Religion and terrorism: Evidence from Ramadan fasting

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Abstract
Do intense religious experiences increase or decrease terrorism? We argue that fasting during the month of Ramadan offers an ideal setting for studying this question empirically. Reasons are twofold: first, daily fasting from dawn to sunset during Ramadan is considered mandatory for most Muslims. Second, the Islamic Hijri calendar is not synchronized with the solar cycle. Therefore, the daily fasting duration during Ramadan is exogenous once we control for latitude and the seasonality of Ramadan, which we can do by using district and country-year fixed effects. Focusing on predominantly Muslim countries, we document three main findings: first, longer and more intense Ramadan fasting has a robust negative effect on the likelihood of local terrorist events and terror deaths over the next year. Second, this negative effect is particularly pronounced for operationally more difficult attack types, which are more dependent on public support for terrorism. Third, using survey data, we show that longer and more intense Ramadan fasting lowers the share of respondents who consider religiously motivated violence to be justified. These findings imply that intense religious experiences may not be a breeding ground for terrorism. Quite the opposite, they can decrease public support for terrorism and, consequently, terrorist attacks.

Keywords
Ramadan fasting, religion, suicide attack, terrorism

Introduction
Terrorist groups have long been using religion as a justification for their actions and as a vehicle to gain public support. Terrorism has been further on the rise since the September 11 terrorist attacks and the subsequent US-led military interventions in Afghanistan and Iraq. This increase has mainly been driven by terrorist groups with Islamist ideologies, with most victims being civilians in predominantly Muslim countries (as discussed in the data section). This surge in terrorist attacks has made the question about the relation between religion and terrorism ever more salient.

In this article, we study the effect of intense religious experiences on terrorism by focusing on the daily fasting during the month of Ramadan in predominantly Muslim countries. For this purpose, Ramadan and Ramadan fasting have three intriguing characteristics. First, Ramadan is one of the five pillars of Islam and seen as mandatory for adult Muslims until they lose their good health or sanity in older age.1 Table I presents survey...
Table I. Ramadan fasting in Muslim countries

| Country      | Fasting most/all days | Observations |
|--------------|-----------------------|--------------|
| Kuwait       | 99%                   | 471          |
| Jordan       | 95%                   | 2,890        |
| Egypt        | 94%                   | 4,653        |
| Palestine    | 93%                   | 3,540        |
| Tunisia      | 93%                   | 981          |
| Indonesia    | 90%                   | 2,769        |
| Senegal      | 85%                   | 742          |
| Turkey       | 81%                   | 5,524        |
| Pakistan     | 78%                   | 9,244        |
| Mali         | 71%                   | 622          |
| Weighted average | 86%             | 31,436       |

Information from Muslim respondents in surveys by the Pew Research Center in the years 2007–13. Column 1 shows the share of respondents answering ‘During most or all days of Ramadan’ or ‘During all of Ramadan and other religious holidays’ as opposed to lower frequencies when asked ‘How often, if at all, do you fast?’ Column 2 provides the number of responses on which this share is based.

data by the Pew Research Center from ten predominantly Muslim countries. It shows that Ramadan fasting is indeed practiced by the large majority of Muslims living in these countries.

Second, most Muslims do not only fast during Ramadan. They also engage in increased prayers and charity, abstain from sinful behavior, meet for pre-fast meals before dawn (called *suhur*) and fast-breaking meals after sunset (called *iftar*), and recite the Quran, which Sunni Muslims often do in extra prayers at night (called *tarawîh*). Hence, for many Muslims Ramadan is an intense religious experience that allows for re-evaluating their lives in light of Islamic guidance as well as for socializing with family, friends, and others. Third, Ramadan fasting lasts from dawn to sunset every day during Ramadan, and the Islamic Hijri calendar follows the lunar rather than the solar cycle. As a result, the daily fasting duration and, thereby, the intensity of the religious experience vary across locations at different latitudes in any given year, and over time at any given latitude.

While longer daily fasting during the months of Ramadan hours might affect terrorism through a number of plausible channels, our theoretical argument focuses on public support for terrorism as a mechanism linking intense religious experiences to the actual occurrence of terrorism. The literature documents the importance of public support for the success of terrorist organizations (e.g., Atran, 2003; Siqueira & Sandler, 2006; Bueno de Mesquita & Dickson, 2007; Tessler & Robbins, 2007; Krueger & Malečková, 2009; Malečková & Stanislíč, 2011, 2013; Jaeger et al., 2015; Toft & Zhukov, 2015; Polo & Gleditsch, 2016). Public support can include monetary assistance, in-kind assistance (e.g., weapons, vehicles or food), shelter, or legitimization. A priori, intense religious experiences could both nurture or counter radical ideas and support for political violence. In the next section, we argue that intense religious experiences are likely to induce more Muslims in predominantly Muslim countries to view the use of force as unacceptable. Based on this argument, we develop three related hypotheses suggesting negative effects of longer Ramadan daylight hours on public support for terrorism and the likelihood of terrorist attacks.

Our empirical analysis tests these hypotheses. We use an identification strategy that builds on Campante & Yanagizawa-Drott (2015). They exploit that Ramadan daylight hours, as a measure of the daily fasting duration in Ramadan, oscillate around approximately 12 hours in any given location over the years. The fact that the amplitudes of these oscillations are smaller at locations closer to the equator allows them to use country and year fixed effects when estimating the effects of the daily fasting duration in Ramadan and the accompanying religious experience. We take their identification strategy to the subnational level by exploiting variation in Ramadan daylight hours across districts within country-years, that is, we use district and country-year fixed effects. One reason for exploiting variation within country-years is the existing literature on the determinants of terrorism. Gassebner & Luechinger (2011) review the literature and find 65 potential determinants of terrorism that have been proposed in earlier studies. Moreover, the effects of many of these potential determinants vary across countries and time periods (e.g., Meierrieks & Gries, 2013; Enders, Hoover & Sandler, 2016). The use of country-year fixed effects implies that we implicitly control for all these potential determinants and their heterogeneous effects across countries and over time.

We use data from the Global Terrorism Database (GTD) by the National Consortium for the Study of Terrorism and Responses to Terrorism (START, 2021). We build a panel dataset of administrative regions at the second subnational level (typically districts) from
190 countries and territories, and with annual frequency from the period 1970–2019. First, we focus on the aggregate effect of longer Ramadan daylight hours on terrorism. For countries with a Muslim population share above 75%, we find that the probability of the occurrence of a terrorist event (or a deadly terrorist event) in a given district and year decreases by around 3 percentage points when the daily fasting duration in Ramadan increases by an hour. We find no robust effect of longer Ramadan fasting on countries with a Muslim population share below 75%.

