



Final Report: Empirical Assessment of Domestic Radicalization (EADR)

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About This Report

This report is part of the National Consortium for the Study of Terrorism and Responses to Terrorism (START) project, “Empirical Assessment of Domestic Radicalization (EADR),” led by Michael Jensen, START, University of Maryland. All questions about this report should be sent to: majensen@umd.edu.

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About START

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Executive Summary

The Empirical Assessment of Domestic Radicalization (EADR) project uses a mixed-method, nested approach to explore a number of key research questions related to radicalization, including:

- what are the demographic, background, and radicalization differences between and within the different ideological milieus?
- are there important contextual, personal, ideological, or experiential differences between radicals who commit violent acts and those who do not?
- is it possible to identify sufficient pathways to violent extremism? and;
- are the causal mechanisms highlighted by extant theories of radicalization supported by empirical evidence?

To address these questions, EADR researchers built the largest known database on individual radicalization in the United States: Profiles of Individual Radicalization in the United States (PIRUS). The database includes 147 variables covering demographic, background, group affiliation, and ideological information for 1,473 violent and non-violent extremists from across the ideological spectrum. The database was analyzed using comparative descriptive statistics and multivariate logistic regression techniques. Additionally, project researchers produced 56 life-course narratives of individuals who radicalized in the U.S., which were analyzed using fuzzy-set qualitative comparative analysis (fs/QCA), a methodology that makes it possible to determine the causal conditions and pathways that are most salient for explaining radicalization to violence.

EADR produced a number of findings that are relevant for domestic countering violent extremism (CVE) programs, law enforcement, criminal justice policy, and academic research.

First, a descriptive comparison of individuals in the PIRUS data shows that with the exception of participation in pre-radicalization criminal activities, many regularly highlighted radicalization warning indicators, such as economic deprivation and low educational attainment, are not more common among extremists than they are for the general population. CVE programs designed to address feelings of relative deprivation may be ineffective in many cases. The results also indicate that it is important to consider age and gender when designing prevention and intervention programs as a part of domestic CVE efforts. Programs designed for juveniles and men may be ineffective for preventing radicalization among older individuals, who are especially prevalent among the far right and single-issue milieus, and women, who are found in large numbers on the far left. In addition to addressing issues of age and gender, intervention programs should look to take advantage of the comparatively long radicalization durations that exist across the ideological spectrum, which often last several months or years, and they should target the face-to-face and virtual social networks that mobilize lone and group-based extremists to act.

Second, through a set of robust statistical models, the project identified a number of factors that indicate which extremists are most likely to engage in violent acts. All other things held constant, pre-radicalization criminal activity and post-radicalization clique membership are strongly associated with violent outcomes among radicalized individuals. To the extent that law-enforcement agencies and CVE programs prioritize potentially violent individuals over others when resources are constrained, this finding suggests that their focus should be placed on individuals with prior interactions with the criminal justice system and those who are known to associate with others holding extreme views. Other factors uncovered by this analysis suggest that individuals on the far right and those motivated by Salafi jihadist ideologies are more likely to engage in violence, while those with stable employment histories and those motivated by animal rights and environmental concerns are significantly less likely to do so.

Lastly, EADR reveals that psychological, emotional, material, and group-based factors can combine in complex ways to produce many pathways to violent extremism. Social and behavioral indicators of radicalization are embedded in complex processes that unfold in non-linear ways. Using fs/QCA techniques, the project reveals that both a sense of community victimization and a radical shift in individuals' cognitive frames are necessary conditions for radicalization to violent extremism. These necessary conditions combine with a host of other factors to produce eight sufficient pathways to violent extremism. Of these, the majority are driven by psychological and emotional vulnerabilities that stem from lost significance, personal trauma, and collective crises. These findings suggest that successful CVE programs and counter-narratives need to address feelings of community victimization in ways that challenge myths and misperceptions, but also acknowledge legitimate grievances. Programs that place an undue focus on particular communities are likely to be counterproductive by exasperating feelings of collective victimization. Successful programs, on the other hand, will be tailored to specific ideological groups and sub-groups, and will address the underlying psychological and emotional vulnerabilities that make individuals open to extremist narratives.

The results of the EADR project lend good support to radicalization mechanisms that are based on personal and collective psychology. That said, our analysis failed to account for the radicalization pathways of 15 of 35 cases of violent extremism that were analyzed, which indicates that extant radicalization research does not account for all of the causal conditions that can contribute to radicalization processes. Future research efforts should focus on interviews with extremists and panel surveys of at-risk populations in order to identify these missing conditions. Doing so will also allow researchers to more closely chart how attitudinal and behavioral traits change over-time. The results of these efforts should be used to inform domestic CVE efforts, especially when it comes to program design and evaluation. CVE programs are only likely to succeed if they reflect an empirical understanding of the myriad causes of radicalization and its consequences.

Project Overview

Despite more than a decade of intense interest in the issue of radicalization, there remains weak empirical grounding for our current understanding of the structures and processes by which some individuals come to adopt extremist ideologies and engage in ideologically motivated violence (Borum 2011; Horgan 2008; Neumann and Kleinmann 2013).¹ Extant research on radicalization has been marred by limitations in scope (i.e., only focusing on radical Islamists, for example [Borum 2011]), a lack of empirical data, and insufficient variation on the dependent variable (i.e., only studying those individuals who successfully commit violent acts) to explain radicalization processes (Gill 2015; Borum 2011). Renewed policy interest in radicalization makes it crucially important to address these shortcomings and to ensure that future research efforts are based on rich data and rigorous methods. The purpose of the Empirical Assessment of Domestic Radicalization (EADR) project is to advance an empirical foundation for understanding radicalization to violent extremism in the United States. EADR pursues this by collecting quantitative and qualitative data on the phenomenon, and by using statistical and qualitative methods to assess the explanatory capabilities of the causal mechanisms that are highlighted by extant theories of radicalization.

In particular, the EADR project addresses several key questions related to radicalization, including:

- what are the demographic, background, and radicalization differences between and within the different ideological milieus?
- are there important contextual, personal, ideological, or experiential differences between radicals who commit violent acts and those who do not?
- is it possible to identify sufficient pathways to violent extremism? and;
- are the causal mechanisms highlighted by extant theories of radicalization supported by empirical evidence?

These questions are addressed in more detail in the findings sections below. As a part of the EADR project, the research team built the largest known database on individual radicalization in the United States: Profiles of Individual Radicalization in the United States (PIRUS). The database, which includes demographic, background, group affiliation, and ideological information on 1,473 individuals, can serve as a foundation for future empirical work on radicalization, and act as a tool by which public officials, law enforcement, community organizers, news media, and the general public come to better understand how individuals radicalize to the point of engaging in illegal behaviors.

The next section of the report details the project design and data collection methods that were used over the course of the project. This section describes how the PIRUS database was constructed and it provides definitions of key terms. The next section gives a brief overview of the analysis techniques that were utilized, including short descriptions of the

¹ This is a shortcoming of terrorism research in general. See Lum et al. 2006.

quantitative and qualitative techniques that were used. Each of the next three sections detail findings from the project that directly address the research questions noted above. These sections provide further details about the particular methods that were used to answer each question and they detail the policy implications of the findings. The next section provides a short discussion of the implications of the project for criminal justice policy in the United States. The final section addresses the limitations of the current study and provides suggestions for future research.

Project Design and Data Collection Methods

This project seeks to address the shortcomings in extant research on radicalization by using a mixed-method, nested approach that analyzes rich large-N and qualitative data in an integrated fashion. The advantage of this approach is that it allows for the detailed study of generalizable causal processes and mechanisms across cases (McCauley and Moskaleiko 2008) in addition to the standard statistical analysis (e.g. multivariate regression analysis) of individual causal factors (Lieberman 2005). This is particularly important for research on radicalization which is increasingly being understood as complex processes driven by multiple causal factors (Horgan 2008; Borum 2011).² The nested approach adopted for this project used preliminary results from the statistical tests to help inform case selection and analysis using a number of selection criteria to insure a diverse sample of cases, a method best suited for hypothesis testing and exploratory analysis (Seawright and Gerring 2008). The qualitative findings were then linked back to the quantitative results, providing a conceptual framework of the mechanisms and pathways through which the indicators derived from the statistical models can be interpreted.

For the purposes of the EADR project, radicalization is defined as the psychological, emotional, and behavioral processes by which an individual or group adopts an ideology that promotes the use of violence for the attainment of political, economic, religious, or social goals. We treat as violent extremism those acts that intend to kill or injure in pursuit of political, economic, religious, or social goals. Given the dearth of empirical data on radicalization, this project entailed significant quantitative and qualitative data collection efforts. To facilitate these analyses, the project team used publically available sources to build a cross-sectional dataset of attributes for 1,473 individuals who radicalized in the United States to the point of violent or non-violent ideologically motivated criminal activity, or ideologically motivated association with a foreign or domestic extremist organization. The PIRUS database includes 147 variable fields that contain detailed information on the individuals' criminal activities and/or violent plots, their relationships with extremist groups, their radicalization processes, their attachment to ideological milieus, and their demographic characteristics and personal histories. Sources referenced include: newspaper articles, websites (e.g., government, terrorist group, watchdog groups, research institutes, personal information finder sites), secondary datasets, peer-reviewed academic

² On multiple conjunctural causation, see Ragin 1987.

articles, journalistic accounts including books and documentaries, court records, police reports, witness transcribed interviews, psychological evaluations/reports, and information credited to the individual being researched (verified personal websites, autobiographies, social media accounts).

Unlike some radicalization studies that focus on specific ideological groups (Borum 2011), the PIRUS data include domestic extremist individuals from across the spectrum of radical ideologies in the United States. Broadly categorized, those ideologies are Islamist, far right, far left, and single issue.

Islamist. We recognize that the terms “Islamist”, “jihadism”, and “jihadist” are applied inconsistently in both academic and policy circles, and can imply a wide range of meanings based on the context in which they are used.³ For this project, we use the broad term “Islamist” in reference to the religio-political methodology practiced by Sunni Islamist-Salafists who seek the immediate overthrow of incumbent regimes, and the non-Muslim geopolitical forces which support them, in order to pave the way for an Islamist society which would be developed through martial power. Although there are a number of Islamist-Salafist thinkers who do not advocate for violent military strategies to achieve their goals (e.g., Muhammad Nasiruddin al-Albani), in the U.S. context, the individuals we classify as “Islamists” are most commonly connected to, or inspired by, violent Islamist-Salafist groups that have their roots in the onset of “global jihadism” of the 1980s, including al-Qaeda and its affiliated movements (Sadowski 2006). There are a number of ideological tenets commonly elaborated by Islamist-Salafist groups, including the imposition of *shari’a* with violent jihad as a central component, the creation of an expansionist Islamic state, or *khalifa*, and the use of local, national, and international grievances affecting Muslims, which are aired in an overtly religious context (Simcox and Dyer 2013; Hoffman 2006; Mogahadam 2016).

Far right. There exists a broad range of far right beliefs and actors (often overlapping movements), including both reactionary and revolutionary justifications of violence (George and Wilcox 1996). In its modern manifestation in the United States, the ideology of the far right is generally exclusivist and favors social hierarchy, seeking an idealized future favoring a particular group, whether that group identity is racial, pseudo-national (e.g., the Texas Republic) or characterized by individualistic traits (e.g., survivalists) (Chermak, Freilich, and Suttmoeller 2013; Simi and Bubolz forthcoming). The extremist far right commonly shows antipathy to the political left and the federal government. As a result of this heterodoxy, this category includes radical individuals linked to extremist religious groups (e.g., Identity Christians), non-religious racial supremacists (e.g., Creativity Movement, National Alliance), tax protesters, sovereign citizens, militias, and militant gun rights advocates.

³ For a thorough review of the challenges in defining these terms, see Sedgwick 2015.

Far left. The far left in the United States is essentially class-oriented and consists primarily of individuals and groups that adhere to belief systems based on egalitarianism and the mobilization of disenfranchised segments of the population (George and Wilcox 1996). With roots in the leftist student movement and radical prison reform movement of the late 1960s, traditional far left extremists generally sought the overthrow of the capitalist system, including the United States government, in order to replace it with a new, anti-imperialist economic order that empowers members of the “working class” (Smith 1994). The traditional left included groups that maintained a distinct racial identity (e.g., Black Panther Party), which were motivated by a mix of economic grievances and race-based issues. Today, the far left is more commonly identified by followers of animal-rights and environmental protection issues. While not all animal rights or environmental groups are inherently leftist in orientation (for instance, there are Green Fascists), the vast majority of these individuals and groups identify with leftist political positions and have thus been included in the far left category for the purposes of this project.

Single issue. Single issue extremists are individuals who are motivated primarily by a single issue, rather than a broad ideology. Examples in the PIRUS data of single issue extremists are individuals associated with the Puerto Rican independence movement, anti-abortion extremists that were not motivated by traditional far right issues (anti-government, race superiority, etc.), members of the Jewish Defense League, and extremists with idiosyncratic ideologies (e.g., Ted Kaczynski).

Data collection and coding for the quantitative portion of the project occurred in several stages. First, starting in January 2013, researchers used open-sources and extant START research products to collect a list of names and preliminary background information on approximately 3,900 individuals from various ideological milieus and time frames for possible inclusion in the dataset. Second, starting in June 2013, researchers coded each of these observations to determine whether the individuals should be included in the dataset based on the following set of inclusion criteria:

- The individual met all three of the following:
 - The individual radicalized in the United States;
 - The individual espoused ideological motives; and
 - The individual engaged in ideologically motivated acts.
- The individual also met **one** of the following five criteria:
 - The individual was arrested;
 - The individual was indicted for a crime;
 - The individual was killed as a result of his or her ideological activities;
 - The individual is/was a member of a designated terrorist organization; or
 - The individual was associated with an organization whose leader(s) or founder(s) has/have been indicted of an ideologically motivated violent offense.

Third, also starting in June 2013, researchers coded the relevant background, contextual, and ideological information on a random sample of individuals who were selected for inclusion in the dataset. Random sampling techniques were used to ensure that the database is representative of radicalization in the U.S. at all points in time that are covered by the project (1945 to 2013).⁴ The criteria coding and full coding stages occurred in multiple waves taking place in summer 2013, fall 2013, and spring 2014, thereby producing sub-sets of fully coded data that allowed for preliminary analysis in the initial phases of the project (see, for example, Jensen, James, and Tinsley 2015). Criteria evaluation continued throughout the life of the project and eventually yielded 1,473 individuals for inclusion in the final dataset. Coders double-coded approximately 10% of the individuals in the data to allow for iterative reliability tests of the coding instrument for each stage of the coding process. Researchers used the Krippendorff's alpha procedure to test for inter-rater reliability across the double-coded cases (Krippendorff and Hayes 2007). The score for the first wave was 0.68, the score for the second wave was 0.73, and the score for the third wave was 0.76. As a standard for acceptable reliability is 0.7, these scores indicate that the data is reliable and that the coding procedure improved between the three waves of full-coding. Moreover, to ensure overall quality of the data, project researchers systematically reviewed and cleaned the data in fall 2014 and spring 2015.

In the initial data collection phase of the project, researchers adopted a systematic approach to handling missing data. Whenever information for a particular variable was not presented in the sources, coders were instructed to treat the information as missing, even if strong logical arguments could be made for treating the values as "No" or "0".⁵ In these cases, coders assigned a missing value code of "-99", or "-88" if the observation was not logically possible (e.g., group-relevant variables when the individual was a lone actor). Only when there was confirmation in sources that the accurate variable value is "No" or "0" did researchers code the value as such. While this approach ensures against the unlikely possibility of erroneously coding values as absent, it also produces high rates of missingness for many variables. High percentages of missing data can render statistical tests more difficult, so the research team adopted several strategies to mitigate the challenges posed by missing data, including fixed-value and expected maximization imputation (King et al. 2001). A detailed discussion of the strengths and weaknesses of the various techniques for handling missing data is found in later sections of the report.

Finally, data collection and coding for the qualitative portion of the project began in summer 2013. Using a nested analysis approach, researchers selected 56 individuals from the first two waves of full coding to be subjects of the life-histories based on three factors:

⁴ While every effort was made to ensure the representativeness of the data, it is important to note that given our reliance on open-sources, the sample likely reflects news reporting trends over time. That is, as reporters shift their focus over time from one ideology or movement to another, it becomes increasingly easier to identify individuals who are associated with the groups that are under intense media scrutiny, and increasingly harder to identify those who are not. Thus, the post-9/11 period in the PIRUS data is likely over-representative of Islamist extremists.

⁵ A strong case could be made for coding values as "No" or "0" when no information is found for variables that are typically well-documented, such as military service, marriage, or children.

the availability of critical information related to their backgrounds and activities in public sources; their participation as a member of a group or movement representing the far left, far right, or radical Islamist ideological milieus; and their status as most-likely or least-likely cases (Eckstein 1975; George and Bennett 2005) for extant theories of radicalization. This last case selection criterion is explained further in the case selection section of the report.

Adopting a uniform template to allow for comparison across cases, researchers completed the life-course histories by fall 2014. Starting in fall 2014, researchers developed a codebook representing five core radicalization research programs: psychological models (Kruglanski et al. 2009; Kruglanski et al. 2014), social identity theory (Hogg 2001; Hogg and Terry 2000; Hogg and Adelman 2013; McCauley 1989; Borum 2011), recruitment theory (Gerwehr and Daly 2006; Borum 2011), social movement theory (Tarrow 2011; Wiktorowicz 2004; Gerwehr and Daly 2006; Borum 2011; Cross and Snow 2011), and cost/benefit theory (Crenshaw 1987; McCormick 2003; Maxwell Taylor and Quayle 1995; Roy 2004; Horgan 2008; Pisiu 2011). The codebook is organized by core causal mechanisms, which when taken together represent the various radicalization processes proposed by each theory. Using MAXQDA data analysis software, coders evaluated the life-course histories and applied the relevant codes to instances in the text where the indicators are apparent. All life-course histories were double-coded to ensure reliability, and then cleaned, reviewed, and verified by the project researchers.

