these journals deal with terrorism. Aside from the increased number of issues per year, both journals published articles on terrorism extensively prior to 9/11. In the sections following, we focus on the general interest journals but identify when these journals diverge from the general trends that we find.

Our selection of journals is a sample of a population of articles on the topic, but it covers significantly more than other reviews of the terrorism studies in academic journals (Czwaro, 2006; Silke, 2009). It also covers most of the journals that we would expect to cover quantitative research, a subject of particular importance in this paper. The different sets of journals (political science, economics, and interdisciplinary) indicate broadly similar trends, suggesting that even if we considered other journals, the trends would likely be quite similar. In each of the journals, we examined the time period from 1980 to fall of 2008 and searched abstracts and titles on the terms “terrorism,” “terror,” and “terrorist” in JSTOR, and on each journal’s Web site.<sup>4</sup> Our search netted 88 articles across the nine journals. A raw count of articles appears in Figure 1 and shows that the number of terrorism articles remained fairly low until shortly after 2001 when it increased substantially. See Figure 2 for a comparison across the nine journals for the entire time period.

One striking trend in Figure 2 is that the *Journal of Conflict Resolution (JCR)* accounts for about 2.5 times the number of articles than the next highest (*International Studies Quarterly (ISQ)*). JCR published 29 articles, the largest in the sample satisfying these criteria. Part of this can be accounted for by the fact that JCR has been publishing six issues per year since 1997. But this should not account for an increase of 2.5 times in and of itself.<sup>5</sup> Furthermore, the *Journal of Peace Research (JPR)* has published six issues per year since 1998 and does not come close to JCR’s number of terrorism articles.

Of the 29 articles in JCR, strikingly only five were published before 9/11 (see Figure 3), which means that JCR has “chased the headlines” on terrorism more than any other journal.<sup>6</sup> ISQ also published only five articles pre-9/11, but nine since then. This is a substantial increase, but not nearly as large as for JCR. Both *Terrorism and Political Violence* and *Studies in Conflict and Terrorism* demonstrate an increased number of quantitative articles in the post-9/11 period relative to the pre-9/11 era.<sup>7</sup> Given this increase in attention to terrorism as a topic of study, and to the more widespread use of quantitative methods, in the

<sup>3</sup>Two recent journals, *Critical Studies on Terrorism* and *Behavioral Studies on Terrorism and Political Aggression*, are also focused on terrorism. Since our study ends in 2008 and these journals began publishing in 2008 and 2009 respectively, we do not survey them here.

<sup>4</sup>*Terrorism and Political Violence* began in 1989; thus, our review does not cover exactly the same time period for this journal as others.

<sup>5</sup>ISQ also tends to print more articles per issue than JCR.

<sup>6</sup>A similar pattern exists in the economics literature as only 16 articles were published in the journals sampled prior to 9/11 and 75 were published afterwards. *Public Choice* and *Defence and Peace Economics* accounted for much of this increase.

<sup>7</sup>These trends are consistent with those found in Czwaro (2006), Silke (2007), and Silke (2009), despite different contexts.

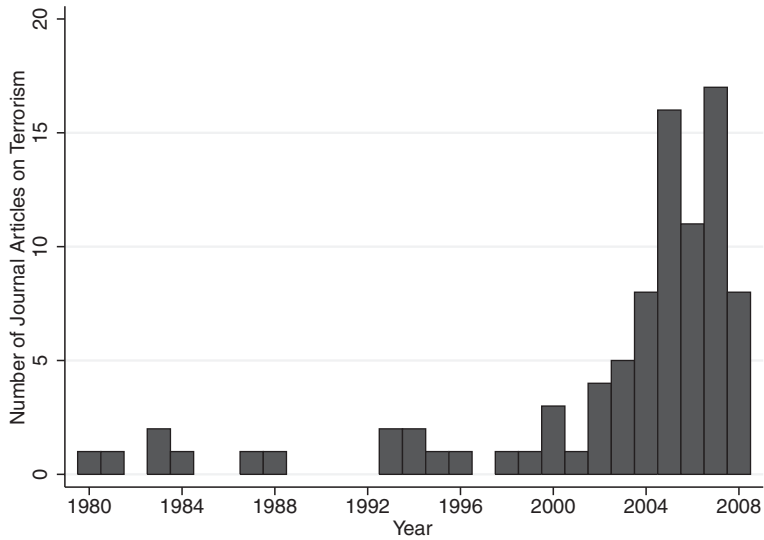


FIG 1. Number of Articles Related to Terrorism in Nine Political Science Journals: 1980–2008.

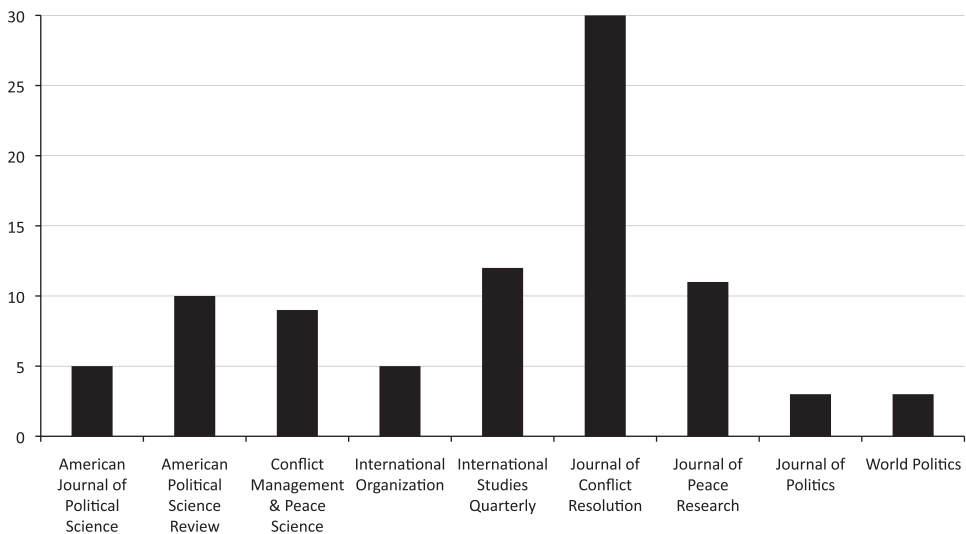


FIG 2. Number of Articles Published in Nine Political Science Journals: 1980–2008.

next sections we identify several problems that still vex the study of political terrorism.

