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RESEARCH ARTICLE

Female Fighters and Deadliness of Terrorist Campaigns in Civil War

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ABSTRACT

We argue that rebel groups with a higher share of female fighters carry out more lethal terrorist operations using more female perpetrators. Rebels have incentives to exploit gender-specific tactical and propaganda advantages of their female operatives in terrorist operations to cause more damage to the opponents and to attract support. Gender stereotypes make female fighters more effective in terrorist operations, and common media narratives on female perpetrators discredit the government and allow rebels to shame men and encourage other female sympathizers to take up arms. We test this mechanism using casual mediation analysis against new data on the prevalence of female fighters in terrorist operations on a sample of 186 rebel groups fighting in civil wars. We find robust empirical evidence that rebels with a higher prevalence of female fighters employ a higher share of females in terrorist attacks leading to more lethal terrorist violence.

KEYWORDS: Terrorism lethality; Civil war; Female fighters; Gender; Quantitative methods

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1. Introduction

This study positions itself at the intersection of the literature on the determinants of terrorism in civil war and the literature on gender and terrorism and contributes to fill their gaps. Existing research on terrorism and conflict has found that rebel groups' characteristics, conflict dynamics and, structural factors incentivize the use of terrorist violence against civilians – where 'terrorism' is defined as the use of indirect attacks by non-state actors against a government targeting non-combatants (Sánchez-Cuenca & de la Calle 2009; Asal et al. 2012; Findley & Young 2012). Existing work has focused, for example, on the role of rebel groups' ideology, military strength, organizational size, resource availability, territorial control, external support, competition between and within rebel factions, battlefield losses, duration of conflicts, state repression, regime type and media freedom (see for example Crenshaw 1985; Kalyvas 2003; Bloom 2004, 2005; Kydd & Walter 2006; Asal & Rethemeyer 2008; Wood 2010; Stanton 2013; Polo & Gleditsch 2016; Belgioioso 2018; Polo & Gonzalez 2020). These studies make an important contribution to our understanding of the use of terrorism by non-state actors involved in violent conflicts, but they also leave important questions unanswered. For example, despite the fact that women fighters – women that engage directly in organized violence (UN Women 2012, pp. 22-23) – have been involved in 30-40% of all rebel groups worldwide (Wood & Thomas 2017), the extent of their inclusion in combatant roles has so far not been studied in relation to their use in terrorist violence.

This is particularly problematic because the literature on gender and terrorism have highlighted various strategic benefits of using female perpetrators in terrorist attacks. The growing body of research on gender and dynamics of violence, most notably in terrorism studies, conflict studies and feminist security studies (see for example Cunningham 2003; Eager 2008; MacKenzie 2009; Cohen 2013; Loken 2017; Warner & Matfess 2017; Gilmartin 2018; Trisko Darden et al. 2018; Loken & Zelenz 2018; Wood 2019; Asal & Jadoon 2020; Soules 2020) analyses female involvement in individual terrorist attacks, or focuses on rebel groups that perpetrate terrorism without an explicit comparison to rebel groups who do not resort to terrorism

(Cunningham 2003; Eager 2008; Bloom 2011; Davis 2017; Thomas 2021). These studies provide very valuable insights into the relationship between gender and the strategic use of terrorism; however, they do not provide direct indication on whether rebels in civil wars have gender-specific incentives to use as many female operatives as they can in terrorist attacks.

We add to the literature on the determinants of terrorist violence in civil wars and the literature on gender and terrorism by investigating whether rebels with a higher percentage of female fighters perpetrate more lethal terrorist violence using more female operatives in terrorist operations. We claim that rebels rationally exploit societal gender stereotypes and take advantage of their female operatives using as many of them as possible in tasks that maximize their strategic utility and effectiveness: such as terrorist operations. By doing so rebel groups aim to exploit gender-specific tactical and propaganda advantages of their female operatives. Therefore, we expect that rebels with higher prevalence of female fighters maximise the lethality of terrorism by employing a higher share of females in terrorist operations. Female fighters provide rebel organizations with decisive tactical advantages over their male counterparts, making them more effective and lethal, particularly in societies where women's role in public life is limited (Cunningham 2003; Speckhard 2008, 2009; O'Rourke 2009; Dalton & Asal 2011; Bloom 2011; Davis 2013; Thomas 2021). In addition, gendered narratives regularly adopted by the media when reporting on female perpetrators are used by rebels to discredit their opponent governments and encourage additional support for terrorist groups. In addition, rebel groups can exploit the news of successful female perpetrators to shame males and encourage other female sympathizers into taking up arms.

Our second contribution is that we present new data on the prevalence of female fighters in terrorist operations in a global sample of 185 rebel organizations active in civil wars between 1979 and 2009. We carry out causal mediation analysis to test whether a higher share of female fighters increases the lethality of terrorist operations via rebels' use of female operatives. The empirical results demonstrate that rebel groups take societal gender biases into account and that they exploit gender

stereotypes using more female operatives in terrorist operations to increase their lethality and gain new support.

2. Incentives to use female fighters in terrorist operations

Women involved in rebel organizations routinely cover a variety of active roles such as fundraisers, first-aid providers, community organizers, and campaigners, in addition to being directly involved in perpetrating various types of political violence. Empirical evidence suggests that the 30-40% of rebel groups worldwide include women that engage directly in organized violence (UN Women 2012, pp. 22-23). Female fighters undertake various violent activities such as direct combat against military apparatuses, guerrilla warfare, terrorist attacks against civilians, have auxiliary fighting roles, operate artillery or anti-aircraft weapons, detonate mines or other explosives, and conduct assassinations and suicide bombings (Wood & Thomas 2019, p. 2). We claim that rebel groups rationally exploit societal gender stereotypes and take advantage of their female operatives using as many of them as possible to perpetrate terrorist attacks in order to maximize their strategic utility and effectiveness. This hypothesis implies that we rule out potential alternative explanations underlying the relationship between female fighters and the deadliness of terrorist attacks. For example, rebels that are militarily weaker because of more female fighters in their ranks might carry out more lethal terrorist attacks against civilians to exert indirect pressure on the government, being unable to target state coercive apparatuses directly. Our inferential goal is to test the extent and validity of our mechanism vs. plausible alternative explanations.

