The Hard Science of Soft Targets What Makes Terrorist Attacks Lethal in Europe?

—

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Applied Statistical Analysis II Group Assignment

Link to GitHub

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Abstract

This research investigates the potential factors influencing terrorist attack lethality across Europe using an integrative framework. While some attacks inflict mass casualties, others result in minimal harm. Variation in casualties and death counts raises a fundamental question: What factors influence the lethality of terrorist attacks in Europe? Unlike previous research examining individual explanatory variables in isolation, we propose the Attack Contextual and Tactical InteractiON (ACTION) framework, which emphasises that lethality arises from the additive effect of the environmental context of attacks in addition to the tactical decisions and levels of group experience. Using data from the Global Terrorism Database, we test six hypotheses examining target type, location, seasonality, group experience and weapon selection. Our findings are largely in line with our predictions, while some question other elements of our framework. These results contribute to our understanding of the lethality of terrorist attacks in a European context, and suggest several additional analyses to further nuance these results.

Contents

1 Introduction

From the 2004 train bombings in Madrid to a vehicle-ramming attack in Nice on Bastille Day in 2016, the proliferation of terrorist attacks in Europe in recent times presents significant security challenges for the continent. Terrorism in this region differs due to unique historical, political, and geographical factors (Oliverio, 2008). Current literature and research on terrorism has a strong focus on non-European attacks and on individual factors and effects - while a comprehensive analysis on terrorist attack lethality in Europe remains sparse and underdeveloped. Most studies focus on examining isolated factors, such as weapon type or target selection. In light of the fact that these individual effects have limited our ability to explain the variations in attack outcomes, we introduce a new theoretical framework - the Attack Contextual and Tactical InteractiON (ACTION) framework. ACTION proposes that lethality emerges from three key dimensions: environmental context, tactical decision-making, and experience. By examining how physical settings, security infrastructure, targets' routine activities, weapon selection, and group experience collectively shape lethal outcomes, we aim to move beyond single-factor explanations.

Our framework challenges existing approaches by bringing together tactical choices at a micro-level, and environmental factors at a macro-level. It attempts to explain why similar actors may cause different levels of lethality in separate contexts and assist in generating testable predictions about patterns of attack. Europe has faced an increasing number of terrorist attacks in recent years and the continent's security has become a bone of contention with its members and voters. Through analysis of GTD data in European countries, our research aims to better our theoretical understanding of terrorist lethality and the practical capacity to mitigate unwanted consequences.

We consider attacks through a lens that combines elements of environmental criminology, tactical decision-making and organisational learning to understand why some attacks are more lethal than others.

2 Literature Review

2.1 Environmental Context

Environmental criminology provides foundational understanding as to how physical and social contexts can shape terrorist opportunities. Cohen and Felson's (1979) "routine activities theory" posits that crime occurs when there is spatio-temporal convergence of motivation, a suitable target and absence of security. LaFree and Birkbeck (1991) extend this with a "situational analysis" of crime, showing how different types of crime cluster along different situational factors. Brantingham and Brantingham (1993) also found that criminal activity is non-random, but follows complex spatio-temporal patterns of interaction between offenders and their environment. Clarke and Newman (2006) applied similar theories to terrorism, demonstrating how groups identify and exploit flaws when selecting targets.

The difference in security levels between target types notably impacts lethality outcomes. Asal and Rethemeyer (2008) found that "soft targets" (e.g. those lacking security measures) experience higher fatality rates. Comparably, Santifort et al. (2013) showed how public transport is especially vulnerable due to crowd density and challenges in defence. This dynamic between security and vulnerability extends to regional differences, with Nemeth et al. (2014) finding that variation in security infrastructure in both densely populated and mountainous areas create potential hotspots for both terrorist attacks and civil wars.