### **Defining Terrorism**

Defining terrorism has been a critical and important part of the evolution of terrorism studies, but it has also resulted in an elusive pursuit for a single definition of terrorism that appears to be unattainable and potentially counterproductive. Schmid and Jongman (1988) famously surveyed an array of researchers and found over 100 definitions of terrorism. In recent years, the proliferation of definitions has continued, but a growing consensus is nonetheless emerging on a

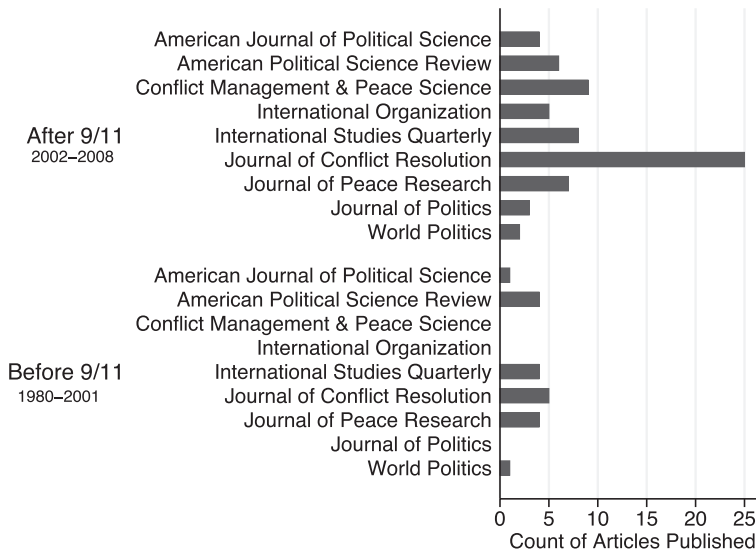


FIG 3. Number of Articles Published in Nine Political Science Journals Before and After 9/11.

few characteristics. Most scholars agree that terrorism is a form of violence or threatened violence against a target to achieve a goal. It is meant to induce fear in an audience that is different from the target of the violence. Separating the victim and the target is one of the key features distinguishing terrorism from other forms of political violence like genocide. This distinction helps draw attention to why groups might use terrorism as opposed to other violent techniques. Some argue that the target of the violence has to be a civilian or a noncombatant, while others relax this restriction (Ross, 2006). Beyond a few points of agreement, there is still much to debate, but we question the utility of continuing the debate absent systematic empirical testing.<sup>8</sup> Consider some of the key problems and our proposed solution below.

*Problem*

The problems of defining terrorism are many and have been discussed at length elsewhere (Hoffman, 2006:20-34). As such, we will not survey them here. Rather we highlight why we believe the definitional debate has been important historically, but is less relevant in the quantitative terrorism literature.

Qualitative, case-study work has dominated the terrorism literature for decades.<sup>9</sup> Because the number of observations in most of this work is extremely small, scholars have been careful to define terrorism to fit the case(s) under study. This makes a lot of sense. The small number of observations, unfortunately, often disallows varying debatable parts of the definition. In one country, for example, violence against the military might occur, but in a second country

<sup>8</sup>This is not to suggest that conceptualization is unimportant. As Goertz (2006) suggests, “Concepts are theories about ontology: they are theories about the fundamental constitutive elements of a phenomenon.” We have numerous conceptualizations of terrorism, but how do we sort among them? Sartori (1970:1035) argues that we need concepts which are applicable across time and space. He asserts that nothing is gained from these concepts “...if our universals turn out to be “no difference” categories leading to pseudo equivalences.” He continues and suggests that “even though we need universals, they must be *empirical* universals, that is, categories which somehow are amenable... to empirical testing.”

<sup>9</sup>For example, of the 412 articles that we surveyed from *Terrorism and Political Violence* from 1989 to 2008, 392 (95%) were qualitative. *Studies in Conflict and Terrorism* had a similar count of qualitative articles with 433 articles (90%) from 1980 to 2008.

it might not. In a study of the first country, one could vary the definition beyond civilian targets to military targets (perhaps during times of peace). In a study of the second country, the results could be compared to explore the implications of varying whether including attacks against the military changes inferences.

In recent work on terrorism in the political science literature, there is ample room to vary the definition of terrorism to understand its consequences. That is, we do not need to agree on one single definition of terrorism; we can allow for multiple definitions and then sort out the effects empirically. We conjecture that some of the protracted definitional debates might not be all that relevant once empirically tested.

### *Suggestion*

We contend that scholars should appreciate the diversity in definitions of terrorism and engage more systematic empirical analysis to sort out differences. As noted previously, a consensus is emerging over some of the attributes of the concept of terrorism. Scholars might begin with a firm minimal definition based on points of agreement about what terrorism is (and is not), but then note other reasonable possibilities that might exist. Stopping here, however, would be inadequate. The next crucial step would be to carefully operationalize terrorism to match the minimal definition *as well as* other possibilities.<sup>10</sup>

To continue the example stated previously, one might begin with a definition of terrorism that specifies that civilians are the only ones that qualify as terrorist victims. But one could then acknowledge that military targets during peace time might also reasonably qualify in the category of terrorism. The suicide bombing of the United States Navy destroyer, the USS Cole, in Yemen in 2000 is a good example of why we might want to consider the latter. Groups used violence against a target to achieve a goal, and the attack was intended to influence an audience beyond the target of the violence. The attack was perpetrated against the military, yet the USS Cole was not involved in any specific combat operation, conflict, or war.<sup>11</sup> The ship was refueling in the port of Aden. Empirical analysis could create two measures of terrorism: one with civilians as the target and the other with both civilians and military entities during peace time as the target. Empirical analysis could show whether results are similar or different depending on the measure. And either outcome would have implications for future conceptual and empirical research.<sup>12</sup>

Because research on terrorism is becoming increasingly quantitative, enough variation exists within most databases on terrorism to explore differences in definitions.<sup>13</sup> Of course, this could be taken too far. We are not advocating the identification of dozens of possible variations all of which should be explored. Scholars should make clear conceptual and theoretical arguments, but on key points of contention, empirical analysis can elucidate how much the contention matters when

<sup>10</sup>Munck and Verkuilen (2002:9) argue that when specifying the meaning of the concept, scholars often create minimalist definitions, or they omit "a relevant attribute in the definition of a concept." To compensate, scholars sometimes create maximalist definitions, or they include too many attributes thus reducing the number of empirical referents. Munck and Verkuilen (2002) suggest trying to balance adding attributes while making sure to include all like cases. In the context of terrorism, this suggests generating a definition that accords with events that most observers consider terror, such as 9/11 and the Bali Bombings, while sorting these events from the events perpetrated by criminals, combatants, and others whose acts have different purposes than terror.