Data Analysis

The analyses of these data involved the use of statistical and qualitative methods, which will be described in detail in later sections of the report. The statistical investigations of the PIRUS database seek to explore similarities and differences among key individual characteristics across the ideological spectrum and to establish which conceptual components derived from theories of criminology reliably explain shifts from non-violent to violent extremism. Researchers relied upon comparative descriptive statistics and multivariate logistic regression modeling to address those questions, respectively. Given the nature of the data and collection methods, a number of variables in the PIRUS database, particularly those representing private and sensitive information, show non-trivial amounts of missing data. After extensive review, the research team used several methods for dealing with missing data, including variable reconstruction, regression-based multiple imputation (Tsikriktsis 2005; Musil et al. 2002), and expected maximization imputation (G. King et al. 2001; Tsikriktsis 2005). Techniques for managing missing data are further explained in Appendix 2.

The data collected from the qualitative life-course narratives were analyzed using fuzzy set/qualitative comparative analysis (fs/QCA) (Ragin 2000; Ragin 2008; Schneider and Wagemann 2012), which allowed for the appraisal of radicalization mechanisms and made it possible to determine the causal conditions and pathways that are most salient for explaining radicalization to violence. Set theory methods are an especially useful way of

analyzing radicalization because they were designed to deal with causal complexity, such as multiple pathways and non-linear causation, and they rely on the use of data where the main outcome of interest does not vary across the cases (i.e. all individuals radicalized) (Schneider and Wagemann 2012). Using fs/QCA it is possible to establish the universe of radicalization pathways among all the cases in our sample, as well as the causal conditions along those pathways that represent critical junctures in individuals' radicalization trajectories.

Project Findings

The findings of this project help to answer the four research questions that are described above. More specifically, a descriptive comparison of the individuals in the PIRUS database show how the four main ideological groups that are common in the U.S. are similar or different on a number of key points, including demographics, group involvement, and background characteristics. The insights generated from these findings not only provide a baseline empirical understanding of extremism in the U.S., they also inform policies on countering violent extremism (CVE), which currently are tailored to addressing the needs of at-risk individuals who may be susceptible to Islamist radicalization, but fail to equally consider extremism on the far right and far left (Schanzer et al. 2016).

Similarly, the results from the statistical tests reveal which variables and theoretical perspectives are the best at explaining violent behaviors among radicalized individuals. These findings are important for policy makers that seek to counter radicalization and illegal extremist activities, including law enforcement agents who need empirically informed information on how best to allocate scarce resources (Freilich and Chermak 2009).

Finally, the findings from the fs/QCA analysis show how the behavioral, social, and structural indicators from the statistical tests are related to underlying psychological emotional, material, and group conditions, all of which combine in various ways to make-up major pathways to violent extremism. These results make it clear that efforts to prevent radicalization to violence will only succeed if they take seriously the cognitive and emotional factors that mobilize individuals to engage in violent forms of political activism.

Part I: Ideological Comparisons

Problem statement

Extent research has failed to rigorously compare Islamist, far right, far left, and other extremist movements despite *prima facie* indications that there are important differences in the radicalization causes and processes for individuals who act across these milieus (Borum 2011). While it may be appealing to draw lessons from better-studied populations of extremists when developing policies that are primarily targeted at countering al-Qaeda, the Islamic State, or similar groups, the research team knows of no empirical effort to assess the comparability of Islamist, far right, far left or other radical ideologically-driven movements in the United States. Given the foundation in different belief systems and widely divergent behaviors that each of these ideologies encourage prior to and following their adoption of violence, this research investigates important differences in the radicalization causes and processes of individuals across these milieus. Depending on the nature and salience of these differences, effective counter radicalization efforts might require different policies to be directed towards each movement and therefore indicate that a broad-brush approach to counter-radicalization might be less effective or even counterproductive.

Descriptive comparison of ideological groups

We begin with a descriptive analysis of the PIRUS database, highlighting some important differences and similarities in the characteristics and radicalization processes of individuals across the ideological spectrum. We orient our analysis on four broad ideological milieus: far right, far left, Islamist, and single issue, as we have defined above.⁶ We start by describing the demographic characteristics of individuals in the dataset and how they vary across different ideologies, focusing on age, gender, education level, socioeconomic status, and immigration status. Next, we turn to delineating the similarities and differences across ideological groups in terms of group involvement, group dynamics, “clique” membership, the duration of radicalization, as well as the role of prison in the radicalization process. Finally, we evaluate individuals across the ideological spectrum in terms of background characteristics and personal histories, including military experience, a history of abuse, criminal background, mental illness, and alcohol/drug abuse.

Demographics

Table 1 compares domestic extremists by age. On average, individuals on the far right and those motivated by a single issue tend to be significantly older at their date of public exposure than their far left or Islamist counterparts.⁷ However, the modal age for far right

⁶ The PIRUS dataset does contain variables that provide a more nuanced aggregation of the primary ideologies that motivated the individual (e.g., Far right extremists further classified by white supremacist, anti-government, militia, etc.). Those figures are available upon request.

⁷ By date of public exposure, we mean the date at which the individual’s radical activity first came to public attention. This usually corresponds to the individual’s arrest or plot/plot attempt, or earliest mention of the individual in publically available sources, so as long it is related to the plot/radicalization of the individual. If only the month and year are known, we default to the first day of the month. If only the year is known, we default to first day of the year. The individual’s date

extremists is equal to that of the modal age of the entire sample, showing a positively skewed distribution of ages among the far right. This suggests that while the majority of far right cases are still relatively young, there is a higher propensity for far right extremists to radicalize and act at an older age than for far left and Islamist extremists. Across all measures of central tendency, the far left is the youngest group, followed by Islamist cases as the second youngest. Moreover, both the far left and Islamists have relatively small standard deviations on age, suggesting that it is much less likely for individuals who subscribe to far left and Islamist ideologies to become publically exposed at older ages than it is for far right and single issue extremists.⁸

Ideology	Age (mean)	Age (median)	Age (mode)	Std. deviation	Valid N	% missing
All cases	34.18	31	26	13.22	1,395	5.2%
Islamist	30.08	27	25	9.76	217	2.2%
Far right	37.76	36	26	14.21	611	4.7%
Far left	28.21	26	22	9.17	285	5.9%
S. issue	35.63	33	33	13.81	282	8.1%

Table 1 - Age of individuals in PIRUS.

Note: Age is defined as the age of the individual at their date of public exposure, which is the date at which the individual's extremist activity/plot first came to public attention. Usually the time of incident or arrest or earliest mention of the individual in publically available sources, so long as these are related to the plot/radicalization of the individual.

Consistent with other studies examining the role of gender among political extremists (Bloom, 2012; Freilich et al, 2014), males significantly outnumber females by a large margin in all ideological categories. There are some noteworthy differences, however, when comparing gender frequencies between groups. Shown in Table 2, nearly one-quarter of extremists on the far left are female. In contrast, females only make up approximately five percent of far right, four percent Islamist extremists, and 11 percent for single issue extremists.⁹

Ideology	Male (%)	Female (%)	Valid N	% missing
All cases	90%	10%	1,473	0%
Islamist	95.6%	4.1%	222	0%
Far right	95.3%	4.7%	641	0%
Far left	75.6%	24.4%	303	0%
S. issue	88.9%	11.1%	307	0%

Table 2 - Gender of individuals in PIRUS

of public exposure is referenced multiple times in this report, and is a central component to the PIRUS codebook. It is referenced as the point in time at which many variables that are dynamic in nature are recorded. For example, the variable measuring the individual's marital status uses the date of exposure as a time of reference.

⁸ To validate the observed differences in means, we performed Lavene's test for equality of variances and independent-samples t-tests for each ideological comparison pair (Islamist-Far Right, Islamist-Far Left, Islamist-Single Issues, etc.). For each pairing, there was a statistically significant difference in age at date of public exposure at the $p = .05$ level (2-tailed test).

⁹ A chi-squared test was performed and a statistically significant relationship was found between ideological category and gender, $X^2(3, N=1473) = 99.48, p = .000$.

The education levels of extremists vary considerably when compared across ideological groups. Illustrated in Table 3, our data show that individuals on the far right are less educated than other groups, with only 25.4% of valid cases holding a college degree or higher compared to the sample average of 43.3%. Individuals on the far left show the highest levels of educational achievement, with 55% of valid cases having attained a college degree or higher, followed closely by single issue extremists. Islamist extremists are near the average, with 41% holding a college degree or higher.¹⁰

Ideology	Did not finish high school (%)	High school diploma (%)	Some college (%)	College degree or higher (%)	Valid N	% missing
All cases	15.7%	21.4%	19.6%	43.3%	547	62.9%
Islamist	16.5%	23.7%	18.7%	41.1%	139	37.4%
Far right	23.9%	30.3%	20.4%	25.4%	142	77.8%
Far left	10.5%	13.5%	20.8%	55.2%	163	46.2%
S. issue	11.7%	18.4%	17.5%	52.4%	103	66.4%

Table 3 - Education level of individuals in PIRUS

Note: measured by the highest level of education completed by the individual's date of public exposure.

There are some noteworthy differences and similarities in socioeconomic status when comparing Islamist, far right, far left, and single issue extremists. Table 4 shows a pattern for SES which is similar to education level and ideology: individuals on the far left are more likely to come from an economically secure background (18.9%) when compared to the far right and Islamist extremists (10.7% and 7.9%, respectively). Far right individuals, on the other hand, are the most likely to come from disadvantaged economic backgrounds at 25.3%. Despite these differences, the majority of extremists from all ideological groups were classified as having a middle-class socioeconomic background, with Islamists having the highest rate with 71.7%.¹¹

Ideology	Low SES	Middle SES	High SES	Valid N	% missing
All cases	21.5%	65.4%	13.1%	670	54.5%
Islamist	20.4%	71.7%	7.9%	152	31.5%
Far right	25.3%	64.0%	10.7%	253	60.1%
Far left	19.7%	61.4%	18.9%	132	56.4%
S. issue	17.3%	64.7%	13.1%	133	56.7%

Table 4 - Adulthood socioeconomic stratum of individuals in PIRUS

Some significant differences exist in the generational status of individuals in the PIRUS data. By a large margin, Islamist extremists had the highest numbers of first and second generation immigrants, making up 80% and 55% of all immigrants in the dataset in those categories, respectively. Furthermore, a majority of Islamist cases were either first or

¹⁰ A chi-squared test was performed and a statistically significant relationship was found between ideological category and education level, $X^2(9, N=1547) = 39.45, p = .000$.

¹¹ A chi-squared test was performed and a statistically significant relationship was found between ideological category and socioeconomic status as an adult, $X^2(6, N=670) = 14.59, p = .024$.

second generation immigrants, at 60.7%. However, this immigrant generation statistic remains roughly consistent with figures from the U.S. Muslim population at large (Pew Research Center 2011) which is majority first-generation immigrants. Individuals classified as far right have the lowest levels of first or second generation immigrant status, at 1.3% overall. Table 5 provides a breakdown of these figures.¹²

Ideology	Not an immigrant	Second generation immigrant	First generation immigrant	Valid N	% missing
All cases	88.2%	2.5%	9.2%	1421	3.5%
Islamist	39.3%	9.7%	51.0%	206	7.2%
Far right	98.7%	.8%	0.5%	639	0.003%
Far left	95.0%	3.0%	2.0%	302	0.003%
S. issue	93.1%	0.7%	6.2%	274	0.1%

Table 5 - Immigrant status of individuals in PIRUS.

Note: An individual is classified as a second generation immigrant if one or both the individual's parents were born outside the United States. An individual is classified as a first generation immigrant if they were born outside the United States.

Extremist group involvement

When comparing individuals' membership in extremist groups across ideological milieus, some important differences stand out. Shown in Table 6, individuals classified as far left had the highest rate of affiliation with a formal extremist group (i.e., an extremist group with identifiable organizational structure, defined roles within the group, and clarity in group goals and ambitions) at 72.9%. Far right extremists also show a relatively high rate of involvement in formal extremist groups at 58.6%, but were also often associated with informal extremist groups—a classification of organization with less leadership structure or defined roles, and includes groups often referred to as 'cells' and small, informal militias. Individuals described as Islamists and single issue had the lowest rate of group membership overall, with 23.1% and 18.2% acting without any known group affiliation, respectively. Islamists were also the ideological milieu most likely to be associated with informal groups and least likely with formal groups. It is important to note, however, that across all ideologies, membership or affiliation with a group, extremist or otherwise, tends to be the norm. This finding supports the notion that radicalization ought to be considered as a distinctly social process, regardless of ideological preference.¹³

Groups advocating the same political or social causes are often in competition for the same base of sympathizers and resources, and they may escalate to increasingly violent behavior in an effort to win support (Bloom 2004; Findley and Young 2012; Biberman and Zahid 2016).

¹² A chi-squared test was performed and a statistically significant relationship was found between ideological category and generational status, $X^2(6, N=1421) = 581.94, p = .000$.

¹³ A chi-squared test was performed and a statistically significant relationship was found between ideological category and group membership status, $X^2(9, N=1451) = 185.13, p = .000$.

Ideology	No identifiable group	Member of informal group	Member of formal group	Member of legal group only	Valid N	% missing
All cases	14.4%	22.1%	56.9%	6.7%	1451	1.5%
Islamist	23.1%	35.3%	39.8%	1.8%	221	0.004%
Far right	13.3%	25.4%	58.6%	2.7%	631	0.02%
Far left	6.6%	13.9%	72.9%	6.6%	303	0.0%
S. issue	18.2%	13.5%	49.3%	18.9%	296	0.04%

Table 6 - Type of group membership of individuals in PIRUS

Note: An informal group is defined as an extremist group, often small in size, which lacks a clear hierarchical structure or defined roles. A formal group is defined as an extremist group with a clear organization structure, defined roles within the group, and clarity in group goals and ambitions.

Likewise, competition within a group may lead to factionalization and polarization, heightening the risk of the formation of more extreme ‘splinter groups’ (Cronin 2011). Table 7 shows that evidence of competition within or between extremist groups over influence, power, resources, and status varied widely when investigated across groups’ ideological orientations. Of valid cases, by a large margin, far right extremist groups exhibited the highest levels of inter- and intra-group competition, at a little over 50%. By contrast, Islamist groups tended to be much more cooperative, experiencing infrequent competition between or within groups for influence or status. While significant, it should be noted that this finding may be influenced by the fact that compared to radical Islamist groups, considerably more far right groups are in open existence in the United States, thereby increasing the risk that groups fall into competition with one another.¹⁴

Ideology	Group competition	No group competition	Valid N	% missing
All cases	35.8%	64.2%	542	63.2%
Islamist	13.8%	86.2%	116	47.7%
Far right	50.4%	49.6%	226	64.7%
Far left	34.9%	65.1%	109	64.0%
S. issue	28.6%	71.4%	91	70.3%

Table 7 - Evidence of group competition for individuals in groups in PIRUS

Note: Group competition is classified as competition within the group or with other groups for status, power, resources, or other things around the time in which the individual was a member.

It is a widely held notion in the field of radicalization studies that the formation of strong social bonds between members of small, informal groups can play a pivotal role in the adoption of violence-justifying ideologies (Sageman 2008). As these informal groups, or “cliques,” form, members are more vulnerable to developing a collective identity which lowers the psychological threshold for committing violent acts for the purpose of attaining ideological goals (McCauley and Moskalkenko 2008). Table 8 shows that the presence of such cliques are common for extremists across all ideologies, lending further support to the

¹⁴A chi-squared test was performed and a statistically significant relationship was found between ideological category and group competition, $X^2(3, N=542) = 47.64, p = .000$.

notion that radicalization is a highly social phenomenon. Individuals subscribing to far left and Islamist ideologies are members of these small, insular groups a majority of the time and at roughly the same rates. Far right extremists are also frequently members of cliques, although at a slightly lower rate. Only extremists who radicalized along a single-issue ideology were below the 50% threshold for clique membership.¹⁵

Ideology	Member of a clique	Not member of clique	Valid N	% missing
All cases	55.7%	44.3%	867	41.1%
Islamist	64.4%	35.6%	177	20.3%
Far right	53.7%	46.3%	369	42.4%
Far left	64.2%	35.8%	165	45.5%
S. issue	41.7%	58.3%	156	49.2%

Table 8 - Clique membership for individuals in PIRUS

Note: Clique is defined as a close-knit, insular, and exclusive group of extremists containing at least two individuals. A clique can exist within a larger extremist group (e.g., a clique of operatives within al-Qaeda) and separately from an organized group such as a clique of close associates that plans an extremist act.

Despite recent concerns about the radicalization of Muslims in U.S. prisons (Crabtree 2015; Cillufo, Cozzens, and Ranstorp 2010), the PIRUS data show that the occurrence of prison-based radicalization is generally low (see Hamm 2008 for similar results) and that there are not significant differences in the occurrence of prison radicalization across ideologies. Illustrated in Table 9, less than 5% of the individuals in the database radicalized, either partially or completely, while in prison. Islamists do not appear to be significantly more at risk than far right or far left extremists to adopt extremist beliefs while in prison.¹⁶

Ideology	No evidence of prison time	In prison, no impact on rad.	In prison, some impact on rad	Valid N	% missing
All cases	92.9%	3.1%	4.1%	1,473	0%
Islamist	94.1%	0.9%	5.0%	222	0%
Far right	92.2%	3.3%	4.5%	641	0%
Far left	91.1%	5.0%	4.0%	303	0%
S. issue	95.1%	3.1%	4.1%	307	0%

Table 9 - Prison radicalization of individuals in PIRUS

Note: Individuals in the category of “In prison, some impact on radicalization” include cases where the radicalization process began before but accelerated in prison, cases where radicalization began but reached higher levels after prison, and cases where radicalization began and reached its highest levels in prison. Cases with missing information on this variable were coded as “No evidence of prison time.”

Measured as the duration of time between the first evidence of radicalization, either cognitively or behaviorally, to when the individual was first publically exposed as an

¹⁵ A chi-squared test was performed and a statistically significant relationship was found between ideological category and clique membership, $X^2(3, N=867) = 23.392, p = .000$.

