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The drawbacks of drones: The effects of UAVs on escalation and instability in Pakistan

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Abstract

Growing reliance on Unmanned Aerial Vehicles (UAVs) in the effort to combat militant groups has led to considerable debate about the consequences of this new mode of warfare. While critics have focused on the impact of civilian casualties on militant recruitment and the resulting use of terrorism, evidence suggests that 'drones' are paradoxically more effective in limiting civilian deaths compared to other forms of military force. This article demonstrates a different causal pathway connecting militant use of force to terrorist attacks. Drone strikes encourage militants to displace operations to urban centers. Confronted with unfamiliar terrain and greater government capacity, militants emphasize terrorist attacks against civilians. The article explores these dynamics in the longest running drone campaign, in Pakistan. While civilian casualties from drone strikes have no discernible effect on terrorism, strikes that kill militants increase terrorist attacks against civilians in urban settings, while failing to reduce attacks on government targets.

Keywords

drone strikes, insurgency, terrorism

Introduction

Unmanned aerial vehicles (UAVs or 'drones') have become a distinguishing feature of the US military's long war against militant groups. The objective of drone strikes is to degrade targeted organizations by killing their active militants and leaders. The capacity of UAVs to closely monitor potential targets for long periods of time makes it possible to collect more accurate intelligence on militants' hide-outs, vehicles, and movements. Drones are armed with precision-guided munitions, allowing their operators to act on intelligence and more reliably strike their targets. The absence of an on-board crew greatly reduces the cost of UAV operations and also ensures that the United States does not suffer military casualties if a drone malfunctions or is shot down. UAVs also require far fewer 'boots on the ground' to sustain operations in combat areas, dramatically lowering exposure of US personnel to threats of all kinds and encouraging the use of force in environments where the risks of military casualties would otherwise outweigh the benefits of military intervention (Walsh & Schulzke, 2018). As President Barack Obama's counterterrorism advisor, John O. Brennan, explained 'the purpose of these actions [using UAVs] is to mitigate threats to US persons' lives' (Becker & Shane, 2012).

US strategy is based on the expectation that targeting militants with drone strikes will degrade their capacity to engage in violence. But scholarly research suggests that such strikes could actually *increase* attacks by militant groups. Many observers argue that drone strikes serve to strengthen the hand of militant groups. A diverse set of critics – human rights organizations (Cavallaro, Knuckey & Sonnenberg, 2012), military experts

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(Kilcullen & Exum, 2009), and the United States and Pakistani government officials (Gerstein, 2011; DeYoung, 2013) – claim in particular that drone strikes that kill civilians do more harm than good. Militants highlight civilian deaths from drone strikes to demonstrate US brutality and justify their own use of violence. Civilian deaths provide powerful narratives used to recruit or sustain support from residents and sympathizers overseas. Pakistani militants have defended their own attacks as retaliation for US drone strikes. A man convicted of attempting to bomb Times Square in New York, who was trained by the Pakistan Taliban, planned the attack in response to drone strikes that were 'killing Muslims' (Elliott, 2010). Research also finds that drone strikes designed specifically to kill militant leaders contributes to a rise in terrorism. Leadership decapitation reduces the ability of militant organizations to control their subordinates, who may be tempted to attack softer, civilian targets, rather than engage in dangerous combat with military forces (Abrahms & Potter, 2015). If this is the case, then the US reliance on drones could be fundamentally misguided, leading to 'blowback' (Johnson, 2001). While drone strikes against militant leaders might be intended to weaken these organizations, the result may actually be to increase violence and instability in the form of increased terrorist attacks.

Each of these lines of criticism invites some skepticism, however. Civilian deaths due to drone strikes, while disconcerting, may actually be less pronounced than for other forms of military violence (Plaw & Fricker, 2012). While one cannot doubt the outrage that drone strikes engender, it is not clear that targeted killings using manned aircraft or special operations personnel would be regarded as more benign by local populations. Similarly, the death of militant leaders need not result in heightened attacks against civilians. Leaderless militants could just as well refrain from taking any aggressive actions, or they might choose to consolidate with other militant groups.

We build on existing work in two ways. First, we test current claims directly and simultaneously with data that disaggregate drone strikes by the number of civilians, militant leaders, and rank and-file militants that they kill. This approach allows us to identify which, if any, of the existing theories are supported when taking into account alternative causal mechanisms. Second, we also introduce a new theory that claims that drone strikes that kill *rank-and-file* militants lead militant groups to increase terrorist attacks in urban areas. Drone technology is particularly effective in targeting militant fighters. The resulting depletion of their ranks makes it difficult for targeted groups to recruit and retain members and supporters, threatening the organization's most fundamental resource. Militant groups shift the location and type of operations to protect personnel from drone strikes. To demonstrate their continued viability, however, militant organizations must respond quickly with attacks of their own. But attacks on military targets are more difficult to carry out when threatened by drones. Instead, militants shift some of their operations to more distant urban areas, where they are less vulnerable to drone strikes and can engage in terrorist attacks that pose less risk to their fighters. Our theory generates two testable hypotheses: drone strikes that kill militants lead to (1) more urban terrorism, and (2) fewer attacks on military targets.

After briefly discussing recent research relevant to the study of drones and their consequences, we detail our theory connecting the killing of rank-and-file militants in drone strikes to urban terrorism. We then assess our claims empirically, comparing them with more commonly asserted claims of links between civilian casualties, leadership decapitation, and militant violence. We find that militant deaths from drone strikes in Pakistan have led to more terrorism in urban areas and have reduced militant attacks on government and military targets. Civilian casualties and leadership decapitation, in contrast, are not consistently related to any form of political violence.

This analysis has important implications for the application of precision weapons to future armed conflicts. Drones and related technologies are attractive to leaders because they remove military personnel from the line of fire and do not require the deployment of large numbers of troops in unstable regions abroad. These characteristics led to rapid expansion of the 'drone war' in Pakistan and in other conflict zones. At the same time, extensive targeting of militants with UAVs encourages militant groups to adapt their own battlefield strategies. More generally, our theory and findings make the point that violence such as drone strikes has first-order effects, such as the killing of militants, but that it is important to recognize that it also has second-order effects. Militant groups are strategic actors that are bound to adapt their own behavior to new threats.

Literature and motivation

Does drone technology have characteristics that distinguish its effects from other types of military force? Existing research identifies three channels through which drone strikes influence the use of terrorism, or other

forms of violence, by militant groups. Most of this work, like the present study, examines empirical evidence from the drone campaign in Pakistan, where UAVs have been employed by the United States most frequently and have continued for the longest period of time.