<sup>11</sup>According to data from the Correlates of War project and PRIO/Upsalla data on internal conflicts, Yemen did not have any internal conflict nor was it at war with the US or any of its allies.

<sup>12</sup>Some current quantitative empirical work examines the similarities and differences between terrorism and different types of insurgent and civil war violence, for example, which could further shed light on the definitional debates identified (Sambanis, 2008; Findley and Young, 2010). We cannot give a full consideration of terrorism vs. insurgency in this paper, but believe that quantitative work can help provide insights into the distinctions.

<sup>13</sup>Burgoon (2006) is a notable example of a recent effort to compare the robustness of quantitative results to changing data and definitions of terrorism.

applied to a large number of cases. Terrorism research has been very productive in some areas,<sup>14</sup> but continues to spin its wheels in others.<sup>15</sup> Shifting attention away from definitional issues, or at least toward shedding light on them through empirical analysis, might lead to greater progress in the study of political terrorism.

### Different Types of Terrorism

Many different typologies and bases for classifying terrorism have been identified. Schmid and Jongman (1988) identified at least 50 typologies and propose that at least 10 common bases for classification. As Schmid and Jongman (1988) rightly note, the proliferation of typologies and classifications has made cumulative knowledge difficult to achieve. Furthermore, Schmid and Jongman (1988:43) contend that most typologies of terrorism are “of little utility since [they] cannot explain or predict terrorist behavior in any way.” We cannot address each of their typologies or bases for classification, but we draw attention to a couple of important dimensions. We discuss the distinct actors involved in terrorism, transnational vs. domestic terror, and suicide vs. ordinary terrorism.<sup>16</sup>

#### *Problem*

Terrorism at the most basic level involves three actors: the individual who uses violence, the victim of the violence, and the target (audience) of the violence. In existing studies of terrorism, much attention has been given to the perpetrators and victims of the violence, but much less attention has been given to the targets. Scholars do not typically distinguish between domestic and transnational terrorism, or they only examine transnational terrorism (Sandler, Tschirhart and Cauley, 1983; Li and Schaub, 2004; Lai, 2007).<sup>17</sup>

Differentiating between the two is potentially consequential for a couple of reasons. First, according to the Global Terrorism Database (GTD) (LaFree and Dugan, 2006), most terrorism occurs domestically, and yet, most studies rely on transnational data from the ITERATE database (Mickolus, 1980; Enders and Sandler, 1999, 2000; Koch and Cranmer, 2007). This suggests that much of what we know might apply only to a small portion of overall terrorism. As Sanchez-Cuenca and De la Calle (2009:37) claim, this may be consequential as “[m]ost attacks are domestic and, more importantly, [transnational] attacks are not a representative sample of all terrorist activity.”

Second, from a theoretical perspective, the causal mechanisms underlying domestic and transnational terrorism might be quite different. For example, the causal logic behind why democracy would motivate domestic terrorism might focus on domestic groups using terrorism so that civilians pressure the government to make a policy change.<sup>18</sup> The causal logic behind democracy

<sup>14</sup>For example, Enders and Sandler (1993) clearly show that effective counterterrorism policy leads to substitution of costly terror acts like hijacking to less costly acts such as assassinations. Subsequent research has confirmed and extended this insight (Enders and Sandler, 2006).

<sup>15</sup>While suicide attacks have intrigued scholars recently (Pape, 2003; Bloom, 2005), competing divergent explanations for this type of terror suffer from research design problems (Ashworth, Clinton, Meirowitz and Ramsay, 2008) or lack of adequate empirical support (Brym and Araj, 2008).

<sup>16</sup>Typologies of terrorism could include other factors such as oppositional terror vs. state terror or the aims and ideologies of terror groups. In this article, we cannot cover all possibilities and opt to focus on the transnational/domestic distinction as well as suicide/ordinary terrorism, which are both topics that quantitative terrorism researchers must grapple with frequently.

<sup>17</sup>In the economics literature, several scholars have investigated differences between the effects of each on topics like economic growth (Gaibulloev and Sandler, 2008) or tourism (Llorca-Vivero, 2008).

<sup>18</sup>Most quantitative studies, however, investigate the relationship between democracy and transnational terrorism (for example, Eyerman, 1998; Weinberg and Eubank, 1998; Li, 2005). See Brooks (2009) for a recent discussion of the variety of ways democracy and the components of democracy related to terrorism.

and transnational terrorism might focus on a transnational group crossing borders into a democratic country to carry out an attack so that the people will pressure the government to initiate a policy change that affects a different country. This is substantially more complex, to say the least. It is possible that the motivations for domestic and transnational terrorism are in fact similar. Regardless, a study of domestic terrorism versus transnational terrorism would have a different research design. Structural factors leading to increases in domestic terrorism are endogenous to whatever state experiences it. Transnational terrorism, however, should involve a research design that incorporates factors associated with the target country as well as the country of origin of the attackers.<sup>19</sup>

In recent years, suicide terrorism has claimed the spotlight in terrorism studies because it is often considered a puzzling form of violence. Recent work by Atran (2003), Pape (2003, 2005), Bloom (2005), Wade and Reiter (2007), and Piazza (2008a) has dispelled some of the common myths associated with suicide terrorism, including that it is exclusively an Islamic phenomenon, it is perpetrated by crazy people, and it is most common among the poor uneducated masses. What this work has not adequately explained is how suicide terror differs from terrorism in general. By studying this form independent of other types of terrorism, this work implicitly assumes some form of difference in causal processes. Pape (2005:9–10) argues that terrorism can be conceived of as three ideal types: demonstrative, destructive, and suicide and suggests that in contrast to the other types of terror “coercion is the paramount objective of suicide terrorism.”