2.2 Tactical Decision-Making

The tactical choices made by terrorist actors reflect rational decision-making processes. Crenshaw (1981) established that terrorist groups make calculated decisions based on strategic objectives. Extending this perspective to airline hijackings, Dugan et al. (2005) demonstrate how security measures (such as metal detectors at airports) usher in tactical adaptation, with the perpetrators finding new measures to overcome obstacles. Weapon selection represents a crucial tactical decision influencing lethality. Bogen and Jones (2006) found that 70% of deaths in adverse events involved bombs and guns, over other weapon types. This weapon choice dimension interacts with environmental factors, as demonstrated by Townsley et al. (2008), who found that terrorist events in Iraq clustered in space and time more than would be expected - which, for other terrorist groups, could indicate increased lethality in times of increased public gathering.

2.3 Organisational Learning

Horowitz (2010) found that terrorist groups innovate through adaptation and relationships made between groups over time. Building on this, Koehler-Derrick and Milton (2017) demonstrated that groups more developed and less constrained in size displayed increased tactical proficiency - indicating that growth, in line with action, can create more efficient tactics. This organisational learning process, as Kenney (2007) argues, created signatures and patterns in attack execution, learned through terrorist codebooks or from experienced guerrilla fighters. The spatial dimension of terrorism further reinforces our integrated approach. Behlendorf et al. (2012) discuss how groups have adapted tactics to fit certain environmental contexts, like how the ETA (Basque Fatherland and Freedom) focused more on police targets in provincial capitals in the Basque country - demonstrating an environmental-tactical interplay.

We see this extant literature as pointing to a need for an integrative theoretical framework that motivates investigation into how the lethality of terrorist attacks emerges from the combination of environmental context, tactical decision-making and organisational learning. A framework connecting these components would offer a more refined understanding of terrorism outcomes than single-factor explanations.

3 Theoretical Argument

Finding no specific framework unique for our purposes of seeking an integrative approach to explaining lethality, we drew on our surveyed literature to formulate a new theoretical framework - the Attack Contextual and Tactical InteractiON (ACTION). ACTION posits that attack lethality emerges from additive effects of specific environmental factors and tactical choices made by the offenders, in addition to the level of group experience. The attack's environment encompasses the physical, social-temporal and security contexts within which terrorist groups operate, which includes potential seasonal fluctuations, country-specific factors, and varying target accessibility. Tactical choices refer to the decisions made by the perpetrators regarding weapon selection and attack strategy. The ACTION framework builds upon aspects from environmental criminology, such as how Brantingham and Brantingham (1993) demonstrate how physical and social environments can shape criminal opportunities, and the emphasis on Cohen and Felson's (1979) routine activities theory on target choice and absence of security. The ACTION framework also incorporates elements of Crenshaws's (1981) rational choice perspective, recognising that terrorist groups make calculated decisions based on their strategic objective and operational constraints.

Central to ACTION is "operational adaptation," wherein terrorist groups adjust their tactical choices in response to environmental restrictions. If faced with robust security measures, terrorist groups adapt by selecting weapons and attack methods that circumvent these barriers. Alternatively, in less-secure environments, groups may optimise their strategy for maximum lethality. This adaptive process creates observable patterns in attack lethality across contexts.

The ACTION framework also recognises the role of "tactical efficiency" - the effectiveness with which groups convert their capabilities into fatal results. Drawing from Kenny's (2007) organisational learning theory, we argue that groups develop specific tactics bred for efficiency through experience. This process creates signature patterns in attack that vary by group, target type and context.

Based on this theoretical framework, we propose the following hypotheses;

H1 - Attacks against civilian targets (in areas such as public spaces, transportation) have higher fatality rates than attacks against more secured targets (such as military, police).

H2 - Attacks on transportation systems result in higher fatality rates than attacks on government buildings due to differences in security measures and crowd density.

H3 - Terrorist attacks in Western European countries result in fewer fatalities than attacks in Eastern European countries due to increased security infrastructure.

H4 - Terrorist attacks during summer months (when public spaces are more densely populated) result in higher fatality rates than attacks during other times of year.

