Who's Afraid of a Lone Wolf?
Terrorist Actors, State Capacity, and Attack Lethality

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Abstract: Scholars, politicians, and pundits increasingly suggest lone wolf terrorists are substantial threats, but we know little about how dangerous these actors are – especially relative to other terrorist actors. How deadly are lone-actor terrorists? A growing body of empirical research focuses on terrorist organizations, but similar work on lone actors is sparse. Furthermore, attempts to explicitly compare these or other types of terrorist actors are basically non-existent. This paper considers theoretical arguments for why lone wolves should be especially lethal, and presents an argument for why terrorist groups should generally be more lethal. This argument is conditional upon the environment in which actors operate. In states with substantial counterterrorism capacity, lone wolves should be more lethal. The paper uses data on terrorist attacks in 15 developed countries, 1970-2010, to compare the lethality of terrorist acts. In general, attacks by organizations are far more lethal than attacks by other actors. However, in the United States, lone wolves are the more lethal terrorist actors. This is argued to be because the robust counterterrorism capacity makes organized terrorism more difficult to accomplish.

On July 22, 2011, Anders Breivik killed 77 people by bombing a government building in Oslo and going on a shooting spree at a politically-orientated summer camp. Two years earlier, on a military base in Texas, U.S. Army Major Nidal Malik Hassan shot and killed 13 people, apparently in part out of anger at U.S.-led wars in Iraq and Afghanistan. Breivik and Hassan are among the most notorious lone wolf terrorists, but many other individual terrorists have attacked without the support of a formal organization.

How dangerous are lone wolf terrorists? How do they compare to the more traditional terrorist threat, terrorist organizations? To what extent does the difference in deadliness depend on the country in which the terrorists operate? These questions are puzzling because lone wolves could be the perfect terrorists – difficult to detect, free from decision-making processes that might discourage creativity, and lacking other organizational constraints that often limit groups (Simon 2013a). For these reasons, governments have voiced serious concern about lone wolves (CNN 2011, Simon 2013b, 23), and researchers are sounding alarms as well. "Increasingly, individuals and small groups carry out some of the most lethal acts of terrorism," argues one scholar (Michael 2012, 3).

The argument presented by this paper, however, is that individuals are generally *not* the most dangerous type of terrorist actor. Terrorist organizations remain an especially deadly threat due to groups' mobilization incentives, division of labor, economies of scale, and other dynamics. However, this argument is conditioned by one factor: state capacity. In states with a great deal of counterterrorism capacity, terrorist

organization face substantial hurdles, so lone wolves are relatively lethal in these environments.

Disaggregating terrorist attacks by actor type is an important for understanding terrorism. Researchers have conducted global empirical studies of terrorist groups (Asal and Rethemeyer 2008, Cronin 2009, Jordan 2009, Horowitz 2010, Price 2012), building on early theoretical work and single-case studies (Crenshaw 1985, Rapoport 2001). However, comparable work on lone wolves is sparse. Studies of these actors are starting to emerge as a substantial line of terrorism research (Spaaij 2010, 2012, Pantucci 2011, Michael 2012, Kaplan, Lööwe, and Malkki 2014), but much remains to be understood. Furthermore, while policymakers and some scholars argue that lone wolves are especially threatening, but we know little about how threatening they are relative to other actors. This gap in the literature is especially surprising given the quantity of research on terrorist organizations.

This paper seeks to address these issues, offering an explanation for why we should expect differences between individuals and organizations. It considers arguments for lone wolf lethality, but ultimately argues that organizational dynamics pressure groups, and provide resources, to be more lethal than informal groups or individuals. Data on terrorist attacks, both worldwide and in the 15 countries with quality lone wolf data, 1970-2010, is used to compare these actors. In general, attacks by terrorist organizations are more lethal than attacks by other types of actors. However, in the United States, when other factors are taken into consideration, lone wolves attacks are on average more lethal than attacks by other actors. Beyond the contribution of comparing

actor types, this study is one of the very few to use the terrorist attack of the unit of analysis – helping us understand why some terrorist attacks are more lethal than others.[1]

Research on lone wolves

Lone wolf terrorism was once thought of as a primarily U.S. phenomenon (e.g., Kaplan 1997), but it has become more common in other countries in recent decades (Spaaij 2012, 31-32). Its increasing rate of occurrence in the post-9/11 years, and several high-profile attacks more recently, has inspired a number of studies (Spaaij 2010, Pantucci 2011, Phillips 2011, Michael 2012, Spaaij 2012, Feldman 2013, Nesser 2012). This growing body of research on lone wolf terror provides important information about conceptual boundaries, trends, and other aspects of lone wolf terrorism.