Pape’s (2003) typology suggests an underlying dimension of commitment by the various groups. As the level of commitment to the cause increases, the group and individuals involved are willing to sacrifice more as well as create more destruction. Rather than leave this untested, future work needs to address whether more violent forms of terrorism correlate with higher commitments to cause. Additionally, models that explain terrorism in general should be applied to different forms such as suicide terror to see whether cross-national and temporal differences exist. In most studies, the various means are lumped together, but suicide terrorism is separated. This is puzzling and needs to be addressed. Suicide terrorism was concentrated in the Middle East in the early 1980s, but spread as the tactic diffused across the globe. It spread to some places like Sri Lanka, but not to others, such as Peru and Northern Ireland. Why? Unraveling these puzzles will help relate suicide terrorism to terrorism, and explore whether there are distinct reasons for using this potentially more destructive form of violence.

### *Suggestion*

Definitional issues and political agendas have stunted the coordination of scholars around a typology of terrorism, and many scholars create their groupings of different forms of terrorism. Rather than accept these typologies uncritically, scholars should attempt to identify whether these different forms of terrorism have different causal processes. If not, then these distinctions are arbitrary at best and misleading at worst. Exploring whether transnational terror is different than domestic or whether either of these are different than state terror could lead to integration of these presently distinct research topics. Finally, whether different forms of terror, like suicide terrorism, have different logics should be evaluated using models that explain terrorism in general.

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<sup>19</sup>Other dyadic relationships, such as the state vs. a group, or leaders of a state and leaders of a group, could be considered too.



This discussion suggests that social scientists thoroughly consider the causal process at work. Part of this entails delineating potential strategic behavior between terrorists, the population, and governments, to which we now turn.

### Unit of Observation

The quantitative study of terrorism is not all that different than the quantitative study of interstate war, which began by looking at the distribution of conflict in the international system. It subsequently moved from discussions concerning polarity, long cycles, and power transitions to issues related to dyadic conflict such as arms races, deterrence, and democratic peace. Focusing on either the international system or particular great powers made sense for the first wave of quantitative research, but it soon became evident that to understand deterrence or the democratic peace, the traditional units of observations needed to be adjusted.

Rationalist work and the democratic peace arguments, in particular, required focusing on dyads (see Maoz and Russett, 1993). This is part of a broader attempt to make “strategic interactions between actors the unit of analysis...[when] study[ing] international politics” (Lake and Powell, 1999:4). Most arguments about the democratic peace stipulate that democracy only limits war propensity when both countries in a dyad are sufficiently democratic. A monadic country level analysis cannot properly test this argument. Researchers need information about the level of democracy in each pair of states to probe the consistency of this finding.<sup>20</sup> Generally, the primary lesson is that units of observation should be selected to match the theoretical argument, which often does not occur, especially in the terrorism literature.

### Problem

Past work dealing with the relationship between democracy and transnational terrorism, such as that Eyerman (1998), Piazza (2007, 2008b), and Li (2005), examines terror events from the perspective of the state experiencing the violence.<sup>21</sup> While this approach might be useful to answer a number of questions, it cannot help us understand fully how democracy either promotes or dampens *transnational* terrorism. For the state experiencing the violence (herein the *target*) and for the state where the perpetrator of the violence originates (herein the *origin*), levels of democracy may have differing impacts on the likelihood of terrorism, for example.<sup>22</sup> Despite important information that could be captured about both origin and target, most studies simply use the country where the incident occurred as the unit of analysis.

Lai (2007) recently used country of origin as the unit of analysis to see which factors led to exporting more terrorism. Whereas state strength is often correlated with increases in targets of terror, Lai finds that weaker states tend to be the greatest exporters of terror. Additionally, democracy and anocracy seem to promote terror originating from a country relative to autocratic systems. Blomberg and Hess (2008) and Krueger and Laitin (2008) are the only authors to our knowledge that attempt to integrate both the origin and targets of transnational terrorism into one analysis. In fact, they also analytically separate the location of the terror event from the target of the event. For example, an attack

<sup>20</sup>This does not suggest that all dyads need to be included. For a discussion related to selecting dyads, see Lemke and Reed (2001).

<sup>21</sup>For an application to domestic terrorism, see Findley and Young (2011).

<sup>22</sup>If a foreigner is targeted in a terror event by local groups, this is still considered an transnational terror attack. For example, when the American Embassy was bombed in 1983 by a local terror group, the origin country was Lebanon, but the target was the US—even though the event occurred in Lebanon.

on the United States Embassy in Beirut may be coded as a terror event in Lebanon even though the United States was the target. This distinction matters as Krueger and Laitin (2008) find that the level of development of a state (GDP) matters for the target of terror, but not for the country where the incident occurs or the origin country. Their research design is clearly an improvement over previous work that only looks at the target country factors that affect the likelihood of terror, yet they do not estimate dyadic relationships and thus ignore potential strategic elements of transnational terrorism.

### *Suggestion*

Terrorism researchers need to be explicit about the implications of their unit of analysis. In some cases, using a country-year dataset may be appropriate for a particular project, but in many cases a different unit, such as the dyad, is preferable.<sup>23</sup> Drawing reliable inferences about transnational terrorism may require a dyadic design as the terror group and the target of the violence (as well as the audience) are by definition from different states. Where the audience and the target are from different states, the appropriate design may be even more complicated. Switching to more complicated designs, however, is not without problems. Potentially one reason why dyad and directed-dyad research designs have not been used is that data on perpetrators are often limited. If we are to understand many terrorism questions, we need to work with the data we have or develop better data. Developing data targeted at the unit of observation, and theory that comports with this same unit is critical to accurate tests of hypotheses. With respect to democracy, the best practice is to be explicit about how a particular phenomenon such as democracy relates to terrorism, and then use the unit of observation that corresponds with that prediction. In the next section, we describe and implement some of the suggestions discussed here and in previous sections.

### **Applying Our Suggestions**

Our initial suggestions have been abstract up to this point. In this section, we estimate models using a set of conventional covariates that predict transnational terrorism. We use these core variables while adjusting the dependent variable to account for different definitions and types of terrorism. These measures were first used by Li (2005) and have since been used in many other projects that attempt to explain the cross-national variation in terror attacks.<sup>24</sup> After exploring whether these same predictors have similar effects on different definitions and types of terrorism, we then adjust the unit of analysis. Most importantly, we attempt a dyadic approach to explain transnational terror attacks. We do not explore the full set of arguments in the literature, but rather examine a few key issues. Li (2005) addresses a fundamental puzzle in the study of terrorism: democracy appears to promote as well as reduce terrorism. Using data on transnational terror incidents as the dependent variable and disaggregating measures of democracy, Li (2005) finds that democratic participation reduces terror while constraints on the executive increase counts of terror events in a country-year thus resolving the inherent puzzle of how democracies both create and inhibit terrorism.