A first perspective, which justifies US use of drones, holds that drone technology is uniquely well-suited to degrading or destroying militant organizations. Proponents argue that technological features of drones allow for more selective targeting of militants while minimizing civilian casualties (Brown, 2007; Mir, 2018, Mir & Moore, 2019; Schwartz, 2003). The ability of UAVs to loiter for long periods, track movements by foot or vehicle, collect real-time information from sensors that can be integrated with other sources, and fire precision-guided missiles makes them especially effective at combatting insurgent movements, which requires identifying militants and distinguishing them from civilians. Historically this has proven difficult, particularly in the application of airpower (Pape, 1996). Militant groups typically do not possess extensive logistical infrastructures, in part to limit their vulnerability to the likely dominance of the skies by their enemy. For similar reasons, militants often resist becoming fixed to specific territory, and seldom choose to operate as massed units.

Drones arguably change the effectiveness of airpower in countering militant groups and their preferred tactics. The sensors and increased loiter time of UAVs allow operators to better distinguish combatants from non-combatants, making drones particularly effective in undermining the militant organizations they target. Indiscriminate attacks can drive civilians into the arms of militants. Such violence reduces the benefits of siding with the authorities in a conflict, '[b]ecause it approximately equalizes the probability of victimization for participants and nonparticipants, indiscriminate violence increases participation in insurgencies by raising its payoff vis-a-vis nonparticipation' (Kocher, Kalyvas & Pepinsky, 2011: 203). Selective violence thus accentuates the 'rebels' dilemma' – making participation in insurgency more risky or costly – while indiscriminate violence has the opposite effect (Lichbach, 1995; Goodwin, 2001; Kalyvas, 2006; Mason & Krane, 1989). In their careful and sophisticated empirical analyses, Johnston & Sarbahi (2016) and Mir (2018) find that drone strikes are associated with short-run reductions in a range of measures of militant violence in the Federally Administered Tribal Areas (FATA) of Pakistan, where many militant groups are based. This relationship also extends to areas immediately surrounding the FATA. Both studies conclude that the surveillance and targeting technology that underpin drone strikes are a key element of this relationship.

Consistent with claims that drones lead to more selective use of violence, Plaw & Fricker (2012) developed a dataset of the victims of drone strikes in Pakistan. Their data collection effort divides victims into three categories: militants, civilians, and those whose status cannot be determined. Based on a careful review of media reports, they measure the ratio of militants killed in drone strikes to civilians that die in such attacks. Using only information from media sources in Pakistan, they estimate that over 26 militants are killed for each confirmed civilian death in a drone strike. This ratio falls slightly to 19 militants per civilian death if they also rely on international media sources. Plaw & Fricker (2012) then compare these ratios of militants and civilians killed by drone strikes with corresponding ratios for other types of armed conflict, including Pakistani military operations in the FATA and the Swat Valley, United States military operations in Pakistan that use other types of force besides drones, targeted killings in the West Bank and Gaza Strip carried out by Israel between 2000 and 2008, and all conflicts in the world in the year 2000. All of these other types of force yield a higher ratio of civilian deaths than even the lowest estimates for the proportion of civilian deaths per militant by drone strikes. It should be acknowledged that it remains difficult to generate accurate counts of civilian and military victims during armed conflicts. Still, these findings seem to indicate that the proportion of civilian victims from drone strikes is comparable or lower to that of other types of military violence. In addition, Plaw, Fricker & Williams (2011) find that the ratio of civilian to military deaths in the drone campaign in Pakistan has dropped over time. Over time, US drone operators have become more adept at distinguishing civilians from military targets.

A second perspective holds that civilian deaths from drone strikes provide militants with political gains that outweigh the harm inflicted on their organizations by successful targeted killings. In the context of drone strikes in Pakistan, the argument is that militant organizations can publicize civilian deaths in propaganda campaigns that mobilize supporters and alter public opinion. This propaganda emphasizes to the larger population – which may not feel vulnerable to targeted killings themselves – that civilian victims share their ethnic, religious, and national identities and thus merit support. Drone attacks, and the resulting propaganda, also make it easier for militants to justify their own use of violence in the face of a more powerful and threatening state security apparatus. For example, Al-Qaeda Central and allied

groups used drone strikes as part of propaganda campaigns intended to mobilize recruits and raise financial donations from overseas diasporas and other groups, portraying drones as unfair exploitation of technology by a powerful foe unwilling to risk the lives of its own soldiers and citizens (Smith & Walsh, 2013; Pape & Feldman, 2010).

Drone strikes have aroused considerable controversy about civilian deaths in Pakistan. One survey conducted in the tribal areas of Pakistan finds that most respondents believe that the drones kill more non-combatants than militants. Respondents were asked if drones 'accurately target militants' or 'largely kill civilians'. Only 16.2% of respondents believed that drones accurately kill militants alone, while 47.8% concluded that they kill civilians and an additional 33.1% believed drones killed both militants and civilians (Terror Free Tomorrow, 2010: 26). Consistent with this perspective, a number of studies of more conventional manned airstrikes, which often victimize non-combatants, were associated with subsequent increases in militant violence in Vietnam and Iraq, and reduced popular support for the authorities during the conflict in Afghanistan after 2001 (Condra & Shapiro, 2010; Kocher, Kalyvas & Pepinsky, 2011; Lyall, Blair & Imai, 2013). This logic holds that drone strikes that kill civilians increase support for militant groups, enabling them to justify and to engage in additional violence.

A third perspective considers how the scale and position of militants killed by the authorities influence subsequent militant violence. Abrahms & Potter (2015) focus on how attacks on the leadership of militant groups, influence subsequent group behavior. The authors challenge the contention that terrorist attacks are typically counterproductive for the groups that mount them because they reduce the likelihood of concessions by the government. Why, if this is the case, would militant organizations engage in such violence? Abrahms & Potter (2015) distinguish between the incentives of leaders and of rank-and-file members in militant organizations. Leaders have incentives to behave strategically, limiting attacks on civilian targets. Rank-and-file members, in contrast, have incentives to carry out such attacks, which place them at a lower risk of harm than they face in attacks on military targets. Targeted killings of militant commanders produce leadership 'deficits' that empower the rank-and-file to act in accordance with their preferences. Abrahms & Potter (2015) test this theory using several sources, including data on drone strikes and terrorism in Pakistan. Their key independent variables are the occurrence of drone strikes and of drone strikes that kill militant leaders. The authors find that drone strikes are associated with an increase in terrorist attacks, regardless of whether the strike kills a militant leader. However, only strikes that actually kill leaders lead to reductions in attacks on military targets.