¹⁶ A chi-squared test was performed and did not find a statistically significant relationship between ideological category and prison radicalization, $X^2(6, N=1473) = 10.36, p = .110$.

extremist, the duration of radicalization varies moderately when examined across ideological categories. Individuals on the far right and those motivated by a single-issue exhibit the longest duration of radicalization compared to far left and Islamist extremists, with nearly one-half of cases taking five years or more. Across all ideologies, radicalization processes taking only one year or less are relatively rare—only occurring 17.6% of the time overall. More than any other group, Islamist extremists take an intermediate amount of time to radicalize, from one to five years. A comparison of the duration of radicalization between ideological groups is found in Table 10.¹⁷

Ideology	One year or less	One to five years	Five years or more	Valid N	% missing
All cases	17.6%	42.7%	39.7%	597	59.6%
Islamist	14.9%	61.7%	23.4%	141	36.5%
Far right	21.9%	30.0%	48.1%	210	67.2%
Far left	14.8%	47.7%	37.4%	58	80.8%
S. issue	16.5%	34.1%	49.5%	45	85.3%

Table 10 - The duration of radicalization of individuals in PIRUS

Note: Duration of radicalization is defined by the amount of time between the individual's first evidence of radicalization, either cognitively or behaviorally, and the individual's public exposure as an extremist.

Background characteristics

Military service among individuals in the PIRUS dataset is somewhat uncommon overall, with only 18.8% of cases having a confirmed record of a military background, as illustrated by Table 11. That figure is driven primarily by individuals on the far right, with 29.2% having military experience. Moreover, of those with a history of military service, the majority of individuals did not undergo their radicalization until they had already left military service. This figure holds true for all ideological groups. Indeed, the PIRUS data show that only in rare circumstances do individuals adopt radical beliefs while they are still active members of the military.¹⁸

Ideology	No military experience	Yes, inactive at time of radicalization	Yes, active at time of radicalization	Valid N	% missing
All cases	81.2%	14.4%	4.4%	856	41.9%
Islamist	89.5%	7.0%	3.5%	172	22.5%
Far right	70.8%	22.3%	6.9%	305	52.4%
Far left	88.7%	7.5%	3.8%	213	29.7%
S. issue	81.9%	14.4%	4.4%	166	45.9%

Table 11 - United States military status of individuals in PIRUS

Note: Inactive at time of radicalization refers to individuals whose radicalization process began while they were no longer in active military service in the U.S. military. Active at time of radicalization refers to individuals whose radicalization process began while they were an active service member in the U.S. military.

¹⁷ A chi-squared test was performed and a statistically significant relationship was found between ideological category and radicalization duration, $X^2(6, N=597) = 41.44, p = .000$.

¹⁸ A chi-squared test was performed and a statistically significant relationship was found between ideological category and military status, $X^2(6, N=856) = 41.56, p = .000$.

Tables 12-16 report on a number of characteristics covering the personal backgrounds and histories of individuals contained in the PIRUS dataset, specifically abuse history, mental illness¹⁹, alcohol/drug abuse, and a history of criminal activity. Table 12 and Table 13 compare rates of abuse among extremists in PIRUS, showing relatively little evidence of abuse.²⁰ On average, 3% of individuals in PIRUS were found to have been abused as children, and even fewer were abused during adulthood. These findings stay fairly consistent across ideologies at low levels, suggesting that individuals with a history of abuse are no more likely to radicalize to one particular ideology over another.^{21,22} The documentation of mental illness and other psychological issues are also relatively uncommon for individuals in the PIRUS data, both for the sample as a whole and for the individual ideologies.²³ Seen in Table 14, the percentage of individuals with evidence of mental illness or other psychological issues reported in source materials does not rise above 10% for any specific ideological group.²⁴ Also rare among individuals in PIRUS are documented histories of drug or alcohol abuse.²⁵ Table 15 shows that evidence of dependency on drugs and/or alcohol are at low levels similar to mental illness. Far right extremists are the group most likely to develop drug/alcohol abuse at 10.1%, although that relatively high figure may be explained, in part, by demographic differences such as gender, age, and socioeconomic status.²⁶ Lastly, Table 16 examines the frequency of pre-radicalization criminal histories among individuals included in the PIRUS data. Individuals on the far right displayed the highest propensity for a criminal background, with 63.1% of valid cases having some sort of criminal history. Moreover, at 25.7%, far right extremists had the highest levels of having a violent criminal past when compared with Islamist, far left, and single issue extremists. Islamist extremists were the only group to have a majority

¹⁹ For this project, clinical diagnoses or popular speculation of the following were coded as “yes” for mental illness: schizophrenia, bipolar disorder, post-traumatic stress disorder, and major depression.

²⁰ This variable captures the presence or absence of evidence of abuse in source materials, which may not reflect actual rates of abuse among extremists. However, the rates reported here are generally in line with statistics on abuse for the U.S. population as a whole. See United States Department of Health and Human Services 2015. Furthermore, this variable records mentions of abuse in source documents that may or may not have been verified by the opinions of psychologists or medical professionals. Given the scope of this project, it was not possible to independently verify claims of abuse that were made in source materials.

²¹ A chi-squared test was performed and did not find a statistically significant relationship between ideological category and evidence of abuse as a child, $X^2(3, N=1473) = 1.37, p = .771$.

²² A chi-squared test was performed and a statistically significant relationship was found between ideological category and evidence of abuse as an adult, $X^2(3, N=1473) = 8.78, p = .032$. This statistically significant finding is likely driven by the lack of a single case of adulthood abuse among single issue extremists and very few for far right extremists.

²³ It is important to highlight that this variable measures the presence or absence of evidence of mental health disorders in source materials and likely does not capture actual rates of mental health issues among extremists. Given that mental illness is serially under-reported in the U.S. (Takayanagi et al. 2014), actual rates of mental health disorders may be higher than what are reported here. Furthermore, this variable records mentions of mental health disorders in source documents that may or may not have been the result of clinical diagnoses. Given the scope of this project, it was not possible to independently verify claims of mental health issues that were made in source materials.

²⁴ A chi-squared test was performed and did not find a statistically significant relationship between ideological category and evidence of mental illness, $X^2(6, N=1473) = 6.90, p = .330$.

²⁵ This variable measures the presence or absence of evidence of substance abuse in source materials and likely does not capture actual rates of substance abuse among extremists. Furthermore, this variable records mentions of substance abuse in source documents that may or may not have been verified by medical professionals. Given the scope of this project, it was not possible to independently verify claims of substance abuse that were made in source materials.

²⁶ A chi-squared test was performed and a statistically significant relationship was found between ideological category and evidence of alcohol/drug abuse, $X^2(3, N=) = 12.55, p = .006$.

of cases show no evidence of a criminal background.²⁷ Despite the notable differences across ideological groups, participation in pre-radicalization criminal behavior is still common for all extremists in the PIRUS data.

Ideology	No evidence of abuse as minor	Evidence of abuse as minor	Valid N	% missing
All cases	97.0%	3.0%	1473	0%
Islamist	95.9%	4.1%	222	0%
Far right	97.3%	2.7%	641	0%
Far left	96.7%	3.3%	303	0%
S. issue	97.4%	2.6%	307	0%

Table 12 - Evidence of history of abuse as a minor for individuals in PIRUS.

Note: This includes abuse by family members, non-family members, or both. Cases with missing information for this variable were coded as “No evidence of abuse as minor.”

Ideology	No evidence of abuse as adult	Evidence of abuse as adult	Valid N	% missing
All cases	99.0%	1.0%	1473	0%
Islamist	98.7%	1.3%	222	0%
Far right	99.99%	0.001%	641	0%
Far left	97.7%	2.3%	303	0%
S. issue	100%	0.0%	307	0%

Table 13 - Evidence of history of abuse as an adult for individuals in PIRUS

Note: This includes abuse by family members, non-family members, or both. Cases with missing information for this variable were coded as “No evidence of abuse as adult.”

Ideology	No evidence of mental illness	Yes, popular speculation	Yes, professional diagnosis	Valid N	% missing
All cases	91.6%	4.6%	3.8%	1473	0%
Islamist	90.0%	5.9%	4.1%	222	0%
Far right	93.4%	4.8%	1.8%	641	0%
Far left	95.0%	3.0%	2.0%	303	0%
S. issue	90.2%	4.9%	4.9%	307	0%

Table 14 - Evidence of mental illness for individuals in PIRUS

Note: cases with missing information for this variable were coded as “No evidence of mental illness or psychological issues.”

²⁷ A chi-squared test was performed and a statistically significant relationship was found between ideological category and pre-radicalization criminal activity, $X^2(9, N=678) = 39.87, p = .000$.

Ideology	No evidence of alcohol/drug abuse	Evidence of alcohol/drug abuse	Valid N	% missing
All cases	92.4%	7.6%	1473	0%
Islamist	92.4%	7.6%	222	0%
Far right	89.9%	10.1%	641	0%
Far left	94.4%	5.6%	303	0%
S. issue	95.8%	4.2%	307	0%

Table 15 - Evidence of alcohol/drug abuse for individuals in PIRUS

Note: cases with missing information for this variable were coded as “No evidence of drug and/or alcohol abuse.”

Ideology	No previous criminal activity	History of minor non-violent criminal activity	History of serious non-violent criminal activity	History of violent criminal activity	Valid N	% missing
All cases	45.9%	24.3%	12.5%	17.3%	678	54.0%
Islamist	59.5%	23.0%	6.3%	11.1%	126	43.2%
Far right	36.9%	21.3%	16.0%	25.7%	268	58.2%
Far left	49.1%	25.2%	13.8%	11.9%	159	47.5%
S. issue	47.2%	31.2%	9.6%	12.0%	125	59.3%

Table 16 - History of criminal activity for individuals in PIRUS

Note: history of criminal activity refers to criminal activities taking place prior to their public exposure as an extremist. Minor criminal activity is defined as a misdemeanor or infraction offense. Serious criminal activity is defined as a felony offense.

Implications

The descriptive comparisons of individuals in the PIRUS data reveal a number of similarities and differences across the four main ideological categories, each of which have important implications for domestic law enforcement and CVE programs. First, a comparison of key demographic characteristics shows that it is important to consider age and gender when designing prevention and intervention programs as a part of domestic CVE efforts. Current CVE programs overwhelmingly target at-risk youth (King and Mohamed 2011; Romaniuk 2015; Vidino and Hughes 2015; Veenkamp and Zeiger 2015) and while younger individuals certainly make up a large percentage of domestic extremists, comparisons across ideologies reveal that the radicalization of older individuals is more common than originally believed, especially among far-right and single-issue extremists. Programs designed for juveniles and young adults may be ineffective for preventing radicalization among older individuals, many of whom are not struggling with the same pressures that confront youth (pursuing higher education, starting a family, etc.), but are instead burdened by the pressures of adulthood, such as supporting children. Likewise, while extremism in the U.S. is generally dominated by males, the high rates of females that

are involved in far left movements suggests that programs designed to target these groups must consider the unique factors that motivate women to join extremist movements.

Second, a comparison of group affiliations among individuals in the PIRUS data reiterates the long-held notion that radicalization is a social process (Borum 2011; Hogg 2001; Wiktorowicz 2004; Sageman 2008). While lone actor behavior appears to be on the rise in the U.S. (Weimann 2012; Lenz 2015; Teich 2013), law enforcement and CVE programs should not lose sight of the social networks, both face-to-face and virtual, that mobilize individuals to act (Klausen 2015). For CVE programs, this finding highlights the importance that peers play in both the radicalization and counter-radicalization processes. In fact, programs designed for prevention and intervention may be most effective when they are led by peers as opposed to professional program administrators. For law enforcement, this finding reiterates the importance of focusing efforts on undermining extremist organizations, especially on the far-right and far-left. This is not to suggest that lone actors do not pose a threat. Rather, it is to say that law enforcement will need to adopt diverse interdiction strategies that are tailored to group-based and lone offenders.

Third, the comparison of individuals in the PIRUS data show that radicalization is typically a long process. While online environments may be speeding up radicalization timelines on average (Jensen et al. 2016), radicalization is typically a process that takes several months, which suggests that there exist windows of opportunity for intervention. In order for CVE programs to take advantage of these openings for intervention, community education efforts must target those who are in the best position to recognize when an individual has begun to gravitate towards extremist views, which in all but the rarest cases are family members and friends. Education efforts should focus both on informing community members about which behaviors constitute concerning activities (e.g. associating with known extremists, making drastic lifestyle changes, expressing extreme views, etc.) and on educating individuals about the assistance programs that are available in their communities.

Finally, a comparison of background characteristics of individuals in the PIRUS data shows that with the exception of participation in pre-radicalization criminal activities, many regularly highlighted warning indicators, such as economic deprivation and low educational attainment (Moghaddam 2005; Elbakidze and Jin 2015; Ali and Li 2015), are not more common for extremists than they are for the general population.²⁸ Rates of mental health issues, drug and alcohol abuse, and childhood trauma are also generally low and consistent across ideologies. This is not to suggest that these factors are unimportant for domestic CVE. On the contrary, our findings (see below) and those of others (Weine et al. 2015) suggest that mental health and social service professionals have important roles to play in CVE efforts. Rather, it is to suggest that profiling based on these warning signs is likely to prove ineffective. That said, the high rates of pre-radicalization criminal behaviors

²⁸ The claim that economic deprivation and low education levels are associated with increased rates of terrorism is commonly made by the news media and politicians, but research efforts have largely failed to find any link between relative deprivation and terrorism. See Piazza 2006; Krueger 2007.

do suggest that CVE programs may benefit from leveraging existing programs that are geared toward addressing the needs of individuals who may be drawn to criminal activity. Furthermore, law enforcement should prioritize their focus on those individuals who have a history of interacting with the criminal justice system. While these individuals may not radicalize at greater rates than non-criminals, as noted below, they are significantly more likely to engage in violent behaviors after radicalizing.

Part II: Explaining Violent Extremism

Problem Statement

Research on violent extremism represents one of the major growth areas in social science scholarship over the past two decades.²⁹ During this period, important research has been conducted that provides a clearer picture of the mechanisms by which individuals and groups come to adopt extreme views (McCauley and Moskalenko 2008), and valuable insights have been generated on the processes that drive extremist organizations to abandon non-violent protest in favor of violent attacks (Bloom 2004; McCauley and Moskalenko 2008; Kydd and Walter 2006). However, scholarship that has sought to identify the factors that are most commonly correlated with violent action has been inconsistent and inconclusive (Neumann and Kleinmann 2013; Gill 2015). The inability to generate cumulative knowledge on the factors that are associated with violent radicalization has been the product of three principal shortcomings in the ways researchers have conceived of radicalization and the designs that they have used to study it.

First, researchers that study radicalization often conflate attitudes and behaviors despite decades of social psychological research showing only weak connections between extreme beliefs and extreme actions (Jones and Harris 1967; Sabini 1995). Survey and experimental research has consistently found strong support for radical ideologies across the political spectrum—and even for the use of violence in support of them—but very few people actually engage in such behavior (McCauley and Moskalenko 2008; Lemieux and Asal 2010). Likewise, there are examples of individuals who have committed serious acts of political violence with relatively weak ideological justifications; most famously Abu Nidal and Carlos the Jackal (Borowitz 2005). The emerging consensus is that there are multiple pathways into violent extremism (Horgan 2008; Borum 2011), which has led to the creation of numerous typologies to cluster and capture these different processes (Venhaus 2010; McCauley and Moskalenko 2008; Cross and Snow 2011). Indeed, Borum (2011) specifically identifies a pressing need to better understand the connection between attitudinal and behavioral aspects of radicalization.

Second, despite more than a decade of intense interest in the issue of radicalization, there is only weak empirical grounding for the current understanding of the characteristics of those who radicalize to the point of violence (Githens-Mazer and Lambert 2010; Borum 2011; Della Porta and LaFree 2012). The main concern here is that most empirical studies of radicalization concentrate only on those who have actually used violence for an extremist cause but do not consider those who may share similar ideological convictions but have not used violence in their pursuit (Borum 2011). There have been a few recent attempts to address this major limitation with varying levels of academic rigor and methodological transparency, including the New America Foundation's Homegrown Threat project, which provides basic biographical information on 310 violent jihadist and non-jihadist extremists, the Triangle Center on Terrorism and Homeland Security's annual report on domestic

²⁹ This section is drawn from Jensen et al. 2016.

jihadi arrests and perpetrators (Kurzman 2015), the Foundation for the Defense of Democracies' study of 117 jihadists in the United States and United Kingdom (Gartenstein-Ross and Grossman 2009), and START's ongoing Terrorism and Extremist Violence in the United States (TEVUS) project, which integrates, among other things, profiles of indicted Islamist, far right and far left individuals from the American Terrorism Study (ATS) and the Extremist Crime Database (ECDB) (Smith and Damphouse 2007; Freilich et al. 2014). With the possible exception of the ECDB, which includes non-violent ideological crime, non-ideological criminal associates and prior criminal activities of far right extremists, none of these efforts identifies at-risk individuals who did not radicalize to the point of committing violence. Thus, in currently available data sets there is virtually no variation on the dependent variable, severely limiting the inferential power of these studies.

Finally, while excellent work has been done to trace and analyze the radicalization pathways of individuals and small groups, variously highlighting the role of psychological processes (Horgan 2008; Horgan 2009; Kruglanski et al. 2009), small group dynamics (Sageman 2004), and social movement catalysts (Wiktorowicz 2004; Wiktorowicz 2005), most of these studies rely on limited case evidence to support their claims. Very few have attempted to utilize systematically collected and coded data to generate robust inferences about causes and effects. The large-scale empirical projects that have been conducted have tended to focus exclusively on providing a cross-sectional analysis of individual attributes that at least theoretically can be compared to known population averages. While this may provide some insight into what increases individuals' susceptibility to radicalization, it provides little information about how they reached the point of violence or when particular interventions might have been effective.

In short, there have been few quantitative empirical analyses of the characteristics of those that engage in politically-motivated violence in the United States. This section seeks to address this absence by identifying a number of conditions that are proposed in extant criminological research as good explanations of individual participation in illegal violence. These conditions are tested for their ability to explain shifts from non-violent to violent behaviors among a broad spectrum of extremists who have supported a range of ideological views, including both those who used violence and those who did not.