Even though there is much to laud about the study including Li's more detailed conceptualization of democracy, using count models to model the

<sup>23</sup>Countries are not the only option to use as a member of the dyad. As we gather more reliable data on groups that use terror, a group may be one part of the dyad or leaders of the state might be another.

<sup>24</sup>According to a recent Google Scholar search, this article is cited at least 172 times. Recent papers that build on Li's work include Drakos and Gofas (2006), Koch and Cranmer (2007), Lai (2007), and Chenoweth (2010).

terrorism data generating process, and a set of robustness checks, there are several aspects of the study that pertain to this paper. In particular, we examine how democratic participation and executive constraints fare as explanations for transnational attacks when applied to different types of terrorism.<sup>25</sup>

Li's arguments may be accurate when we apply his reasoning to domestic terrorism as opposed to the transnational form. Attacks in London in 2005, Sri Lanka in the 1990s and 2000s, and Madrid in 2004 might be explained by Li's argument about the competing democratic mechanisms. We cannot be sure when we only apply these arguments to data on transnational events. Closely related, does suicide terror have a separate logic or can these set of covariates explain this type of terror as well? While applying a similar model to suicide terror data extends some claims from this literature, it allows for an initial probe into the plausibility of a single set of causes that explains different types of terror. Furthermore, we analyzed a third model in which the outcome is the number of terrorist events in a country-year that originated from a certain country (as opposed to the country in which the attacks occurred).

As we also suggest earlier, when using transnational terror data, a dyadic research design is preferable. The puzzle that Li (2005) and others have identified might also be explained away by the fact that the level of democracy may matter for both the origin country as well as the target. Or the level of democracy might matter in conflicting ways for each state. For example, recent attacks by Al-Qaeda against the United States were planned and executed by nationals of Saudi Arabia, Egypt, and other states who have little constraints on the executive and do not allow free democratic participation. When these attacks occurred, the US had both high levels of constraints on the executive and high levels of participation. While the political environment of the origin country and the target likely matter in explaining transnational terror, we cannot address this issue using a country-year unit of analysis.

### *Empirical Analyses*

We created a dataset that includes the core variables described earlier as well as different dependent variables and different units of analysis. We then carried out six unique analyses. First, to evaluate how important definitional concerns are, we varied one aspect of many terrorism definitions — whether the target was military or non-military. Model 1 in Figure 4 illustrates the results using only attacks on military, rather than non-military, targets. We explicitly compared this result to a model in which we use only non-military targets, and the results are almost identical. We further compared this result to a model in which the dependent variable is a measure of *domestic* terrorism from the GTD (LaFree and Dugan, 2006) and find that the results are also quite similar.<sup>26</sup> Model 2 displays these results, which are also important because the GTD has approximately six times the data on terrorism, most of which represents domestic terrorism. Figure 4 graphically displays the incidence rate ratios and standard errors for democratic

<sup>25</sup>Like Li (2005), all of our analyses use a negative binomial regression model. We also estimated zero-inflated negative binomial model and found qualitatively similar results. Li, and subsequent papers that followed, includes a number of variables (which we also use) including: democratic participation, executive constraints, income inequality, GDP per capita, regime durability, size, government capability, past incidents, post-Cold War, conflict, and region variables. Press freedom and whether the democracy is proportional, majoritarian, or a mixture are also used as controls in alternative models. For a detailed discussion of each variable, see Li (2005).

<sup>26</sup>We separate domestic from transnational attacks using the GTD's indicator of the entity that was attacked. In many cases, the GTD notes that a foreign entity or a domestic business was attacked. Not all of events are coded in a way that allows us to differentiate. Thus, we created several levels of precision and estimate the results with all of them to check the robustness. In short, there tends to be no difference between the data that is domestic and the data that includes ambiguous cases. This is consistent with the findings from Young and Dugan (2011).

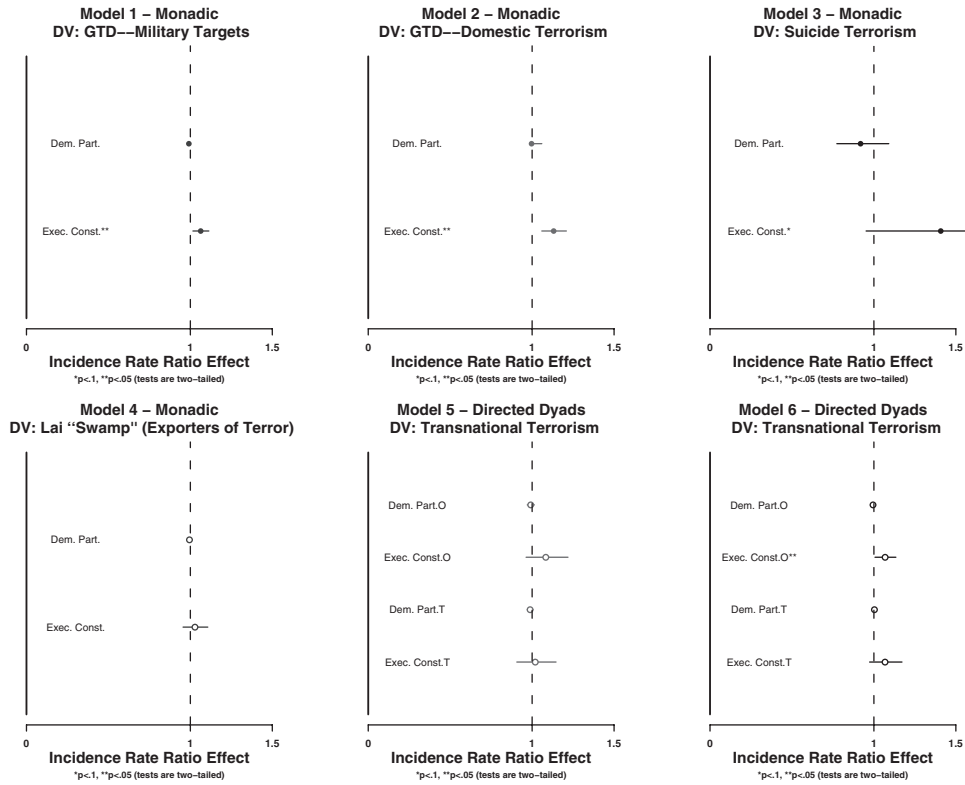


FIG 4. Incidence Rate Ratio Plots Comparing Results for Democratic Participation and Executive Constraints—The six models use the same core predictors of terrorist attacks. Model 1 includes a dependent variable of terrorism that only includes attacks on the military (from the GTD). Model 2 employs a dependent variable, also from the GTD, which only includes domestic terror attacks. Model 3 uses a dependent variable of only suicide attacks. In Model 4, we change the unit of analysis and use a dependent variable of terror attacks emanating from an origin country. Model 5 utilizes directed dyads using the nationality of the terror group (country of origin) and the location of the attacks as the dyad. Model 6 also uses directed dyads, but the nationality of the victim is used as one country in the dyad and the nationality of the group is the other.

participation and executive constraints given changes in the unit of analysis or the dependent variable.