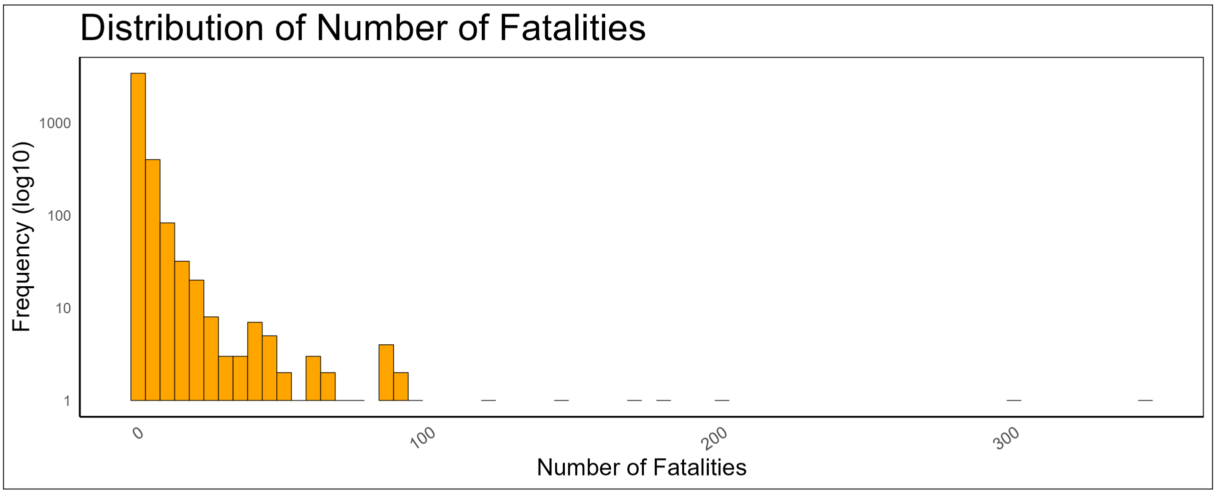
H5 - More experienced groups (higher number of previous attacks) achieve higher fatality rates.

H6 - Attacks using explosive devices produce higher fatality rates than attacks using other weapon types.