Theoretical rationale

In order to develop a series of hypotheses about the correlates of criminal violence, we draw from relevant theories in criminology and terrorism studies that purport to explain criminal behaviors at the individual level. These include social control, social learning, peer effects, and outbidding perspectives. It is important to note that it is not our intention to test these theories or appraise their relative strengths and weaknesses. Rather, it is our goal is to determine if any insights can be gleaned from these perspectives that may be used to improve our understanding of individual-level violent extremism. We acknowledge that most theories from criminology are intended to explain variation in non-crime and crime, as opposed to non-violent crime and violent crime, and that attempts to apply these perspectives to new outcome areas will require some adjustments to the ways in which the

theories and their related concepts are operationalized. Nevertheless, we argue that these perspectives provide a useful starting point for an exploratory analysis of the correlates of extremist violence. The findings generated from such an analysis are not only likely to provide important policy implications, but also to highlight avenues for further empirical study.

Below we draw on these theories to develop a series of exploratory hypotheses about individual participation in acts of political violence. We then use the PIRUS database to determine which, if any, of the hypotheses enjoy empirical support.

Social Control

Social control perspectives generally hold that deviation from conforming behaviors is more likely to occur when bonds to family, friends, and conventional society are weak (Hirschi 1969; Gottfredson and Hirschi 1990; Laub and Sampson 1993). Overwhelmingly, extant empirical research on those who have committed crime has been aimed at testing whether key life events, such as marriage, employment, or military service, have the potential to alter criminal trajectories, with findings largely supportive of the substantial impact of these positive “turning points” (Laub and Sampson 1993). While most theoretical and empirical work examines the effect of positive turning points on desistance from crime, turning points can also be negative in nature by promoting continued or accelerated involvement in negative behavior. For instance, research has demonstrated that negative life experiences, including residence in dilapidated living environments, dysfunctional family environments, school dropout, and substantial periods of unemployment, result in a lower likelihood of desistance from crime and an increased likelihood of offending (Bersani and Chapple 2007; Chung et al. 2002; Fergusson and Horwood 2002; Wiesner and Capaldi 2003). From the perspective of social control, continued criminal behavior, including participation in criminal violence, may be explained by weak bonds to family and society, and the absence of positive turning points (e.g. marriage).

H1: Compared to other extremists, extremists who experience “positive turning points” are less likely to participate in violence.

H2: Compared to other extremists, extremists with weak bonds to family are more likely to participate in violence.

Social Learning/Peer Effects

In contrast to the social control perspective, social learning theory emphasizes that small-group interactions and communication are the primary drivers of deviant and criminal behavior. This perspective emphasizes the impact of social influences, particularly family members and peers (Warr and Stafford 1991). Within this context there is an evolving learning process that involves the transmission of defining behaviors as right or wrong through imitation, modeling, conditioning, and reinforcement (Akers 2009). Put simply, the social networks in which individuals are embedded—family, mentors, and especially peers—will influence them in important ways. This can occur through mechanisms, such as fear or ridicule and loyalty, which produce compliance and status enhancement (e.g., acceptance, reward systems) in adolescent peer networks (Warr 2002). People will be

influenced according to the frequency, intensity, duration, and priority of their relationships with others, who in turn help create and mold definitions of behaviors (Akers 2009).

The social learning/peer effects perspective has some similarities to group dynamics models of violent extremism, which suggests that the in-group/out-group biases that form in small cliques can often lead to extreme forms of violent expression and groupthink (Bion 1961; Allison 1971; Janis 1972; McCauley 1989; Post 1998). The intense bonds experienced within cliques, and the weak bonds tying individual members to those outside cliques, eventually change the calculus of conformity and remove a brake on the individuals' participation in violent extremism. It is important to note that although group dynamics often lead to conformity by the individual, the individual can at times also influence the beliefs and behavior of the group, implying that small groups that form for one purpose can sometimes be re-tasked through the influence of in-group opinion leaders (Moscovici and Nemeth 1974). Based on these perspectives, extremists may be more likely to engage in violence when they have family members that are involved in extremist activities and when they are members in close-knit, insular groups. This reasoning leads to our next two hypotheses:

H3: Compared to other extremists, those with radical family members are more likely to participate in violence.

H4: Compared to other extremists, extremists who are members of radical cliques are more likely to participate in violence.

Outbidding

Researchers that study how non-violent political organizations transition into violent extremist groups often stress the important role that rivals play in the escalation of extremist behaviors (Bloom 2004; Bloom 2007; Kydd and Walter 2006; Findley and Young 2012). Competition with rival groups often compels individuals to abandon non-violent forms of political expression in favor of violent acts, which are increasingly viewed by the group as a more effective way to garner attention, obtain resources, and establish leadership within a community. The process of outbidding has been shown to play an important role in the adoption of extreme forms of political violence, including suicide terrorism (Bloom 2004; 2007) and the deliberate targeting of children (Biberman and Zahid 2016).

Similarly, the pull towards increasingly extreme behaviors is common in organizations that experience significant in-fighting over organizational leadership, vision, and routines (Cronin 2011). Such competition within organizations often leads to dangerous splintering, where individuals who were once allies find themselves in opposing factions that are vying for support from a common constituency. Opposing factions are often pulled toward increasingly extreme forms of political behavior in order to outdo each other and establish a hierarchy within the political movement. Following the logic of outbidding theory, extremists will be more likely to engage in violence when they are members of groups or

cliques that are engaged in competition with rival organizations or are members of groups that are suffering from internal splintering.

H5: Compared to other extremists, those who are engaged in competition with rival groups or fellow group members are more likely to participate in violence.

Methodology

We utilized information from the PIRUS database to establish which variables drawn from various criminology and radicalization theories are regularly associated with increased probabilities of violence among individuals who radicalized in the United States. In order to isolate the effects of the indicators, the model specifications include a variety of control variables, which are discussed below. To generate findings, we use a multivariate logistic regression model where the dependent variable is a dichotomous measure of whether the radicalized individual engaged in acts of violent or non-violent political resistance.

Structure of the Dependent Variable

The dependent variable (violent/non-violent) is coded “1” for individuals who committed or intended to commit an act of violence and “0” for individuals who committed non-violent acts. We treat as violent those cases where there is clear evidence that individuals were conspiring to kill or injure even if they failed to do so. We treat as non-violent all cases where it is clear from source documents that individuals did not intend to harm people, including acts of vandalism, illegal protest, fraud, and acts of property destruction where the perpetrators took measures to ensure that no one would be hurt or killed.

Usually binary classification schemes are straightforward and easy to implement. However, within the universe of radicalized individuals, because of their interactions with law enforcement, including interdiction and extra-judicial execution, the dependent variable could feature many cases of incorrectly censored data about non-observations of violence. For example, individuals who were killed or incarcerated before they could *successfully* complete an act of violence would appear to be non-violent in a simplistic implementation of dichotomous classification. We avoided this problem by factoring in the recorded intent of the radicalized individual. Functionally, *radicalized individuals who intended to do violence* are treated as identical in the empirical model as *individuals who successfully committed violence*. Classifying individuals in this way removes the latent variable of *capacity to perform violence* from clandestinely shaping the empirical results. In summary, individuals were coded ‘1’ for the violence variable if they met any of the following conditions:

- Active participation in operational actions/plots that resulted in casualties
- Active participation in operational actions/plots that intended to result in casualties but were unsuccessful
- Conspiring to kill or injure but were interdicted in the plotting phase

Non-violent radicals, on the other hand, are those individuals who meet any of the following criteria:

- Are not charged with any violent criminal act but were known members of an extremist group
- Actively participated in operational actions/plots not intending to result in casualties (e.g., property destruction, vandalism)
- Engaged in only legal/aboveground activism in support of extremism ideology
- Participated in armed standoffs that were defused without injury (e.g., Montana Freemen, Ruby Ridge)
- Received “terrorist” training but did not act on it
- Incited others to violence but no direct action themselves
- Threatened but undertook no direct action or operational progress toward a plot
- Involved in a plot targeting a building (arson/explosives) that did not intend to produce any casualties
- Possessed illegal weapons but no operational plans for violence

Structure of the Independent Variables

For each hypothesis outlined above, we extracted representative variables contained in the PIRUS data that best operationalize the underlying theoretical concepts.³⁰ Based on the Age-Graded Theory of Informal Social Control (Sampson and Laub, 1993), which in part emphasizes the role played by social bonds in adulthood as explaining participation in criminal behavior, we matched the following variables with “positive turning points” outlined in **H1**: *marital status*, that is whether the individual was married at the time of their public exposure as an extremist; *stable employment history*, that is whether the individual had stable employment in the period leading up to their public exposure as an extremist; and *military history*, which we separated into two measures of military service: one if the individual’s military service was prior to their public outing as an extremist (*past military experience*); and one if the individual’s military service was concurrent with their public exposure as an extremist (*active military*).

Another component of social control theory posits that weak bonds to family can increase an individual’s propensity to commit crimes. To operationalize this concept put forward in **H2**, we draw upon *childhood abuse*; that is, whether the individual suffered abuse, either physically, sexually, or verbally, at the hands of family or non-family members, as a child.

The social learning perspective, most commonly represented by Akers (2008), suggests that individuals learn behaviors and attitudes which are transmitted to them by close family members. Because we are interested in learning what best predicts the propensity to engage in violent extremism, we selected the variable from PIRUS *radical family member* to operationalize the concept outlined in **H3**.

³⁰ We chose the variables from the PIRUS dataset that best operationalize the underlying concepts that were gleaned from the theoretical perspectives described above. However, given that the PIRUS database was not created in order to model these theories, the variables that we selected are not, in most cases, perfect operationalizations of the theories, nor do they provide exact measurements of the theories’ respective concepts. For example, as a cross-sectional dataset, PIRUS is not ideal for assessing arguments about changes over time, such as those made by social control and social learning perspectives. That said, we believe that the PIRUS data provide a useful starting point for an exploratory analysis of the applicability of these theories to questions of violent extremism. Future research efforts can improve on this initial analysis by collecting and analyzing individual-level time-series data.

Similarly, the peer effects research perspective argues that the presence of close-knit peer groups can lead to a greater risk of engaging in extreme behaviors that the individual may otherwise not consider. We thus measure the role of peer effects put forward in **H4** by whether the individual was known to be associated with a “clique”, or a close-knit insular group of two or more fellow extremists.

Lastly, outbidding between groups and in-fighting within groups has been shown to play a possible role in escalating the level of violence committed by the group. To best capture this concept posited in **H5**, we utilize the variable *group competition*, which is coded for whether there is evidence that the group with which the individual in question was associated was experiencing competition with other groups or within the group for status, power, or resources.

Table 17 below shows how each independent variable in the model relates to the criminological concepts outlined above and how they were calculated for analysis in the logistic regression models.³¹ All independent variables are recoded into dichotomous measures. The marital status and employment history of the individual are determined at the date of their public exposure, defined as the time at which their radical activity first became public knowledge. This date usually refers to the date of their first arrest or indictment for an ideologically motivated criminal offense, or earliest mention of the individual in open sources, so long as it is related to the individual’s radical activity. Military experience, both past and active, were recorded as they related to when the individual began their radicalization process. Thus, past military experience is recorded as *1* for individuals whose military service preceded their radicalization process, while active military is recorded as *1* for individuals whose time in the military coincided with the onset of their radicalization.

In order to build the final model (Model 5), we added the independent variables associated with each theory to the model specification that came before. This step-wise approach to model design enables empirical extrapolation of two things. First, by cumulatively adding variables from different theories with a constant set of controls, we can observe how the addition of variables from each theoretical perspective changes the significance level and magnitude of variables from the base model. Second, in the final specification of the models, we can compare the relative explanatory power of each of the theoretically derived factors.

³¹ Bivariate correlations between the independent variables included in the model can be found in the Appendix. The results of these correlations indicate that there are no significant interactions between the independent variables, and thus the model that is tested below is not biased by multicollinearity.

Construct	Variable name	Description	Structure of variable
Social control	Married	The individual's marital status at their date of public exposure	<i>0=Single, Divorced, Separated, or Widowed 1=Married (religious or civil marriage)</i>
Social control	Stable employment history	The individual's work history leading up to their date of public exposure	<i>0=Long-term unemployment, underemployment, or unstable employment 1=Regularly employment/stable employment</i>
Social control	Past military experience	The individual's radicalization took place after they had left the US military	<i>0=No military history, or active member of military at time of radicalization 1=Inactive member of military at time of radicalization</i>
Social control	Active in military	The individual's radicalization took place while a member the US military	<i>0=No military history, or inactive member of military at time of radicalization 1=Active member of military at time of radicalization</i>
Social bonding	Abused as child	Evidence that the individual was abused, either verbally or physically, as a child	<i>0=No evidence of childhood abuse 1=Evidence of childhood abuse</i>
Social learning	Radical family	A family member of the individual was involved in radical activities	<i>0=No radical family members known to have engaged in radical activities 1=Family members known to have engaged in radical activities</i>
Peer effects	Clique membership	The individual was a member of a clique, defined as a close-knit, insular, and exclusive group of extremists	<i>0=Not a member of a clique 1=Member of a clique</i>
Outbidding	Group competition	The individual was a member of an extremist group in which there was competition within the group or with other groups for status, power, or resources	<i>0=No group competition 1=Group competition</i>

Table 17 - Structure of independent variable

Control Variables

We identified fifteen variables from the research literature on violent crime for inclusion in the models that control for the effects of various factors that are not covered by the theories described above. These controls can be grouped into four distinct conceptual categories. In the first category are standard controls from the base empirical model of crime: previous criminal history (Bushway, Paternoster, and Brame 2003; D. P. Farrington 1987; Gendreau, Little, and Goggin 1996; Langan and Levin 2002), mental illness (Monahan 1995; Mulvey 1994), education (D. P. Farrington 1987), and gender (Canter 1982; Daly and Chesney-Lind 1988; Steffensmeier and Allan 1995). These standard controls from empirical criminological models are included because much of the classification of radicals in the dependent variable stems from observations linked to being charged with a crime. Without these standard criminological controls, it would be difficult to estimate which variables, beyond those associated with violent criminal activity in general, were prevalent in the violent behavior of radicals. In the second category are two control variables for age which acts as measures of individual or life-cycle time. It has been shown that people are more likely to engage in crime up to a certain age, and then increasingly less likely as they get older (Farrington 1986; Gottfredson and Hirschi 1986; Hirschi and Gottfredson 1983). The model includes controls for age and the non-linear effects of age, using age-squared.

The third category includes control variables associated with three of the four sub-types of radical ideologies: Islamist, far right and far left.³² The inclusion of the ideological categories controls for differences in violence-justifying beliefs that may be present across the ideological spectrum. For example, certain groups on the far left expressly discourage the use of violent tactics, and we assume that norms such as these will suppress participation in violence for certain individuals.

In the final category are controls for the “wave” of radicalization that the individual was a part of, which acts as a measure of the effects of time on the permissibility of violence and violent radicalization. For example, studies have shown that crime in the United States, in particular violent crime, has been steadily decreasing since its peak in the early 1990s (Truman and Langton 2015). We assume that the decline of violent crime over time is uniform among extremists and non-ideological criminals. We dropped the 2000s decade from the model, using it as the reference category for the other decades because that temporal category contains the largest number of radicalized individuals in the PIRUS data.

Table 18 illustrates how the research team operationalized and coded the control variables used in the model. All the variables are dichotomous measures, except for age, age squared, and the education variable, which is an ordinal scale from 0 to 3, with 0 indicating that the individual did not complete high school, and 3 signifying that they attained a college degree. As an added level of validation, we test Model 5 using 4 different missing data protocols, drawn from prior research (results are reported in Table 22.) See Appendix 2 for a detailed discussion of the missing data protocols.

³² Single-issue was used as the reference category and was thus excluded as a control variable.

Missing Data Techniques

Missing data is a challenge that all researchers confront, but it is particularly important for research such as this based on open source data collection. A number of the variables in the PIRUS database are designed to capture private or sensitive information, often about personal experiences and conditions that are well documented to be serially under-reported (e.g. mental health disorders; Takayanagi et al. 2014). In some instances, relying on publically available sources to collect data on these variables resulted in non-trivial amounts of missing values (see Appendix 1 for variable frequencies). This is unsurprising given the nature of open source data collection where it is frequently impossible to distinguish negative responses from no responses. For example, we might not necessarily expect open sources to report that a given individual was *not* the victim of abuse or that a particular individual had *no* record of drug use. The amount of missing data was also likely increased by our selection procedures, which chose cases based on representativeness rather than completeness of information, and our coding guidelines that instructed researchers to be conservative and record values as missing instead of absent (i.e. as a missing code of “-99” instead of a value representing “No”) whenever sources failed to report values.

There are several options for dealing with missing data (see Honaker and King 2010; Tsikriktsis 2005). Some rely on researchers’ substantive knowledge and case expertise to fill in missing values, while others employ advanced statistical techniques. Although no method provides a perfect solution, advances in techniques for handling missing data have made it possible to make valid inferences about causes and effects despite missing values on variables of interest. For this study, we identified four techniques for handling missing data that are sensible options given the structure of the PIRUS data and our substantive knowledge of the cases and radicalization processes (see Table 27 in Appendix 2). These are: simple imputation using fixed values (i.e. cold-deck imputation) (Andridge and Little 2010), simple imputation using sub-group means (Tsikriktsis 2005), regression-based multiple imputation (Rubin 2004), and multiple imputation based on expected maximization calculations (G. King et al. 2001; Honaker and King 2010). We provide a brief summary of these techniques in Appendix 2.