2.1. Gender-specific tactical advantages

Qualitative and quantitative literature on conflict and terrorism shows that gender stereotypes provide women fighters with the capacity of being more effective and deadly in terrorist operations than their male counterparts (Cunningham 2003; Bloom 2005; Thomas 2021). For rebels, female fighters present peculiar gender-

specific tactical advantages over male fighters both in the coordination and perpetration of terrorist activities.

For example, the mobility of female fighters tends to be less restricted than the mobility of male operatives, providing them with an important tactical advantage when carrying out terrorist attacks. Gender stereotypes evolving around women's assumed innocence often make female fighters less likely to be denied access to targets of terrorist operations. Several qualitative studies have provided evidence that females are effective suicide bombers because of their capability to avoid suspicion while approaching targets (O'Rourke 2009; Bloom 2011; Davis 2017). One notorious example is the attack against an Israeli checkpoint by a female operative of Hamas in Jerusalem. Reem al-Riyashi, a 22-year-old Palestinian walked freely up to her target: a checkpoint in Jerusalem, and exploded herself, killing four Israelis and injuring 10 other people (The Guardian 2021).

Females also tend to be less frequently selected for thorough security checks than men (Cunningham 2003; Nacos 2011). This is often linked to cultural norms that prohibit physical checks of women by male security officers – and the lack of female staff amongst the security personnel (Cunningham 2003; Bloom 2005). In some conflict-afflicted zones, such as Afghanistan and Pakistan, this has led to male rebels dressing up as women to avoid suspicion (Dearing 2010). Being a woman is also often advantageous for avoiding arrests and being convicted in court. Alison (2009), for example, suggests that, in Northern Ireland, one of the reasons the number of female detainees associated with the Irish Republican Army was relatively low is that women are less likely to be arrested, trialled and convicted than men. Alexander and Turkington (2018) have also shown that female terrorist suspects often experience more lenient treatment from government institutions.

Rebel organizations have often exploited these gender-specific tactical advantages of women fighters and employed female operatives as bomb-planters, plane-hijackers and hostage-takers, amongst others (Eager 2008). Rebels also exploit gender stereotypes making female fighters particularly effective as facilitators and enablers of terrorist violence. One such example includes the Palestinian woman Mona Najar,

who contacted Israeli teenager Ophir Rakhum online, assuming a fake identity, pretending to be in love, and convincing him to meet her in a secluded place in Ramallah in early 2001. Once Rakhum arrived at the meeting place, expecting to be welcomed by the woman he had met online, he was assassinated by Palestinian militants (Beaumont 2001). Even though the woman, in this case, was not actively involved in perpetrating the violence, her direct participation was essential in organizing the terrorist operation, which relied on dominant gender stereotypes.

In summary, female operatives have often proved more effective than male operatives in a wide range of roles in the facilitation and perpetration of terrorist operations on behalf of rebel groups across the ideological and geographical spectrum. Rebel groups actively use widespread gender stereotypes and the deriving tactical advantages. We claim that major effectiveness in terrorist operations constitutes an incentive for rebel groups with higher prevalence of female fighters to use a higher share of female operatives to perpetrate more lethal terrorist operations. However, rebel groups have yet another incentive to exploit the effectiveness of their female operatives in terrorist operations. This second incentive is related to a gender-specific propaganda effect.

2.2. Gender-specific propaganda value

The potential publicity generated by highly lethal spectacular terrorist attacks is often as important as the physical damage they inflict (Jenkins 1975). In many cases, female perpetrators receive a disproportionate amount of attention by media and general public compared to male perpetrators (Ness 2008; Speckhard 2008; Zedalis 2008). This disproportionate amount of attention is due to dominant gender stereotypes and the perceived contrast between women's gender and the immorality involved in terrorist violence (Warner & Matfess 2017). Women's participation in terrorism violence challenges many people's beliefs about what 'being a woman' means and, what a woman can do. This shocking effect is exacerbated the more effective and deadly the terrorist violence. Terrorism is considered to be an extraordinarily

extreme and ruthless form of violence because it targets civilians. When terrorism causes many civilian deaths, its alarming effect is bound to be more extreme.

Media reporting on female perpetrators of terrorist violence commonly builds gendered narratives around the motivations and identities of female suicide bombers, using mainstream gendered imaginary portraying women through the lenses of inner feelings, individual pathologies, relational matters, nurturance, and emotional support, to an extent that it is unlikely for the public to gain an accurate view of facts (Patkin 2004; Nacos 2007; Revital 2007). The leadership of rebel groups is likely to exploit these narratives as they let the decision of perpetrators using lethal political violence appear more relatable. Loken (2020), for example, has shown that rebels exploit gender stereotypes connected to motherhood as a mean to legitimize their use of political violence.

The gender-specific propaganda value of female fighters involved in terrorist operations is twofold. First, terrorist groups aspire to discredit the actions of the government, motivating new support. Second, when the news of lethal female suicide bombers emerges, terrorist groups aim to shame men and encourage female sympathizers to actively join the fight.

2.3. Discredit governments' actions

Krulistova (2016, p. 31) notices that media narratives of female perpetrators of terrorist attacks across nationality, age, location, and ideology commonly deny perpetrators' political agency and rationality behind their involvement in carrying out lethal violence. International and local media depictions of female attackers typically represent perpetrators through physical images and motivated by feelings of desperation and a desire for revenge (generated by government abuses against themselves, their families, and kin) rather than more explicitly political aims (Patkin 2004; Nacos 2007). Terrorist groups expect these gendered narratives to make perpetrators' motives more relatable, discrediting the actions of target governments, and ultimately generating additional support among potential supporters. Aggrieved citizens are

likely to sympathise with the self-sacrifice of women as a reaction to abuses and to perceive that the state is unable to manage the conflict.