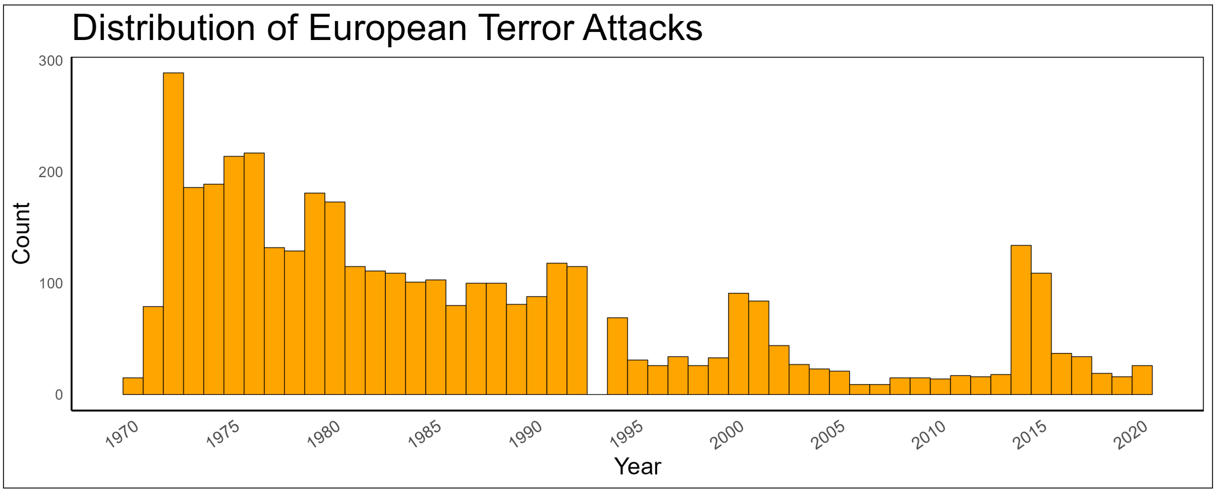
4 Methodology

Data was obtained from the Global Terrorism Database (hereafter the GTD), an open-source dataset from the National Consortium for the Study of Terrorism and Responses to Terrorism (START) centre at the University of Maryland (START, 2024), which is commonly used in terrorism research. The unfiltered dataset consists of 209,706 attacks from 1970 to 2020, while its inclusion of variables such as group, target type, weapon type, and casualties, make it highly relevant to our research interests.

Observations with unknown values for text-based variables like group names and attack types were removed. While these omissions may have been non-random, our analysis required informative entries and these values could not be imputed. Because attack lethality is measured as a count variable (total casualties, including fatalities and injuries), we selected Poisson regression as our core method of analysis. Attacks with zero or unknown fatalities were excluded (where 'nkill' was 0 or missing), to ensure the analysis focuses on events with confirmed deaths. While this step aimed to address the issue of excess zeros potentially leading to overdispersion, the risk of overdispersion still remains, especially given the prevalence of attacks with low fatality counts, as can be seen with the distribution of the data. This could challenge a key assumption of Poisson regression.



After removing 0s and missing values, and filtering for attacks occurring only in Europe, we end up with a total sample of n = 4022 attacks. This allows us to concentrate on the core elements of lethality in European attacks, removing the noise of irrelevant or unusable data.



To determine the best model fit, we compared the Akaike Information Criterion (AIC) across models. The lower AIC of the Negative Binomial model confirmed its superior fit. Consequently, the Negative Binomial model is the most appropriate model to analyse our data, as it accounts for the observed overdispersion and provides a better fit for the data's distribution compared to OLS and Poisson regression.

Model	AIC
OLS model	30118.82
Poisson Model	23365.57
Negative Binomial Model	14692.46

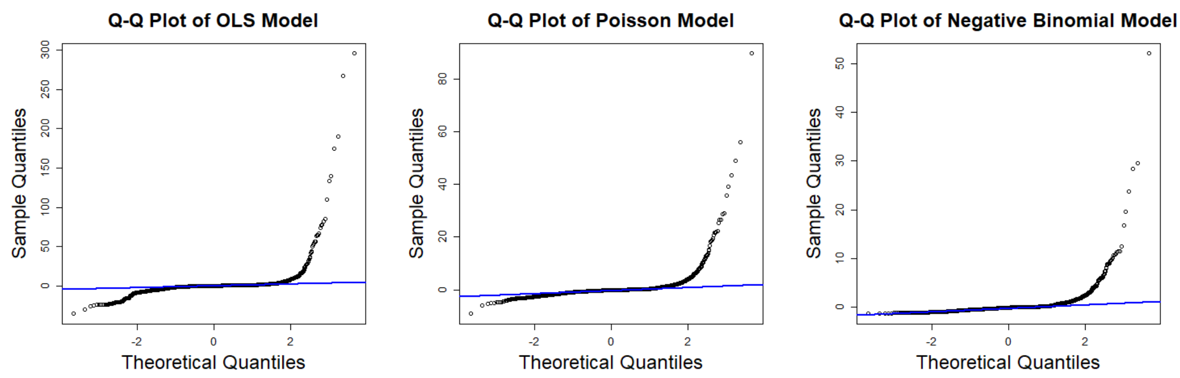
4.1 Empirical operationalisation

We operationalised our dependent variable, lethality, as the number of recorded deaths. This is a straightforwardly quantifiable outcome, as the number of recorded deaths can be treated as a binary outcome data generating process. While the total number of injuries also features in the GTD, the GTD does not provide detail on injury type or severity. We choose to focus solely on fatalities as this allows us to concentrate on the extreme end of the lethality spectrum. This decision aligns with the research question, which specifically aims to understand the factors driving the most lethal attacks.