In the first five specifications of the model that is tested below, we used a parallel qualitative effort to make the best choices about how to treat the missing data. We replaced missing values with fixed values on variables for which logic or cumulative knowledge provided accurate estimates. These variables include:

Control variable	Description	Structure of variable
Previous criminal activity	Evidence that the individual engaged in criminal activity prior to their radicalization	<i>0=No evidence of previous criminal activity 0.5=Evidence of previous, non-violent minor criminal activity (e.g. misdemeanor) 1=Evidence of previous non-violent serious criminal activity, or violent crime</i>
Mental illness	Evidence that the individual had a known history of psychological issues and/or mental illness	<i>0=No evidence of psychological issues and/or mental illness 1=Evidence of psychological issues and/or mental illness</i>
Education	The highest level of education completed by the individual by their date of public exposure	<i>0=Did not complete high school 1=High school diploma 2=Some college, no college degree 3=College degree or higher</i>
Gender	The individual's gender	<i>0=Female 1=Male</i>
Age	The age of the individual at their date of public exposure	<i>Numerical (years)</i>
Islamist ideology	The individual became radicalized as part of an Islamist movement	<i>0=No, other ideology 1=Yes</i>
Far right ideology	The individual became radicalized as part of a Far right movement	<i>0=No, other ideology 1=Yes</i>
Far left ideology	The individual became radicalized as part of a Far left movement	<i>0=No, other ideology 1=Yes</i>
Exposure 1950s	The individual's date of public exposure occurred in 1959 or earlier	<i>0=No, other decade 1=Yes</i>
Exposure 1960s	The individual's date of public exposure occurred between 1960 and 1969	<i>0=No, other decade 1=Yes</i>
Exposure 1970s	The individual's date of public exposure occurred between 1970 and 1979	<i>0=No, other decade 1=Yes</i>
Exposure 1980s	The individual's date of public exposure occurred between 1980 and 1989	<i>0=No, other decade 1=Yes</i>
Exposure 1990s	The individual's date of public exposure occurred between 1990 and 1999	<i>0=No, other decade 1=Yes</i>
Exposure 2010s	The individual's date of public exposure occurred between 2010 and 2015	<i>0=No, other decade 1=Yes</i>

Table 18 - Structure of control variables

- Past military—given well-documented records of military service, missing values were assumed to be “no” if no record of service could be found
- Active military—same as above
- Abused as child—cumulative knowledge suggests that childhood abuse is a comparatively rare phenomenon.³³ Thus, a value of “0” (“no”) was entered for cases where no mention of childhood abuse could be found in source materials
- Previous criminal activity—like military service, missing values were treated as “no” when records of criminal activity could not be found
- Mental illness—there is considerable asymmetry between reported and estimated rates of mental health disorders in the United States (Takayanagi et al. 2014), making it particularly difficult to accurately compensate for missing data on variables related to mental health conditions. However, since the PIRUS data err on the side of inclusion when it comes to mental health, treating clinical diagnosis and popular speculation as evidence of mental illness, we believe that the data do not suffer from the same extensive under-reporting that impacts many other data collection efforts. Furthermore, based on the observed rates of mental health conditions in the PIRUS data, imputing missing values would lead to a drastic over-representation of mental health conditions in the data, as high as 50% of all cases. Therefore, cases for which no mentions of mental health issues could be found in source materials were recoded from “unknown” to “no”.

For the remaining variables, which include stable employment history, marital status, clique membership, group competition, radical family, age, and education, we used the expected maximization multiple imputation technique. However, as a check on the robustness of our findings, we re-ran the final model specification against four complete datasets that each handle missing data according to the techniques that are described in Appendix 2—expected maximization, regression-based multiple imputation, sub-group mean imputation, and fixed value imputation. The results of these tests are reported below.

Empirical Results and Discussion

The results of the step-wise modeling technique are reported in Table 19, with the columns representing the following models:

Model A: base criminological (controls)

Model 1: base criminological + social control

Model 2: base criminological + social control + social bond

Model 3: base criminological + social control + social bond + social learning

Model 4: base criminological + social control + social bond + social learning + peer effects

Model 5: base criminological + social control + social bond + social learning + peer effects + outbidding³⁴

³³ According to the United States Department of Health and Human Services, fewer than 12 out of every 1000 children, or 1.2%, suffer some form of abuse. See United States Department of Health and Human Services 2015.

³⁴ We ran Model 5 for each ideological category: Islamist, Far Right, and Far Left. However, due to the relatively small number of cases in the Far Left and Islamist groups and issues of missing data, we were not able to produce statistically

As Table 20 shows, all of the variables that are significant in the various models retain their significance and substantive effects as new variables are added. This means that each step of the step-wise investigation is testing distinct and important aspects of violent radicalization. The practical effect of these stable empirical regularities is that there are many points of interdiction toward both preventing and countering violence among radicalized individuals, each of which are discussed below.

The base criminological model (Model A)³⁵, comprised solely of control variables, shows four important findings. First, the decade in which individuals radicalize has a significant impact on the likelihood that they will engage in acts of violent extremism. Relative to the 2000s, which is the decade with the largest number of radicalized individuals in the PIRUS dataset, earlier decades, in particular the 1970s and 1980s, witnessed more individuals who radicalized to the point of committing violence or intending to commit violence. This finding generally supports the conclusions of recent reports based on annual crime statistics, which show that violent crime in the United States has been steadily decreasing since the early 1990s (Blumstein and Wallman 2006; Blumstein and Wallman 2005). This trend appears to extend to radicals and non-radicals alike.

Second, all other things held constant, ideology is significantly related to behavior. Not surprisingly, individuals who adhered to ideologies that promote non-violent forms of political resistance were found to be significantly less violent than those on the far right or those who adhere to Salafi jihadist ideologies. However, the relationship between far left ideology and non-violent activism may be a recent trend that is driven by the emergence of animal rights and environmental activist organizations as the dominant actors within the milieu. These organizations typically promote non-violent forms of political resistance, which stands in contrast to traditional far left groups, such as the Weather Underground, who commonly perpetrated acts of political violence. In a subsequent iteration of our model, we excluded individuals motivated by animal rights or environmental concerns in order to determine if the relationship between far left ideology and non-violence holds. When environmentalists and animal rights activists are excluded from the model, there does not appear to be a relationship between far-left ideology and non-violence (see Appendix 5).

reliable results for single ideological categories. As noted below, increasing the number of cases across ideologies in order to do this type of analysis is a potentially fruitful area of future inquiry.

³⁵ We ran the model using a single measure for age, which resulted in a significant and negative relationship with the dependent variable. However, when age squared is introduced into the model, the level of significance dissipates, suggesting a non-linear relationship between the age of extremists and the likelihood for violence. That is, individuals show a higher propensity for violence up until a certain age, and then are increasingly less likely to engage in violence as they get older.

Independent variable	Model A – control variables only	Model 1 – H1 conditions added	Model 2 – H2 conditions added	Model 3 – H3 conditions added	Model 4 – H4 conditions added	Model 5 – H5 conditions added
	β (SE β)	β (SE β)	β (SE β)	β (SE β)	β (SE β)	β (SE β)
Married		-296 (.194)	-291 (.194)	-256 (.199)	-329 (.207)	-325 (.209)
Stable employment history	*	-.552** (.204)	-.534* (.206)	-.551** (.209)	-.559** (.211)	-.560** (.213)
Past military exp.	*	.066 (.248)	.054 (.248)	.046 (.256)	.022 (.264)	.012 (.274)
Active military	*	.348 (.333)	.341 (.332)	.358 (.363)	.450 (.358)	.448 (.367)
Abused as child	*	*	.422 (.383)	.364 (.383)	.551 (.400)	.560 (.406)
Radical family	*	*	*	-.330 (.223)	-.429 (.228)	-.445 (.231)
Clique membership	*	*	*	*	.898*** (.163)	.908*** (.162)
Group competition	*	*	*	*	*	-.229 (.228)
Controls						
Previous criminal activity	.582*** (.179)	.510** (.182)	.494** (.182)	.471* (.186)	.441* (.191)	.447* (.191)
Mental illness	.756*** (.229)	.645** (.237)	.616** (.239)	.581* (.246)	.744** (.253)	.729** (.254)
Education	-.110 (.094)	-.075 (.089)	-.073 (.090)	-.076 (.094)	-.076 (.097)	-.077 (.097)
Gender	.291 (.210)	.319 (.218)	.330 (.219)	.306 (.222)	.330 (.229)	.344 (.229)
Age	-.045 (.025)	-.035 (.025)	-.036 (.026)	-.036 (.026)	-.026 (.026)	-.026 (.027)
Age (squared)	.000 (.000)	.000 (.000)	.000 (.000)	.000 (.000)	.000 (.000)	.000 (.000)
Islamist ideology	1.247*** (.228)	1.285*** (.239)	1.283*** (.239)	1.269*** (.239)	1.114*** (.245)	1.094*** (.246)
Far right ideology	.660*** (.171)	.655*** (.177)	.658*** (.177)	.673*** (.181)	.590*** (.182)	.617*** (.185)
Far left ideology	-.585** (.199)	-.603** (.205)	-.603** (.205)	-.613*** (.206)	-.755*** (.210)	-.757*** (.213)
Exposure 1950s	.921 (.562)	1.035 (.575)	1.043 (.574)	1.173 (.624)	1.210 (.637)	1.235 (.637)
Exposure 1960s	.824*** (.258)	.863*** (.263)	.858*** (.263)	.886*** (.267)	1.012*** (.281)	1.044*** (.284)
Exposure 1970s	1.153*** (.220)	1.176*** (.229)	1.176*** (.229)	1.190*** (.236)	1.250*** (.246)	1.280*** (.252)
Exposure 1980s	.956*** (.204)	.984*** (.213)	.986*** (.213)	1.004*** (.214)	.995*** (.225)	1.002*** (.226)
Exposure 1990s	.163 (.178)	.174 (.182)	.170 (.182)	.188 (.184)	.199 (.189)	.187 (.190)
Exposure 2010s	.601** (.212)	.602** (.217)	.603** (.217)	.607** (.220)	.688** (.222)	.677** (.223)

Table 19 - Multivariate regression model

Note: ($n = 1,473$). Standard error noted in parentheses, * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

The same cannot be said, however, for those on the far right or those who adhere to a Salafi jihadist ideology. Regardless of how we model the relationship between ideology and extremist behaviors, far right and Islamist ideologies appear to have a significant and positive relationship to violence. Despite being hard to assess using statistical methods, our results indicate that ideology may play a distinct, non-epiphenomenal role in the likelihood of violence. That is, the relationship between ideology and violence does not appear to be one that is completely driven by selection effects, whereby individuals with violent tendencies choose violent ideologies, and those without violent tendencies choose leftist ideologies. Rather, ideology appears to have an independent effect on shaping individual behaviors. These findings also suggest that ideological frameworks interact with other aspects of a radicalized individual's life—namely peer-effects and personal stability indicators—to create pathways toward violence in the processes of radicalization.

Third, a history of mental illness has a strong relationship to violent outcomes among radicalized individuals. Across all models, mental health issues have a positive and significant relationship to violence, suggesting that mental and public health officials have a role to play in effective responses to violent radicalization (Weine et al. 2015). That said, it should be noted that overall rates of mental health issues in the PIRUS data are low, representing 3.8% to 8.4% of the sample depending on how the variable is measured (i.e. clinical diagnosis only or clinical diagnosis and popular speculation). Moreover, given data limitations, our tests do not model for the possibility that mental health conditions lead to violent outcomes when they are paired with substance abuse, which is a common finding of psychiatry research (see, for example, Swartz et al. 1998). Future research on the link between mental illness and extremist violence should model for this possibility.

Finally, pre-radicalization criminal activity is strongly associated with post-radicalization violence. This includes pre-radicalization criminal activities that are non-violent in nature, such as drug offenses and unarmed robbery. This suggests that individuals who engage in criminal activities prior to radicalization may be more likely to participate in more extreme forms of crime once they have adopted extremist ideologies. This finding highlights the importance of integrating CVE programs with existing efforts that seek to keep at-risk individuals from engaging in crime. From a law enforcement perspective, the relationship between pre-radicalization crime and post-radicalization violence indicates that violent radicals typically interact with the criminal justice system prior to committing acts of violent extremism. Thus, it is potentially important to consider criminal histories when making threat assessments or decisions about resource allocations.

While these results show that many of the control variables drawn from traditional criminology research are significant forecasters of which kinds of radicalized individuals are most likely to engage in violence, correlates drawn from more recent criminological and social science perspectives were mixed in their ability to explain violent extremism. In terms of the theories that we reviewed, variables from two—social control and social learning—showed significant relationships with violent extremism.

From a social control perspective, we found a strong, negative relationship between stable employment history and the propensity for violence among individuals in the PIRUS data. As social control theory suggests, the acquisition and maintenance of employment may act as a positive turning point that forces individuals away from paths to violent extremism. It should be noted, however, that when we run the model for post-2000 cases only, the relationship between stable employment and non-violence drops away (see Appendix 4). We believe that this change is likely driven by the fact that a larger percentage of young people (i.e., individuals who have not been in the workforce long) make up the post-2000 cases in PIRUS. Future research should continue to explore the relationship between employment and non-violence, paying particular attention to how that relationship changes as individuals get older. The two other turning points that are emphasized by social control—marriage and military service—do not appear to have an effect on the probability that radicals will engage in violence. Thus, our results indicate that there is limited support for **H1**.

In regards to theories of social learning, our results show a strong positive relationship between clique membership and participation in violent extremism, **H4**. That is, when peers organize as small, insular groups, there appears to be a strong pull towards increasingly extreme behaviors. However, we did not find support for the argument that individuals with radical family members are more likely to engage in violent extremism, **H3**. Thus, social learning in the context of politically-motivated violence may be driven by peers more so than family members. The strong effect of peers on individual participation in violence is a conclusion that is also reached by those who study in-group/out-group dynamics and group biases (Hogg 2001; Kruglanski et al. 2014; McCauley and Moskalenko 2008), and which is also supported by the results of the qualitative analysis that is detailed below. While much has been made of the apparent recent increase in lone actor behavior in the United States and around the world, our findings suggest that radicalization to violence remains a process that is distinctly social. Individuals who act alone may nevertheless still establish close relationships, both virtual and face-to-face, with peers that contribute to their movement towards violence (Klausen 2015). Thus, CVE and law enforcement efforts to counter violent extremism should not ignore the mobilizing effects of social networks just because an increasing number individuals are acting more independently.

Our results do not support either **H2**, which was drawn from social bond perspectives, or **H5**, which was based on theories of outbidding. We caution that these results could be driven by modeling decisions and context. For example, our failure to find a relationship between weak familial bonds and violence may, in part, be driven by our operationalization of the variable, which uses the presence or absence of childhood abuse as a measure of the strength of an individual's bonds to their family. Certainly, childhood abuse is not the only metric by which to judge familial relationships, and in some cases individuals may actually establish strong bonds with their family members despite being subjected to verbal or physical abuse.³⁶ Future research on violent extremism should seek to flesh-out the topological space in regards to social bonds, and determine if any other measures show

³⁶ For example, individuals who are subjected to physical or emotional abuse may establish close bonds with their siblings.

significant relationships to extremist violence. Similarly, outbidding may be more salient to extremist violence outside of the United States, where formal extremist organizations are more prevalent and competition over scarce resources is more intense (Bloom 2004). Viewed together, our results indicate that theories from criminology may provide important clues for understanding extremist violence. However, it is also certainly true that criminological perspectives gain significant inferential power when they are integrated and combined with common control measures, such as a history of criminal activity. As will be discussed in greater detail in the next section, we believe that this lends support to the view that radicalization to violence is best understood as a complex causal process that is driven by the conjunction of many unique factors.

Robustness tests. Given that several of the variables included in the models showed high rates of missing values, we ran the final fully-specified model against three other versions of the PIRUS dataset, each of which treat missing data in unique ways. The results of these robustness tests are reported in Table 20. Column one shows the expected maximization-based findings that are discussed above. Column two shows the results when values are assigned to missing data using regression-based multiple imputation. Imputed values in this dataset were predicted using variables that had no or low rates of missing values and that were representative of demographics, ideation, and behavior:

- Age
- Gender
- Ideology
- Previous criminal activity
- Violence

Column three displays the findings when missing data are replaced with sub-group means. Since significant clustering occurs within ideological groups (see previous section of the report), we opted to use ideology as the primary sub-group of which individuals in the data are members. We then replaced missing values with the mean for the ideological sub-group for each individual according to the individual's ideological affiliation. Finally, column four shows the results when the model is run against a dataset that uses fixed-value imputation to replace missing data. The fixed values were selected based on logical probabilities and substantive knowledge. They are:

- Marital status = not married
- Employment = employed
- Radical family member = no radical family members
- Clique membership = not a member of a clique
- Group competition = no group competition
- Education = finished high school

As Table 20 shows, the key factors that show a significant relationship to violence in the expected maximization model, including stable employment history, clique membership, previous criminal activity, mental illness, and ideology, retain their significance and -

Independent variable	Expected Maximization model	Regression-based multiple imputation model	Subgroup mean substitution model	Fixed value substitution model (n=1,395)
	β (SE β)	β (SE β)	β (SE β)	β (SE β)
Married	-.325 (.209)	-.366 (.200)	-.202 (.147)	-.232 (.149)
Stable employment history	-.560** (.213)	-.512** (.188)	-.600** (.209)	-.454* (.187)
Past military exp.	.012 (.274)	-.013 (.234)	.173 (.218)	.107 (.233)
Active military	.448 (.367)	.400 (.319)	.414 (.317)	.060 (.309)
Abused as child	.560 (.406)	.547 (.381)	.585 (.376)	.527 (.370)
Radical family	-.445 (.231)	-.396 (.353)	-.242 (.301)	-.011 (.200)
Clique membership	.908*** (.162)	.831*** (.137)	.823*** (.156)	.698*** (.129)
Group competition	-.229 (.228)	-.100 (.292)	-.175 (.206)	-.145 (.177)
Controls				
Previous criminal activity	.447* (.191)	.410* (.194)	.531*** (.169)	.544*** (.170)
Mental illness	.729** (.254)	.711** (.233)	.743** (.230)	.629** (.226)
Education	-.077 (.097)	-.097 (.103)	-.081 (.090)	-.058 (.075)
Gender	.344 (.229)	.345 (.227)	.333 (.205)	.293 (.210)
Age	-.026 (.207)	-.019 (.025)	-.046 (.023)	-.030 (.024)
Age (squared)	.000 (.000)	.000 (.000)	.000 (.000)	.000 (.000)
Islamist ideology	1.094*** (.246)	.978*** (.243)	.924*** (.249)	.961*** (.231)
Far right ideology	.617*** (.185)	.494** (.182)	.534*** (.176)	.567*** (.166)
Far left ideology	-.757*** (.213)	-.898*** (.218)	-.891*** (.214)	-.777*** (.201)
Exposure 1950s	1.235 (.637)	.997*** (.258)	1.064 (.550)	1.048 (.557)
Exposure 1960s	1.044*** (.284)	1.249*** (.224)	.973*** (.249)	.883*** (.259)
Exposure 1970s	1.280*** (.252)	1.005*** (.202)	1.214*** (.211)	1.234*** (.218)
Exposure 1980s	1.002*** (.226)	.170 (.180)	.953*** (.192)	.872*** (.197)
Exposure 1990s	.187 (.190)	.651** (.210)	.146 (.174)	.128 (.179)
Exposure 2010s	.677** (.223)	-.240 (.588)	.661** (.203)	.589** (.203)

Table 20 - Regression models: comparison of missing data strategies

Note: $n = 1,473$ except in fixed value substitution model, where $n=1,395$ due to list-wise deletion of cases with unknown value for Age and Age squared, Standard errors noted in parentheses, * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

substantive effects, regardless of how missing data are treated. Previous criminal activity shows a stronger relationship to violence when missing data are replaced by using subgroup means or fixed values. However, previous criminal activity is significant and positive across all datasets, suggesting that it is a strong correlate of violent behavior. Similarly, the depression effect of stable employment decreases slightly when missing data are replaced with fixed values. Again, however, since stable employment is significant and negative across all datasets, we can have some confidence in its observed effect on violent behavior. Overall, the results of these tests indicate that our findings are robust and are not driven by our preferred missing data technique. That said, future research should continue to build on existing data collection efforts to reduce rates of missing values and to increase the number of cases in order to ensure that the potential deleterious effects of missing data are kept to a minimum.