Tables 1–6 report the results of a negative binomial regression model with all of the relevant control variables as well. The results from Figure 4 indicate a statistically significant and positive relationship between executive constraints and domestic terrorism. Both the direction and sign matches the results in his work. Contrary to models that use transnational terrorism as the dependent variable, the results show that the effect of the democratic participation measure cannot be distinguished from zero, although the direction is negative. These initial results, with respect to executive constraints, suggest that a similar logic might explain both domestic and transnational terrorism. In contrast, this may not be the case for democratic participation.

We again estimate a negative binomial with the country-year unit of analysis, but change the dependent variable to suicide attacks rather than exclusively domestic or transnational attacks. The top row and third column in Figure 4 reports these results. This analysis indicates that executive constraints are still

TABLE 1. Monadic–Military Attacks

<i>Variable</i>	<i>Coefficient (Std. Err.)</i>
Executive constraints	0.160** (0.042)
Democratic participation	-0.004 (0.007)
GINI index (imputed)	0.033 <sup>†</sup> (0.020)
Real GDP/capita	-0.332* (0.168)
Regime durability	-0.155* (0.071)
Population (log)	0.128 <sup>†</sup> (0.070)
Govt. capability	0.195 (0.214)
Past incident of terrorism	0.575** (0.075)
Cold war	0.010 (0.110)
Interstate conflict	-0.218 (0.222)
Europe	0.012 (0.366)
Asia	0.039 (0.368)
America	-0.105 (0.261)
Africa	-0.347 (0.419)
Intercept	0.116 (2.746)
<i>N</i>	2,117
Log-likelihood	-3,324.863
$\chi^2_{(14)}$	217.499

(Notes. Significance levels <sup>†</sup>10%, \*5%, \*\*1%.)

TABLE 2. Monadic–Domestic Attacks

<i>Variable</i>	<i>Coefficient (Std. Err.)</i>
Executive constraints	0.124** (0.034)
Democratic participation	-0.004 (0.006)
GINI index (imputed)	0.018 (0.013)
Real GDP/capita	-0.220 <sup>†</sup> (0.121)
Regime durability	-0.139** (0.049)
Population (log)	0.136** (0.048)
Govt. capability	0.176 (0.156)
Past incident of terrorism	0.471** (0.052)
Cold war	0.034 (0.094)
Interstate conflict	-0.023 (0.147)
Europe	0.214 (0.284)
Asia	-0.012 (0.273)
America	0.062 (0.214)
Africa	-0.017 (0.265)
Intercept	0.527 (1.793)
<i>N</i>	2,117
Log-likelihood	-5,232.83
$\chi^2_{(14)}$	413.248

(Notes. Significance levels <sup>†</sup>10%, \*5%, \*\*1%.)

correlated when looking only at suicide terrorism, but our confidence in this inference is weakened ( $p < .10$ ). Like the domestic terrorism results, democratic participation is also uncorrelated with suicide terrorism.

We conduct a final test using the country-year as the unit of analysis, but in this analysis we use terrorist events by origin country (“the Swamp”) and year, rather than location country and year. Figure 4 displays the results of this analysis (bottom row, first column) and is less consistent with Li (2005) than the domestic and suicide terrorism models. Neither the government constraints or democratic participation variables are statistically significant, although both are in the expected directions.

TABLE 3. Monadic–Suicide Attacks

<i>Variable</i>	<i>Coefficient (Std. Err.)</i>
Executive constraints	0.342 <sup>†</sup> (0.199)
Democratic participation	−0.085(0.088)
GINI index (imputed)	−0.132*(0.057)
Real GDP/capita	−1.428(1.161)
Regime durability	1.842(1.954)
Population (log)	−0.421(0.662)
Govt. capability	2.236(1.706)
Past incident of terrorism	1.052 <sup>†</sup> (0.608)
Cold war	1.617**(0.627)
Interstate conflict	−0.728(0.978)
Europe	−6.078**(1.936)
Asia	−0.641(2.789)
America	−3.582**(1.009)
Africa	−15.296**(1.282)
Intercept	6.000(9.351)
<i>N</i>	2,186
Log-likelihood	−172.965
$\chi^2_{(14)}$	1,630.907

(Notes. Significance levels <sup>†</sup>10% \*5%, \*\*1%.)

TABLE 4. Monadic–Exporters of Terror

<i>Variable</i>	<i>Coefficient (Std. Err.)</i>
Executive constraints	0.028(0.037)
Democratic participation	−0.005(0.009)
GINI index (imputed)	0.027(0.019)
Real GDP/capita	−0.208(0.177)
Regime durability	−0.155*(0.079)
Population (log)	0.184**(0.065)
Govt. capability	0.074(0.237)
Past incident of terrorism	0.489**(0.072)
Cold war	−0.413**(0.131)
Interstate conflict	0.143(0.275)
Europe	−0.278(0.347)
Asia	−0.714 <sup>†</sup> (0.376)
America	−0.752**(0.276)
Africa	−1.074**(0.401)
Intercept	−1.652(2.459)
<i>N</i>	2,230
Log-likelihood	−2,697.666
$\chi^2_{(14)}$	251.613

(Notes. Significance levels <sup>†</sup>10%, \*5%, \*\*1%.)