The selection of independent variables was guiding by our theoretical framework and the availability of data within the Global Terrorism Database (GTD) codebook. "Environmental factors" were operationalised as a combination of variables: region (Western vs Eastern Europe), time of year (season), and target type (e.g. airport versus educational institution). "Tactical factors" were operationalised as weapon-type and attack type (e.g. assault, bombing). For the "experience" component of ACTION, we did not code for the number of attacks of each group, but rather chose the top ten most frequently occurring groups as predictors of lethality, compared against all other groups as a reference category.

4.2 Strategy for analysis

Given our count-based dependent variable (number of deaths) the potential models for statistical analysis were either Poisson or Negative Binomial regression. Ordinary Least Squares (OLS) was not appropriate due to its assumption of normally distributed residuals, a condition clearly violated as evidenced by the non-normal residuals in our Q-Q plot. Count data is also inherently skewed and discrete, further violating OLS assumptions. Even the Poisson model presented challenges, as its Q-Q plot revealed higher sample quantiles than the Negative Binomial, with residuals still deviating at the extremes, suggesting it might not be optimal.



5 Results

The following table presents key variables and their coefficients exponentiated for easier interpretation. The full regression results can be found in Appendix 1.

Variable	***Coefficient***	***P-value***
Perpetrator Group (Reference: Other)		
Chechen Rebels	1.602	p<0.01
Irish National Army (IRA)	0.675	p<0.01
Basque Fatherland and Freedom	0.73	p<0.01
Target Type (Reference: Private Citizens & Property)		
Airports	5.721	p<0.01
Educational Institution	2.171	p<0.01
Transportation	2.676	p<0.01
Government (General)	0.857	p<0.01
Weapon Type (Reference: Firearms)		
Vehicle	4.33	p<0.01
Explosives	1.356	p<0.01
Melee	0.724	p<0.01
Attack Type (Reference: Assassination)		
Hostage Taking (Barricade)	7.407	p<0.01
Armed Assault	1.523	p<0.01
Bombing or Explosion	1.42	p<0.01
Season (ref: Summer)		
Spring	0.866	p<0.01
Winter	0.87	p<0.01
Region (ref: Western Europe)		
Eastern Europe	1.551	p<0.01

The constant term in the regression model represents the baseline expected count of fatalities when all predictor variables are held at their respective reference categories. Ideally, it would provide a meaningful intercept value. However, in this analysis, the constant was statistically insignificant and approximated zero. This likely comes from the reference category for perpetrator groups ("other") which includes a diverse mix of groups rather than a single, defined category. Unlike the other predictors with clear baselines, this broad grouping makes the constant unstable and difficult to interpret. All other reported results are statistically significant.

Perpetrator Groups Chechen Rebels and Donetsk People's Republic caused more deaths compared to our "Other" baseline. Attacks by the Chechen Rebels led to a 60.2% increase in fatalities, and those by the Donetsk People's Republic saw a 44.7% increase. In contrast, the other groups, like the IRA and Basque Fatherland and Freedom were linked to fewer deaths. This shows that higher attack frequency does not correlate with greater lethality, indicating these groups were potentially more focused on political messaging or damaging infrastructure instead of causing mass casualties.

Target Type Attacks on large, crowded targets like airports, transportation hubs, and educational institutions had the highest fatality rates, with airports alone leading to a 472.1% increase in expected deaths. These results show how certain targets are more vulnerable to deadly attacks due to large concentrations of people. On the other hand, attacks on government (building, diplomats, members, etc) and journalists led to fewer deaths, possibly due to better security or a focus on targeted attacks, which are aimed at specific individuals rather than large groups.