Future research. Future research efforts can build on these findings in a number of important ways. First, given the relatively small numbers of far left, Islamist, and single issue cases that are included in the PIRUS database, we are not able to run the above statistical models for specific ideological milieus. Therefore, we cannot assess whether the findings that are discussed above hold when we look only at the individuals who adhere to a certain ideology (e.g., Islamists). In order to perform this type of analysis, future efforts should bolster existing data collections, paying particular attention to increasing the number of cases from across the ideological spectrum.³⁷

³⁷ Future data collection efforts should not only increase the numbers of far left and Islamist cases, as doing so would bias the overall sample and compromise the reliability of any general findings derived from analyses of the data.

Part III: Radicalization Pathways

Problem Statement

The statistical models that are detailed in the previous section identify a number of factors that are associated with violence among extremists. While useful, models such as these are significantly limited in their ability to explain the temporal, causal processes through which individuals come to adopt radical views that justify the use of violence for political goals. These processes are complex, non-linear (i.e., having a certain level of the cause is not always associated with having a certain level of the outcome, as would be predicted in the net-effects/correlational line of thinking), and driven by underlying psychological, emotional, material, and group-based motivators that are difficult to model in statistical tests.³⁸ Moreover, radicalization to violence is a phenomenon that is often characterized by equifinality (i.e., multiple pathways to the same outcome) (Bennett and Elman 2006), multifinality (i.e., many outcomes from the same starting point) (George and Bennett 2005), and non-uniformity in the relationship between holding radical beliefs and engaging in radical behaviors (Borum 2011). Despite some advances in the ability of statistical tests to model for complex causality (Braumoeller 2003), traditional quantitative methods are largely inappropriate for the study of complex radicalization processes.

The qualitative analysis that is detailed in this section seeks to address this shortcoming by both treating radicalization to violence as causal processes and by exploring those processes using data and methods designed to handle causal complexity. Our approach in this section is different than the standard statistical techniques that were used above, where causation was treated as linear and which sought to establish the net-effects of various indicators (i.e., total variability explained in the outcome) on the propensity for violence. This section uses set-theory (Schneider and Wagemann 2012; Ragin 2000; Ragin 2008; Goertz and Mahoney 2012), which conceives of causal conditions in terms of necessity or sufficiency (defined in Appendix 5) to show how causal mechanisms logically combine to produce multiple sufficient radicalization pathways to violence. The results of this section show how the indicators of violence mentioned above are embedded in complex radicalization processes that are largely driven by particular cognitive and emotional developments. In particular, we find that both a sense of community victimization and a radical shift in individuals' cognitive frames are necessary conditions for radicalization to violent extremism. These necessary conditions combine with a host of other factors to produce eight sufficient pathways for violent radicalization, most of which are driven by the presence of psychological and emotional vulnerability, and the intense need for emotional rewards.

Theoretical Rationale

To move from profiles to processes, we grouped extant models of radicalization into their respective research programs and focused our efforts on identifying the causal

³⁸ This section is drawn from Jensen, Seate, and James 2016.

mechanisms that are emphasized by each perspective. The five research programs that we analyzed are psychological models, social identity theory, group-based recruitment theory, social mobilization theory, and cost/benefit theory. We chose to focus on radicalization research for two reasons. First, radicalization research emphasizes the underlying psychological, emotional, material, and group-based processes of radicalization to a far greater extent than do theories from criminology. Incorporating insights from these perspectives into our analysis of radicalization to violence is critical for understanding the phenomenon. Second, theories from the field of radicalization research are rarely tested using rich data and rigorous methods (Neumann and Kleinmann 2013).³⁹ Most commonly, they are supported by limited evidence from a handful of cases, which is often anecdotal in nature. Using the data and methods that are described below, we provide an initial test of these theories and assess their relative strengths and weaknesses when it comes to explaining violent extremism.

Not surprisingly, we found considerable overlap between the research programs when it comes to their core assumptions and the causal mechanisms they put forth. To facilitate the assessment of the perspectives, we mapped the conceptual overlap between them and then identified ten unique conceptual constructs in which all of the causal mechanisms from the research programs could be grouped. Below we briefly describe the five key radicalization research programs that we reviewed and we detail the mechanisms that were extracted from each and their pairings in the ten conceptual categories.

Individual-level psychological models. Psychological models of radicalization emphasize the complex cognitive and emotional processes that motivate individuals' involvement in extremism (Borum 2011a; Horgan 2005; Taylor and Horgan 2006). In particular, psychologists (Bhui and Dinos 2012; Kruglanski et al. 2009; Kruglanski et al. 2014) who study extremism highlight the importance of cognitive and emotional vulnerabilities, which are often the products of identity-seeking behavior in adolescence or early adulthood. In order to fulfill a search for personal identity, or to overcome a sense of vulnerability or diminished self-worth, individuals derive personal meaning and value through group membership or identification with a cause greater than themselves (Borum 2011a; Bhui and Dinos 2012; Kruglanski et al. 2009; Kruglanski et al. 2014).

Prominent among psychological models of extremism is the quest for personal significance theory, which argues that extremists are motivated by the activation of the significance quest, defined as the "fundamental desire to matter, to be someone, to have respect" (Kruglanski et al. 2014, 73). While arguably all humans are similarly motivated, Kruglanski et al. (2009; 2014) posit the presence of an ideological component that identifies involvement in terrorism as an appropriate means to gain (or regain) a lost sense of significance, followed by processes of socialization and implementation. While personal circumstances, such as blocked ambitions or job loss, can lead to the loss of significance,

³⁹ Several studies compare radicalization theories, drawing similarities and differences. These works, however, do not assess the comparative strengths and weaknesses of the theories using empirical data. See, for example, King and Taylor 2011; Hafez and Mullins 2015.

traumatic experiences in childhood, such as experiencing abuse or parental abandonment, may also play a role in fostering a sense of significance loss (Simi et al. 2015).

Social identity models

In general, social identity theory argues individuals' membership in identity groups (e.g., race, gender, extremist groups) influences how people see, think, and feel about themselves. More specifically, these identities are important because they provide information about how individuals should think and behave, thereby reducing their uncertainty about the social world, while providing the individual a positive sense of self (Tajfel and Turner 1986; Turner 1985). Drawing from this perspective, Hogg (Hogg and Terry 2000; Hogg 2001) argues that group leaders are an important part of understanding group processes, including extremist groups, because group leaders reflect what characteristics are needed for group membership. In other words, extremist groups and their leaders provide important cues for how individuals understand their social world. This is particularly important for individuals who feel uncertain about things that are relevant to the self. One important communicative strategy that group leaders use is called black sheeping. In black sheeping, the communicator uses a group member's actions to show that this is *not* how group members should think or behave. In relation to the influence of the group on individuals, the more prominent group dynamic concepts and theories that have been put to use in the study of terrorism are: group polarization; groupthink; in-group/out-group bias; diffusion of responsibility; and rule compliance.

Recruitment models

The recruitment approach focuses on extremist organizations and their efforts to draw recruits to support their political ambitions. From this perspective, group behaviors and messages are the units of analyses. As Gerwehr and Daly (2006) note, there is not much progress in the "scientific study on the vulnerability of *individuals* to recruitment by terrorist groups" (emphasis added). Similarly, Borum (2011) finds recruitment to be an important, yet so far neglected, field of inquiry. Gerwehr and Daly (2006) argue that recruitment to extremism can occur in a number of ways, including public and proximate; public and mediated; private and proximate; and private and mediated. It is important to note that for recruitment to be effective, messages need to be tailored to an audience's cultural, social, and historical background. For this reason, the recruitment perspective draws heavily from approaches that emphasize psychological and emotional variables (e.g., dependent personality, mental trauma associated with personal and community crises).

Social movement models

Social movement theory is a broad field out of which 'framing theory' has so far been put to the most use (Borum, 2011). Quintan Wiktorowicz's 2005 study of Islamic radicalization stands out as a central work that connects social movement theory to the study of radicalization. Wiktorowicz develops a radicalization model with several phases: cognitive opening (triggered by a crisis), religious seeking (as a result of the cognitive opening), frame alignment, and indoctrination. Frame alignment refers to the linkage between the interpretative frames (i.e. lenses through which reality is perceived and interpreted) of the

radical organizations with those of prospective constituents. The decision to engage in extremist violence is rational and motivated by gain, but defined in the terms of the newly acquired frames.

Cost/benefit models

Cost/benefit models are based on the assumption that extremists are not different from non-extremists in terms of socio-demographic characteristics or decision-making processes (Crenshaw 1987; McCormick 2003). From this perspective, individual radicalization is the product of a rational (though perhaps bounded) decision-making process in which the costs and benefits of alternative strategies are weighed prior to action. Extremist behaviors are determined to maximize potential benefits while minimizing costs. So-called ‘lures’ or ‘selective incentives’—forms of material gain which render ‘being a radical’ attractive—play an important role in the radicalization process by convincing individuals that the gains from extremist activities outweigh the costs (Pisoiu 2011). The way such incentives might function was explained by the adoption of rules and values based on the feedback of the social environment—the observation of models and rewards and punishments received (Bandura 1973), and conceptualized as behavioral reinforcers (Max Taylor and Horgan 2001).

Conceptual Constructs

From these research programs, we identified over 70 causal mechanisms (see Appendix 7) that have been proposed as conditions that drive radicalization to violence. These run the gamut from psychological and emotional causes, to material benefits and group dynamics. Instead of attempting to directly test the applicability of these research programs on the data, we opted to organize the different theoretical mechanisms according to their conceptual similarities (see Table 21) and to use the conceptual constructs as the conditions included in the set-theory analysis. There are several justifications for this approach, including the considerable thematic overlap in the mechanisms that are detailed, the lack of processor pathway hypotheses in extant theories, and the ability to drastically increase the overall causal complexity of the analysis.⁴⁰

Before moving on to a description of the 10 causal constructs that we identified, it is important to reiterate that the conceptual overlap among theories of radicalization is extensive, which makes it difficult to organize individual causal mechanisms into neatly demarcated conceptual categories. The 10 conceptual constructs that we have developed here are distinct in terms of their constitutive attributes, but they are also deeply interconnected. However, this should not be viewed as an obstacle to the investigation of causal pathways for three reasons.

⁴⁰ Tests of set-coincidence (Borgna 2013) revealed no significant overlap between these conceptual constructs, and, thus, all were retained for analysis.

Psychological rewards

- A.1: Significance restoration
- A.2: Individual significance gain
- A.3: Social significance gain
- A.4: Group prestige
- A.5: Uncertainty relief
- A.6: Heroism
- A.7: Individual recognition
- A.8: Emotional rewards
- A.9: Moral rewards
- A.10: Avoidance of significance loss

Material Rewards

- B.1: Paradise
- B.2: Status
- B.3: Material Reward

Personal Crisis

- C.1: Economic crisis
- C.2: Socio-cultural crisis
- C.3: Personal crisis
- C.4: Crisis-driven cognitive opening
- C.5: Emotional distress
- C.6: Crisis-driven religious seeking

Community Crisis

- D.1: Collective crisis situation
- D.2: External threat
- D.3: Political crisis
- D.4: Cognitive opening
- D.5: Imminent existential threat

Recruitment

- E.1: Public-proximate
- E.2: Public-mediated
- E.3: Private-proximate
- E.4: Private-mediated

Cognitive Frame Alignment

- F.1: Frame alignment
- F.2: Indoctrination
- F.3: Authority of frame articulator
- F.4: Empirical evidence
- F.5: Universal truth
- F.6: Incremental learning
- F.7: Individual learning
- F.8: Forming interpretive frames
- F.9: Framework exclusivising
- F.10: Rules directed redesigning

Psychological Vulnerability

- G.1: Humiliation
- G.2: Helplessness
- G.3: Socially based significance loss
- G.4: Group boundaries
- G.5: Uncertainty
- G.6: Emotional distress
- G.7: Cultural disillusionment
- G.8: Anomie
- G.9: Broken family
- G.10: Loose family
- G.11: Lack of affection from parents
- G.12: Loose community relations
- G.13: Dependent personality
- G.14: Socio-cultural crisis

Physical Vulnerability

- H.1: Physical distress
- H.2: Material distress
- H.3: Family dysfunctionality
- H.4: Community dysfunctionality
- H.5: Economic crisis

Group Norms

- I.1: Leadership prototypicality
- I.2: Leadership importance
- I.3: Leadership norms
- I.4: Black sheeping
- I.5: Rule compliance
- I.6: Authority of frame articulator
- I.7: Uncertainty relief

Group Biases

- J.1: Group influence
- J.2: Groupthink
- J.3: External threat
- J.4: Typicality threat
- J.5: In-group/out-group bias
- J.6: Dehumanizing rhetoric
- J.7: Diffusion of responsibility
- J.8: Social isolation
- J.9: Interpretative frameworks

Table 21 - Conceptual constructs

First, the connections between the conceptual constructs that we have developed and their constitutive causal mechanisms are often temporal in nature and help us to understand radicalization to violence as processes that unfold over time. For example, while the individual mechanisms that make up the personal crisis and psychological vulnerability constructs are inherently similar, they may stand in temporal relation to one another, where crises are the causes of vulnerabilities.

Second, the method that we have chosen—fs/QCA—treats overlaps between sets (our conceptual constructs) as normal social phenomena and it is designed to handle this type of complexity. What is important from an fs/QCA perspective is that the calibration scheme which is used is sufficiently detailed to accurately describe what it means for a case to be fully in one set (conceptual construct) as opposed to another. Table 23 below details how we have defined membership in the various causal constructs. Finally, to ensure that our conceptual constructs do not overlap to the point of mutual constitution, we performed tests of set-coincidence (Borgna 2013) and found that our conceptual constructs easily cross the threshold for uniqueness, meaning that all could be retained for our analysis.

Personal crisis. Personal crises refer to events experienced by individuals who experienced intense trouble, difficulty, or danger leading to personal instability (e.g., Wiktorowicz 2005). Several prominent radicalization theories surmise that the instability stemming from personal crises makes some individuals vulnerable to radicalization. Specifically, recruitment models (Gerwehr and Daly 2006) argue that while there is no “one-size-fits-all” (p. 75) recruitment strategy, those who experienced personal crises may be able to be particularly vulnerable at recruitment pitches that are framed as social advancement. Social movement models (e.g., Wiktorowicz 2005) suggest that the instability that comes from personal crises allow for a cognitive opening wherein the person’s belief system can be changed to align with more radical beliefs. To capture personal crisis, we coded the cases for emotional distress, economic crises, personal discrimination, personal experience with death or crime, or crisis-driven cognitive opening.

Community crisis. Similar to personal crisis, community crisis refers to events that are characterized by intense trouble, difficulty, or danger that leads to personal instability (e.g., Wiktorowicz 2005). However, unlike personal crises, community crises occur to members of the community, which can evoke psychological and communicative processes related to group dynamics. All theories reviewed above indicate that community crises are an important precursor to radicalization, including psychological models (e.g., Kruglanski et al. 2014), social identity models (e.g. Hogg 2001), recruitment models (e.g., Gerwehr and Daly 2006), social movement models (e.g., Borum 2011), and cost/benefit models (e.g., Max Taylor and Horgan 2001). To measure community crisis, we coded for group-facilitated cognitive opening, collective crisis situation, feelings of external or imminent threat posed by other social groups, and political crises.

Psychological vulnerability. Psychological vulnerability refers to cognitive and emotional characteristics that threaten a person’s sense of self, which in turn makes them vulnerable

to the adoption of radical beliefs and engagement in radical behavior (e.g., Kruglanski et al. 2014). Four of the reviewed theories predict that psychological vulnerabilities play an important role in the radicalization process, including psychological models (e.g., Kruglanski et al. 2014), social identity models (e.g., Hogg 2001), recruitment models (e.g., Gerwehr and Daly 2006), and social movement models (e.g., Borum 2011). We coded for psychological uncertainty, personal humiliation, personal helplessness, socially-instilled significance loss, failure to assimilate to dominate cultures, emotional distress, cultural disillusionment, anomie, divorce or other family separation, loose or distant family relations, lack of attention/affection from family, loose or distant relations from community members, socio-cultural crisis, and dependent personality.

Psychological rewards. Psychological rewards refer to cognitive and emotional benefits that are received, or believed will be received, from adopting radical beliefs and/or engaging radical behaviors (Hogg 2001; Kruglanski et al. 2014). These cognitive and emotional benefits are thought to positively influence a person's sense of self (Hogg 2001; Kruglanski et al. 2014). Three of the perspectives reviewed above propose that psychological rewards are important drivers in the radicalization process, including, psychological models (e.g., Kruglanski et al. 2014), social identity models (e.g., Hogg 2001), and (bounded) cost/benefit models (e.g., Max Taylor and Horgan 2001). To capture psychological rewards we coded for significance restoration, individually-based significance gain, socially-instilled significance gain, group prestige, psychological uncertainty relief, heroism, personal status, recognition, emotional rewards, and moral rewards.