Existing research has identified three ways that drone strikes could influence terrorist attacks by militant groups: degradation, civilian casualties, and leadership decapitation. The first expects drone strikes to reduce militant violence, while the second and third claim that drone attacks increase such violence. We build on this work in two ways. First, we test these arguments directly with data that disaggregate drone strikes by the number of civilians, militant leaders, and rank-and-file militants that they kill. Disaggregating in this way allows us to identify which, if any, of the existing theories are supported by the data. Second, we offer a new theory in which UAV strikes that kill rank-and-file militants lead militant groups to increase terrorist attacks in urban areas.

Theory: Militant kills and urban terrorism

Militant organizations, like all organizations, need resources to survive and to achieve their objectives. The specific resource needs of militant groups vary depending on context and their strategy; a rebel group seeking to overthrow a government with a conventional military strategy needs heavy weapons and a robust logistical supply chain, while a group pursuing a guerrilla strategy would find these military resources unsuitable, for example. All militant organizations, though, need to recruit and retain fighters. UAVs are particularly effective at targeting and killing rank-and-file militants. Drone strikes thus pose a direct threat to a militant organization's core need for human capital.

As discussed earlier, drone technology poses a significant threat to the lives of both militant leaders and their rank-and-file fighters. UAVs also disrupt the ability of militant organizations to maintain command and control of their fighters and supporters, whose motives often differ from those of an organization's leaders and commanders. These differences lead militant organizations to establish methods of communication and record-keeping that ensure that subordinates are acting in ways consistent with leaders' larger political and strategic objectives (Shapiro, 2013). Drone strikes disrupt these methods of command and control. Their ability to surveil suspect locations for long periods requires targeted militant organizations to regularly relocate their fighters and to search for new

hide-outs. Intercepts of electronic communications allow drone operators and the intelligence organizations that support them to track and locate likely militants. This, in turn, makes it more difficult to conceal the activities of militant organizations that are concerned with managing human capital, including recruiting, training, supplying, and deploying militant forces (Abrahms & Potter, 2015).

Beyond the immediate tactical objective of killing active militants, drone strikes also seek to deter potential fighters and supporters from enlisting with, or aiding, a militant organization. By eliminating their current manpower and disrupting their methods of communication and concealment, drone strikes increase the need for militant organizations to recruit fighters and to maintain a network of non-combatant supporters who can provide it with donations, resources such as safe houses or vehicles, and intelligence about government and military operations. Potential fighters and supporters are less likely to join a militant organization if they fear that they will be identified and targeted by drone strikes themselves. Furthermore, they may conclude that drone strikes that kill militant fighters will weaken the organization, making it less likely to survive or achieve its political, ideological, or social objectives. Instead, potential supporters may shift their allegiance to other militant organizations, decide not to involve themselves in the conflict, or even provide intelligence about the identity and location of militant operatives to the authorities.

To remain viable, militant organizations targeted by drone strikes need to convince their current and potential supporters that they remain capable and effective after drone strikes deplete their ranks. Over the longer run, militant organizations can signal their resilience in the face of UAV attacks in a variety of ways, such as issuing propaganda, maintaining an armed presence in locations they control, and providing security and other services to citizens in these locations. But these actions will be difficult to sustain if drone strikes lead current and potential supporters to begin to abandon the organization. Militants thus have incentives to issue prompt signals of their viability in the wake of drone strikes. As specialists in the use of force, they are well-positioned to respond to drone strikes by launching violent attacks soon after drone strikes occur. Conducting violence in response to drone strikes demonstrates to current and potential supporters that the organization retains the capacity to use force. It also implies that this capacity can be directed at their members or network of supporters who abandon the militants or betray them to the government.[1]

The loss of regular militant fighters to drone strikes thus threatens a targeted organization's ability to retain and attract soldiers and supporters. It further creates an incentive for the militant organization to respond with violent attacks of their own to demonstrate their continued resilience. Retaliatory attacks are best undertaken shortly after drone strikes occur; a prompt response will most effectively counter any perception that drone strikes have undermined the group's viability.

We next turn to the types of violence that militants will employ in response to drone strikes: either conventional and irregular attacks on government and military targets, or terrorism directed at civilian targets. Drone strikes make attacks on military targets less attractive. They degrade the militants' military capacity, making it more difficult for them to strike at well-defended targets. This makes terrorist attacks a more attractive option for militant groups, as they typically require fewer human and physical resources and can be planned and undertaken on shorter notice.

We expect, then, that drone strikes will lead militant organizations to increase their use of terrorism. We further argue that such attacks should tend to target locations beyond the normal base of militant operations in remote, rural regions of the country. Attacks in more distant urban areas transport violence away from militant bases. It is more difficult for drones to strike at militants in urban areas. Denser populations make it harder to track militants and increase the likelihood of civilian casualties, countering key advantages of UAVs as observation and fire platforms. Relocating at least part of militant operations to urban centers shields militant soldiers from being targeted by drones. This offsets the threat of drone strikes to current and potential fighters and supporters.

This shift in the location of militant violence also publicizes militant grievances, as domestic and international media will devote more coverage to attacks that kill civilians in locations where they have reporting infrastructure in place.[2] Terrorist attacks put pressure on the

[1] See Topalli, Wright & Fornango (2002) for a discussion of this behavior in the context of criminal organizations. Lyall (2014) makes an argument similar to the one we advance here, although his work does not theorize about the form of violence that militants will use in response to government attacks, a point we take up later in the article.

[2] While urban violence is more likely to be reported, the change in terrorism we identify occurs across time, within the same urban setting. Our findings are not (just) a result of geographic bias in reporting.

government to stop or at least modify its support for drone operations. Urbanized Pakistani civilians may begin to perceive that they are bearing the burden for a contest between militants and the superpower, the USA, a dispute in which they have little to gain and much to lose. This process reorients the focus of conflict away from regions where drones dominate to areas where drone warfare is less effective.

The impact of drone strikes in terms of militant casualties will then produce an increase in operations against civilians and others in areas where terrorist attacks were previously less common. The use of drone strikes destabilizes conflict geographically and shifts targeting of retaliation by militant groups towards civilians, since direct retaliation against UAVs is not practical. Our first hypothesis thus predicts that drone strikes should be associated with a rise in urban terrorism:

> *H1:* Militant deaths from drone strikes lead to a short-term increase in terrorist attacks in major population centers.