Weapon Type Vehicle attacks were the deadliest, causing four times more fatalities than firearms, which was the baseline. Since they can strike large crowds quickly, the impact is often severe. Explosives were also highly dangerous, but security measures like bomb detection may limit their effect. Melee and incendiary attacks were less lethal, as they require close contact and cannot cause mass casualties as effectively as vehicles or explosives.

Attack Type Hostage-taking incidents, especially barricade situations, had the strongest effect in the regression, with a 640.7% increase in fatalities. These situations often lead to long standoffs and failed rescues, raising the number of deaths quickly (Schmid, 2021). Armed assaults and bombings also increased fatalities by around 50%. Every attack type resulted in more fatalities than assassinations, which served as the baseline in the model. Since assassinations typically focus on eliminating a single individual, they naturally result in fewer deaths compared to large-scale attacks.

Season Attacks during the summer months saw the highest fatalities. This could be due to larger public gatherings, increased tourism, and major events, which give easier access to and larger crowds. Compared to summer, the number of deaths were lower in spring (-13.4%), winter (-13%), and autumn (-10.5%). Warmer climates may make it easier for attackers to move and manage logistics.

Region The model also shows regional differences between the lethality of attack in Eastern vs Western Europe. Eastern Europe showed a 55% increase in the fatality rates compared to Western Europe. This confirms that there exists factors specific to the region (e.g., political instability, different security environments) that may influence the lethality of the attacks.

In addition to the main model, we ran separate Negative Binomial regressions for each category to simplify the analysis and improve its interpretation. By isolating each factor, these models show the impact of each variable on fatalities without the influence of other categories. This approach makes it easier to compare which factors have the strongest contribution to lethality, like target type versus weapon type. The results from these separate models confirmed the main findings, with target type and attack method being the strongest predictor of fatalities, with the largest coefficients. For example, attacks on airports led to a 1065.4% increase in fatalities, and hostage-taking incidents saw an even greater increase of 2274.4%.

For perpetrators, the "Other" category had a high coefficient (4.034), meaning even lesser-known groups can carry out highly lethal attacks. In the attack method model, assassination was the baseline category and had the lowest coefficient (1.174), as it focuses on individual targets rather than mass casualties. These results confirm that the scale of fatalities is influenced by a range of factors, including attack strategy, target type, weapon type, and perpetrator group, each contributing in different degrees.

Table 1: Type of Attack

	Dependent variable:
	nkill
Armed Assault	2.745***
	(0.047)
Bombing or Explosion	3.912***
	(0.041)
Facility or Infrastructure Attack	1.626***
	(0.241)
Hijacking	7.438***
	(0.240)
Hostage Taking (Barricade)	23.744***
	(0.178)
Hostage Taking (Kidnapping)	3.365***
	(0.158)
Unarmed Assault	1.987***
	(0.237)
Assassination	1.174***
	(0.027)
Observations	4,022
Log Likelihood	−7,915.020
θ	1.352*** (0.037)
Akaike Inf. Crit.	15,846.040
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 2: Terrorist Group Name

	Dependent variable:
	nkill
Basque Fatherland and Freedom	0.361^{***}
	(0.060)
Chechen Rebels	1.933^{***}
	(0.074)
Donetsk People's Republic	2.442^{***}
	(0.079)
Irish National Liberation Army (INLA)	0.324^{**}
	(0.141)
Irish Republican Army (IRA)	0.341^{***}
	(0.046)
Irish Republican Extremists	0.308^{**}
	(0.151)
Protestant extremists	0.292^{***}
	(0.080)
Ulster Freedom Fighters (UFF)	0.281^{***}
	(0.101)
Ulster Volunteer Force (UVF)	0.367^{***}
	(0.082)
Other	4.034^{***}
	(0.030)
Observations	4,022
Log Likelihood	−7,883.510
θ	1.382^{***} (0.038)
Akaike Inf. Crit.	15,787.020
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 3: Target of Attack