Most authors consider a lone wolf to be an actor who is not directed by a formal organization, but differences exist over to what extent the individual can still be connected to an organization. Spaaij (2010, 2012) employs a narrow definition, arguing that a lone wolf (a) operates individually, (b) lacks a connection to a terrorist group or network, and (c) conceives and directs his mission himself, without any other direct command or hierarchy. Regarding the second point, some authors disagree that a lone wolf must lack any connection to a terrorist group. Hoffman, for example, argues that in order to qualify as "terrorism," a lone wolf must be at least inspired by a terrorist organization (Hoffman 2006, 40, 118). Pantucci (2011, 19-20) argues that one subtype of lone wolf, instead of being an absolute "loner," has contact with members of terrorist groups.

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[1] One exception is Piazza (2009), exploring which types of terrorist organizations carry out the most lethal attacks.

Another debated issue is whether the lone wolf must truly act without the assistance of any others, or whether a terrorist can act with one or several partners and still be considered a lone wolf. An example of the first scenario would be the Unabomber, Theodore Kaczynski, who apparently acted completely on his own. This fits Spaaij's narrow definition. Actors such as Timothy McVeigh, who bombed a federal building in Oklahoma in 1995, fit in the second scenario. Although McVeigh delivered the bomb on his own, convicted accomplice Terry Nichols and others helped in earlier stages. Some scholars nonetheless consider McVeigh to essentially be a "lone wolf," because he was apparently not acting as member of a formal organization (e.g., Hoffman 2006, 118).

Pantucci uses the term "lone wolf pack" to describe a small group of similarly minded terrorists who lack a formal connection to an established terrorist group.[2] Furthermore, the lone wolf pack does not have a formal organizational structure – such as a group name and other attributes discussed below – that separates an informal collective of individuals from an actual terrorist organization. This is consistent with Sageman's notion of a "bunch of guys," a term he adopted from Canadian authorities' description of a suspicious group of friends (Sageman 2004, 101). The idea of a "lone wolf pack" is basically what other authors refer to as "autonomous cells" (Ackerman and Pinson 2014).

Overall, the term "lone wolf" seems to mean, to most scholars, an individual terrorist who is not *directed* by a terrorist organization, regardless of inspiration from or minor connections to an organization. While some studies also include small groups unaffiliated with formal organization, the current paper excludes such actors, consistent with Spaaij's definition. The conclusion discusses potential downfalls to this approach.

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[2] The term "lone wolf pack" has been criticized for being unclear (Spaaij 2012, 17).

Beyond definitional issues, one apparent consensus is that the threat of lone wolf terror is increasing. In Great Britain in mid 2013, the independent reviewer of terrorism legislation said that "lone actors" were more of a threat, as opposed to larger coordinated attacks such as the 2006 attempt to bring down airliners with liquid explosives (Silverman 2013). President Obama made a similar comment about the United States in 2003, saying that his "biggest concern" regarding terrorism was a "lone wolf terrorist" (CNN 2011).

Research on terrorism suggests that lone wolf terrorism is indeed greater than in the past. The number of lone wolf attacks has increased each decade since the 1970s in the United States, and in other developed countries as well (Spaaij 2012, 31-32). In the United States, between 1955 and 1977, only 7% of terrorism fatalities were killed by lone wolves, but between 1978 and 1999, unaffiliated actors were responsible for 26% of terrorism deaths in the country (Hewitt 2002, 78).[3] In Europe, lone-wolf attacks *quadrupled* between the 1970s and the 2000s (Spaaij 2012, 31-32). Between 1995 and 2012, individual attacks accounted for 14% of successfully executed jihadist terrorist events in Western Europe, according to one study (Nesser 2012).