Second, we look at differential effects across types and targets of terrorist attacks in predominantly Muslim countries. We find that the negative effects of longer Ramadan daylight hours on assaults and bombings are considerably stronger than those on suicide attacks, and that the negative effect on terrorist attacks against armed targets is larger than the effect on terrorist attacks against unarmed civilians. This focus on operationally easier attacks is exactly what we expect to see if longer Ramadan daylight hours indeed reduce public support for terrorism.

Finally, we use survey data from 13 predominantly Muslim countries collected by the Pew Research Center to test whether more intense Ramadan fasting indeed reduces public support for terrorism. We confirm that longer Ramadan daylight hours lead to a decrease in the share of Muslim respondents who feel that violence is often or sometimes justified in order to defend Islam from its enemies.

Taken together, these three sets of empirical results provide strong support for our theoretical argument that intense religious experiences decrease public support for terrorism and, consequently, terrorist attacks in predominantly Muslim countries.

The remainder of the article is structured as follows. The next section presents our theoretical argument and develops our hypotheses. Then, we describe the data and discuss our empirical strategy. This is followed by the presentation of our empirical results and the discussion of some alternative channels. The final section concludes.

**Ramadan, identity, and terrorism**

The starting point for our theoretical discussion of the nexus between Ramadan, the support for political violence, and terrorism is the identity model of behavior by Akerlof & Kranton (2000). This framework has become a prominent model in the social sciences to better understand how religion can help to organize groups and enhance support for a common cause (e.g. Carvalho, 2019), foster political mobilization (e.g. McCauley, 2014), amplify conflict between different cultures (e.g. Hauk & Mueller, 2015), legitimize socially unacceptable behavior (e.g. Huettel & Kranton, 2012), and ultimately lead to radicalization and increased support for terrorism (e.g. Mahmood, 2021).

The basic premises are that identity is an important component of an individual’s utility and that each identity has a set of ideal behaviors or prescriptions assigned to it. Actions that follow these prescriptions are rewarded by society while deviations from these prescriptions may be punished. In our context, we assume that the prevalent interpretation of religious decrees determines the prescriptions for those with an (ideal) Muslim identity.

Islam is a religion that assigns particular importance to communal rituals (McCleary, 2007). Ramadan fasting is one of these important rituals and an intense religious experience for Muslim communities. Ramadan has a wide range of effects on a devout Muslim’s day-to-day routine. Apart from the physiological consequences associated with fasting, Ramadan is also a time of more intense individual spiritual activities, such as studying the Quran and additional prayers. The daily fasting breaks are large social gatherings conducted with family and friends. We argue that it is these increased religious and social activities associated with Ramadan that drive the overall effect of Ramadan on terrorism. In particular, the intense communal, religious, and spiritual experience can lead to a change in the prescriptions for ideal Muslims and, consequently, a change in their support for political violence and terrorist attacks.

A priori, Ramadan practices could nurture or counter radical ideas and support for political violence. Increased religious activities might foster an individual’s identity as a Muslim (or a member of a particular Muslim group or sect) and entrench in-group vs. out-group sentiments. It is therefore possible that an identity based on a narrow definition of Islam makes individuals more susceptible to radical and violent ideas. There is indeed qualitative evidence suggesting that terrorism against the West has its roots in Islam (e.g. Juergensmeyer, 2017; Stern, 2003). Consistent with this notion, Ginges, Hansen & Norenzayan (2009) document a positive correlation between attendance of religious services and out-group hostilities among Muslims living in predominantly Muslim countries.

In contrast, the intense religious experience of long Ramadan daylight hours could decrease the public support for terrorism in predominantly Muslim countries. A possible reason could be that most Muslims are exposed to interpretations of the Quran that condemn
the use of force against innocent victims rather than interpretations preferred by Islamist groups, which focus on ‘verses that have a backdrop of violence’ (Comerford & Bryson, 2017: 19). For the prescription for individuals with an (ideal) Muslim identity, it is important whether jihad has a violent or a nonviolent meaning. The distinction between lesser and greater jihad is important in this respect (Cook, 2015). Lesser jihad refers to external violent struggle and warfare, while greater jihad refers to the internal or personal struggle to live a moral life and pursue righteousness (Richardson, 2006). Fair, Malhotra & Shapiro (2012) underscore the importance of this difference. In their large public opinion survey in Pakistan, they find that respondents who define jihad as an external struggle are supportive of terrorist groups, while those who consider jihad more as an internal struggle are not.4

Assuming that most Muslims are exposed to interpretations of the Quran that condemn the use of force and see jihad mainly as an internal struggle, we expect that public support for terrorism decreases with intense religious experiences like long daily fasting during the month of Ramadan. There is indeed considerable evidence that support for terrorism decreases with more religious practice. Using survey data from predominately Muslim countries, Egger & Magni-Berton (2021) show that the likelihood of justifying political violence decreases with the importance respondents assign to religion in their life. Clingingsmith, Khwaja & Kremer (2009) show that participation in the Hajj pilgrimage, which is another intense religious experience, increases the belief in peace and harmony among adherents of different religions. Relatedly, Reese, Ruby & Pape (2017) argue that public support for terrorism decreases on Islamic holidays and document a lower frequency of terrorist attacks on Islamic holidays than other days. In some sense our article is close to Reese, Ruby & Pape (2017). There is however one important difference: they focus on the short-run effects of Islamic holidays, while we investigate the medium-run effects of a heightened level of religious devotion and extended periods of spiritual sanctity on terrorism in the year following Ramadan.

Based on these arguments, we expect that the decrease in public support for terrorism induced by longer fasting hours could reduce the operational capability of perpetrator groups in predominantly Muslim countries. This could make terrorist attacks more difficult and costly, which leads us to our main hypothesis:

**H1:** Longer Ramadan daylight hours decrease terrorism in predominantly Muslim countries.

However, a decrease in public support for terrorism affects the feasibility of different attack types and tactics differentially. Suicide attacks require less public support than tactics that require escape routes or shelter. Indeed, Berman & Laitin (2008: 1948) emphasize that suicide attacks remain effective in conditions in which other tactics would fail and are therefore chosen more often ‘when conditions disfavor’. Similarly, terrorist attacks against unarmed civilians are operationally easier and, thus, less contingent on public support than attacks against armed targets. Assuming that the leaders of perpetrator groups are rational agents who weigh the costs and benefits of their options,5 our theoretical argument therefore yields a second hypothesis:

**H2:** Longer Ramadan daylight hours have differential effects on terrorism in predominantly Muslim countries, with the decrease being more pronounced (i) for operationally difficult terrorist attacks than for suicide attacks, and (ii) for terrorist attacks against armed targets than for attacks against unarmed civilians.