The increased tempo of militant operations in distant urban environments poses opportunity costs for militant groups. At the same time that their ranks are depleted by drone strikes, the organization must divert militants and resources away from other tasks to planning and carrying out terrorist attacks in cities. This reduces their capacity to engage in other types of violence, such as conventional or irregular attacks on military and police targets. Furthermore, one motive for shifting operations to urban areas is to shield current rank-and-file militants from drone strikes. Continuing to attack military targets in areas of the country where drone strikes occur compounds exposure of militant fighters to danger, from both the air and on the ground. These factors suggest that militant organizations facing UAV strikes will curtail attacks on government or military targets:[3]

> *H2:* Militant deaths from drone strikes lead to a short-term decrease in attacks on military targets.

Militant 'kills' from drone strikes should tend to influence the timing, type, and location of subsequent militant violence. Drone strikes could have short-term effects (days and weeks), as well operating over the longer run. We focus on the short-run effects here. This is not to suggest that longer-term effects are less interesting or powerful. Instead, our effort is motivated by the fact that the drone campaign in Pakistan has only been conducted with high intensity for a few years. Our hypotheses suggest that militant deaths should lead to an increase in attacks on civilian targets in more distant, populous areas. Militants need to counter the perception that drone strikes may have undermined the group's ability or willingness to fight. Engaging in violent attacks shortly after drone strikes demonstrates that this is not the case, communicating to current supporters and fighters that the organization can respond to threats to its survival quickly and decisively. At the same time, the need to sustain the organization discourages militants from attacking well-protected targets such as military and government facilities at a time of relative weakness, particularly when such operations are likely to be compromised by the very same drones attriting militant members.

Analysis: Drone strikes and political violence in Pakistan

This section details the data, empirical strategy, and results of statistical tests of the relationships of civilian, militant, and militant leader deaths from drone strikes with militant violence in Pakistan.

Data

The dependent variables are taken from incidents of political violence reported in the BFRS Political Violence in Pakistan Dataset (Bueno de Mesquita et al., 2015). Based on reports in the Pakistani media, the BFRS dataset records the location, type, date, target, and other characteristics of each reported incident. These data have three advantages over alternative sources. First, the dataset records the location of each attack, making it possible to measure political violence at the local rather than at the national level. Second, these data report multiple types of political violence, unlike other data sources that typically contain information about one type of incident, such as terrorist attacks. This allows us to estimate the effects of UAV strikes on the type of violent attack chosen by militant groups. Third, the BFRS dataset includes a considerably larger number of events of each type over a longer time period than do comparable data collection efforts. Our analysis begins on 1 January 2006, about two years before the time period when the pace of drone

[3] Johnston & Sarbahi (2016) argue that drone technology is particularly well suited to disrupting militant organizations. We focus on how this disruption influences the willingness and ability of militant organizations to undertake terrorist attacks far from their base of operations. While Johnston & Sarbahi (2016) analyze the effects of drone strikes in rural areas controlled by militants, we show that militants shift their violence to other regions of the country.

strikes accelerated, and ends on 8 November 2011, the last date for which the BRFS dataset records violence in Pakistan. The temporal unit of analysis is the week.

Our main dependent variable is a weekly count of *Urban terrorism*. Terrorism is defined as 'premeditated, politically motivated violence against noncombatant targets by subnational groups of clandestine agents'; *Urban terrorism* also includes assassinations, defined as 'an attempt by a non-state entity intended to kill a specific individual' (Bueno de Mesquita et al., 2015: 5). Assassinations in Pakistan are similar to terrorism, we suggest, because they frequently target local political leaders who are regularly provided with personal protection. We exclude other types of violence, such as ethnic riots, political demonstrations, and acts of violence committed by Pakistani state agents. *Urban terrorism* is the count of terrorist attacks per week in Pakistan's most populous districts[4] and in Islamabad, the national capital. The definition of urban districts is somewhat arbitrary. To assess how variation in the inclusion of fewer or more populous districts influences the analysis, we report results using the number of terrorist attacks per week in the 5, 10, 15, and 20 most populous districts plus Islamabad. All of these cities are in the Punjab and Sindh provinces. The militant groups targeted by drone strikes had their bases of operations in other areas of the country: the Federally Administered Tribal Areas, and Khyber Pakhtunkhwa (formerly the North-West Frontier Province).[5] These districts thus provide a reasonable measure of terrorist attacks in urban areas where militant groups do not control territory or population. To determine if drone strikes lead to a displacement of violence from combat against government forces to *Urban terrorism*, we use as a second dependent variable: the weekly count of *Antigovernment attacks*, defined as attacks directed at state institutions and conventional and irregular attacks on military, paramilitary, police, and intelligence targets. Finally, our theory indicates that drone strikes that kill militants should specifically increase *Urban terrorism*. We do not expect that militant kills in drone strikes will influence terrorism in rural areas. To assess this expectation, our third dependent variable is *Rural terrorism*, defined as the weekly count of terrorist attacks in Pakistan's least populous provinces – Balochistan and Khyber Pakhtunkhwa – and in the FATA.

[4] Districts are the third order administrative division in Pakistan.

[5] Pakistan merged the Federally Administered Tribal Areas and Khyber Pakhtunkhwa in 2018.

The source for data on drone strikes in Pakistan is The Bureau of Investigative Journalism (BIJ). The BIJ uses media reports as well as interviews with witnesses and victims to identify the occurrence, timing, and location of each drone strike. They also seek to identify by name the victims of each strike, whether or not the victim played a role in a militant organization, and the nature of the victim's role in the organization (Bureau of Investigative Journalism, 2013). We code three variables from the BIJ. The first is the number of militants killed per week in drone strikes, labeled *Militant kills*. The second is the number of civilians killed per week in drone strikes. BIJ defines a militant organization as 'all organized, named groups that bear arms and that are not part of Pakistani [. . .] police, paramilitary, or militia forces' (Bureau of Investigative Journalism, 2013). The BIJ classifies victims of drone strikes as militants if reporting sources link the targeted house, compound, or vehicle to a militant organization. The BIJ also estimates the total number of individuals killed by each drone strike. We subtract militants and leaders killed from the count of all individuals killed for our measure of the number of civilians killed per week by drone strikes, *Civilian kills*. Third, *Leader kills* measures the number of militant leaders killed each week in drone strikes. Leaders are defined as commanders, or those who play key logistical or political roles within a militant organization. BIJ narratives list the names and roles of individual leaders who are victims, including, for example, 'Al-Qaeda operations commander in Pakistan', 'senior Taliban commander', 'deputy chief of TTP', and 'leader of ETIM'. Our dataset records a total of 302 drone strikes, resulting in the deaths of 2,211 militants, 878 civilians, and 51 leaders.