Lone wolves and attack lethality

Some lone-actor attacks result in a great deal of fatalities, such as the Breivik and Nadal cases mentioned in the introduction. Another possible example is McVeigh, who killed 168 – although his "lone wolf" status is debated. A number of other lone attackers left substantial death tolls. Mohammad Merah, for example, killed 8 people, including

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[3] Note that Hewitt includes small groups, up to four people, in his understanding of lone actors.

Jewish school students and soldiers, in France in 2012. Other lone wolves have killed numerous people over the course of a series of attacks, such as U.S. white supremacist Joseph Paul Franklin, who killed at least 15 people in the late 1970s and 1980.

Simon (2013b, esp. 89-112) outlines a number of reasons for why he considers lone wolves to be especially dangerous. His argument comes in the form of explaining why unaffiliated actors should be unusually likely to use weapons of mass destruction (WMD) such as chemical, biological, or radiological devices. First, organizations might avoid using highly lethal and less-discriminate means such as WMD out of fear of backlash among the organization's supporters. Lone wolves generally do not depend on support from a community, and are therefore less restricted by such concerns. Second, organizations might face serious retaliation such as an intense government crackdown if they use such harmful agents. Lone actors are less likely to fear such repression. Indiscriminate government tactic such as restrictions on travel or persecution of an ethnic group thought to be associated with the attack would likely have little effect on one individual perpetrator. Finally, a lone actor can be affected by mental illness, which might cause him or her to act less "rationally" than an organization with various bureaucratic hurdles intending to reduce costly behavior.

The logic that Simon presents is intended to explain why lone wolves are likely to use WMD, which he argues would be catastrophic, but the same logic can be used to explain why lone wolves might be more dangerous than actors affiliated with terrorist organizations. The Norwegian lone wolf Breveik suggested some of these same advantages in his manifesto. He argued that there is a tradeoff wherein the individual needs to exert more labor in preparation, but has a greater chance of success in operations

(Feldman 2013, 277-279). One related and additional reason lone wolves could be relatively lethal is the lack of collective action problems. Terrorist groups face a great challenge of trying to motivate their members and reduce free-riding – which could greatly affect lethality. Some groups are better at this than others (Berman 2009, Shapiro 2013). However, a lone wolf is as deadly as he or she wants to be, and does not depend on the motivations and potential shirking of others. Overall, this suggests the following hypothesis:

H1: Attacks by lone wolves are more lethal than attacks by other actors.

How do lone wolves compare to terrorists on average? Spaaij examines 15 developed countries and mentions that lone wolf attacks have a fatality rate that is less than half the fatality rate of *terrorist attacks in general* in the same 15 countries (Spaaij 2012, 28). This snapshot suggests lone wolf attacks are considerably less lethal than terrorist attacks in general, at least in this set of countries.

The finding is interesting, but a number of issues need to be addressed. First, while lone wolf attacks are less lethal in the sample of 15 developing countries, can the same be said of a broader sample of countries? Second, a simple comparison of means does not take into consideration other factors, such as the type of weapon used. When these differences are taking into consideration, are lone wolves still less lethal? Third, Spaaij does not directly compare lone wolves with terrorist groups, because the deaths figure for all terrorist attacks includes many attacks not attributed to any perpetrator, as well as attacks carried out small, unnamed groups – arguably neither lone wolves nor

terrorist organizations. There are theoretical reasons to expect important differences between lone wolves and terrorist organizations, but these have not been explored theoretically or empirically in the literature.

Organizations and terrorist attack lethality

In order to identify differences between lone wolves and terrorist organizations, this section presents an argument for how the organizational context has specific important consequences for terrorism. I argue that organizations face pressure to attack regularly and visibly. Additionally, they are able to draw and use resources in ways that individuals cannot. Overall, the net result of the organizational context is that attacks linked to a formal terrorist group – even if the actual perpetrator is a single person – should be more deadly than attacks by an unaffiliated individual.

James Q. Wilson's influential work defines organizations as formal, voluntary associations (Wilson 1973, 31). By formal, he indicates there should be a definable membership and a group name. He explicitly clarifies that this understanding excludes social movements (membership is not formal) and casual associations and kinship networks. These characteristics are crucial for separating organizations from informal or temporary groups.