The theoretical discussion leading to the first two hypotheses builds on the assumption that more intense Ramadan fasting affects terrorism indirectly by shaping public support for terrorism. In turn, the effect of religiosity and religious experiences on public support for terrorism may be mediated through various channels. For example, Zaidise, Canetti-Nisim & Pedahzur (2007) and Canetti et al. (2010) document that more religious respondents show less support for political violence and that this effect depends on the level of

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3 The most prominent Quran verse condemning the use of force against innocent victims is verse 5:32. In its edict against terrorism in July 2005, the Fiqh Council of North America translated this verse as follows: ‘Whoever kills a person [unjustly] it is as though he has killed all mankind. And whoever saves a life, it is as though he had saved all mankind.’

4 A similar argument is made around the interpretation of shari‘ah, where scriptural literalism supports physical punishments while another interpretation is the call for good governance and access to fair courts. Recent studies using survey data from Bangladesh and Pakistan find that respondents with a more literal interpretation of shari‘ah are more likely to support Islamist political violence (Fair, Hamza & Heller, 2017; Fair, Littman & Nugent, 2018).

5 This assumption is common in theoretical studies on the organizational structure and functioning of religious groups and terrorist organizations (e.g. Iannaccone, 1992; Berman & Laitin, 2008; Berman, 2011).
economic and psychological deprivation, that is, actual and perceived discrimination. Further, Weinstein (2006) argues that resource-poor rebel groups are more dependent on committed members and support from the local population than resource-rich groups. More recently, Sarbahi (2014, 2021) shows that the embeddedness of rebel groups in the population and their structural connectivity are important mediating factors that systematically impact rebel recruitment and subsequent violence. While acknowledging that the effects of more intense Ramadan fasting on public support for terrorism may depend on the people’s deprivation as well as the group’s resources, embeddedness, and structural connectivity, we focus on the following, more direct hypothesis:

\[ H3: \text{Longer Ramadan daylight hours lower public support for terrorism in predominantly Muslim countries.} \]

**Data**

**Data on terrorist events**

We use the Global Terrorism Database (GTD) by the National Consortium for the Study of Terrorism and Responses to Terrorism (START, 2021), which is among the most comprehensive terrorist event datasets. The GTD defines a terrorist event as ‘the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation’ (START, 2018: 10).

For an event to be included in the GTD it must fulfill three criteria: first, the incident must be intentional. Second, it must involve violence against humans or property, or threats thereof. Third, its perpetrators must be non-state actors. In addition, the event must meet at least two of the following three criteria: first, the perpetrators have a political, economic, religious, or social goal. Second, they intend to coerce, intimidate, or send some other message to a large audience (beyond the victims). Third, the event does not occur in the context of legitimate warfare activities (START, 2018: 10).

The GTD contains detailed information about the time and location of terrorist events and the number of deaths, which includes perpetrators and victims. The START assembles the GTD from three main data sources. First, the Pinkerton Global Intelligence Services identified terrorist events between 1970 and 1997 from wire services, government reports, and major international newspapers. Second, the Center for Terrorism and Intelligence Studies, using archival sources, documented attacks until 2008. Third, the Institute for the Study of Violent Groups included data on terrorist events that occurred between 2008 and 2011. The START continuously integrated and updated the data sources. They improved machine learning and data mining techniques to pre-screen news articles that potentially include information about terrorist events. Currently, the GTD contains more than 200,000 terrorist events. Given that the GTD combines different data sources and that the data quality may vary over time and across countries, the use of country-year fixed effects will be important.

The GTD only includes terrorist events for which the perpetrators were ‘out of the door’ and tried to execute the attacks, but differentiates between events that were successfully executed and those for which execution failed, for example because the perpetrators were intercepted by the authorities. We keep both successful and failed attacks for now.\(^6\)

A major advantage of the GTD is the daily temporal scale and the availability of the location of the terrorist events. This information enables us to exploit variation in those events within districts and arbitrary time units.

We omit terrorist events that occurred outside our sample period, that is, before 1 November 1970 or after 5 May 2019 (see the next subsection for an explanation). In addition, we omit 13,557 terrorist events that we cannot match to any of the districts in our final panel dataset (see the next subsection for details). The START only adds terrorist events from credible sources to the GTD. We drop 28,565 ambiguous events that the START classifies with high probability, but not certainty, as an act of terrorism. Overall our dataset contains 151,583 terrorist events that caused 308,755 terror deaths.

For most terrorist events, the GTD provides information about the targets and the non-mutually exclusive attack types, which reflect the broad tactics used by the perpetrators. The most common targets are unarmed civilians and armed targets (such as military, police or armed rivals). The most common attack types and the causes of most terror deaths are assaults and bombings. The GTD also indicates suicide attacks. Most suicide attacks are assaults or bombings, but they are disproportionately deadly and have become disproportionately common in predominantly Muslim countries.

\(^6\) Heghammer & Ketchley (2021) argue that the ideal dataset for studying determinants of terrorism would include plots that detailed even before the execution stage. There exists no such dataset with the spatial and temporal coverage necessary for our analysis.
The GTD also provides the names of the perpetrator groups for the majority of terrorist events. We classify these perpetrator groups into Muslim and non-Muslim groups. Muslim perpetrator groups have some connection to Islam, for example because the groups refer to Islamist ideologies or because many of their members and supporters are Muslim. For the years up to 2008, we follow the classification of Kis-Katos, Liebert & Schulze (2014). We update their classification for more recent years. In total, we identify 731 Muslim and 2,180 non-Muslim perpetrator groups. These groups are jointly responsible for 51% of terrorist events and 69% of terror deaths in our data. We are unable to classify the perpetrators of the remaining terrorist events because these perpetrators are unknown, multiple groups confessed to the attack, or the press reports were ambiguous.

Online appendix B provides detailed information about the terrorist events during our sample period. Table B.1 list the countries and territories with the highest numbers of terrorist events and terror deaths, and Table B.II provides summary statistics stratified across country groups differing in their Muslim population shares.9 As a result, the Islamic year has 354 or 355 days. Accordingly, the Islamic year is 10–12 days shorter than the Gregorian year, which is based on the solar cycle. Consequently, the lunar cycle laps the solar cycle approximately every 33 years.