Descriptive statistics appear in Table I. On average, militants launch roughly two attacks on military targets and between six and seven terrorist attacks in urban centers each week. Given the attention that civilian deaths from drone strikes have received, it is notable that drones kill more militants than civilians. Not surprisingly, the mean number of militant leaders killed is considerably lower than the number of rank-and-file militant kills. Nevertheless, leader kills are by no means infrequent, occurring approximately once per month.

Figures 1 through 3 plot relationships of interest between the weekly counts of militants, civilians, and leaders killed in drone strikes and the number of urban terrorist attacks in Pakistan's 20 most populous districts plus Islamabad. The pattern of *Militant kills* appears to closely coincide with that of *Urban terrorism*. There is also a reasonably close relationship between *Civilian kills* and *Urban terrorism*, offering apparent support for the

Table I. Descriptive statistics

	Median	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
Terrorist attacks in 21 districts	4	6.92	9.03	0	68
Terrorist attacks in 16 districts	4	6.63	8.94	0	68
Terrorist attacks in 11 districts	4	6.28	8.84	0	68
Terrorist attacks in 6 districts	3	6.06	8.77	0	67
Attacks on military targets	2	2.24	2.49	0	17
Rural terrorism	5	5.92	3.88	0	20
Militant kills	0	7.10	12.66	0	84
Civilian kills	0	2.87	7.42	0	82
Leader kills	0	0.17	0.52	0	3
Offensive	0	0.18	0.39	0	1
Malakand	0	0.04	0.19	0	1
Election period	0	0.04	0.19	0	1
Bin Laden	0	0.09	0.29	0	1

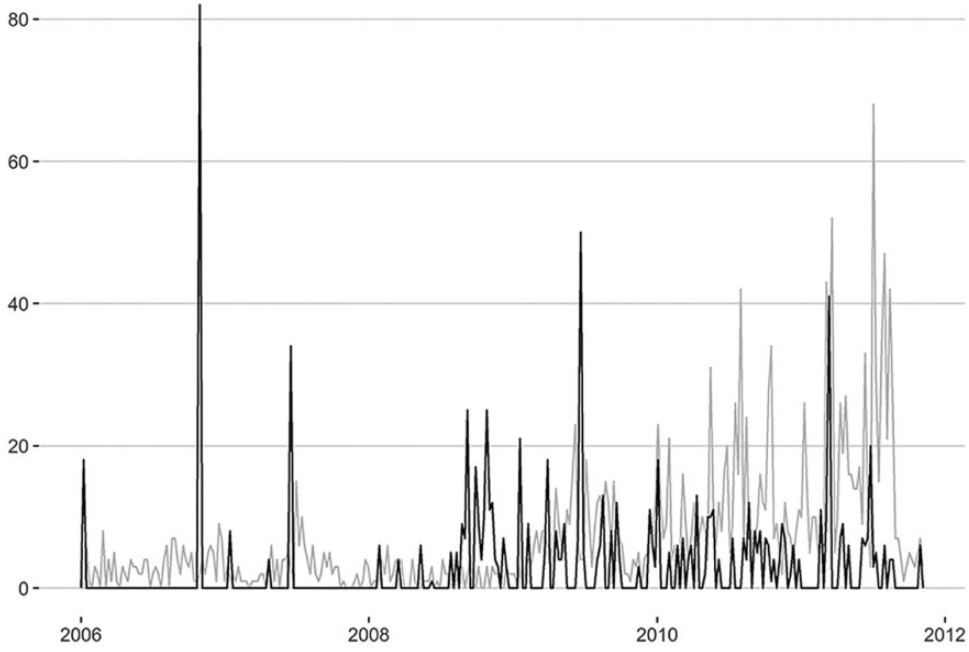

Figure 1. Weekly counts of urban terrorist attacks (grey) and civilian kills (black).
Urban terrorist attacks in 20 most populous districts in Pakistan and in Islamabad.

conviction that civilian deaths due to drone strikes lead to increased terrorism. *Leader kills*, in contrast, do not track closely with *Urban terrorism*. For example, a spike in militant leaders killed in drone strikes in 2009–10 is not associated with an increase in *Urban terrorism*.

Empirical strategy

Plots such as those in Figures 1 through 3 are suggestive of relationships between the deaths of militants and civilians in drone strikes and *Urban terrorism*, but they are not definitive. For a more detailed assessment, we turn to multivariate regression analysis. Despite the fact that militant, civilian, and leader kills are all caused by drone strikes, the variables are not strongly correlated. The correlation statistic between militant and civilian kills is 0.24, between militant and leader kills is 0.31, and between leader and civilian kills is 0.13. Including all of these measures together in the same statistical model is thus not going to produce problems with multicollinearity.

Our dependent variables and key independent variables are counts and time series. This data structure poses two challenges. First, the data are over-dispersed, meaning that the conditional variance exceeds the conditional

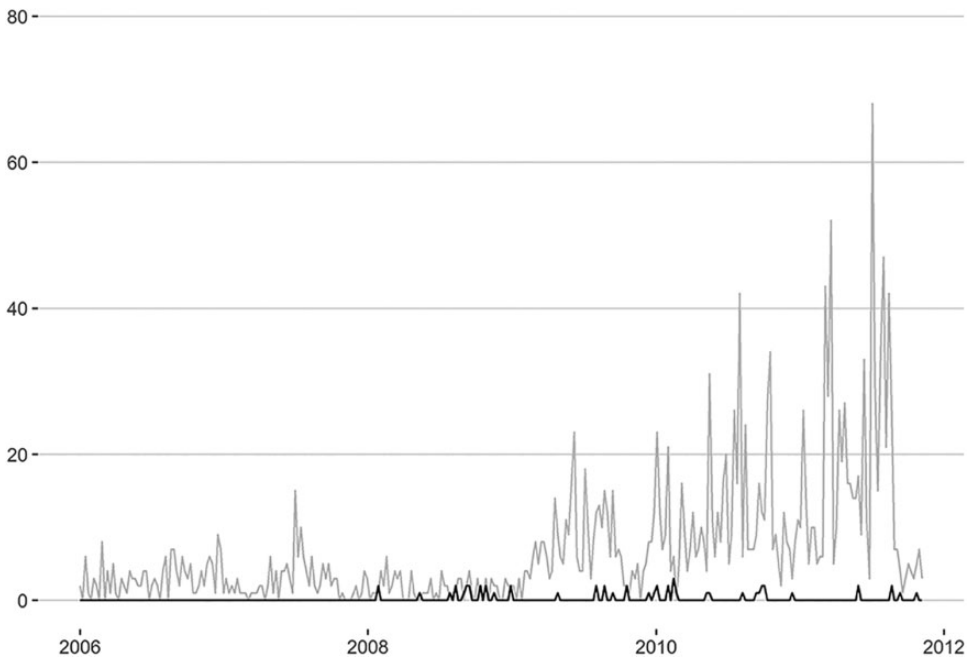

Figure 2. Weekly counts of urban terrorist attacks (grey) and leader kills (black).
Urban terrorist attacks in 20 most populous districts in Pakistan and in Islamabad.