"Organizations tend to persist," notes Wilson, and he argues that beyond its political or social motivations, a group worries about its relevance and ultimately survival. This encourages it to attack, keep attacking, and attack in especially visible ways, while an individual faces only personal motivations to attack or not. The additional sources of motivation – organizational survival, inspiring members, and so on – can spur

groups to carry out more and more lethal terrorism than what we might expect from individuals.

Crenshaw, drawing on Wilson's work, argues that organizational dynamics can pressure group leadership to become less concerned with achieving political goals and more concerned with maintaining the group (Crenshaw 2001, 21). How do terrorist groups sustain their organization? "The terrorists' ability to attract – and moreover, to continue to attract – attention is most often predicated on the success of their attacks," argues Hoffman (2006, 248-249) Terrorist groups, then, are constantly focused on carrying out more impressive attacks, to stay relevant and keep members and supporters motivated. Organizational pressure can lead groups to carry out attacks that individuals likely deem too risky. Referring to ideological incentives, Crenshaw (2001, 24) argues, "The incentives [groups] offer members may require violent actions against the government regardless of cost, if that cost is short of complete destruction of the organization."

An example of a costly tactic, usually carried out by terrorist groups,[4] is suicide terror. Attacks in which the perpetrator intentionally dies in the process are more lethal than non-suicide terror. Between 1980 and 2001 – and not including the 9/11 attacks – each suicide attacks killed on average 13 people, compared with a lethality rate of les than one death per attack for terrorism generally (Pape 2003, 346).

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[4] Pape (2003, 2005, 15) finds that at least 95% of suicide attacks are part of "organized campaigns."

Suicide terror is largely an organizational phenomenon for a few reasons. First, Bloom (2005) argues that the tactic is the result of organizational competition.[5] Rivalries over resources encourage groups to try new tactics, and one is suicide terror. Second, organizations can dramatize suicide attacks, creating the "art of martyrdom" to draw and train future recruits (Schalk 1997). They indoctrinate recruits about "sacrificial myths," and provide payments to the attacker's family (Pape 2003, 347). Organizational dynamics encourage terrorist groups to use innovations such as suicide terror, and groups are especially capable of doing so efficiently. The division of labor allows certain members to focus on this task, while others are engaged fund-raising or other tasks. The same is true of other lethal tactics, such as effective bomb making. It is also consistent with research finding that organizations are more likely than lone wolves to use WMD (Ackerman and Pinson 2014). This further suggests that organizations should be especially lethal.

Terrorist groups not only face pressure to carry out substantial attacks, but they have resources to do so that individuals lack. The sheer numbers of members associated with terrorist groups offer a number of advantages in attack lethality.[6] First, groups can provide logistic networks that enable more effective attacks. Bomb making units, transportation elements, and safe houses all help attackers prepare for and carry out especially deadly terrorism. Second, groups can withstand the arrest or killing of members, while lone wolves, strictly defined as single individuals, obviously cannot. This

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[5] There is mixed evidence for this (Findley and Young 2012), but a number of studies support the assertion (Nemeth 2013). This is consistent with a broad literature suggesting competition leads to innovation generally (Porter 1985).

[6] Organizational size also brings some disadvantages, such as greater visibility to state security forces. However, on balance, I suggest that larger group size should contribute to greater lethality.

is beneficial not simply in terms of continued existence, but the advantages that come from longer-term survival. Terrorist actors that have been around a longer amount of time likely have improved knowledge about their trade, and therefore can kill more effectively. Terrorist groups learn from their interactions with governments, and from each other (Kenney 2007, Horowitz 2010).

Individuals can learn from their interactions with the government as well, but a key difference between these two types of terrorist actors is that only organizations can continue after an arrest or multiple arrests. This gives them the advantage of institutional memory, institutional learning over time that can help them to improve their techniques and therefore increase their lethality as they age. The notion of institutional memory and learning is particularly relevant for organizations because lone wolves are often arrested within a year of starting, while terrorist groups tend to survive for more than 10 years on average (Jones and Libicki 2008).