Next, rather than use a dependent variable from a different source, we use the ITERATE data on transnational terrorism, but we change the unit of analysis. Instead of using the country-year as the unit of analysis, we created a directed dyad dataset. The choice between using directed vs. nondirected dyads is based on the belief that certain aspects of the origin country lead to greater attacks on the target country or that certain aspects of the target country makes them a plausible target for actors from the origin country. The choice between the different types of dyads as well as between a dyadic design and a single country is important as the inferences sometimes change (Bennett and Stam, 2000).

TABLE 5. Dyadic 1-Transnational Terrorism

<i>Variable</i>	<i>Coefficient (Std. Err.)</i>
Executive constraints <sub>o</sub>	0.080(0.060)
Executive constraints <sub>t</sub>	0.019(0.060)
Democratic participation <sub>o</sub>	-0.008(0.011)
Democratic participation <sub>t</sub>	-0.012(0.009)
GINI index (imputed) <sub>o</sub>	0.066*(0.027)
GINI index (imputed) <sub>t</sub>	0.032(0.024)
Regime durability <sub>o</sub>	0.081(0.098)
Regime durability <sub>t</sub>	0.002(0.110)
Population (log) <sub>o</sub>	0.084(0.093)
Population (log) <sub>t</sub>	-0.046(0.108)
Govt. capability <sub>o</sub>	0.161(0.227)
Govt. capability <sub>t</sub>	0.002(0.225)
Past incident of terrorism <sub>o</sub>	0.732**(0.117)
Past incident of terrorism <sub>t</sub>	0.616**(0.109)
Cold war	-0.529**(0.162)
Interstate conflict <sub>o</sub>	0.260(0.179)
Interstate conflict <sub>t</sub>	-0.235(0.169)
Europe <sub>o</sub>	-1.455**(0.438)
Europe <sub>t</sub>	0.472(0.459)
Asia <sub>o</sub>	-1.211**(0.374)
Asia <sub>t</sub>	0.030(0.529)
America <sub>o</sub>	-2.154**(0.266)
America <sub>t</sub>	-0.120(0.333)
Africa <sub>o</sub>	-1.246**(0.470)
Africa <sub>t</sub>	-0.156(0.579)
Intercept	-9.325**(2.543)
N	28,186
Log-likelihood	-2,548.342
$\chi^2_{(25)}$	410.539

(Notes. Significance levels †10%, \* 5%, \*\*1%, o=origin, t=target.)

The key decision in estimating a directed dyad model surrounds the identification of the origin and target countries. Because this is not a straightforward task, we employed two separate specifications using data from the ITERATE database (Mickolus, 1980; Enders and Sandler, 1999, 2000; Koch and Cranmer, 2007). First, we define the origin country as the nationality of the terrorists and the target country as the country (location) in which the terrorist event occurred. Second, we then define the origin country as the nationality of the terrorists and the target country as the nationality of the victims.<sup>27</sup> The origin country can be thought of as the *exporter* of violence while the target is the *importer*.<sup>28</sup>

In Figure 4, we report two initial models using the core set of variables. Tables 5 and 6 report the full set of these results.<sup>29</sup> The results of both of these analyses offer little support for the executive constraints and transnational terrorism argument. Democratic participation in both the origin and the target reduces terrorism. We find an interesting result that relates to the current debate over economic factors and terrorism. The lower GDP per capita in a country, the more likely they

<sup>27</sup>In both cases, the origin and target could be different countries, but they could also be the same country. (If a terrorist originates in one country, but attacks a foreign entity, such as a diplomat, within that same country, for example.)

<sup>28</sup>Blomberg and Hess (2008) use this analogy when estimating models of terrorism. In fact, they use gravity models adapted from the study of international trade to estimate this importing and exporting of terrorism.

<sup>29</sup>We denote the indicators that apply to the origin country with an <sub>o</sub> and the indicators that apply to the target with a <sub>t</sub>.

TABLE 6. Dyadic 2-Transnational Terrorism

<i>Variable</i>	<i>Coefficient (Std. Err.)</i>
Executive constraints <sub>o</sub>	0.067*(0.031)
Executive constraints <sub>t</sub>	0.066(0.047)
Democratic participation <sub>o</sub>	-0.005(0.008)
Democratic participation <sub>t</sub>	0.003(0.006)
GINI index (imputed) <sub>o</sub>	0.092**(0.016)
GINI index (imputed) <sub>t</sub>	-0.006(0.013)
Regime durability <sub>o</sub>	-0.068(0.064)
Regime durability <sub>t</sub>	0.137 <sup>†</sup> (0.076)
Population (log) <sub>o</sub>	-0.085(0.053)
Population (log) <sub>t</sub>	0.295**(0.077)
Govt. capability <sub>o</sub>	0.075(0.159)
Govt. capability <sub>t</sub>	0.206(0.186)
Past incident of terrorism <sub>o</sub>	0.885**(0.071)
Past incident of terrorism <sub>t</sub>	0.327**(0.081)
Cold war	-0.241*(0.098)
Interstate conflict <sub>o</sub>	-0.197(0.179)
Interstate conflict <sub>t</sub>	-0.027(0.099)
Europe <sub>o</sub>	-0.681*(0.287)
Europe <sub>t</sub>	-0.921**(0.275)
Asia <sub>o</sub>	0.148(0.284)
Asia <sub>t</sub>	-1.653**(0.347)
America <sub>o</sub>	-1.086**(0.175)
America <sub>t</sub>	-0.385 <sup>†</sup> (0.212)
Africa <sub>o</sub>	-0.928**(0.248)
Africa <sub>t</sub>	-0.423(0.407)
Intercept	-11.972**(2.256)
N	28,186
Log-likelihood	-4,362.86
$\chi^2_{(25)}$	657.993

(Notes. Significance levels <sup>†</sup>10%, \*5% \*\*1%, <sub>o</sub>=origin, <sub>t</sub>=target.)

export terror. In contrast, the higher the GDP of the target, the less likely they will experience terror. This result is tentative, yet it suggests that more research should be done parsing out the effects of importers and exporters of terror. Finally, although executive constraints and democratic participation explain transnational terrorism in country-year studies, the data most clearly tied to transnational terrorism (the directed dyad approach or the origin country measure) yield results that offer tepid support for hypotheses related to the effects of these variables.