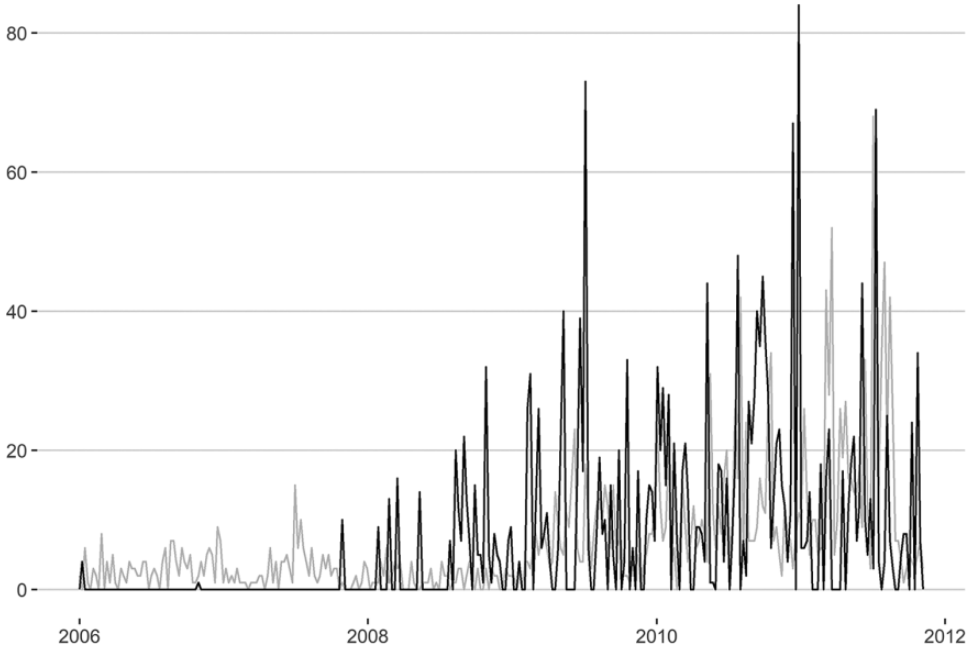

Figure 3. Weekly counts of urban terrorist attacks (grey) and militant kills (black).
Urban terrorist attacks in 20 most populous districts in Pakistan and in Islamabad.

mean. Second, the time-series nature of these data means that observations are unlikely to be independent – values in the current period depend in part on values in past periods. This serial dependence can be addressed by introducing lagged dependent variables into the model, but only if one assumes that the growth rate is exponential and that there are no dynamics in the data (Brandt et al., 2000; Brandt & Williams, 2001). We use an estimator that accounts for serial correlation in overdispersed data (Liboschik, Fokianos & Fried, 2017).

We first performed Dickey-Fuller tests, which for each dependent variable rejected the null hypotheses that the time series have unit roots. In other words, the data are stationary. To account for serial correlation, we examined partial autocorrelations for each dependent variable to determine how many lags of the independent variable to include in the estimation. Results reported in the next section include three lags for *Urban terrorism* and two lags for *Antigovernment attacks* and *Rural terrorism*.

We also control for other developments that could influence the willingness or ability of militant groups to launch attacks in Pakistan. During the period 2006–11, the Pakistani military engaged in five sustained, large-scale campaigns against militant groups based in the north and west of the country: the Zalzala offensive (January through May 2008), the Sher Dil offensive (23 September through October 2008), the Rah-e-Rast offensive (May 2009), the Rah-e-Nijat offensive (2 October through 12 December 2009), and the Orakzai and Kurram offensives (23 March through 3 June 2010) (Jones & Fair, 2010). Since there are no reliable data on the specific intensity or effectiveness of these operations, we measure them as a dichotomous variable *Offensives*, that takes a value of one during time periods in which they occurred and a value of zero otherwise. The Pakistani government also negotiated a ceasefire and partial withdrawal of troops from the Swat Valley, known as the Malakand Accord, from mid-February through April 2009. We include a dummy variable, *Malakand*, which takes on a value of one during this period and zero otherwise to capture the effects of this ceasefire. We also include a dummy variable that takes a value of one after the killing of Osama bin Laden *bin Laden* by US forces on 2 May 2011. Based on the theory of leadership targeting discussed earlier, one might expect that attacks on government targets would decline, while terrorist attacks would increase, after bin Laden's death. We also include a dummy variable *Election*, which equals one for the two months preceding national elections in Pakistan. Violence not related to militant targeting by drone strikes often occurs during these elections.

Results

Table II presents results of six statistical models. The first four models use *Urban terrorism* as the dependent variable. These models vary the number of districts included in the count of *Urban terrorism.* Model 1 includes the five most populous districts plus Islamabad; Models 2 through 4 each add the next five most populous districts. We report multiple measures of *urban terrorism* to see if the results depend on the number of districts defined as urban. *Militant kills* in the current week has no statistically signification relationship to *Urban terrorism.* The one-week lag of *Militant kills* has a negative and statistically significant relationship to *Urban terrorism* in all four models.

Civilian kills from drone strikes have no discernible relationship to *Urban terrorism*. *Civilian kills* is also not associated with attacks on military and government targets. This finding is notable, as it contradicts widespread claims that the deaths of civilians in drone strikes in Pakistan have provided militant groups with the means or motive to engage in greater violence. Recall that much of the research on repression finds that indiscriminate use of violence that harms civilians often backfires and strengthens militant groups. The findings reported here suggest that drone strikes may be selective enough to avoid triggering blowback in the form of increased militant violence. However, our focus is only on the short term. It remains possible that civilian or militant leader deaths due to drones increase popular support for militant organizations over the longer term.