For example, Chechen rebel groups fighting for the independence of Chechnya from Russia extensively employed their female operatives in terrorist attacks (Bloom 2005; Ness 2008; Eggert 2015). Crucially, the average number of people killed by female fighters in terrorist operations during the civil war was substantially higher than that of their male counterparts: female fighters killed an average of 21 people per attack compared to 13 for male operatives (Pape et al. 2010). Local and international media characterized Chechen female fighters involved in terrorist attacks as helpless, weak, and innocent. One of these accounts, for example, characterizes a woman who took hostages at the Moscow Theatre in 2002 ignoring her participation in violence and focusing instead on her femininity. The article described her as very normal, courteous, and as someone who would ask people about their children and "always say, 'everything will be fine. It will finish peacefully"' (Sjoberg 2010). An analysis of the public responses to female members of Chechen rebels involved in suicide bombings as opposed to their male counterparts demonstrates that the extensive use of female operatives in suicide bombings undermined public faith in the Russian government (Stack 2011, p. 91). "The pity the public feels for Chechen women can be used to discredit Russian operations in Chechnya. [These women] undermine public faith in the Russian government, because women's violence is seen as a symptom of a war gone out of control and a weak government" (Stack, 2011, p. 91).

2.4. Shaming men and encouraging women sympathisers into joining

In addition to discrediting government actions, rebel groups can exploit media gendered narrative on female fighters involved in successful terrorist operations to shame men and encourage female sympathisers to join the group. When the news that female operatives perpetrated successful terrorist attacks emerge, rebels can leverage widespread gender expectations according to which male members of their constituency have the duty to protect the women who are considered to be the 'weaker sex' (Goldstein 2001; Carpenter 2003, 2005; Cunningham 2003; Bloom 2011; Sjoberg

et al. 2011; Trisko Darden et al. 2018). Men are signalled out, not only because they did not step up and play the role prescribed to them by dominant gender norms, but also because women successfully carried out duties prescribed to them. Successful terrorist attacks by female operatives can also be used to inspire female sympathisers to join the rebel group. In fact, highly lethal terrorist attacks perpetrated by women represent efficacious exempla that even the 'weaker sex' can make a difference in direct armed struggles. Female terrorists transgressing stereotypical gender expectations are likely to become role-models for other women in the rebel groups' pool of potential supporters facilitating their active participation.

For example, in Al Qaeda in Iraq (AQI) "women combatants were commonplace" (Winter & Margolin 2017), mostly as suicide bombers, and are reported to have been heavily involved in very deadly terrorist operations (Davis 2013). AQI's terrorist attacks involving female fighters were systematically more lethal than terrorist attacks involving male operatives (Eggert 2015), and the majority of female perpetrators were sent to attack soft targets with the goal of creating a large number of casualties (Davis 2013, p. 287). AQI's leadership publicly and routinely celebrated the deadliness of female fighters in terrorist operations. For example, in 2005, AQI's spokesman Abu Maysarah al-Iraqi officially commemorated the suicide attacks of a female operative against the U.S. military base near Tal Afar. The attack killed at least five, injured more than 30 civilians (Spinner 2005) and was soon revendicated by the group. The bomber was declared 'a noble sister' who was acting 'heroically in the name of her religion' (Winter 2005). In the writings of Al-Zarqawi, AQI's leader and major ideologue, the involvement of female operatives in very deadly terrorist operations is justified both tactically, as a way to strike the adversary, and strategically, as a way to shame men and encourage women to take up arms (Eggert 2015; Winter & Margolin 2017).

Based on the above discussions, we hypothesise that: rebel groups with a higher share of female fighters are likely to perpetrate more lethal terrorist campaigns using more female attackers than rebel groups with lower prevalence of female combatants.

3. The question of female fighters' recruitment

Work on how and why female operatives are recruited into rebel groups have investigated the phenomena of conscription and voluntary participation in general and in relation to fighter roles (Eager 2008; Henshaw 2015, 2018). As far as organisational motivations for the recruitment of female fighters are concerned, several explanations have been advanced in existing literature. Most studies discussing the question of why rebels recruit female fighters focus on factors such as the security environment (for example, Dearing 2010) or the organisational attributes including a group's structure, age or size and military strength (see for example Dalton & Asal 2011). The ideology of rebel organizations has also been described as a strong predictor of the recruitment of female fighters (Gonzalez-Perez 2008; Ness 2008; Wood 2019).

Whether or not women have joined voluntarily and the reasons for rebels to recruit female fighters should not affect our argument on the strategic rationales for rebel groups to utilize more female fighter in very lethal terrorist violence when they hold a higher share of this resource. However, we carry out a mediation analysis to test for reverse causality: we test if a higher share of female operatives in terrorist operations leads groups to recruit more women in their fighting ranks, leading to more lethal terrorist campaigns. We do not find evidence that such a mediation effect is in place (see Appendix, Figure 3). In the section on confounder below, we also take into account the main determinants of female fighters' recruitment identified by the literature and empirically test whether the link between prevalence of female fighters on female involvement in lethal terrorist operations is confuted by organizational motivations and the circumstances under which women have joined the groups as fighters in the first place. Finally, we run sensitivity analysis to estimate the extent that unobserved factors might bias our results.

4. Methodology

4.1. Research design and data

To test our hypothesis, we collect new data on prevalence of female operatives in terrorist operations in a global sample of cross-sectional data on 185 rebel organizations in civil wars active between 1979 and 2009, building on the Women in Armed Rebellion Dataset (WARD) (Wood & Thomas 2019). To collect data on prevalence of female fighters in terrorist operations, we follow a similar approach to Wood and Thomas (2019). More detail on the coding rules can be found in the Mediator Variable section below. Where reports explicitly state that women did not take part in terrorism as perpetrators or facilitators, or where it was not possible to locate any evidence of the existence of female perpetrators (despite locating substantial information regarding other group characteristics), the group was coded as not including female perpetrators.

WARD considers female members as fighters when they undertake combat against military apparatuses and civilians, have auxiliary fighting roles, operate artillery or anti-aircraft weapons, detonate mines or other explosives, conduct assassinations and suicide bombings (Wood & Thomas 2019, p. 2). WARD codes the presence of female fighters as being absent (in their best estimation measure) for those rebel groups that mainly employ female operatives in suicide bombings. This coding choice should work against our expectation in the quantitative test. For the purpose of this paper, we focus on the share of terrorist attacks in which at least one female operative was involved. We account for both female operatives who operated arms in terrorist operations and those who did not use arms, but facilitated their use by others functioning as facilitators of terrorist attacks.