Physical vulnerability. Recruitment models argue physical vulnerabilities make people susceptible to recruitment into extremists groups (e.g., Gerwehr and Daly 2006). Physical vulnerability is when individuals are in situations or experience circumstances where their basic needs are not met, such as not having access to important resources, such as food, shelter, and the like. We coded for physical vulnerabilities at both the personal and community levels.

Material rewards. Material rewards refer to incentive or benefits that are physical or real, or perceived to be physical or real by the individual. Both cost/benefit (e.g., Gerwehr and Daly 2006), and social movement (e.g., Borum 2011) perspectives predict that some individuals are driven to engage in radical behaviors because they believe will receive material rewards, achieve a form of status that will allow them to receive future material rewards, or go to paradise (i.e., an other-worldly place where individuals will go if they martyr themselves).

Recruitment. Recruitment models suggest that many individuals need access to extremist groups to solidify their radical beliefs and have the resources needed to engage in radical behaviors (Gerwehr and Daly 2006). Gerwehr and Daly (2006) put forth four methods of recruitment: public and proximate; public and mediated; private and proximate; and private and mediated.

Group biases. Group biases refer to a pattern of cognitions (e.g., beliefs, values) wherein a person favors social groups (e.g., racial/ethnic groups, extremist groups) that they are a part of, or wish to be a part of (termed ingroups) over groups that they are not a part of (termed outgroups). Given that many radical behaviors are committed by, or on behalf of, extremist groups, it is not surprising that group biases are predicted to be a driving factor in engaging in radical behaviors (e.g., Hogg 2001; Kruglanski et al. 2014; Taylor and Horgan 2001). To capture group biases we coded the cases for group-based radicalization, groupthink (McCauley and Moskalenko 2008), external threat of another social group, whether the external threat was typical of intergroup threat, ingroup/outgroup biases, dehumanizing rhetoric, diffusion of responsibility, forming interpretative frameworks, and social isolation.

Communicating group norms. Both social identity and occupational choice perspectives surmise that exposure to communication endorsing the need to hold radical beliefs and engage in radical behaviors is part and parcel of the radicalization process. Specifically, social identity model of leadership (e.g., Hogg 2001) argues that many of these messages about group beliefs, values, and subsequently actions are likely to come from group leaders, and group leaders that embody group characteristics (i.e., are prototypical members are the group) are more likely to be persuasive. Similarly, occupational choice models suggest that the authority of the message articulator likely influences a person's willingness to hold extremist beliefs and engage in radical behaviors. Hence, we coded leadership importance, leadership prototypical, authority of frame articulator, communication of group rules, uncertainty relief, and black sheeping.

Cognitive frame alignment. Drawing from social movement perspectives, cognitive frame alignment refers to the learning processes an individual undergoes in forming radical beliefs (Bandura 1973; Borum 2011). This notion is rooted in both theory and evidence in social psychology that cognitions (e.g., attitudes and beliefs) are predictive of human behavior (see Kraus, 1995 for a meta-analytic review). To capture cognitive frame alignment, we coded for frame alignment, indoctrination, frame exclusivising, authority of the frame articulator, empirical evidence of the belief system, universal truth of the belief system, incremental learning, individual learning, forming interpretative frameworks, and rules directed redesigning.

Methodology

Given the study's emphasis on radicalization as a complex causal process, we utilized case study methods designed to handle conjunctural causation and non-linearity in order to assess the mechanisms detailed above. Specifically, we used process-tracing techniques (Bennett and Checkel 2014; A. L. George and Bennett 2005; Collier 2011) to write life-course narratives for a sample of U.S.-based extremists. We then coded the cases for the presence of the key mechanisms that were extracted from the five research programs. Finally, we used fs/QCA in order to test for causal necessity and show how the proposed causal mechanisms combine to form causal conjunctions that are sufficient for individuals to be members of the set of violent extremists.

Case selection. The research team compiled life-histories for 56 individuals who radicalized in the U.S. between 1960 and 2013. These individuals were selected for inclusion in the set-theory analysis based on four factors: the availability of critical information related to their backgrounds and activities in public sources; their participation as a member of a group or movement representing the far left, far right, or radical Islamist ideological milieus; their values on key variables from the statistical analysis described in the previous section, and their statuses as most-likely or least-likely cases for extant theories of radicalization (Eckstein 1975; George and Bennett 2005). This last case selection criterion is especially important. Since one of the goals of this analysis is to assess the explanatory strength of the causal mechanisms that are highlighted by radicalization theories, cases were selected in part on the types of challenges for explanation that they pose for the theories and their respective causal logics. Most-likely cases are those that show high values on the particular causal conditions that are highlighted by a theory, and thus, should display the outcome that is predicted by the theory. Least-likely cases, on the other hand, are those that show low values on the conditions that are emphasized by a theory and, thus, should fail to display the outcome that is posited by the theory (Eckstein 1975). Mechanisms that help explain least-likely cases are considered to have strong explanatory power, while those that fail to contribute to explanations of most-likely cases are considered to be less important as general explanatory conditions.

In addition to these case selection criteria, we took efforts to ensure that our sample of cases is representative of the larger population of extremists in the U.S. As the previous section shows, extremists in the U.S. tend to be overwhelmingly male (approximately 90%), are typically around 28-32 years of age at the time of their involvement in extremist activities, and are fairly well educated. The sample used in this section is 91% male, has an average age of 31 years at the point of involvement in extremist acts, and is dominated (52%) by individuals who attended or completed college.

Case coding. Using MAXQDA data analysis software, coders evaluated the life-course histories and applied the relevant codes (see Appendix 7) to instances in the text where the mechanisms were apparent. All life-course histories were double-coded to ensure reliability and then cleaned and reviewed by the project researchers. See Table 22 for basic descriptive statistics of the conceptual construct coding.

Condition	Mean	Std. Dev.	Cases
Personal Crisis	0.69642	0.43227	56
Community Crisis	0.83482	0.32485	56
Psychological Vulnerability	0.70535	0.37233	56
Psychological Rewards	0.66964	0.33108	56
Physical Vulnerability	0.49553	0.41640	56
Material Rewards	0.13839	0.30222	56
Recruitment	0.44196	0.47946	56
Group Norms	0.49553	0.46649	56
Group Biases	0.78125	0.34738	56
Cognitive Frame Alignment	0.95982	0.15509	56
Violent Extremism	0.67857	0.35265	56

Table 22 - Descriptive statistics of conceptual constructs

Fuzzy-set/Qualitative Comparative Analysis (fs/QCA). The cases studies described above were analyzed using fs/QCA techniques. Fs/QCA was chosen because of its unique ability to handle causal complexity and its focus on necessary and sufficient causation (Schneider and Wagemann 2012). Fs/QCA relies on a fundamentally different logic of inference than traditional quantitative based approaches, which are grounded in inferential statistics (Ragin, 2008). Instead of attempting to isolate the net-effects of independent variables, QCA conceives of the social world in terms of membership in sets (e.g. the set of democracies) and the relationships between sets (e.g. the relationship between the set of countries with fair elections and the set of democratic countries). QCA looks for consistent commonalities among cases that are members of the same set and asks whether those commonalities are necessary or sufficient for membership in the set (Ragin 2008). In contrast to quantitative approaches, QCA assumes that set relations are asymmetrical and non-linear, driven by complex processes, such as equifinality and multi-finality (defined above), and that causation is typically conjunctural in nature (i.e. conditions combine to produce set membership) (Schneider and Wagemann 2012; Ragin 2008; Goertz and Mahoney 2012). We next provide a brief description of the important concepts of fs/QCA before moving on to our analysis results.

Necessary conditions. Necessary conditions are causes which must be present for an outcome to occur, but also causes whose presence do not guarantee the occurrence of the outcome (Goertz and Starr 2002; Mahoney, Kimball, and Koivu 2009). In set-theoretical terms, tests for necessity measure the extent to which the outcome Y is a subset of cause X; that is, the extent to which all cases that are members of the outcome set Y are also members of the condition set X (Schneider and Wagemann 2012; Ragin 2008). For example, all U.S. presidents are members of the set of U.S. citizens, but not all members of the set of U.S. citizen are members of the set of U.S. presidents. The uncovering of necessary conditions is often an important discovery, especially for young research fields, since they are the conditions that make outcomes of interest possible. Of course, in the social world, things rarely display the type of rigid uniformity (always absent or always present) built

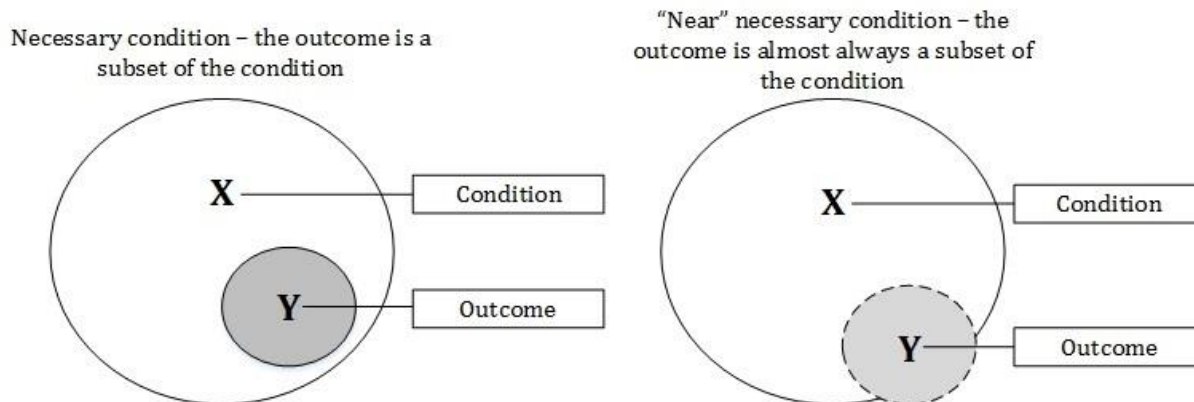


Figure 1 - Necessary and "near" necessary conditions

into this strict conception of necessary causes, which has led social scientists to instead think of causes as “near” necessary conditions—causes which usually must be present for the occurrence of an outcome (Ragin 2008). See Figure 1 for an illustration of these concepts.

Sufficient conditions. A condition is sufficient when its presence causes the occurrence of an outcome, but the outcome may also be caused by other (and conceptually unrelated) conditions (Mahoney, Kimball, and Koivu 2009; Ragin 2008; Schneider and Wagemann 2012). In set-theory, a sufficient condition X is a subset of the outcome Y ; that is, all cases that are members of the condition set X are also members of the outcome set Y . For instance, all men who are members of the set of bachelors are also members of the set of unmarried individuals, but the set of unmarried individuals also contains men and women from other set groups, such those who are divorced, widowed, or are too young to marry. While necessary conditions are those factors which make outcomes possible, sufficient conditions are those which cause outcomes to occur, and, thus, they are especially important to scientific exploration. As is the case with necessary conditions, however, social and behavioral phenomena very rarely follow the law-like pattern (if X , then Y) that is built into statements of sufficiency, causing social scientist to think of sufficiency in terms of conditions that are almost always sufficient for the occurrence of an outcome (see Figure 2).

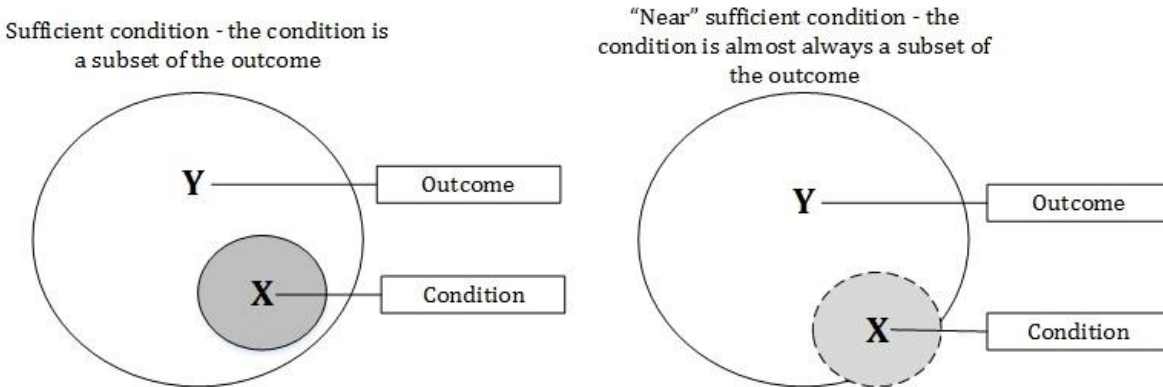


Figure 2 - Sufficient and "near" sufficient conditions

INUS conditions. In social science, a causal condition typically only has a sufficient relationship with an outcome of interest when it is combined with other causes. Causes that combine with others to form sufficient conjunctions are commonly known as INUS conditions (Mackie 1965; Mahoney, Kimball, and Koivu 2009). In formal terms, an INUS cause is a necessary, but not sufficient, part of a conjunction of conditions which are collectively sufficient, but not necessary, for producing an outcome (Mackie 1965). INUS conditions make up the solution pathways (termed causal recipes, see Ragin, 2008) that are the products of fs/QCA analysis and are of central importance to studies of causal complexity.

Truth tables. The main tool that researchers utilizing QCA use to uncover solution pathways is the truth table. Truth tables contain rows that represent all possible logical combinations of the causal conditions equal to 2^k , where k equals the number of causal condition that are being retained as potential INUS conditions (Ragin 2000; Ragin 2008). Once constructed, truth tables are minimized using Boolean techniques, leaving behind those conjunctions of causes that are sufficient to produce membership in the outcome set. In short, "the truth table elaborates and formalizes one of the key analytic strategies of comparative research—examining cases sharing specific combinations of causal conditions to see if they share the same outcome" (Ragin 2008: 24). In fs/QCA analysis, the strength of empirical support for the solution paths that are generated by the logical minimization of a truth table is generally derived from two descriptive measures—consistency and coverage.

Consistency. Consistency measures the extent to which the data support the set-theoretic claims that are implicit in the logic of necessary and sufficient causes. In other words, for necessary conditions, consistency measures the extent to which the outcome is a subset of the causal condition, while for sufficient relationships, consistency measures the extent to which the causal condition is a subset of the outcome (Schneider and Wagemann 2012). These scores range from 0 (i.e., not consistent with the set-theoretical claim) to 1 (i.e.,

completely consistent with the set-theoretical claim). While researchers have not yet reached a universal consensus on which consistency scores to use as the benchmarks for necessity and sufficiency, most agree that in tests for necessity, conditions with a consistency score of 0.90 or higher can be considered necessary for the outcome (Ragin 2008; Schneider and Wagemann 2012), while in tests of sufficiency, consistency scores of 0.80 and higher signal that the cause is “mostly” a subset of the outcome (Ragin 2008). Consistency scores for necessary conditions are calculated by using the following formula, where X_i is the degree of membership in set X, and Y_i is the degree of membership in set Y:

$$(Y_i \leq X_i) = \frac{\sum[\min(X_i, Y_i)]}{\sum(Y_i)}$$

The formula for sufficiency consistency is:

$$(X_i \leq Y_i) = \frac{\sum[\min(X_i, Y_i)]}{\sum(X_i)}$$

Coverage. Coverage measures the proportion of cases that display an outcome of interest explained by a solution pathway. Coverage is conceptually similar, but not mathematically equivalent, to measures of explained variance that are reported in statistical tests. Since solution pathways often contain one or more of the same INUS conditions, coverage can be thought of as the total proportion of cases covered by a solution pathway (raw coverage) or the unique portion of cases that are covered by that pathway alone (unique coverage) (Ragin 2008). Coverage can also be calculated for all of the solution pathways combined (solution coverage), which effectually measures the proportion of the data in a given study displaying the outcome that are covered by the various combinations of the causal conditions that are included in the study. Coverage for sufficient conditions is calculated by using the following formula:

$$(X_i \leq Y_i) = \frac{\sum[\min(X_i, Y_i)]}{\sum(Y_i)}$$

Fuzzy sets. When it was first introduced, QCA involved the analysis of simple dichotomous measures of set membership in causes and outcomes, what is known as crisp set QCA, which treats both causal inputs and outcomes as binary (Ragin 1987). However, given that the social world rarely conforms nicely to simple present/absent classifications,

researchers now more commonly think of set membership in fuzzy terms, where cases can have membership scores ranging anywhere in the continuum between 0 (i.e., the condition is completely absent) and 1 (i.e., the condition is completely present) (Ragin 2000; Ragin 2008). This allows for much finer grained analyses, where cases can be more in than out of a set and vice versa, and it frees researchers from making membership decisions that are not backed by substantive knowledge or empirical evidence. Moreover, fuzzy scores retain a key strength of set-theory, where researchers are forced to think critically about what it means for a case to be a member of a condition or outcome set. Unlike traditional quantitative analysis, which treats any difference in measurement as meaningful, fs/QCA requires that researchers make informed decisions about the ontology of concepts (Goertz 2005) and decide at which points measurement differences are no longer conceptually meaningful. For example, a researcher might decide that full democracy is made up of competitive elections, civil liberties, and a free press. All cases displaying those attributes would be assigned membership scores of 1 in the set of full democracies. Cases that display additional attributes, such as legislative constraints or executive cohesiveness, would not be given a higher score since those features are not additionally useful for determining which countries are democracies and which are not.

Calibration. The process of assigning membership scores to cases for causal conditions and outcomes is known as calibration (Ragin 2008; Basurto and Speer 2012; Schneider and Wagemann 2012). To calibrate data for fs/QCA analysis, researchers must first use their topic and case expertise to decide what case attributes constitute full membership (a score of 1), full non-membership (a score of 0), and full ambiguity (a score of 0.5, not in or out of the set) for all causal conditions and the outcome. For example, a researcher looking to assign case membership in the set of democracies might use the POLITY index and decide that all countries with scores of 7 and above are fully in the set (a score of 1), all countries with scores 0 and below are fully out of the set (a score of 0) and all countries with a score of 3 are fully ambiguous (a score of 0.5). The cases displaying the remaining POLITY values would be given membership scores that fall between the anchor points. There are numerous methods for assigning intermediate scores, including statistical and theoretical approaches (Ragin 2008). The decision of which to use should be driven by the particular questions that the researcher hopes to answer and the type of data he or she is using.