Organizational advantages seem to be apparent to lone wolves. This is likely part of the reason that lone actors sometimes claim to be working for an organization. Austrian anti-immigrant bomber Franz Fuchs signed a number of letters from the "Bajuvarian Liberation Army," U.S. pro-immigrant bomber Muharem Kurbegovic claimed to represent the group "Aliens of America" (Simon 2013), and Kaczynski wrote his manifesto in the third person and repeatedly claimed to represent the "Freedom Club." These steps were in part to throw off detectives, but also likely because these actors wanted to inspire grater fear in officials and the public. Organizations perhaps inspire more fear than do individuals. Overall, this suggest the following hypothesis, an alternative to the lone wolf hypothesis:

H2: Attacks by terrorist organizations are more lethal than attacks by other actors.

Lone wolf territory? Certain environments favor solo-actor terror

Lone wolves emerge in developed countries in part because the state prevents organizations from attacking. In states with especially strong counterterrorism capacity, the state can intercept communications, monitor and interrupt meetings, and take other actions that make organized terror difficult. This is consistent with evidence finding that, for example, terrorist organizations do not survive as long in highly developed states as they do in less developed states (Young and Dugan 2014, Carter 2012). As a result, terrorist groups are likely to *not* be especially lethal in these kinds of states. Assuming rationality, lone wolves realize they are more likely to be effective on their own than as a part of a group. Additionally, in certain countries there are simply fewer groups for an aggrieved person to join, or it is harder to contact current members. This logic suggests the following hypothesis.

H3: In highly developed countries, attacks by lone wolves are more lethal than attacks by other actors.

Research design

To compare the lethality of terrorist organizations, lone wolves, and other terrorist actors, I use terrorist attack information from the Global Terrorism Database (GTD), combined with updated lone wolf data based on Spaaij's (2012) data set. The GTD is

probably the most expansive public data set of terrorist attacks. The Spaaij data is the

most geographically inclusive lone wolf data, including 15 countries – basically North

America, some of Europe, and Australia.[7] The years covered in the study are 1970-2010,

because the GTD begins in 1970, and Spaaij coded lone wolf events through 2010. The

unit of analysis is the individual terrorist attack.

Data

To combine GTD data with the Spaaij data, there were two main hurdles. First,

Spaaij's data are not listed as events or attacks; there is a list of lone wolf *actors*, many of

whom carried out multiple attacks, but details of all attacks are not provided by Spaaij. I

had to determine how many attacks each actor carried out, and gather information on

these attacks. Second, while about half of the attacks Spaaij identifies as lone wolf attacks

are already in the GTD, the other half are not. This occurs in spite of the fact that they

tend to clearly fit within GTD criteria for "terrorism." As a result, beyond marking 123

GTD attacks as lone wolf events, I also added 140 events to the GTD, based on Spaaij's

data. The steps are discussed in detail below.

The unit of analysis for Spaaij is the actor, not the event. As a result, his data do

not have a clear number of attacks each actor carried out. For example, his data appendix

mentions that Rachelle Shannon committed arson at "a number of" U.S. abortion clinics.

(I found evidence of nine attacks by Shannon, six of which appear in the GTD.) Perhaps

using rough estimates, Spaaij writes that his 88 actors were responsible for 198 attacks.

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[7] The countries are Australia, Canada, the Czech Republic, Denmark, France, Germany, Italy, Netherlands, Poland, Portugal, Spain, Sweden, United Kingdom, United States, and Russia.

However, his data appendix does not indicate how this total was reached – it does not include a number of attacks for each actor. More importantly, upon further research, I found that the number of attacks attributed to these actors in various public sources adds up to more than 198 attacks.

To determine the precise number of attacks carried out by each of Spaaij's lone wolves, I analyzed the GTD and numerous qualitative sources, such as newspaper accounts and terrorism chronologies (e.g., Hewitt 2005). This analysis suggested that there were a total of 263 lone wolf attacks by the actors listed in Spaaij's data. If they were already in the GTD, they were coded as lone wolf attacks. If they were not in the GTD, rows of data were added, to include these additional attacks in the GTD data to be able to compare them with other attacks. For example, the Unabomber carried out 16 attacks according to many sources, and they were clearly "terrorism" according to GTD criteria. However, the GTD only includes 13 Unabomber attacks. The remaining three attacks were added to the data, with variables coded with information from these sources, and according to the GTD codebook.