Moreover, our dataset includes information reflecting the deadliness of terrorist attacks and the prevalence of female fighters in rebel groups. Rebel group is the ideal unit of analysis because it allows to test our argument on tactical and strategic choices, which need to empirically account for agency. To obtain data on the deadliness of terrorist attacks perpetrated by rebel organizations in civil wars, we merged the Terrorist Organizations v.2014 2.0 crosswalk (Asal et al. 2014), the Global

Terrorist Database by the National Consortium for the Study of Terrorism and Responses to Terrorism (START 2015), the Uppsala Conflict Data Program Dyadic Dataset v1-2015 (Harbom et al. 2008); the Non-State Actor Data 3.4 (NSA) (Cunningham et al. 2012) and the UCDP Georeferenced Event Dataset 0.4 (see Sundberg & Melander 2013; Croicu & Sundberg 2015). The TORG (v.2014 2.0) data comprises rebel organizations using terrorist attacks and identifiers found in the most recent versions of the GTD, UCPD Dyadic Dataset etc. (Asal et al. 2014).

4.2. Dependent variables

Our operationalization of terrorism relies on the GTD's three basic coding rules, and three additional criteria (START 2015): 1) attacks must be intentional; 2) attacks entail the use of violence or the threat of violence; 3) perpetrators are non-state actors; 4) attacks must be aimed at political, economic, or social goals (the exclusive pursuit of economic profit does not satisfy this criterion); 5) attacks must have the intention to coerce, intimidate or transmit some message to a larger audience then the immediate victims; 6) attacks must violate international humanitarian law's prohibition of targeting civilians or non-combatants.

The principal dependent variable is a continuous variable accounting for the deadliness of terrorist attacks. This variable measures the total number of civilian terrorism casualties by individual rebel groups during its active years in civil war. For robustness checks we also use a measure indicating whether terrorist attacks were perpetrated against high-casualty civilian targets (for a similar approach, see Stanton, 2013). This variable allows to capture the intentionality of the deadliness of terrorist attacks. High-casualty targets is equal to one when a given rebel group bombed or targeted populated civilian targets and zero otherwise. We consider populated civilian targets the following facilities: medical and pharmaceutical facilities, hotels and resorts, shops and markets, entertainment sites including theatres, exhibitions, stadiums and casinos, constructions sites, courts, political party's rallies and meetings, voting sites and government buildings. Police and military buildings are not included. However, for additional robustness checks, we include these two targets that fit a looser

definition of terrorist attacks, by creating the additional measure of high-casualty undergrounds attacks.

Finally, as one last robustness check, we generate a measure to proxy the willingness of rebels to provoke a high number of civilian casualties using a dichotomous indicator for the use of highly destructive explosives. Highly destructive explosive is equal to 1 if the rebels used grenades, mines, mail bombs, projectiles such as rockets mortars and missiles, remote explosive devices, bombs carried bodily by human being, time fuse, vehicle bombs and other unknown explosive devices, equal to 0 otherwise. While this proxy captures rebel capacity, the use of highly destructive explosives also represents a clear tactical choice to the extent that the rebel groups possess other, less sophisticated arms, which allows a higher level of targets discrimination.

4.3. Explanatory variables

We extract data on prevalence of female fighters in rebel groups using the best estimate of female fighters in WARD (Wood & Thomas 2019) 'cat4_prevalence'. Female fighters' prevalence is a categorical indicator accounting for the estimated proportion of a group's combat force that comprises women. The measure is categorical rather than a direct estimate of the proportion of female combatants in an armed group because "different sources sometimes provide varying estimates of the numbers of women serving as combatants and occasionally provide only qualitative descriptions of the extent of women's participation" (Wood & Thomas 2017, p. 38). Therefore, a blunter coding scheme is used to increase the confidence that the prevalence of female combatants within rebel groups is accurately captured, although doing so reduces the precision of the resulting measure. The variable ranges from 0 -no female fighters- to 3 -high prevalence of female fighters- (see Wood & Thomas 2017, p. 38). As a control variable, we also use 'cat4_prevalence_high' which uses a more lenient definition of combatant, accounting, for example, for women mainly employed in suicide bombings (Wood & Thomas 2019).

4.4. Mediator variable

Female fighters' prevalence in terrorist operations is a categorical indicator: 0 indicates no evidence of female fighters in terrorist attacks; 1 indicates that female fighters were involved in less than 5% of the terrorist attacks carried out by a group; 2 indicates that female fighters were involved in 5-20% of the terrorist attacks; 3 indicates that female fighters were involved in 20-40% of the terrorist attacks; and 4 indicates that female fighters were involved in over 40% of the terrorist attacks. Making a determination regarding the employment of female fighters in terrorist attacks requires information of three independent sources. This blunt coding scheme reflects a trade-off between precision and confidence in the measure. The sources utilized are official reports of international governmental and non-governmental organizations on terrorist attacks, terrorist convictions, and the roles of female fighters in rebel groups, and academic literature. We also used newspaper articles obtained from Nexis. To extract relevant articles, we used the name of the groups, the location(s) in which the group operate(s) and we include search words such as female perpetrators, female attackers, female terrorist suspects. The four categories were devised inductively according to the nature of available information on the prevalence of female perpetrators of terrorist attacks. Female terrorist attackers usually spur high media attention. Media outlets as well as academics, governmental and nongovernmental organizations tend to report specific information on the systematicity with which females are used by rebel groups as terrorist perpetrators the more frequent is their involvement in terrorist operations.

Therefore, we assumed that female fighters were involved in less than 5% of the total attacks when we found only individual reports of terrorist attacks carried out by females on behalf of a rebel group. When the sources provided only qualitative descriptions of the extent of female participation in terrorist operations (such as 'many' or such as 'increasing levels'), we assumed that female fighters were involved in 5-20% of the terrorist attacks. The differentiation between the last two categories is more subtle. We find that the participation of females in the 40% of terrorist attacks constitute a 'natural cutting point' in the available sources. While, sources reporting a

share of the 40% of total terrorist attacks in which females are involved are typically associated to other sources reporting smaller shares, reports of estimations higher than the 40% are more consistent across sources.