### *Strategic Terrorist Behavior*

The forgoing discussion about directed dyads suggests an important possibility. With data on both the origin and the target, testing hypotheses about two actors is more feasible and plausible. This is especially important because much of the terrorism literature captures strategic interaction through the use of formal models, but very little of this research in political science is tested explicitly. As terrorism involves the interaction of states and oppositional groups, it follows that methods to explain interdependent choice would be used to understand this dynamic interaction. Sandler and Arce (2003:319) argue for the use of formal models and game theory in the study of terrorism as “game theory captures the strategic interactions between terrorists and targeted government, where actions are interdependent and, thus, can not be analyzed as though one side is passive.” Although game theory’s strength is in analyzing strategic interactions,



Bueno de Mesquita (2002:61) also rightly claims that “without empirical testing we can make no headway in choosing internally consistent theories that make different predictions about behavior and outcomes.”

The current use of game theory in studying terrorism is encouraging given the promises of the approach identified by Bueno de Mesquita (2002) among others, but the lack of empirical testing of the models is troubling. The Empirical Implications of Theoretical Models (EITM) approach in political science is one promising way to incorporate strategic interaction and test the models appropriately. As Granato and Scioli (2004:318) argue “EITM offers, through the integration of a formal model and empirical test, the specification of the conditions under which empirical possibilities occur.” This is important or as Granato and Scioli (2004:318) explain, “[c]onsider the difference between knowing that cold weather can make water freeze and knowing the conditions of time and temperature it takes to freeze. Both forms of knowledge are correct, but there is considerable difference in precision and explanation.”

In our analysis of the 88 articles published on terrorism since 1980, we found that 26 incorporated a formal model — a relatively high percentage given the relative use of game theory in other areas of political science.<sup>30</sup> Another 28 articles used statistics to test hypotheses.<sup>31</sup> Only eight articles attempted an EITM approach.<sup>32</sup> That is, only 9% of the articles used formal models to generate hypotheses then used statistics to evaluate the implications of the model.<sup>33</sup> Without evidence supporting the claims from the models, we can be sure of the internal consistency of the formal model, but we cannot be sure how accurately it predicts terrorism.

Game theory is the most widely accepted modeling approach for analyzing strategic interaction (Morrow, 1999), but it is by no means the only one. An alternative or complement to game-theoretic models are computational (or agent-based) models (ABMs). While the use of ABMs to study terrorism is rare, recent models of civil conflict and insurgent/counterinsurgent dynamics (Epstein, 2002; Findley and Young, 2007; Bennett, 2008) and war (Cederman, 2003) demonstrate the utility of this approach for generating propositions about violent behavior. Terrorism is a phenomenon in which multiple, decentralized, and heterogeneous groups and individuals interact to produce violence. What we know about terrorism suggests that ABM, which can analyze such complexity in a systematic way, are equally (if not more) appropriate as modeling approaches. ABMs allow for the researcher to explain how microlevel interactions lead to macrostructural phenomena. Moreover, the models allow for “experiments” that can provide a causal explanation or rule out certain alternative explanations. As Epstein (1999), 43 argues “if the microspecification  $m$  does not generate the macrostructure  $x$ , then  $m$  is not a candidate for explanation. If  $m$  does generate  $x$ , it is a candidate.” Using data to confirm these expectations would be another application of the EITM principle.

<sup>30</sup>For example, this is greater than the percentage of articles published using formal models in seven of the ten journals evaluated in Bennett, Barth and Rutherford (2003). In the terrorism-focused journals, *Studies in Conflict and Terrorism* and *Terrorism and Political Violence*, only five (1.6%) and six (1.5%) articles respectively utilized formal modeling.

<sup>31</sup>*Studies in Conflict and Terrorism* and *Terrorism and Political Violence* had 25 (8.2%) and 19 (4.6%) quantitative articles, respectively.

<sup>32</sup>In our survey of Economic journals, 15 of the 91 or 16% used an EITM approach. A large portion were solely formal as well. In *Studies in Conflict and Terrorism* and *Terrorism and Political Violence*, only two articles (both from *Terrorism and Political Violence*) pair formal models with empirical tests.

<sup>33</sup>Atkinson, Sandler, and Tschirhart (1987) use an EITM approach long before EITM became an issue of concern for political scientists. Sandler and Scott (1987) and Gaibullov and Sandler (2009) are notable articles that employ a formal model and statistical test of the implications from the model.

### Conclusions

Even though the study of terrorism in political science has increased rapidly since the events of September 11, 2001, we still face a conundrum as conceptual, definitional, and research design issues plague this endeavor. We have identified several pitfalls when studying terrorism, including using a unit of observation that does not fit the theoretical expectations and not exploring whether results are robust to different definitions and types of terrorism. We have attempted to offer a constructive discussion of steps that scholars can take to improve terrorism research in political science, international relations, and related fields. We hope that our suggestions will be implemented by future scholars of this form of violence as these shared standards can help build knowledge and overcome some of the shortcomings that have stunted the field.

When we use a core set of variables to estimate models explaining different types and definitions of terrorism, we find that a key result relating democracy to terrorism is unstable. Democratic participation in most cases is unrelated to domestic and transnational terrorism, suicide terrorism, and the export of terrorism. When we investigate the question in a dyadic context, the result also is unsubstantiated.<sup>34</sup> The effect for Executive Constraints is sometimes significant and generally has a larger impact on generating terror accounts. In a directed dyad setup, or the situation that would likely model the transnational process the best, the result does not hold. This result needs to be extensively investigated before completely throwing out the argument, but our initial results suggest some doubt that this relationship holds when adjusting the unit of observation.

We also find that variables that impact terrorism have a similar effect whether we look at attacks on civilians or the military. Most scholars of terrorism would include the attacks on the USS Cole in 2000 in a database of terror attacks, and our results support this decision. It seems that variables that predict attacks on civilians similarly predict attacks on military who are in a noncombatant role.

Since this research field is inherently policy relevant, it is important that we produce models that generate accurate predictions. If executive constraints increase terrorism for a target country, then reducing these constraints may reduce future terror events. If, however, the reverse is true, then this recommendation could create the problems it is attempting to solve. Most importantly, the relationship seems to fall apart when looking at directed dyadic relations and transnational terror. Counterterrorism policy since 9/11 has led to some progress, but has also been misguided in a number of ways. Before these suggestions are offered to policy makers as ways to reduce terrorism, the results should be robust and should apply to the appropriate domain. The consequences when implementing foreign policies can be monumental.

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<sup>34</sup>In substantive terms, the average effect is also extremely small. Even if we had confidence in the result, we would be confident that Democratic Participation has nearly no effect on reducing terrorism.

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