	Dependent variable:
	nkill
Target = Airport	11.654***
	(0.162)
Target = Business	1.405***
	(0.066)
Target = Educational Institution	10.769***
	(0.212)
Target = Food or Water Supply	0.497
	(1.354)
Target = Government (Diplomatic)	0.728***
	(0.171)
Target = Government (General)	1.124***
	(0.078)
Target = Journalists	1.123***
	(0.206)
Target = Maritime	1.393***
	(0.489)
Target = Military	1.433***
	(0.049)
Target = NGO	0.497
	(0.553)
Target = Other	0.497
	(1.354)

Target = Police	0.948***
	(0.052)
Target = Religious Figure or Institution	1.403***
	(0.209)
Target = Telecommunication	0.497
	(0.677)
Target = Terrorist or Non-State Militia	0.645***
	(0.095)
Target = Tourists	1.293***
	(0.494)
Target = Transportation	5.234***
	(0.119)
Target = Utilities	2.558***
	(0.384)
Target = Violent Political Party	0.746
	(0.501)
Target = Private Citizens and Property	2.010***
	(0.034)
Observations	4,022
Log Likelihood	−8,197.421
θ	1.203*** (0.033)
Akaike Inf. Crit.	16,434.840
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 4: Weapon Used in the Attack

	Dependent variable:
	nkill
Weapon = Chemical	0.580
	(1.371)
Weapon = Explosives	2.822***
	(0.038)
Weapon = Incendiary	1.106***
	(0.211)
Weapon = Melee	0.856***
	(0.116)
Weapon = Other	1.741
	(1.101)
Weapon = Vehicle	5.224***
	(0.575)
Weapon = Firearms	1.723***
	(0.024)
Observations	4,022
Log Likelihood	−8,267.763
θ	1.137*** (0.030)
Akaike Inf. Crit.	16,549.530
Note:	*p<0.1; **p<0.05; ***p<0.01

During the model selection process, we checked assumptions, including tests for overdispersion, which, along with the AIC, indicated that the Negative Binomial model was a better fit than the Poisson model. We can further compare the models using ANOVA and the Chi-square test to assess model fit.

Model	AIC Resid Df	AIC Resid Dev	AIC Df	AIC Deviance
Poisson Model	3974.00	13930.32		
Negative Binomial Model	3974.00	2725.57	-0.00	11204.74

The Negative Binomial model has a significantly lower Residual Deviance (2725.57) compared to the Poisson model (13930.32). This supports the AIC result, confirming that the Negative Binomial model provides a much better fit to the data.

6 Discussion

Our results are broadly in line with our expectations. Attacks on transportation systems were indeed more lethal than on government buildings (H2). While this may be due to differences in security measures and crowd density, our analysis cannot explicitly confirm this. Explosive devices also caused more deaths than firearms, but vehicle attacks resulted in the highest number of fatalities, suggesting that certain weapon types may have a disproportionately higher impact on fatalities than initially expected (H6). However, the hypothesis regarding the experience of terrorist groups was more nuanced (H5). While some experienced groups, such as the Chechen Rebels, resulted in higher fatalities, this was not consistent across all groups, as most experienced groups had less lethal attacks than less experienced ones. Group experience alone may not be the sole factor influencing lethality. Other variables may be at play, such as group-specific strategies or resources, which were not included in this model.

While most of our hypotheses received support, these results are not necessarily robust validation of the ACTION framework. For example, operationalising the region aspect of the "environmental" factors in terms of Western/Eastern Europe is overly coarse. More research is needed to account for additional factors that influence lethality with variables more detailed than those included in the GTD.