Where reports explicitly state that women fighters did not participate in terrorism as perpetrators or facilitators, or where it was not possible to locate any evidence of women taking part in terrorist attacks as perpetrators or facilitators (despite locating substantial information regarding other group characteristics), the group was coded as not employing female perpetrators. We include a list reporting the rebel groups found to use female perpetrators in terrorist attacks in the Appendix. Table 1 below shows the distribution of prevalence of female operatives in terrorist operations across levels of prevalence of female fighters in rebel groups. While this table shows a positive covariance between female fighters in rebel groups and their use in terrorist operations, we identified several rebel groups that exclusively used female fighters in terrorist attacks. These groups are coded as containing no female fighters in WARD.

To rule out that more females are used in terrorist operations as a result of the troops size of rebels and of rebels' military power vis a vis the government, we examine Kernel-weighted local polynomials smoothing with prevalence of females in terrorist operations as a regressor and rebels' military strength and fighting capacity as responses (Appendix, Figures 1 and 2). The results Figure 1 and Figure 2 (Appendix) show that the expected values of prevalence of female fighters in terrorist operations remain fairly stable showing no evidence of a general decrease in of the use of females as perpetrators of terrorist attacks when rebels possess more military troops or are militarily stronger relative to the government. Finally, we examine cross tabulations between the existence of females in terrorist operations and different ideologies (Appendix, Tables 1-3). These tables show that the percentages of groups using female fighters in terrorist operations are fairly similar across leftist and radical Islamist rebel groups (54.55% and 46.15% respectively). Nationalist rebel groups seem less prone to use females in terrorist attacks: only around the 15 % of them include females in terrorist operations.

Table 1 – Cross tabulation of prevalence of female fighters and prevalence of female fighters in terrorist operations.

	Prevalence of female fighters in terrorist operations				
Prevalence of female fighters	**0**	**1**	**2**	**3**	**4**
0	112 89.60%	9 7.20%	4 3.20%	0 0.00%	0 0.00%
1	23 66.65%	3 8.82	0 0.00%	4 11.76	4 11.76
2	9 60.00%	0 0.00%	1 6.67%	4 26,67%	1 6.67%
3	5 45.45	0 0.00%	1 9.09%	2 18.18%	3 27.27%
Total	149 80.54%	12 6.49%	6 3.24%	10 5.41%	8 4.32%

4.5. Control variables

We control for several confounders that reflects rebel characteristics, conflict dynamics and structural factors that have been found to affect the use of terrorist violence and are also likely correlated to the share of female fighters and their prevalence in terrorist operations.

First, we account for the rebel group's military strength. Militarily weak rebels are more likely to use terrorism during civil wars (Wood 2010; Polo & Gleditsch 2016). Militarily strength is also likely to be connected to the willingness of rebel groups to deploy female fighters, although there exists contradictory evidence on the directionality of this relationship. For example, while Israelsen (2018) finds that weaker rebel groups are less likely to recruit female fighters, cases such as IS show how female fighters were deployed in military and terrorist operations at a time when

the group was at the lowest of its military power (Dearden 2017). Military strength is obtained using the variable 'rebstrength' from NSA (Cunningham et al. 2012). This is a categorical variable that measures rebel group's military capacity with respect to the opponent state. It takes the value of 1 when the rebel group is much weaker than the state; 2 when the rebel group is weaker than the state; 3 when the rebel group and the state are in parity; 4 when the rebel group is stronger than the state, and 5 when the rebel group is much stronger than the state.

We account for the employment of forced recruitment strategies by rebel organizations. On one hand, rebel groups that rely on forced recruitment are "often indiscriminate in their selection and may be more likely to recruit female fighters to fill resource needs" (Wood & Thomas 2017, p. 22), thus presenting a higher prevalence of female fighters than other groups. On the other hand, rebels using forced recruitment strategies might be more open to engage with other forms of coercion of civilians and civilian victimization such as terrorist violence. Groups such as Boko Haram, for example, extensively forced women to carry out suicide bombings (Thomas 2021). We use a binary measure extracted from Wood and Thomas (2017) which reflects whether abduction, press-ganging, or other forcible recruitment strategies were employed during a given conflict.

We control for the ideology of rebel groups. The ideology of rebel groups determines their potential audience. In turn, this determines what kind of terrorist targets might backlash. Nationalist and religious rebel groups representing a specific faith or ethnic community are less likely to attack hard and official targets than groups with a universalistic ideology and audience such as leftist and rightist (Stanton 2013; Polo & Gleditsch 2016). Rebel groups' ideology also affects the willingness of the leaders of the groups to recruit female fighters. In particular rebels with leftist, revolutionary ideologies are more likely to recruit female combatants than rebels with nationalist or Islamist ideologies (Ness 2008; Wood & Thomas 2017). We extract data on the ideologies of rebel groups from WARD (Wood & Thomas 2017). Leftist ideology is a dichotomous variable equal to 1 when rebel groups adopt a Marxist-inspired ideology (such as Socialist, Communist, Maoist, or Marxist-Leninist), 0 otherwise.

Religious ideology is also a dichotomous variable equal to 1 when rebel groups mobilize primarily or exclusively to promote the interests of a specific religion or religious sect and seek to either establish autonomy from the central government or impose their group's religious doctrine on the entire state, 0 otherwise. Nationalist ideology is a dichotomous variable equal to 1 when rebel groups pursue similar goals on behalf of a distinct ethnic or national community (Wood & Thomas 2017).

We control for competition between rebel organizations within conflicts. Competition among rebel groups increases the likelihood of terrorism because rebels expect to attract members and media attention with more militant actions (Bloom 2004; Taylor & Van Dyke 2004; Conrad & Greene 2015; Belgioioso 2018). Competition within civil wars brought on by the entrance of new factions contributes to an increase in civilian targeting in general and terrorism in particular (see for example Clauset et al. 2010; Cunningham et al. 2012; Wood & Kathman 2015; Dowd 2016). Rebel groups in more fragmented civil wars environments might also be militarily weaker compared to opponent governments and this, in turn, might be connected to systematic variation of recruitment of female fighters (as discussed above). We use the variable 'Splinter' from the UCDP Actor Dataset Version 2.2-2016 (Pettersson 2014) to obtain two alternative measures of competition: the first is a dummy variable equal to 1 when non-state actor was created by breaking away from another actor listed in the UCDP data, the second variable counts the number of splinter factions that a given rebel group faces within its conflict context.