Leader kills are also not associated with *Urban terrorism*. There is some evidence that a more limited drone campaign targeting militant leaders alone might have avoided contributing to the increase in *urban terrorism* that Pakistan experienced during our study period. Prior to mid-2008, this was the primary objective of drone strikes in the country. The United States launched drone strikes when it was able to identify the location of a named individual leader of a militant group. These 'personality strikes' were few in number; two were launched in 2006, and four in 2007. These rules of engagement were altered in early 2008 to allow attacks against groups of armed men that bore the 'signatures' of militants as long as no civilians were nearby. This change meant that strikes increasingly targeted groups of rank-and-file militants in addition to militant leaders. Off-the-record explanations by US and Pakistani officials for this change in policy are summarized as follows: 'Instead of having to confirm the identity of a suspected militant leader before attacking, this shift allowed US operators to strike convoys of vehicles that bear the characteristics of Qaeda or Taliban leaders on the run, for instance, so long as the risk of civilian casualties is judged to be low' (Schmitt & Sanger, 2008).

Another journalist noted that the change in the rules of engagement allowed attacks from drones 'based solely on intelligence indicating patterns of suspicious behavior, such as imagery showing militants gathering at

Table II. Militant violence in Pakistan

	Model 1 Urban terrorism (21 cities)	*Model 2 Urban terrorism (16 cities)*	*Model 3 Urban terrorism (11 cities)*	*Model 4 Urban terrorism (6 cities)*	*Model 5 Military attacks*	*Model 6 Rural terrorism*
Militant kills	0.0055	0.0059	0.0059	0.0061	0.0078	0.0061*
	(0.0048)	(0.0048)	(0.0051)	(0.0051)	(0.0054)	(0.0031)
Militant kills lag	0.0147*	0.0153*	0.0154*	0.0159*	–0.0159*	0.0047
	(0.0046)	(0.0047)	(0.0049)	(0.0051)	(0.0065)	(0.0031)
Leader kills	–0.0049	–0.0014	0.0086	–0.0047	–0.1701	–0.0566
	(0.1213)	(0.1242)	(0.1322)	(0.1344)	(0.1328)	(0.0753)
Leader kills lag	0.1197	–0.1145	–0.1087	–0.1114	0.1107	–0.0219
	(0.1199)	(0.1226)	(0.1289)	(0.1308)	(0.1300)	(0.0748)
Civilian kills	0.0017	0.0022	0.0034	0.0039	–0.0040	–0.0013
	(0.0079)	(0.0081)	(0.0085)	(0.0087)	(0.0088)	(0.0051)
Civilian kills lag	0.0143	0.0146	0.0149	0.0150	–0.0047	0.0044
	(0.0089)	(0.0090)	(0.0095)	(0.0097)	(0.0090)	(0.0048)
Offensive	0.1851	–0.1793	–0.1756	–0.1464	–0.0884	–0.1081
	(0.1612)	(0.1651)	(0.1757)	(0.1779)	(0.1661)	(0.0999)
Malakand Accord	0.0743	0.0595	0.0781	0.0854	–0.2423	0.2124
	(0.2861)	(0.2933)	(0.3085)	(0.3147)	(0.3401)	(0.1839)
Election period	–0.1491	–0.1439	–0.1197	–0.1628	–0.1904	–0.0242
	(0.3533)	(0.3594)	(0.3817)	(0.3883)	(0.3421)	(0.2122)
Bin Laden	0.3329	0.3519	0.3839	0.3962	–0.9041	0.2093*
	(0.1982)	(0.2026)	(0.2148)	(0.2182)	(0.2723)	(0.1221)
Lagged dependent variables	0.5755*	0.5738*	0.5688*	0.5759*	0.2436*	0.2308
	(0.0768)	(0.0785)	(0.0824)	(0.0836)	(0.0879)	(0.0590)
Intercept	0.5751*	0.5396*	0.5059*	0.4591*	0.7151*	1.268*
	(0.1499)	(0.1506)	(0.1542)	(0.1542)	(0.1265)	(0.1174)
Observations	303	303	303	303	304	304
Overdispersion coefficient	0.6423	0.6684	0.7506	0.7644	0.6149	0.2144
Log likelihood	–827.809	–815.059	–801.0613	–787.5411	–591.5329	–802.246
AIC	1,681.618	1,656.118	1,628.123	1,601.082	1,209.066	1,630.492
BIC	1,729.982	1,704.482	1,676.487	1,649.446	1,372.905	1,678.856

* $\rho < .05$.

known al-Qaeda compounds or unloading explosives'.[6] Our finding that *Leader kills* are not associated with more *Urban terrorism* suggests that the introduction of signature strikes may have been counter-productive, triggering an increase in terrorist attacks. While our results do not suggest that targeting militant leaders exclusively during this period would have led to a reduction in violence, they are consistent with the idea that expanding the targeting to rank-and-file militants contributed to an increase in terrorist attacks in urban areas of Pakistan.

Model 5 reports the results of models using *Antigovernment attacks* as the dependent variable. *Civilian kills* and *Leader kills* do not have statistically significant relationships with attacks on military and government targets. However, the one-week lag of *Militant kills* has a negative and significant relationship with such attacks. This is consistent with Hypothesis 2 that militants substitute different tactics in response to drone strikes. Drone strikes appear to have reduced the capacity or willingness of militant groups to undertake attacks on government and military targets in the short run.

In model 6, *Rural terrorism* is the dependent variable. Neither *Civilian kills* nor *Leader kills* has a statistically significant relationship to *Rural terrorism. Militant kills* in the current week is positively associated with *Rural terrorism*, which would seem to contradict our expectations.

However, the substantive effects of *Militant kills* on *Rural terrorism* are very small. Figure 4 plots the changes

[6] Miller (2012). The shift to signature strikes also led to an increase in the USA's ability to understand the logistics and civilian support bases of militant organizations; see Mir (2018).