A limitation of this analysis is the inability to explore interactions between factors, such as the combination of weapon type and attack method or the interaction between perpetrator group and target type, which could also significantly influence lethality. More sophisticated models, including interaction terms and marginal effect plots for interpretation would be useful to capture more complex relationships. The dataset had many categorical variables, some with up to 20 categories, complicating the analysis. Additionally, while motivational factors were available under the 'motive' variable, these were not included in the regression. The broad political, social, or economic context of this field made it hard to code, treating these as categorical variables, in conjunction with data available from other sources, could have add valuable information in future analyes. We also had to drop several variables due to missing data. It remains unclear if the missingness was random, and looking into this further could help determine if some variables need to be updated or refined. Our study focused on a limited set of variables, but other potentially important factors could influence lethality. For example, whether a group is state-sponsored could provide them with better resources, political support, and even influence their targeting strategy, all of which could impact the lethality of their attacks.

Appendix

Contribution to the project

We had regular meetings all together discussing each other's parts, mainly on the theoretical framework and the data analysis.

- **Abstract:** Eimhin & Fionn
- **Introduction:** Eimhin & Fionn
- **Literature review:** Eimhin & Fionn
- **Theoretical framework:** Eimhin & Fionn
- **Methodology:** Kofi & Ombeline
- **Data Analysis:** Kofi & Ombeline
- **Results:** Kofi & Ombeline
- **Discussion:** Kofi & Ombeline

Full Model

Table 5: Full Model Output

	Dependent variable:
	nkill
Basque Fatherland and Freedom	0.730***
	(0.065)
Chechen Rebels	1.602***
	(0.078)
Donetsk People's Republic	1.447***
	(0.086)
Irish National Liberation Army (INLA)	0.715***
	(0.136)
Irish Republican Army (IRA)	0.675***
	(0.057)
Irish Republican Extremists	0.682***
	(0.147)
Protestant extremists	0.675***
	(0.086)
Ulster Freedom Fighters (UFF)	0.665***
	(0.101)
Ulster Volunteer Force (UVF)	0.776***
	(0.086)
Target = Airport	5.721***
	(0.146)
Target = Business	1.092***

	(0.063)
Target = Educational Institution	2.171***
	(0.188)
Target = Food or Water Supply	0.198
	(1.227)
Target = Government (Diplomatic)	0.640***
	(0.160)
Target = Government (General)	0.857***
	(0.075)
Target = Journalists	0.906***
	(0.186)
Target = Maritime	1.183***
	(0.443)
Target = Military	0.980***
	(0.052)
Target = NGO	0.441
	(0.502)
Target = Other	0.134
	(1.227)
Target = Police	0.907***
	(0.054)
Target = Religious Figure or Institution	0.779***
	(0.191)
Target = Telecommunication	0.656
	(0.614)
Target = Terrorist or Non-State Militia	0.911***

	(0.087)
Target = Tourists	0.796*
	(0.440)
Target = Transportation	2.676***
	(0.102)
Target = Utilities	1.496***
	(0.343)
Target = Violent Political Party	0.944**
	(0.446)
Weapon = Chemical	1.012
	(1.229)
Weapon = Explosives	1.356***
	(0.067)
Weapon = Incendiary	0.863***
	(0.209)
Weapon = Melee	0.724***
	(0.115)
Weapon = Other	1.065
	(0.966)
Weapon = Vehicle	4.330***
	(0.554)
Armed Assault	1.523***
	(0.049)
Bombing or Explosion	1.420***
	(0.071)
Facility or Infrastructure Attack	1.294***

	(0.255)
Hijacking	1.055***
	(0.241)
Hostage Taking (Barricade)	7.407***
	(0.160)
Hostage Taking (Kidnapping)	1.517***
	(0.154)
Unarmed Assault	1.049***
	(0.310)
Region = Eastern Europe	1.551***
	(0.070)
Time of Year = Autumn	0.903***
	(0.049)
Time of Year = Spring	0.866***
	(0.049)
Time of Year = Winter	0.870***
	(0.049)
Constant	0.0001
	(3.751)
Observations	4,022
Log Likelihood	−7,298.231
θ	2.000*** (0.063)
Akaike Inf. Crit.	14,692.460
Note:	*p<0.1; **p<0.05; ***p<0.01

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