We control for the duration of the civil war because longer civil wars tend to increase rebels' internal organizational pressure as leaders develop expectations of a decline in followers' commitment with protracted use of mass dissident tactics. This is likely to motivate leaders to initiate terrorist campaigns to secure organizational survival (Belgioioso 2018). Additionally, leaders may be reluctant to recruit women fighters at the beginning of an uprising but may permit their inclusion once the group becomes larger and more established (Wood & Thomas 2017).

We also control for a number of structural factors. First, *development*, measured as the natural log of national per capita GDP from Wood and Thomas (2019).

Widespread poverty may create grievances and a large pool of potential recruits for terrorism (Crenshaw 1981). Second, free and fair election and, third media freedom extracted from Varieties of Democracy (V-Dem) (Coppedge et al. 2020). Countries with free and fair elections are held by some to provide a favourable environment for the use of terrorism because rebels can exploit the accountability of governments to the public opinion which increase their capacity to obtain concessions as a consequence of the indiscriminate targeting of civilians with terrorism (Pape 2003; Li 2005). Media freedom increases the likelihood of terrorism because free media are expected to extensively report about terrorist events thereby providing free publicity to rebels using such type of violence and exacerbating the fear these groups intend to create (Hoffman 2006; Gadarian 2010). Development, free and fair elections and media freedom are also likely to be correlated with societal gender equality and gender biases that might motivate rebels' leader to deploy female fighters in terrorist operations (see for example, Wood & Thomas 2017, p. 22). Because the data are time invariant, these measures represent the average values of the variables over the course of the conflict.

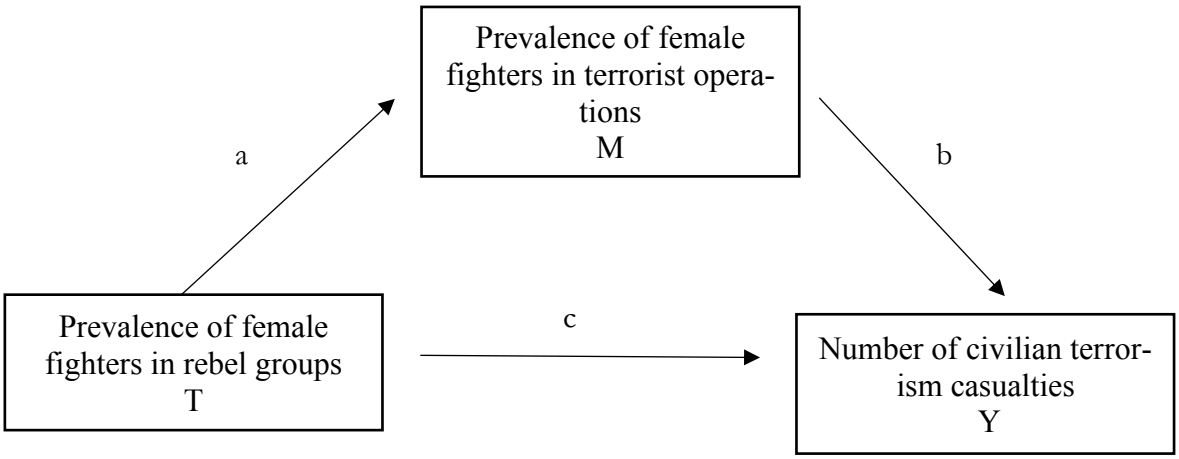
Finally, we include *Percent Muslim* which reflects the estimated percentage of the state population associated with Islam (Maoz & Henderson 2013). Accounting for countries with Muslim-majority population has been said to "isolate the effect of the Islamist ideology measure from broad cultural values" believed to be inherent in many Muslim-majority countries, which might affect the recruitment of women combatants (Wood & Thomas 2017, p. 23).

5. Empirical analysis

To test our proposed mechanism, we carry out causal mediation analysis. Mediation analysis seeks to quantify the effect of a treatment that operates through a particular mechanism. Following Imai et al. (2011), we define a causal mechanism as a process whereby one variable T causally affects the outcome Y through an intermediate variable or mediator M that operationalizes the hypothesized mechanism. In this study, the prevalence of female fighters in terrorist operations (M) transmits the causal effect of prevalence of female fighters in rebel groups (T) on the number of

civilian terrorism casualties (Y). Figure 1 below graphically illustrates this simple idea. The mediated effect combines two arrows 'a' and 'b', whereas the single arrow 'c' represents the direct effect. The direct effect represents the effect of the treatment on the outcome that is not transmitted by our proposed mechanism. For example, rebels that are militarily weaker because of more female fighters in their ranks might carry out more lethal terrorist attacks against civilians to exert indirect pressure on the government, being unable to target state coercive apparatuses directly. Our inferential goal is to test the extent and validity of our mechanism vs. plausible alternative explanations.

Figure 1. Diagram representing the casual mechanism



We use Hicks and Tingley's (2011) 'mediation' package to calculate the average mediation and direct effects of our treatments. We apply this package on our ordinal mediator and our continuous outcome variable using OLS models.[1] The results of the two-stage mediation models are reported in Table 1 below. The exposure-

[1] The use of an OLS model for the ordinal mediator might rise concern over correctness of the estimated results. The mediation package, however, only allows for OLS and probit models for the mediator-outcome regression. To address this concern, we create a dichotomous variable equal to one when rebels use female fighters in terrorist attacks and equal to zero otherwise. Using this indicator, we rerun the analysis in the main text estimating a probit model for the mediator-outcome regression (Appendix, Figure 10). The main results remain consistent.

mediator models represent the first stage of the estimation and report the effects of prevalence of female fighters and prevalence of female fighters (high est.) on the prevalence of female fighters in terrorist operations. Both exposure-mediator models show a significant and positive relationship between the prevalence of female fighters and the prevalence of female fighters in terrorist operations providing support to the idea that rebels use as many female operatives as they can in terrorist operations hoping to exploit their tactical and strategic advantages. The mediator-outcome models test the effects of the mediator and exposure variables on the number of civilian terrorism casualties. Both mediator-outcome models show that while the prevalence of female fighters in rebel groups does not bear a direct effect on the number of terrorist casualties, the effect of the prevalence female fighters in terrorist operations is positive and significant. In particular, Model 1 Table 1 implies that at one ordinal scale increase of prevalence of female fighters, the prevalence of female operatives in terrorist operations increases by half a unit. Ultimately, any unit increase of prevalence of female operatives in terrorist operations lead to an average increase of 196 additional civilian victims of terrorist attacks.