To compare lone wolf attacks with group attacks, the GTD data were sorted according to perpetrators. Many attacks in the GTD have information on the perpetrator in a variable called *gname* (group name). The variable, for example, is labeled "Hezbollah" for attacks attributed to Hezbollah.

Unfortunately, about half of the attacks list "Unknown" for *gname*, so these attacks cannot be used to provide information about the lethality of terrorist groups vs. unaffiliated individuals. They are excluded from my analyses. Additionally, many of the "groups" associated with attacks are not formal terrorist organizations in the sense

discussed in this paper, but instead are coded with names such as "Gunmen," "Students," and other generic identifiers. These attacks cannot be confidently associated with a formal organization, so they represent a third category – between lone wolves and terrorist organizations – that is considered in some of the analyses. I refer to these collections of multiple people that are not named terrorist organizations as *unknown groups.* An additional and smaller category could be referred to as *unknown individuals.* These are attacks where the *gname* variable contains a generic identifier suggesting a single person, such as "Gunman" or "Protestant."

Variables

The dependent variable is *fatalities,* the number of deaths attributed to each terrorist attack. This variable ranges from 0 to 1382, with a mean of .80 in the 15-country sample. This variable is actually a rounded-up version of the fatality counts in the GTD, because GTD includes some non-integers, and a negative binomial model requires integers. For example, the GTD counts the two plane strikes in New York as separate terrorist attacks, with 1382.5 deaths each. This is because of obvious challenges determining which fatalities came from which strike, so the GTD assumes that half of the 2,765 9/11 fatalities in New York came from each attack.

Regarding independent variables, *lone wolf* is a dichotomous variable coded 1 for the 263 attacks carried out a lone wolf according to Spaaij's data.[8] *Group* is a

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[8] If there was an inconsistency between the Spaaij data and GTD about whether an attack was a lone wolf attack, I went with Spaaij's information. This is because he has analyzed the GTD data – which are imperfect – looking to verify which attacks were lone wolf attacks. Some attacks are coded for a particular group under the GTD variable *gname,* but it turns out these were individuals acting alone. For example, David Copeland's attacks

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dichotomous variable coded 1 for group attacks. *Unknown group* is coded 1 for attacks

where the perpetrator was identified as multiple people who are not known to be

members of a terrorist organization, as discussed above. *Unknown individual i*s coded 1

for attacks where there is a single perpetrator, but it is not known if the person was a

member of a group, or without any group connections (a lone wolf). Table X shows a

breakdown of

A number of control variables are included in models. Dichotomous controls for

the Sept. 11, 2001 attacks and the 1995 Oklahoma City attacks are included, as these are

outliers. A dummy is also included for suicide attacks, since these tend to be more lethal

than non-suicide attacks. A variable is included to indicate whether the perpetrator used a

gun or not, as we might expect these attacks to be more lethal than bomb, arson, knife, or

other type of attacks. This data comes from the GTD. Two temporal controls are

included: *Cold War*, which is coded 1 for years through 1991, and *New Terrorism*, which

is coded 1 from 1998 onward. Cold War attacks might have been especially lethal

because of resources from superpower sponsors, and the "religious era" of terrorism is

said to be especially lethal. Models also include two state-level controls, GDPPC and the

Polity2 measure, taking into consideration a state's level of development and its regime

type, respectively. GDPPC data come from the Penn World Tables, and Polity2 comes

from the Polity IV data (Marshall and Jaggers 2002).

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are listed under the perpetrator name Combat 18 in the GTD, and Walter Leroy Moody's
attacks are listed in the GTD under Americans for a Competent Federal Judicial System.
Copeland was inspired by Combat 18, but there is no evidence of organizational
involvement. Americans for a Competent Federal Judicial System is not a real group, but
a name used by Moody.