We construct a pseudo time scale which we label ‘Ramadan year’. Ramadan is the ninth month of the Islamic Hijri calendar. The Islamic year has 12 months. The duration of each month is based on the lunar cycle and varies between 29 and 30 days, depending on actual observations of the lunar crescent. As a result, the Islamic year has 354 or 355 days. Accordingly, the Islamic year is 10–12 days shorter than the Gregorian year, which is based on the solar cycle. Consequently, the lunar cycle laps the solar cycle approximately every 33 years.

7 Muslim perpetrator groups include groups with Islamist ideologies (e.g. al-Qaeda or al-Shabaab) and groups with secular ideologies (e.g. the Kurdistan Workers’ Party or the Palestine Liberation Organization), as well as groups to which we cannot assign an Islamist or secular ideology.

Online appendix A provides more information on these country groups. Table A.1 lists all countries in these three groups, and Figure A.1 shows the corresponding map. Figure A.2 presents a histogram showing that 70% of the countries have a Muslim population share below 5% or above 95%. The exact thresholds used in the stratification of the countries into three groups are therefore not particularly important.

Some Muslims use a tabular calendar, which assigns 30 days to odd months and 29 days to even months. In Iran and Afghanistan, the solar calendar is common, but Ramadan is practiced following the lunar Hijri calendar.
(corresponding to the Gregorian date 20 October 1971). The reason for basing our analysis on Ramadan years is that we are interested in how the daily fasting duration during Ramadan affects terrorism over the next year. The underlying idea is that longer and more intense Ramadan fasting may shape beliefs and behavior in the entire year until the next Ramadan. We restrict our sample to Ramadan years 1390 to 1439 (corresponding to the Gregorian dates 1 November 1970 and 5 May 2019). Hence, the time-series dimension is 50 Ramadan years. Our sample therefore contains 1,994,150 observations.

We transform the terrorism data from the GTD by aggregating the terrorist events and terror deaths by districts and Ramadan year, using the date and location information in the GTD and the administrative (ADM2) boundaries provided by GADM. In the resulting panel, the occurrence of terrorist events is highly right-skewed. There are terrorist events in only 4.75% of our observations in the sample of predominantly Muslim countries, and deadly terrorist events in 3.55% of the observations in this sample. These shares are even lower in the other two country groups. Most observations with terror events have only few such events and relatively few terror deaths, but there were 980 terrorist events in Baghdad in Ramadan year 1436 and 3,348 terror deaths in Baghdad in Ramadan year 1427.\(^{10}\) We transform our terrorism data to avoid the results being driven by extreme outliers. In the main analysis, we focus on the extensive margin of terrorist events defined as \(1\{N > 0\} \cdot 100\), where \(N\) stands for the number of terrorist events or terror deaths by district and Ramadan year.\(^{11}\) The extensive margin of terrorist events indicates whether any terrorist event occurred in the given district and Ramadan year, and the extensive margin of terror deaths indicates whether any fatal terrorist event occurred.\(^{12}\)

In order to collect information on daylight hours during Ramadan, we first determine the centroid of each district.\(^{13}\) We then use the centroid’s geo-coordinates to collect the district’s daylight hours during Ramadan from the Astronomical Application Department. Finally, we average the daylight hours in a district over all days of Ramadan in a given Ramadan year. Hence, the Ramadan daylight hours always refer to the latest Ramadan, that is, the first month of a Ramadan year. Table II presents summary statistics of the Ramadan daylight hours and the occurrence of terrorist events and terror deaths, both for the full sample and the sample of predominantly Muslim countries.

### Empirical strategy

Our empirical strategy builds on Campante & Yanagizawa-Drott (2015) and exploits key characteristics of Ramadan fasting and the Islamic Hijri calendar. Daily fasting from dawn to sunset during Ramadan is seen as mandatory and is practiced by many Muslims (see Table I). Daylight hours, however, vary by latitude and seasons, and the season in which Ramadan takes place varies over time because the Islamic Hijri calendar is not synchronized with the solar cycle. As a result, the daily Ramadan fasting duration typically varies across districts within a given country and year, and the difference in Ramadan fasting duration between districts varies over time. Figure 1 shows the Ramadan daylight hours in the northernmost (solid lines) and southernmost (dashed lines) regions of Iraq, Pakistan, Somalia, and Indonesia throughout our sample period.

The Ramadan daylight hours oscillate around approximately 12 hours. The amplitude depends on the distance to the equator. The Ramadan daylight hours have larger amplitudes in districts farther away from the equator. Zakho is the northernmost district of Iraq and Al Faw the southernmost. The Ramadan daylight hours are longer in Zakho than in Al Faw when Ramadan is in the summer season. Conversely, Ramadan fasting is shorter in Zakho than in Al Faw when Ramadan is in the winter season. Ramadan daylight hours are similar for Iraq and Pakistan, in particular in their northernmost districts, which have similar latitudes. Ramadan daylight hours have smaller amplitudes in Somalia, which is much closer to the equator. They are almost time constant in the southernmost district of Somalia, Kismaayo, which is located almost on the equator. Ramadan daylight hours in the Indonesian districts Banda Aceh and Rote Ndao oscillate in opposite directions. The reason is that Banda Aceh is in the northern hemisphere and Rote Ndao in the southern.

Comparing all 35 predominately Muslim countries, we find that the maximum within-country difference in Ramadan daylight hours ranges from 1.2 hours in

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\(^{10}\) By comparison, the terrorist attacks on the World Trade Center in New York on 11 September 2001 enter the data with 2,766 deaths.

\(^{11}\) We multiply our dependent variables by 100 to ease the interpretation of the coefficient estimates.

\(^{12}\) We also present results for the intensive margin based on the log-modulus transformation (see Table C.I in Online appendix C).

\(^{13}\) More specifically, we calculate the ‘representative’ centroid (point) for each ADM2 polygon, which ensures that the point falls inside the polygon.
Indonesia to 6.3 hours in Uzbekistan, which is the northernmost of these countries. The maximum variation within country and Ramadan year varies from a few minutes in some small countries to 78 minutes in Algeria, with the median being 30 minutes in Tunisia (see Table B.III in Online appendix B).

Ramadan daylight hours are exogenous after controlling for latitude and the seasonality of Ramadan. We can account for these two factors with district and Ramadan year fixed effects. The district fixed effects capture factors that are time constant within districts, such as geography, culture, and historical heritage. The Ramadan year fixed effects capture the Gregorian month during which Ramadan takes place in a given Ramadan year, as well as yearly varying factors that affect all countries equally. Possible candidates for such factors might be the global business cycle and tectonic shifts in geopolitics, such as the end of the Cold War, the September 11 attacks or the US-led invasions in Afghanistan and Iraq. However, even such global factors are likely to affect different countries differently.