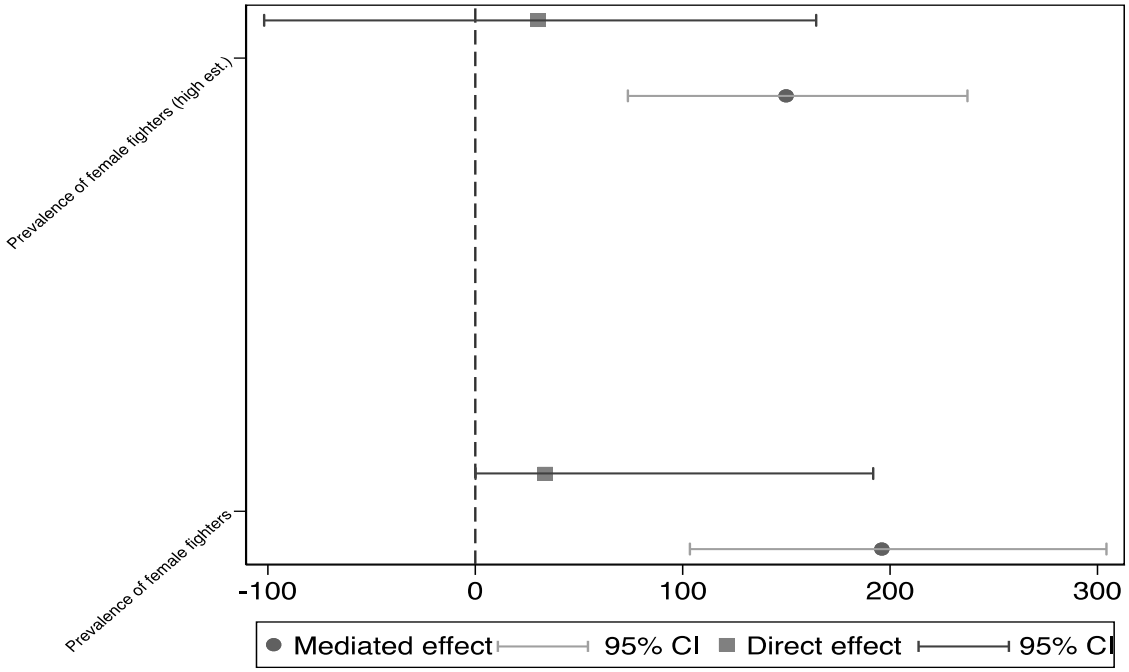
We plot the main findings in Figure 2 below. Each pair of estimates reported in Figure 2 are produced by a single full mediation model where the explanatory variable represents WARD high estimation of prevalence of female fighters (top of Figure 2) and WARD best estimation of prevalence of female fighters (bottom of Figure 2). Figure 2 confirms that the mediated effect of prevalence of female fighters (for both the WARD's best and high estimation) on the expected number of terrorist casualties is positive and significant, while the direct effect is not significant. These results provide evidence that rebels rationally exploit societal gender stereotypes and take advantage of their female operatives using as many of them as possible in tasks that maximise their strategic utility and effectiveness: terrorist operations. Crucially, the direct effects of both indicators are not significant, showing that no alternative explanations underlay the relationship between prevalence of female fighters and lethality of terrorist operations.

Table 2 – Mediation models.

VARIABLES	Model 1 Exposure-mediator	Model 1 Mediator-outcome	Model 2 Exposure-mediator	Model 2 Mediator-outcome
Prevalence of female fighters	.66*** (.09)	39.84 (82.46)		
Prevalence of female fighters (high est.)			.50*** (.085)	35.45 (69.92)
Prev. of female fighters in terrorist operations		288.70*** (59.79)		288.90*** (58.78)
Military strength		92.50 (74.11)		90.12 (74.24)
Forced recruitment		-57.25 (106.70)		-59.63 (107.00)
Leftist ideology		-369.50* (197.90)		-351.50* (179.70)
Jihadist ideology		-48.17 (146.50)		-40.73 (149.70)
Nationalist ideology		-64.97 (105.10)		-65.23 (105.10)
Splinter groups		294.60* (151.60)		284.50* (151.90)
Civil war duration		11.80** (5.51)		11.21* (5.83)
GDP per capita (logged)		-73.42 (71.05)		-75.83 (69.98)
Free elections		32.53 (64.32)		33.76 (64.69)
Media freedom		-25.37 (62.78)		-24.77 (62.83)
Percent. Muslim		226.10 (143.50)		226.70 (143.40)
Constant	.20*** (.10)	367.90 (522.60)	.19** (.10)	389.10 (514.70)
Observations	146	146	146	146
R-squared	0.25	0.30	0.19	0.30

*Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

Figure 2. Estimated average mediation effects and direct effects of treatment of interest on the expected number of civilian terrorism casualties.



As a first robustness check, we test whether a higher share of female operatives in terrorist operations leads groups to recruit more women in their fighting ranks, leading to more lethal terrorist campaigns by, for example, weakening the military strength of the group. While the direct effect of female prevalence in terrorist operations on the number of terrorism causalities is positive and significant, we do not find evidence that a mediated effect of female prevalence in terrorist operations through the prevalence of female fighters is in place (Appendix, Figure 3). We also check that the control variables included in the full model with the best estimate are not driving the results by running a simple bivariate mediation model (Appendix, Figure 4). While the results remain consistent with those presented in the main text, excluding controls decreases the magnitude of the effect of our mediated mechanism on the outcome: the number of expected terrorist casualties decreases to 155 for one

unit increase of prevalence of female operatives in terrorist operations. We then re-run the mediation models using high-causality targets, high-causality undergrounds attacks and highly destructive explosive as alternative treatments (Appendix, Figures 5-7). We also re-run the mediation models proposed in the main text using an alternative measure of competition between rebel groups involved in civil war (Appendix Figure 8). Finally, we test whether the results remain robust when considering exclusively large-scale conflict reducing the sample to 125 rebel groups (Appendix Figure 9). The results presented in the main text remain robust to all these checks.