Model

The models use a zero-inflated negative binomial, a count model often used in analysis of other count outcomes, such as the number of terrorist attacks in a country-year (Piazza 2011). Another possibility is a standard negative binomial, but the Vuong test suggests that the zero-inflated model is preferable. This makes sense, given the high quantity of terrorist attacks with zero fatalities. In the 15-country sample, 72% of attacks do not have a fatality. The independent variables included in the first-stage model, the logit or inflation model, are the same as those in the second stage, because I do not have different expectations about what explains zero outcomes. Only the second stage of the model, the count estimation, is shown for space reasons. To take into consideration cross-country difference, and particularly that attacks are not randomly distributed across countries, standard errors are robustly clustered by country.

Two regression models are shown. The first is a model of the 15 countries for which there are data on lone wolves. The second model includes a different sample, only terrorist attacks in the United States. This is to evaluate hypothesis 3, about terrorism in countries with especially advanced counterterrorism capabilities. In the U.S.-only sample, the standard errors are obviously not clustered by country, and the Polity variable drops from the model because it does not change for the United States during these years.

Descriptive data

Table 1 shows some descriptive data. In the global sample, the 15-country sample, and in the United States, attacks by terrorist organizations are more lethal than attacks by lone wolves. In the global sample and in the United States, the typical attack by a terrorist

group is several times more lethal than the typical attack by a lone wolf. The difference is smaller in the 15-country sample, but terrorist groups still are almost twice as deadly as lone wolves in this sample. Overall, with this basic descriptive data, there is some support for the second hypothesis, that terrorist groups are the more deadly type of terrorist actor.

[Table 1 about here.]

Table 2 shows the same comparisons, but with the extreme outlier of the 9/11 attacks removed. When we take out these very lethal attacks, the overall results of Table 1 hold – except in the United States. In the United States, when 9/11 attacks are not included, lone wolf attacks have a lethality rate that is seven or eight times that of terrorist group attacks. This provides some preliminary support for the third hypothesis. In the 15-country sample, the lethality rates of lone wolves and terrorist groups are closer than they were in Table 1, but terrorist groups are still more lethal. These comparisons are interesting, but only analyze descriptive data. It is unclear if we can reach the same conclusions when other factors are taken into consideration.

[Table 2 about here.]

Results

Table 3 shows the results of the zero-inflated negative binomial regressions. Model 1 includes the full sample for which there are data on lone wolves, the 15 countries. In this sample, the two actor-level variables that are statistically significant are

Terrorist group and *unknown group.* Both coefficients are positively signed, suggesting an attack by either of these actor types is more lethal than an attack by an unknown perpetrator, other factors held constant. Regarding substantive significance, incident rate ratios suggest than an attack by a terrorist group results in 113% more deaths than an attack by an unknown perpetrator. An attack by an unknown group is estimated to be 278% more deadly than attack by an unknown perpetrator. Neither *lone wolf* nor *unknown individual* is statistically significant. This model fails to provide support for H1, but does find support for H2.

[Table 3 about here.]

Model 2 shows the reduced sample of only attacks in the United States. This is to test the hypothesis about states with high levels of counterterrorism capacity. In this model, contrasting with the previous, the only actor-level variable that is statistically significant is *lone wolf.* Again using incident rate ratios, an attack by a lone wolf is estimated to result in 124% more deaths than an attack by an unknown perpetrator. In the United States, attacks by lone wolves are more lethal than attacks by unknown perpetrators, other factors held constant. This is consistent with the third hypothesis.

Regarding control variables, most return expected results. According to both models, the 9/11 attacks and Oklahoma City attacks, and suicide attacks generally, are more lethal than other attacks. Interestingly, terrorist attacks involving guns are *less* lethal than non-gun attacks in the 15-country sample, but *more* lethal than non-gun attacks in the United States. Perhaps this result is driven by the availability of high-capacity

firearms in the United States. With respect to temporal issues, the Cold War variable is statistically insignificant, but the variable indicating 1998 and later is statistically significant and positive. Consistent with the idea of "new terrorism" or the "religious era of terrorism," terrorist attacks in 1998 and later is more lethal than attacks in the early 1990s, the omitted category. Neither GDPPC (log) nor the Polity measure is statistically significant. This is surprising, but perhaps the lethality of attacks is better explained by factors other than state-level attributes.