In addition, the literature has proposed a large number of potential determinants of terrorism that vary across countries and over time. For example, Gassebner & Luechinger (2011) perform an extreme bound analysis in which they consider 65 correlates of terrorism at the country-year level that had been proposed by previous studies. Moreover, Meierrieks & Gries (2013) and Enders, Hoover & Sandler (2016) show that some of these determinants have heterogeneous effects across countries and time periods. For these reasons, we use interacted country-Ramadan year fixed effects instead of Ramadan year fixed effects. These interacted fixed effects allow us, among others, to implicitly control for the many previously proposed determinants of terrorism and to account for their potentially heterogeneous

### Table II. Descriptive statistics of the district-Ramadan-year panel data

| Sample: | All countries | Muslim countries |
|---------|---------------|------------------|
|         | (1) Mean | Std dev. | (3) Mean | Std dev. | (2) Mean | Std dev. | (4) Mean | Std dev. |
| Ramadan daylight hours | 12.31 | 1.79 | 12.36 | 1.40 |
| **Terrorist events** | | | | |
| All events | 1.77 | 13.19 | 4.75 | 21.27 |
| By attack types: | | | | |
| Suicide attacks | 0.10 | 3.10 | 0.74 | 8.57 |
| Other attacks | 1.75 | 13.12 | 4.65 | 21.05 |
| By targets: | | | | |
| Armed targets | 0.59 | 7.66 | 2.28 | 14.91 |
| Unarmed civilians | 1.38 | 11.68 | 3.72 | 18.93 |
| By perpetrator groups: | | | | |
| Muslim | 0.47 | 6.87 | 3.15 | 17.46 |
| Non-Muslim | 0.73 | 8.50 | 0.30 | 5.51 |
| **Terror deaths** | | | | |
| All deaths | 1.03 | 10.09 | 3.55 | 18.51 |
| By attack types: | | | | |
| Suicide attacks | 0.09 | 3.02 | 0.70 | 8.36 |
| Other attacks | 1.01 | 9.98 | 3.41 | 18.15 |
| By targets: | | | | |
| Armed targets | 0.41 | 6.37 | 1.84 | 13.45 |
| Civilians | 0.77 | 8.76 | 2.65 | 16.07 |
| By perpetrator groups: | | | | |
| Muslim | 0.35 | 5.88 | 2.45 | 15.45 |
| Non-Muslim | 0.36 | 6.03 | 0.17 | 4.11 |
| Observations | 1,994,150 | 201,800 |

See the data section for a detailed description. All variables for terrorist events and terror deaths indicate extensive margins.
The findings by Campante & Yanagizawa-Drott (2015) further imply that Ramadan fasting may affect terrorism differently in regions with longer Ramadan daylight hours because of larger economic losses in these regions. In an important robustness test, we thus control for economic activity as proxied by nighttime lights (see Table C.V in Online appendix C). We find no evidence that Ramadan fasting affects terrorism differently across regions with different Ramadan daylight hours because of differences in the economic effects of Ramadan fasting.

Figure 1. Average daylight hours during Ramadan

where $Terror_{ict}$ is a terror outcome in district $i$ of country $c$ in Ramadan year $t$, for example the occurrence of at least one terrorist event or one terror death. $\alpha_c$ and $\beta_{ct}$ represent the region and country-Ramadan year fixed effects mentioned above. $RDH_{ict}$ measures the average Ramadan daylight hours in region $i$ of country $c$ in Ramadan year $t$. The coefficient of interest is $\gamma$. It measures the average effect of Ramadan daylight hours on terror outcomes. It is worth highlighting that we exploit only variation within countries and Ramadan years to identify this parameter. That is, in Figure 1 we exploit only the vertical variation in the Ramadan fasting duration within country-years, but not the horizontal variation across Ramadan years or any cross-country variation. This choice makes it a conservative specification. The error term $\epsilon_{ict}$ absorbs unexplained variation of the terror outcome. We cluster the standard errors of the estimated coefficients at the country-level.
Table III. Effects of longer Ramadan fasting on terrorist events and terror deaths

| Countries by Muslim population share |
|-------------------------------------|
| All (1) | All (2) | All (3) | <25% (4) | 25–75% (5) | >75% (6) |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Ramadan daylight hours | –0.076 (0.092) | –0.113 (0.096) | 0.006 (0.113) | –0.085 (0.085) | 0.626 (0.898) |
| × Muslim pop. share | –2.292 † (1.302) | | | | |
| A: Terrorist event (extensive margin) |
| Ramadan daylight hours | –0.044 (0.058) | –0.058 (0.051) | 0.032 (0.071) | –0.041 (0.042) | 1.178 (1.361) |
| × Muslim pop. share | –1.741 (1.150) | | | | |
| Country fixed effects (FE) | Yes | No | No | No | No |
| Ramadan year FE | Yes | No | No | No | No |
| District FE | No | Yes | Yes | Yes | Yes |
| Country-Ramadan year FE | No | Yes | Yes | Yes | Yes |
| Observations | 1,994,150 | 1,994,150 | 1,994,150 | 1,692,700 | 99,650 |

Panel fixed effects regressions. The sample includes all countries in columns 1–3, but is restricted to the countries with the Muslim population shares indicated in the top row in columns 4–6. Dependent variables are the extensive margins for terrorist events in panel A and terror deaths in panel B. The data section introduces the time unit Ramadan year and all the variables used. Standard errors are clustered at the country-level and reported in parentheses. ** p < 0.01; * p < 0.05; † p < 0.1.

Results

Main results

Table III reports the effects of the daily fasting duration during Ramadan, measured by Ramadan daylight hours, on the extensive margins of terrorist events and terror deaths in panels A and B, respectively.

We start with the full sample of 190 countries. Column 1 looks at average effects and accounts separately for country fixed effects and Ramadan year fixed effects. We find negative relations between Ramadan daylight hours and the extensive margins of terrorist events and terror deaths. These relations, however, are not statistically significant at conventional levels. Column 2 includes district fixed effects as well as interacted country-Ramadan year fixed effects to account for constant region-specific characteristics and country-level changes of all sorts over time. The coefficient estimates remain negative and statistically insignificant. Hence, averaged across the globe, Ramadan daylight hours have no causal effect on the occurrence of terrorism.

Column 3 introduces an interaction term between Ramadan daylight hours and the Muslim population share. The coefficient estimates on this interaction term are negative, suggesting that the effect of Ramadan daylight hours on the occurrence of terrorist events is decreasing in the Muslim population share. However, the coefficient estimates are not statistically significant at the 5% level. Moreover, the model in column 3 would be misspecified if the relation between the Muslim population share and the effect of Ramadan daylight hours were non-linear.