After robustness checks, across the control variables, only the duration of civil war seems to have a robust and positive effect. This is consistent with the literature suggesting that longer civil wars increase rebels' internal organizational pressure as leaders develop expectations of a decline in followers' commitment with protracted use of mass dissident tactics, leading to an increased use of terrorist strategies to maintain commitment (Belgioioso 2018).

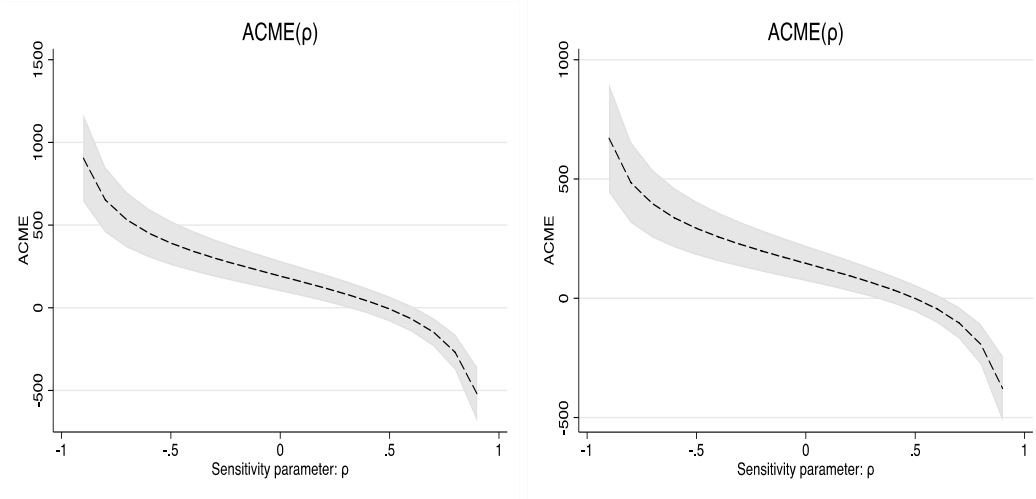
6. Sensitivity Analysis

We conduct sensitivity analyses to investigate the extent to which our conclusions are robust to unobserved pre-treatment confounders using 'medsens' (Hicks & Tingley 2011). In our analysis we assume that we have fully accounted for any confounders that might have effects on both the mediator and the outcome, but this might not be the case. In other words, it might be that unobserved underlying features of rebel organizations affect both female affiliation in general as well as use of female fighters in terrorist operations in particular. If for example, unmeasured historical gender relationships of the society in which the rebel group operates make rebel groups both more likely to include more women in their ranks and to use more women in terrorist operations our estimations of the mediated effects are bias.

Figure 3 below plots the true mediated effect for our variables of interest (Y axes) against values of the sensitivity parameter which is equal to the correlation between the error terms in the mediated and outcome models (X axes). This parameter represents both the degree and direction of the unobserved confounding factor. As

the mediation analysis assume no correlation between error terms in the mediation and outcome models, the fitted value of the average mediation effects reported in Figure 3 below coincides to 0 on the X axes. The question that we are asking here is how large must the correlations between the error terms be for the average mediated effects to be indistinguishable from zero? A low value of this proportion indicates a more robust estimate of the mediation effect because there is less room for an unobserved confuter to bias the results (Imai et al. 2011). Across the models presented in the main text, the sensitivity analyses show that an omitted variable confounder would have to explain the .04 percent of the total variation not explained by the observed predictors for the average mediation effects to be biased.

Figure 3. Sensitivity analyses for models in Figure 2.



7. Conclusion

Whilst a substantial number of studies on the organizational determinants of terrorism in civil wars and on the role of female in terrorist operations have been published in recent years, substantial gaps exist in our understanding of the strategic logic of using female fighters in deadly terrorist attacks in civil wars settings. Particularly under-investigated is whether tactical and strategic violent behaviours of armed

groups in civil wars can be explained at least partially when accounting for considerations on societal gender biases. This is problematic given that women make up around 30-40% of many rebel groups (Wood & Thomas 2017; Henshaw 2018). Our study is the first to explore the relationship between women fighters and the deadlines of terrorist attacks in civil wars by focusing on incentives that societal gender stereotyping provides to rebel groups when employing female operatives in terrorist operations.

We have argued that rebel groups with a higher prevalence of female fighters have incentives to use their female operatives in terrorist attacks to exploit societal gender stereotyping and perpetrate more lethal terrorist operations. The capacity of female operatives to be more deadly than male operatives make up an incentive for rebel groups to use their female fighters in terrorist attacks. In addition, female perpetrators provide rebel groups with specific propaganda advantages. Their gender-specific propaganda value is two-fold: gendered narratives portraying female participation in terrorist operations (1) discredit governments' actions thereby increasing support for the rebel group, (2) allow rebels to shame men and encourages female sympathisers to join the fight.

From a methodological point of view, terrorism studies exploring the connections between gender and dynamics of violence have largely relied on unique case studies and comparative analysis focused on groups perpetrating terrorist attacks. To our knowledge, this is the first study to explore the employment of female fighters in terrorist operations across rebel groups that do and do not use terrorist attacks. More generally, much of the research on female fighters in civil wars is characterised by an absence of available sets of large-N quantitative data on roles of female operatives. Future research might depart from the evidence provided in this study to further test the links between gender stereotyping, female fighters and various types of violent behaviours used by rebel groups in civil wars. Further research might also attempt to use survey experiments to explore the latent sentiments of various audiences when the news of female operatives involved in very lethal terrorist violence became known depending on specific media narratives. This study provides evidence that rebels use

as many female fighters as possible as asymmetric weapons exploiting gender stereotypes to cause intense civilian losses and capitalize support. Therefore, measures for countering gender discrimination and negative gender stereotypes in civil wars might eventually contribute to decrease civilians' deaths.

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