Conclusion

How dangerous are lone wolf terrorists? They have dominated news stories about terrorism in recent years, and scholars have begun to explore the phenomenon of lone-actor terrorism conceptually, and with some data analysis. This study provided the first in-depth look at the lethality of lone wolf terrorist attacks. The emphasis of analysis was to directly compare it with terrorism by formal organizations, because there are theoretical reasons why each type of terror should be especially deadly.

Results suggest that in general, lone wolf terrorist attacks are far less deadly than acts by other terrorist actors. However, in the United States – a country with high counterterrorism capacity – lone wolves are estimated to be the more deadly type of terrorist actor. This was argued by be because in this environment, terrorist organizations have a difficult time operating.

These analyses suggest interesting implications for the study of both lone wolves and terrorist organizations. In spite of the relatively low death rate of lone wolf attacks, they are of course worthy of continued study. Why are some lone wolves more lethal than

others? Are there national attributes, such as weapons access, that make actors of certain countries more lethal than those of other countries? Much of the research on terrorism thus far has at least been implicitly organization-focused, but models can be applied to studying individual actors. For example, just as we benefit from typologies of terrorism and terrorist groups, it would behoove us to better understand types of lone wolves (Pantucci 2011, Bates 2012). Just as we are beginning to understand why some terrorist groups last longer than others, we should understand why some lone actors carry out attacks for years, while others are arrested or quit earlier.

The results also suggest terrorist organizations deserve more serious focus of scholarly scrutiny. In terms of theoretical work, there are numerous reasons why one might choose a particular unit of analysis over another, but this study suggests that the terrorist group is a particularly important entity to analyze to understand terrorism. Organizational dynamics help us understand not only the lethality of terrorism, but also its timing and other attributes. Quantitative studies of terrorist groups only began in earnest in the past several years, so this research program – qualitative, quantitative, or otherwise – has much to contribute to the study of terrorism.

In terms of policy significance, some readers might argue that because lone wolves are unusually deadly in the United States, perhaps policy in this country should be focused on lone actors. Perhaps similarly capable countries should principally be focused on lone wolves. I would suggest that given the lethality of attacks associated with groups generally, states cannot afford to shift their focus disproportionately toward lone actors. Obviously states need to be alert for all types of threats, including individual actors, but

attacks perpetrated by groups still carry the potential for grave danger for states, even the

most developed states.

Tables

Table 1. Average fatalities of attacks by terrorist groups and lone wolves, 1970-2010

	Global sample	15 developed countries	United States
Terrorist groups	2.33	.88	2.85
Lone wolves	.47*	.47	.78

* Lone wolf data is from only 15 countries.

Table 2. Average fatalities of attacks, 1970-2010. 9/11 attacks excluded.

	Global sample	15 developed countries	United States
Terrorist groups	2.30	.56	.10
Lone wolves	.47*	.47	.78

* Lone wolf data is from only 15 countries.

Table 3. Zero-inflated negative binomial of terrorist attack fatalities, 1970-2010.

	Model 1 15 developed countries	Model 2 The United States only
Lone wolf	0.653	0.804***
	(1.21)	(3.08)
Unknown individual	0.249	-0.059
	(0.73)	(-0.17)
Terrorist group	0.755**	-0.277
	(2.16)	(-1.09)
Unknown group	1.330***	0.360
	(5.03)	(1.02)
9/11 attacks	5.165***	6.245***
	(26.13)	(8.65)
Oklahoma City attacks	5.564***	7.206***
	(41.23)	(12.70)
Suicide	0.733***	1.528***
	(5.26)	(2.82)
Gun	-0.410***	0.854**
	(-3.22)	(2.05)
Cold War	-0.083	0.265
	(-0.29)	(0.62)
New terror	0.735***	1.366***
	(3.07)	(3.68)
GDPPC (log)	-0.484	-1.341
	(-1.59)	(-1.50)
Polity	-0.039	
	(-0.95)	
Constant	4.740*	11.95
	(1.65)	(1.26)
N	16,124	2,332

T-statistics are shown in parentheses. * *p*<.10 ** *p*<.05 *** *p*<.01

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