We therefore split the sample into three parts, depending on whether a country’s Muslim population share is below 25%, between 25% and 75%, or above 75%, respectively. We report the results for these three smaller samples in columns 4–6. The point estimates indeed hint at a non-linear relation. The effect of Ramadan daylight hours on the occurrence of terrorist events is negative, but small and not statistically significant in non-Muslim countries; positive, but imprecisely estimated in religiously divided countries; and negative, sizeable, and statistically significant at the 5% level in predominantly Muslim countries. For the latter countries, the point estimates suggest that an additional hour of daily fasting during Ramadan lowers the probability of a terrorist event within 12 months after the beginning of Ramadan by 3.3 percentage points, and the probability of a fatal terrorist event by 2.6 percentage points.
The results in column 6 provide strong confirmation for our main hypothesis (H1). Moreover, they imply that the geography of terrorism depends on the timing of Ramadan within the solar cycle. Suppose Ramadan daylight hours differ by 30 minutes between a northern and a southern district of a predominantly Muslim country when Ramadan is in summer (around late June) or winter (around late December), which is approximately true for Iraq (see Figure 1 and Table B.III in Online appendix B). Further suppose that these two districts have the same time-averaged propensity to terrorism, such that the probability of terrorist events is the same in these two districts if Ramadan is around late March or late September. Then, the probability of a terrorist event would be 1.6 percentage points lower in the northern (southern) than in the southern (northern) district if Ramadan were in summer (winter).15

In Online appendix C, we present and discuss many robustness tests for our main results for predominantly Muslim countries. There, we look at alternative outcome variables (Table C.I), non-linear specifications (Table C.II), the inclusion of lagged outcomes and spatial lags (Table C.III), the role of possible confounders (Tables C.IV–C.VI), alternative cross-sectional units (Table C.VII), different samples of Muslim countries (Tables C.VIII–C.XI), and different sample periods (Tables C.XII and C.XIII). The general pattern emerging from these robustness tests is that longer Ramadan daylight hours have a robust negative effect on terrorist events and terror deaths in predominantly Muslim countries.

Heterogeneous effects

Our second hypothesis (H2) predicts differential effects across attack types and targets in predominantly Muslim countries. We test this hypothesis in Table IV. In columns 1 and 2, we distinguish between suicide attacks and other/non-suicide attack types. We see that longer Ramadan daylight hours have a strong and statistically significant negative effect on non-suicide attacks, but not on suicide attacks.

In columns 3 and 4, we report the effects of Ramadan daylight hours on terrorist attacks against unarmed civilians and armed targets, respectively. We see that longer Ramadan daylight hours tend to reduce terrorist attacks on both types of targets. The effect on the probability of a terrorist attack against civilian targets, however, is not statistically significant at the 5% level. Comparing the point estimates and the sample means (reported in Table II) suggests that the relative change in terrorist attacks

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Table IV. Heterogeneous effects of longer Ramadan fasting on terrorist events and terror deaths in Muslim countries

| Attack type: | Target: | Perpetrator group: |
|-------------|---------|-------------------|
|            | Suicide attacks | Other attacks | Unarmed civilians | Armed targets | Non-Muslim | Muslim |
| Ramadan daylight hours | –0.364 (0.646) | –2.697** (0.963) | –1.921† (1.077) | –1.921* (0.718) | –0.175 (0.319) | –2.746* (1.210) |

Panel regressions with district and country-Ramadan year fixed effects. The sample is restricted to countries with a Muslim population share above 75%. Dependent variables are based on the extensive margins for terrorist events in panel A and terror deaths in panel B. They are restricted to suicide attacks in column 1, other/non-suicide attacks in column 2, terrorist events against unarmed civilians in column 3, terrorist events against armed targets in column 4, terrorist events by non-Muslim perpetrator groups in column 5, and terrorist events by Muslim perpetrator groups in column 6. The data section introduces the time unit Ramadan year and all the variables used. Standard errors are clustered at the country-level and reported in parentheses. ** p < 0.01; * p < 0.05; † p < 0.1.

15 In comparison, the probability of a terrorist event occurring in an average year and district is 16.7% in Iraq and 4.7% across all predominantly Muslim countries.
against civilian targets is smaller than the relative change in terrorist attacks against armed targets.

Taken together, the results in columns 1–4 suggest that longer daily fasting during Ramadan has a large negative effect on operationally difficult terrorist attacks, but a relatively smaller and less robust negative effect on operationally easier attacks, such as suicide attacks and attacks against civilians. These findings confirm our second hypothesis (H2).

In columns 5 and 6, we look at differential effects of Ramadan daylight hours on terrorist attacks committed by Muslim and non-Muslim perpetrator groups. The results from this exercise need to be interpreted with caution, as we could only classify the perpetrators of 51% of the terrorist events. This split nevertheless offers an interesting test: if Ramadan daylight hours matter for terrorism because they affect public support for Muslim perpetrator groups, then we should not find any notable effect on terrorist attacks committed by non-Muslim groups. Our estimates confirm that longer Ramadan daylight hours have no significant effect on terrorist attacks by non-Muslim perpetrators, but lead to significantly fewer terrorist attacks by Muslim perpetrators.

Effects on public support for terrorism
A key element of our theoretical argument has been the assumption that more intense religious experiences reduce public support for terrorism in predominantly Muslim countries. We now test this third hypothesis (H3) using survey data from the Pew Research Center. In particular, we use responses from Muslims who were asked whether they feel that violence is ‘justified in order to defend Islam from its enemies’. They could respond that such violence is ‘never’, ‘rarely’, ‘sometimes’ or ‘often’ justified, or they could refuse to answer. We take these responses as a proxy for public support for terrorism. The Pew Research Center has included this question in surveys in 13 predominantly Muslim countries and territories since 2002. Those who feel that violence is never justified to defend Islam from its enemies make up 57% of respondents. The corresponding shares who feel that it is rarely, sometimes or often justified are 13%, 11% and 9%, respectively.

To estimate the effect of longer Ramadan daylight hours on these shares, we employ the same empirical strategy as before, but the unit of observation is now a Muslim respondent from a particular province surveyed in a particular Ramadan year. Table V reports the results. Column 1 suggests a large positive effect of longer Ramadan daylight hours on the share of people who feel that violence is ‘never’ justified to defend Islam from its enemies. They could respond that such violence is ‘never’, ‘rarely’, ‘sometimes’ or ‘often’ justified, or they could refuse to answer. We take these responses as a proxy for public support for terrorism. The Pew Research Center has included this question in surveys in 13 predominantly Muslim countries and territories since 2002. Those who feel that violence is never justified to defend Islam from its enemies make up 57% of respondents. The corresponding shares who feel that it is rarely, sometimes or often justified are 13%, 11% and 9%, respectively.