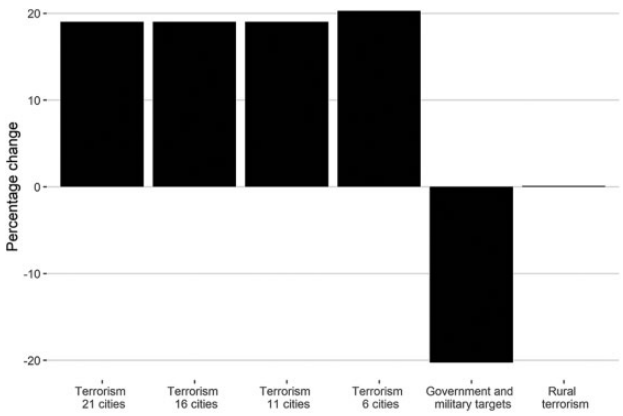

Figure 4. Percentage change in attacks for a one standard deviation increase in militant kills in previous week. Rural terrorism based on one standard deviation increase in militant kills in current week.

in the expected number of each type of militant attack for a one standard deviation increase in the number of militants killed in drone strikes in the previous week. Such a change in this variable is expected to produce about a 20% increase in all of our measures of *Urban terrorism.* It is also associated with a decrease in attacks on military targets of the same magnitude.

There are at least three limitations to this analysis that are worth bearing in mind. First, the BFRS dataset is unable to identify the specific perpetrator of many of the military and terrorist attacks analyzed here. This is because attackers frequently do not identify themselves; militants do not wear uniforms, and they often decline to take credit for the attacks that they carry out. It is possible that some of these attacks may have been carried out by groups whose members and leaders are not recent targets of drone strikes. Second, the BIJ data used to identify the victims of drone strikes do not measure civilian, militant, and leader deaths perfectly. It is sometimes difficult for journalists and other independent observers to visit the locations of drone strikes immediately after they occur, although the Bureau made extensive efforts to interview local people sometime after such strikes. It is also difficult for investigators to determine if a victim was a bona fide militant or civilian with complete certainty. One reason is that local residents, perhaps pressed by local armed groups, will identify victims as civilians rather than disclose the victim's affiliation with a militant group. The fact that the large majority of victims identified by the BIJ are classified as militants, however, suggests that any inflation of civilian death counts is in fact modest.

Finally, it is important to repeat the fact that this analysis examines the short-term effects of drone strikes on militant violence. It is entirely possible that drones have different effects than those identified here over the longer term. For example, civilian deaths from drone strikes may lead to greater support in Pakistan for militants, but the effects of support on militant behavior may take a considerable period of time to manifest themselves. Since drone strikes have only occurred in sizable numbers for a few years, it is too early to assess such consequences over the longer term, which would require a research design and data that differ from that employed here.

Conclusions and implications

We make two contributions to the debate about the consequences of drone strikes against militant organizations. First, we simultaneously assess the relationship between strikes that kill civilians, rank-and-file militants, and militant leaders. Only the deaths of rank-and-file militants are associated with subsequent increases in urban terrorism in Pakistan. Existing research on this topic has theorized that civilian and leader deaths lead to more terrorism. Our findings cast doubt on these explanations, at least for this important case and in the short run. Second, we theorize that killing rank-and-file militants drives the spread of violent attacks against civilian targets in the country. Such terrorist attacks demonstrate that a militant movement is resilient enough to absorb strikes from drones and to continue to carry out violent acts. This could help to persuade current and potential supporters to offer assistance to the group and lead the United States to conclude that the campaign of drone strikes, by undermining the Pakistani state's ability to protect its citizens and politicizing the debate over cooperation with the United States, was less effective than hoped. Militant organizations targeted by drone strikes came to favor terrorist attacks on civilian and political targets in Pakistan to protect their militants from harm and to signal their continued willingness to fight. We also find evidence that this choice to launch more urban terrorist attacks led to a decline in attacks on military and government targets, suggesting that militants responded to drone strikes by substituting their efforts away from military targets and toward urban terrorism.

Some of our results provide some good news for advocates of the strategy of drone strikes. The evidence we present here is consistent with the argument that drone strikes do not generate enough civilian deaths to motivate militants to engage in more terrorism or attacks on government and military targets. The finding that

targeting militant leaders is not associated with increased militant violence suggests as well that focusing on leadership decapitation is not producing significant blowback effects, at least not over the short term. It is possible that targeting leaders weakens militant groups in the longer run, a possibility debated in the literature on leadership decapitation (Johnston, 2012; Jordan, 2009, 2014; Price, 2012), although we are not able to assess this possibility with the data used here. Finally, we find evidence that militants substitute away from attacks on military targets to urban terrorism in the face of drone strikes. This might be a worthwhile outcome for the United States if attacking militants in this manner reduces the ability of militants to undertake irregular attacks in Afghanistan or terrorism overseas. From the perspective of Pakistani civilians, however, substitution puts them more directly in the crosshairs of militant violence.

In other respects, however, our findings create considerable doubt about the effectiveness of the US strategy underlying its drone campaign in Pakistan. Drone strikes appear to contribute to more terrorist attacks on civilians and to generate negative and unforeseen externalities for the US relationship with Pakistan. Although drone strikes themselves may result in fewer civilian deaths compared to other forms of violence that the United States or Pakistan might employ, they lead indirectly to harm against a larger number of civilians, by creating incentives for militants to shift to terrorist attacks in urban centers of Pakistan. This relationship has received little attention in the United States, but attracted a great deal of comment in Pakistan, where the drone campaign was blamed for increasing instability and has fueled militant violence against civilians. This in turn likely made it more difficult to persuade Pakistani authorities to end their support for some militant groups and to pursue more effective counterinsurgency tactics against others.

Beyond the present Pakistan theatre, US policymakers should consider the nature of an insurgency when deciding whether to employ drone strikes. Drone technology is rapidly diffusing within the United States military and across other military and paramilitary organizations. UAVs are a key priority for research and development by all branches of the US military. Drones have also been used in other areas where terrorists operate against US interests, including Yemen and East Africa. The results presented here suggest the need for caution regarding the rapid expansion of the use of armed drones, or at least consideration of their as yet unanticipated liabilities. There are good reasons to believe that drones should work most effectively in Pakistan if they prove effective against militant organizations anywhere. Militant groups in Pakistan are concentrated in a small geographic area. The USA devoted enormous intelligence resources to understanding this area after 2001. It also receives important logistical and, on occasion, intelligence support from its local partner. These characteristics may not hold in other conflict zones, where the United States is unlikely to have as much intelligence and may lack a cooperative local government. If this is the case, then the rapid introduction of drones into other conflicts may again produce similar dynamics to those we report for Pakistan. Militants everywhere will suffer attrition from drone strikes against their leadership and personnel. The vulnerability of militants to drone strikes may also drive them to reposition personnel and operations to urban centers and other 'soft' targets. In the end, drone strikes may prove destabilizing, disrupting civilian and governmental affairs in these regions.

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Replication data

The dataset and script for the empirical analysis in this article are available at https://www.prio.org/jpr/datasets/. All analyses were conducted using R.

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