Table V. Effect of longer Ramadan fasting on public support for terrorism

| Ordinal outcome | Violence justified against ‘enemies’ of Islam? |
|----------------|-----------------------------------------------|
| (1)            | (2)   | (3)   | (4)   |
| Ramadan daylight hours | 10.33 | 3.76  | -5.41**| -8.98* |
| (12.17)        | (5.24)| (2.01)| (4.34)| (0.16)|
| Province fixed effects (FE) | Yes | Yes | Yes | Yes |
| Country-Ramadan year FE | Yes | Yes | Yes | Yes |
| Observations | 52,452 | 52,452 | 52,452 | 52,452 |

Panel regressions with province and country-Ramadan year fixed effects. The sample is based on Pew surveys conducted by the Pew Research Center in 13 predominantly Muslim countries and territories (Bangladesh, Egypt, Indonesia, Jordan, Kuwait, Mali, Morocco, Pakistan, Palestine, Senegal, Tunisia, Turkey, and Uzbekistan) in the years 2002–15. The dependent variables are equal to 100 if the Muslim respondent gave the answer indicated at the top of each column (never, rarely, sometimes, often) when asked whether they personally feel that ‘suicide bombing and other forms of violence against civilian targets are justified in order to defend Islam from its enemies’, and 0 otherwise. The ordinal outcome ranges in ascending order from 1 ‘never’ to 4 ‘often’. Standard errors in parentheses are clustered at the level of provinces.

** $p < 0.01$; * $p < 0.05$; $y p < 0.1$.

16 It is impossible to know whom survey respondents have in mind when answering such a question on the enemies of Islam. They may think about non-Muslims or about other Muslims who follow different religious practices or who follow the same religious practices with less fervor.
respondents’ answers in column 5. These results confirm our third hypothesis (H3).

**Alternative mechanisms**

We have argued that longer Ramadan daylight hours reduce terrorism, because they decrease public support for terrorism and, thereby, the operational capability of terrorist groups. We now briefly discuss some alternative channels by which longer Ramadan daylight hours may reduce terrorism. First, long Ramadan daylight hours are known to have physiological and psychological effects, such as body weight loss, sleep deprivation, tiredness, lassitude, and irritability (e.g. Leiper & Molla, 2003). These physiological and psychological effects could have a direct effect on the behavior of (potential) terrorists or security forces during Ramadan. Second, government officials may want to be less repressive during Ramadan for political or religious reasons (and not just because of the physiological and psychological effects of fasting). Third, longer Ramadan fasting could affect the time terrorists have available for planning and carrying out terrorist attacks. These three channels all suggest that the effect of longer Ramadan fasting on terrorism should be most pronounced during Ramadan or shortly thereafter.

To evaluate the plausibility of these three channels, we construct a new panel dataset with the same cross-sectional units as our main dataset (districts from predominantly Muslim countries), but quarterly frequency instead of annual frequency. Adapting our empirical strategy to the quarterly frequency, we find that the negative effects of longer Ramadan daylight hours on terrorist events and terror deaths persist beyond the first two quarters after Ramadan (see Table E.1 in Online appendix E). This finding is at odds with the three channels discussed above as well as other potential channels suggesting only short-term effects of longer Ramadan daylight hours.

Another channel could be that longer Ramadan daylight hours increase the empathy and self-restraint of (potential) terrorists. This notion, however, is hard to reconcile with our finding that longer Ramadan daylight hours have a comparatively smaller negative effect on terrorist attacks against unarmed civilians than on attacks against armed targets (see Table IV).

**Concluding remarks**

The long history of terrorist groups with a religious background and the recent surge of terrorist attacks by Islamist perpetrators in predominantly Muslim countries has motivated us to study the effect of religion and intense religious experiences on terrorism. We have developed a theoretical argument and three hypotheses suggesting that more intensive Ramadan fasting would reduce terrorism by decreasing the public support for terrorism.

Building on Campante & Yanagizawa-Drott (2015), we have exploited the facts that the daily fast during Ramadan lasts from dawn to sunset and that the lunar Islamic calendar is not synchronized with the solar cycle. We have identified causal effects by focusing on differences in Ramadan daylight hours across districts within country-years. We have provided empirical support for our three hypotheses. First, we have shown that longer Ramadan daylight hours reduce terrorism in predominantly Muslim countries. Second, we have found that the negative effect of longer Ramadan daylight hours is stronger for operationally difficult terrorist attacks than for suicide attacks and attacks against unarmed civilians. Third, using survey data, we have shown evidence suggesting that longer Ramadan daylight hours reduce public support for terrorism.

Hence, while Islamist terrorist groups may (mis-)use religion to legitimize their attacks and to try to gain public support, it would be wrong to think that intense religious experiences are necessarily a breeding ground for terrorism. Quite to the contrary, our results show that intense religious experiences can reduce public support for terrorism and, thereby, terrorist attacks.

**Replication data**

The dataset, codebook, and do-files for the empirical analyses in this article, along with the Online appendix, can be found at http://www.prio.org/jpr/datasets. All analyses were conducted using STATA.

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**References**

Akerlof, George A & Rachel E Kranton (2000) Economics and identity. *Quarterly Journal of Economics* 115(3): 715–753.

Atran, Scott (2003) Genesis of suicide terrorism. *Science* 299(5612): 1534–1539.

Berman, Eli (2011) *Radical, Religious, and Violent: The New Economics of Terrorism*. Cambridge, MA: MIT Press.

Berman, Eli & David D Laitin (2008) Religion, terrorism and public goods: Testing the club model. *Journal of Public Economics* 92(10–11): 1942–1967.

Bueno de Mesquita, Ethan & Eric S Dickson (2007) The propaganda of the deed: Terrorism, counterterrorism, and mobilization. *American Journal of Political Science* 51(2): 364–381.

Campante, Filipe & David Yanagizawa-Drott (2015) Does religion affect economic growth and happiness? Evidence from Ramadan. *Quarterly Journal of Economics* 130(1): 615–658.

Canetti, Daphna; Stevan E Hobfoll & Eran Zaidise (2010) Much ado about religion: Religiosity, resource loss, and support for political violence. *Journal of Peace Research* 47(5): 575–587.

Carvalho, Jean-Paul (2019) Religious clubs: The strategic role of religious identity. In: Jean-Paul Carvalho, Sriya Iyer & Jared Rubin (eds) *Advances in the Economics of Religion*. Cham: Springer International, 25–42.

Clingingsmith, David; Asim Ijaz Khwaja & Michael Kremer (2009) Estimating the impact of the Hajj: Religion and tolerance in Islam’s global gathering. *Quarterly Journal of Economics* 124(3): 1133–1170.

Comerford, Milo & Rachel Bryson (2017) *Struggle Over Scripture: Charting the Rift Between Islamist Extremism and Mainstream Islam*. London: Tony Blair Institute for Global Change.

Cook, David (2015) *Understanding Jihad*. Oakland, CA: University of California Press.

Egger, Clara & Raül Magni-Berton (2021) The role of Islamist ideology in shaping Muslims believers’ attitudes toward terrorism: Evidence from Europe. *Studies in Conflict and Terrorism* 44(7): 581–604.

Enders, Walter; Gary A Hoover & Todd Sandler (2016) The changing nonlinear relationship between income and terrorism. *Journal of Conflict Resolution* 60(2): 195–225.

Fair, Christine C; Ali Hamza & Rebecca Heller (2017) Who supports suicide terrorism in Bangladesh? What the data say. *Politics and Religion* 10(3): 622–661.

Fair, Christine C; Rebecca Littman & Elizabeth R Nugent (2018) Conceptions of Shari’a and support for militancy and democratic values: Evidence from Pakistan. *Political Science Research and Methods* 6(3): 429–448.

Fair, Christine C; Neil Malhotra & Jacob N Shapiro (2012) Faith or doctrine? Religion and support for political violence in Pakistan. *Public Opinion Quarterly* 76(4): 688–720.

Gassebner, Martin & Simon Luechinger (2011) Lock, stock, and barrel: A comprehensive assessment of the determinants of terror. *Public Choice* 149(3–4): 235–261.

Ginges, Jeremy; Ian Hansen & Ara Norenzayan (2009) Religion and support for suicide attacks. *Psychological Science* 20(2): 224–230.

Haruvy, Ernan; Cristos A Ioannou & Farnoush Golshirazi (2018) The religious observance of Ramadan and prosocial behavior. *Economic Inquiry* 56(1): 226–237.

Hauk, Esther & Hannes Mueller (2015) Cultural leaders and the clash of civilizations. *Journal of Conflict Resolution* 59(3): 367–400.

Hegghammer, Thomas & Neil Ketchley (2021) Plots, attacks, and the measurement of terrorism. https://osf.io/preprints/socarxiv/t72yi/

Huettel, Scott A & Rachel E Kranton (2012) Identity economics and the brain: Uncovering the mechanisms of social conflict. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 1589(4): 680–691.

Iannaccone, Laurence R (1992) Sacrifice and stigma: Reducing free-riding in cults, communes, and other collectives. *Journal of Political Economy* 100(2): 271–291.

Jaeger, David A; Esteban Klor, Sani Miaari & Daniele M Paserman (2015) Can militants use violence to win public support? Evidence from the second intifada. *Journal of Conflict Resolution* 58(3): 528–549.

Juergensmeyer, Mark (2017) *Terror in the Mind of God: The Global Rise of Religious Violence*. Oakland, CA: University of California Press.

Kis-Katos, Krisztina; Helge Liebert & Günther G Schulze (2014) On the heterogeneity of terror. *European Economic Review* 68: 116–136.

Krueger, Alan B & Jitka Malečková (2009) Attitudes and action: Public opinion and the occurrence of international terrorism. *Science* 325(5947): 1534–1536.
Leiper, John Beattie & AM Molla (2003) Effects on health of fluid restriction during fasting in Ramadan. European Journal of Clinical Nutrition 57(2): S30–S38.

Mahmood, Rafat (2021) On the Madrassa conundrum in terrorism studies. Working paper.

Malečková, Jitka & Dragana Stanislić (2011) Public opinion and terrorist acts. European Journal of Political Economy 27(1): S107–S121.

Malečková, Jitka & Dragana Stanislić (2013) Does higher education decrease support for terrorism? Peace Economics, Peace Science and Public Policy 19(3): 343–358.

McCaughey, John F (2014) The political mobilization of ethnic and religious identities in Africa. American Political Science Review 108(4): 801–816.

McCleary, Rachel M (2007) Salvation, damnation, and economic incentives. Journal of Contemporary Religion 22(1): 49–74.

Meierrieks, Daniel & Thomas Gries (2013) Causality between terrorism and economic growth. Journal of Peace Research 50(1): 91–104.

Polo, Sara MT & Kristian Skrede Gleditsch (2016) Twisting arms and sending messages: Terrorist tactics in civil war. Journal of Peace Research 53(6): 815–829.

Reese, Michael J; Keven G Ruby & Robert A Pape (2017) Days of action or restraint? How the Islamic calendar impacts violence. American Political Science Review 111(3): 439–459.

Richardson, Louise (2006) The Roots of Terrorism. New York: Routledge.

Sarbhie, Anoop (2021) The structure of religion, ethnicity, and insurgent mobilization: Evidence from India. World Politics 73(1): 82–127.

Sarbhie, Anoop K (2014) Insurgent–population ties and the variation in the trajectory of peripheral civil wars. Comparative Political Studies 47(10): 1470–1500.

Siqueira, Kevin & Todd Sandler (2006) Terrorists versus the government: Strategic interaction, support, and sponsorship. Journal of Conflict Resolution 50(6): 878–898.

START (2018) Global Terrorism Database (GTD): Codebook. College Park, MD: National Consortium for the Study of Terrorism and Responses to Terrorism.

START (2021) Global Terrorism Database (GTD) [Datafile]. College Park, MD: National Consortium for the Study of Terrorism and Responses to Terrorism (https://www.start.umd.edu/gtd in spring 2021).

Stern, Jessica (2003) Terror in the Name of God. New York: Harper Collins.

Tessler, Mark & Michael DH Robbins (2007) What leads some ordinary Arab men and women to approve of terrorist acts against the United States? Journal of Conflict Resolution 51(2): 305–328.

Toft, Monica Duffy & Yuri M Zhukov (2015) Islamists and nationalists: Rebel motivation and counterinsurgency in Russia’s North Caucasus. American Political Science Review 109(2): 222–238.

Weinstein, Jeremy M (2006) Inside Rebellion: The Politics of Insurgent Violence. Cambridge Studies in Comparative Politics. New York: Cambridge University Press.

Zaidise, Eran; Daphna Canetti-Nisim & Ami Pedahzur (2007) Politics of god or politics of man? The role of religion and deprivation in predicting support for political violence in Israel. Political Studies 55(3): 499–521.

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