Steps in conducting fs/QCA. Once all cases have been calibrated for set membership in the proposed causal conditions and the outcome, the completion of fs/QCA analysis occurs in several stages. It is important that researchers complete all of these steps to uncover all meaningful relationships in the data and to ensure that those findings are robust.

Necessity tests. The first step in carrying out fs/QCA analysis is to determine which conditions, if any, are necessary for the occurrence of an outcome. As noted above, in social science, conditions are usually “near” necessary, as opposed to always present. The “nearness” of a condition to the pure conceptualization of necessity is measured by calculating the proportion of cases that have values on a cause which are greater than or equal to their values on the outcome. Expressed graphically, necessity tests measure the

number of cases that cluster on or below the main diagonal on XY plots in comparison to those that fall above the main diagonal (see Figures 3 and 4). As previously stated, the consistency cutoff for necessity is .90.

Tests for “trivialness” and true logically contradictory cases (TLCs). Tests for necessity often reveal important relationships between conditions and outcomes, but researchers must be careful to recognize that the constraining effects of necessary conditions on outcomes are lessened if the conditions are trivial (Goertz 2006), or contain true logically contradictory cases (TLCs) (Schneider and Wagemann 2012). Trivial necessary conditions are those which are consistently fully present even though membership scores in the outcome set vary from fully absent to fully present. In other words, trivial necessary conditions are those which must be present, but are limited in their ability to explain variations in outcomes. Trivial necessary conditions can still be important findings, but given consistently high set membership scores, they must be married with additional causal conditions to have any analytical leverage. By comparison, TLCs are those cases that display set membership scores that place them in the outcome set (i.e. greater than 0.5), but out of the condition set (i.e. less than 0.5) (Schneider and Wagemann 2012). TLCs are a particularly problematic type of inconsistent case because they directly violate the logic of necessity, which stipulates that the outcome cannot occur in the absence of the necessary condition. Conditions that contain TLCs should be included in later tests for sufficiency since the outcome can occur in their absence. Measuring the extent of a condition’s “trivialness” as well as detecting the presence of TLCs, are accomplished using simple XY charts that plot all cases according to their membership scores in the causal conditions and the outcome. Trivial necessary conditions are ones that display case clustering along the far right vertical axis, while TLCs are markers that have scores above 0.5 on the Y axis, and scores below 0.5 on the X axis.

Truth table construction. With tests for necessity complete, the next step in fs/QCA analysis involves the construction of a truth table. The most important decision researchers must make in the construction of the truth table is to determine which conditions to include, which in turn has an impact on the range of possible INUS conditions that can be uncovered. It is common in fs/QCA research to drop necessary conditions from the truth table since the table allows for tests of sufficiency, not necessity (Ragin 2009). However, more recent scholarship on fs/QCA cautions against dropping necessary conditions from table if those conditions are non-trivial or contain TLCs (Mello 2013). Non-trivial necessary conditions can also be sufficient, either on their own or in conjunction with other causes, for the occurrence of the outcome. Removing them from the truth table analysis limits the ability of researchers to uncover potentially meaningful relationships. Likewise, the exclusion of necessary conditions that show the presence of TLCs from the truth table precludes the possibility of identifying the causal conjunctions that explain the occurrence of the outcome in spite of the absence of “near” necessary conditions.

Sufficiency tests. Similar to tests of necessity, “near” sufficient conditions are identified by calculating the proportion of cases that fall on or above the main diagonal in XY plots in

comparison to those that fall below. As noted above, since sufficient conditions are comparatively rare in the social sciences, tests for sufficiency usually seek to identify the universe of INUS causes, or the conjunctions of individual causal conditions, that are sufficient for explaining the occurrence of an outcome. The process of identifying INUS conditions involves the logical minimization of the truth table using Boolean techniques. This process requires that researchers make two critical decisions. First, researchers must decide which rows in the truth represent sufficient conditions for the outcome. This is most commonly done by assigning a cutoff for sufficiency using the raw consistency scores of the individual rows in the truth table. While there are many suggestions for choosing a raw consistency cutoff in the fs/QCA literature, researchers most commonly use the 0.80 consistency (see discussion above) threshold for determining which truth table rows constitute sufficient conditions for outcome set membership (Ragin 2008). This value should only be used, however, after careful analysis reveals the absence of natural breaks in consistency scores and tests show that none of the rows with consistency scores of 0.80 or higher contain TLCs (Schneider and Wagemann 2012). Second, researchers must decide whether to use the truth table rows that lack empirical evidence, known as logical remainders, in the logical minimization procedures. Given the limited diversity that is common in the social world (Ragin 2008), researchers are likely to find that the majority of the rows in their truth tables lack empirical content. Logical remainders can be used as counterfactuals to further simplify the complexity of the INUS combinations that are left after standard Boolean minimization techniques have been applied. The use of logical remainders requires that researchers make knowledge-based decision about the presence or absence of each of the causal conditions that are include in the truth table. If such knowledge does not exist, researchers should avoid using logical remainders for further logical minimization.

Robustness tests. Upon the completion of the logical minimization of the truth table, researchers should perform at least two robustness tests to ensure that the combinations of INUS conditions that they have uncovered are, in fact, sufficient conditions for outcome set membership. First, researchers should look for the presence of any TLCs in any of the solution paths. This is done by using XY plots to determine if any cases that are members of the individual solution paths (i.e. values greater than 0.5) have values on outcome membership that put them outside of the set (i.e. less than 0.5). Again, TLCs are problematic because they contradict the logic of sufficiency, which states that a case will exhibit the outcome if the solution condition is present. Second, researchers should test to ensure that none of the solution paths are simultaneously sufficient for the negation of the outcome ($\sim Y$). Simultaneous subset relations significantly lessen the analytic value of INUS conjunctions since those solution paths are sufficient for explaining the cases that are members in an outcome set but are also sufficient for explaining those cases that fail to exhibit the outcome (Schneider and Wagemann 2012). Simultaneous subset relations are determined by calculating the solution path's raw consistency and proportional reduction in inconsistency (PRI) scores for both the outcome and its negation. Solution paths that display high raw consistency and PRI scores on the outcome, and low consistency and PRI

scores on the negation of the outcome, have clear non-simultaneous subset relations and can be considered sufficient conditions for the outcome (Schneider and Wagemann 2012).

Results

Calibration. The 56 cases included in this study were calibrated for membership in the ten causal conditions and the outcome using a manual, theoretical approach (see Appendix 6 for case calibration scores). The research team used its knowledge of the conceptual constructs described above to determine which combinations of causal mechanisms from the conceptual constructs constitute full membership in a particular set (a score of 1), which combinations are indicative of a case being more in than out of the set (a score of 0.75), which mechanisms are associated with full ambiguity (a score of 0.5), the combinations that suggest that a case is more out than in the set (a score of 0.25), and the requirements for exclusion from the set (a score of 0). This calibration scheme was chosen because of the use of non-numerical data and for the particular analytical benefits it provides. This scheme forces researchers to use theory and substantive knowledge to determine what mechanisms constitute necessary, sufficient, and INUS conditions for set membership, and, thus, it allows for a more direct assessment of the explanatory capabilities of causal mechanisms than a calibration scheme based on regularities found in the data.

The details of the calibration scheme that we used are listed in Table 23. The table shows how the mechanisms that were drawn from the various theories were weighted to establish membership in the conceptual sets. For example, an individual was treated as fully out of the set of “personal crisis” if they failed to show evidence of the presence of any of the mechanisms that were identified as belonging to that conceptual category. An individual was deemed to be more out than in the set (i.e. a 0.25) if they showed evidence of the presence of either, but not both, an economic crisis or socio-cultural crisis. When both were present, the individual was deemed to be neither in nor out of the set (i.e. a 0.5). Individuals were determined to be mostly in the set (i.e. 0.75) when there was evidence that they experienced a crisis-driven cognitive opening. Finally, an individual was deemed to be a full member of the set (i.e. a score of 1) if they showed evidence of experiencing a personal, non-material crisis or severe emotional distress, or if a crisis-driven cognitive opening combined with either an economic crisis or a socio-cultural crisis.

Condition	0	.25	.5	.75	1
Psychological Rewards	No codes	Any single "A" code	Any two "A" codes	Any three "A" codes	Any four "A" codes
Material Rewards	No codes	B.1+B.3 only	B.1*B.3 only	-	<i>B.2 only</i>
Personal Crisis	No codes	C.1+C.2 only	C.1*C.2 only	C.4 only	<i>C.3+C.5+C.6+(C.4*(C.1+C.2))</i>
Community Crisis	No codes	D.3 only	D.4 only	D.1+(D.3*D.4)	<i>D.2+D.5+(D.1*D.3)+(D.1*D.4)</i>
Recruitment	No codes	E.2 only	-	E.1+E.4 only	<i>E.3 only</i>
Cognitive Frame Alignment	No codes	(~F.1*~F.2*~F.9)*(any one remaining "F" code)	(~F.1*~F.2*~F.9)*(any two remaining "F" codes)	F.1+F.2+F.9+(any three remaining "F" codes)	(F.1+F.2+F.9)*(any single remaining "F" code)+(~F.1*~F.2*~F.9)*(any four remaining "F" codes)
Psychological Vulnerability	No codes	~ G.5 *(any remaining "G" codes)	G.5 only	G.5 *(any single remaining "G" code)	G.5 *(any two remaining "G" codes)
Physical Vulnerability	No codes	H.1+H.4 only	H.1*H.4 only	H.3*(H.1+H.4)	<i>H.2+H.5+(H.3*H.1*H.4)</i>
Group Norms	No codes	I.4+I.5+I.7	(I.4*I.5)+(I.4*I.7)+(I.5*I.7)	I.1+I.2+I.6+I.3	(I.1+I.2+I.6+I.3)*(I.4+I.5+I.7)+(I.1*I.2)+(I.6*I.3)+(I.1*I.3)
Group Biases	No codes	~ J.1 *(any remaining "J" codes)	J.1 only	J.1 *(any single remaining "J" code)	J.1 *(any two remaining "J" codes)
Violent extremism (outcome)	Renunciation of the use of violence for political goals	Property damage but no violence against person(s)	Support for, but no direct participation in, violence	Intent to perpetrate violent act(s) against person(s)	Actual or attempted violence against person(s)

Table 23 - fs/QCA calibration scheme

Legend: + = Logical OR, * = Logical AND, **Bold** = necessary condition, *Italics* = sufficient condition, ~ = Absence of condition, - = Score not applicable

In order to stay consistent with the quantitative analysis that was done in the previous section⁴¹, we calibrated the outcome set according to the following scheme: individuals who engaged in acts meant to cause injury or death were considered to be fully in the set (i.e. a score of 1); individuals who intended to participate in acts meant to cause injury or death, but nevertheless failed to do so because of law enforcement intervention, were coded as mostly in the set (i.e. a score of 0.75); individuals who materially supported the violent actions of others, but showed no intention to personally engage in violent acts, were coded as fully ambiguous (i.e. a score of 0.50); individuals who engaged in illegal acts that were not intended to cause death or injury (e.g. vandalism, property destruction, etc.) were scored as mostly out of the set (i.e. a score of 0.25); and individuals who denounced acts meant to kill or injure were scored as fully out of the set (i.e. a score of 0).

Tests for necessity. With calibration complete, the research team measured the set relations of the ten causal conditions described above in relation to the outcome (violent extremism) to determine if any cross the 0.90 consistency threshold for necessity. The results, which are reported in Table 24, show that two conditions—cognitive frame alignment and community crisis—pass this threshold and can be viewed as “near” necessary causes of violent extremism. This is potentially a very significant finding, as it suggests that radicalization to violence will not occur in the absence of dramatic shifts in an individual’s cognitive belief system or in the absence of a deeply held perception that the individual is a member of a community that has been victimized.

To assess the robustness of these claims, the team measured the extent to which these conditions approach “trivial” necessity and also determined if any True Logically Contradictory Cases (TLCs; see Appendix 6 for more information on “trivialness” and TLCs) were present for either of the conditions. Figure 3 shows all 56 cases included in this study plotted according to their membership scores in the condition set “cognitive frame alignment” and the outcome set “violent extremism.” While TLCs are not present (as evidenced by the lack of cases in the shaded area of the graphic), the cases cluster around the far right vertical axis, which reveals that cognitive frame alignment is likely a trivial necessary condition for violent extremism. This finding is not altogether surprising, as one of the main contentions of this and other studies (Borum 2011) is that there is often incongruity between extremist beliefs, which are commonly violence-justifying, and extremist behaviors, which are less commonly violent.

⁴¹ The calibration of the outcome set reflects the definition of violence (i.e., an individual’s participation in acts meant to kill or injure for the purpose of achieving political goals) that is used throughout this project. We recognize, however, that alternative definitions of violence could be adopted, including those which treat property violence as parallel to acts which harm people. Considering this, we used alternative calibrations of the outcome set, including ones that treated property violence and material support to a terrorist group as an act of violence. However, these alternate calibrations of violent extremism did not significantly change the fs/QCA results that are reported.

Condition	Consistency	Coverage
Personal Crisis	0.736842	0.717949
~Personal Crisis	0.289474	0.647059
Community Crisis	0.901316	0.732620
~Community Crisis	0.138158	0.567568
Psychological Vulnerability	0.782895	0.753165
~Psychological Vulnerability	0.309211	0.712121
Psychological Rewards	0.782895	0.793333
~Psychological Rewards	0.328947	0.675676
Physical Vulnerability	0.348684	0.854839
~Physical Vulnerability	0.664474	0.623457
Material Rewards	0.182411	0.903226
~Material Rewards	0.835526	0.658031
Recruitment	0.460526	0.707071
~Recruitment	0.565789	0.688000
Group Norms	0.513158	0.702703
~Group Norms	0.506679	0.681416
Group Biases	0.802632	0.697143
~Group Biases	0.236842	0.734694
Cognitive Frame Alignment	0.960526	0.679070
~Cognitive Frame Alignment	0.046053	0.777778

Table 24 - Tests for necessity

Note: ~ = Negation of condition. Threshold for a necessary condition is 0.90.

Thus, while most extremists experience a process that leads to a radical alteration in their perceptual frames, comparatively few actually engage in violent acts (see also McCauley and Moskalenko 2008). In short, while cognitive frame alignment helps explain the psychological changes that make violent extremism possible, it is less useful as a contributing explanation for why some extremists avoid engaging in violent activism.

Similarly, Figure 4 plots the cases membership scores in the condition set “community crisis” and the outcome. Community crisis displays far less trivialness than cognitive frame alignment, with cases scattered more evenly on or below the main diagonal. This suggests that the presence of community crisis not only makes violent extremism possible, but that its presence at least partially drives case membership in the violent extremist set. Unlike cognitive frame alignment, however, community crisis contains two TLCs, as indicated by the markers that fall in the shaded area of the chart. In practical terms, this means that, while somewhat uncommon, violent extremism can occur in the absence of the development of a sense of belonging to a community that has been collectively victimized. Community crisis is, thus, a “near” necessary condition for violent extremism and it is important to determine what conjunction or conjunctions of additional causes make violent extremism possible in the absence of a sense of community victimization.

Tests for sufficiency. With tests for necessity complete, the research team moved on to the creation of the fuzzy set truth table that allows for the identification of causal conjunctions that are sufficient explanations of the outcome. Since one of the necessary conditions, community crisis, contained TLCs, it was retained for inclusion in the truth

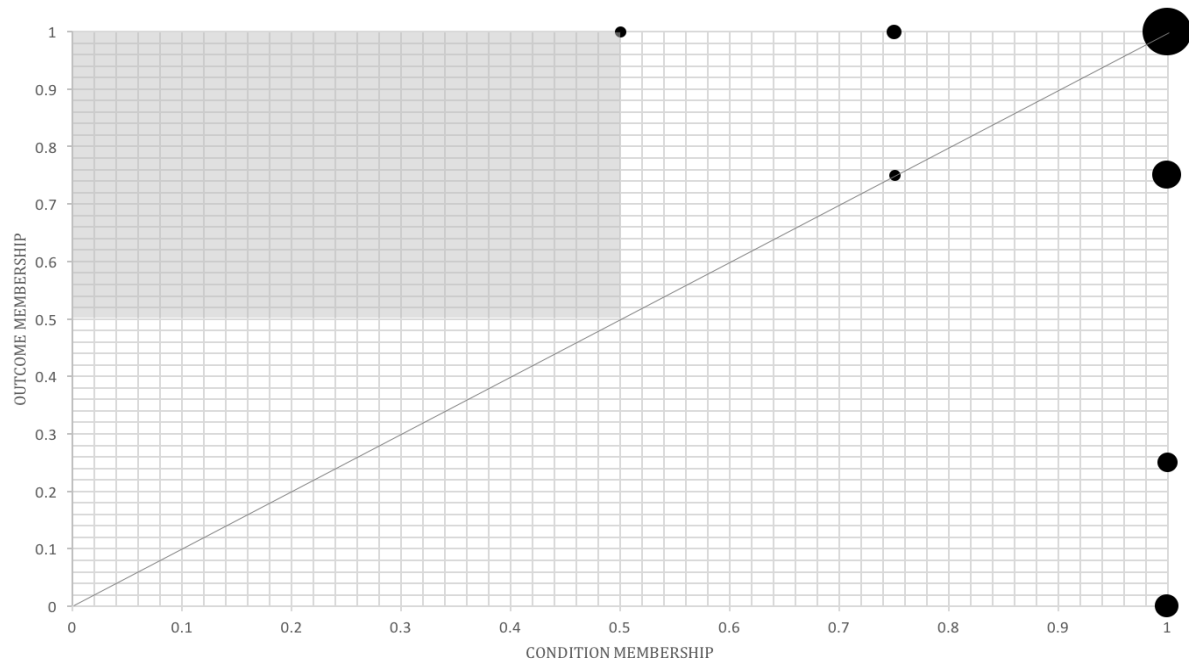


Figure 3 - Necessary condition test for cognitive frame alignment
 Note: Size of markers indicates number of cases.

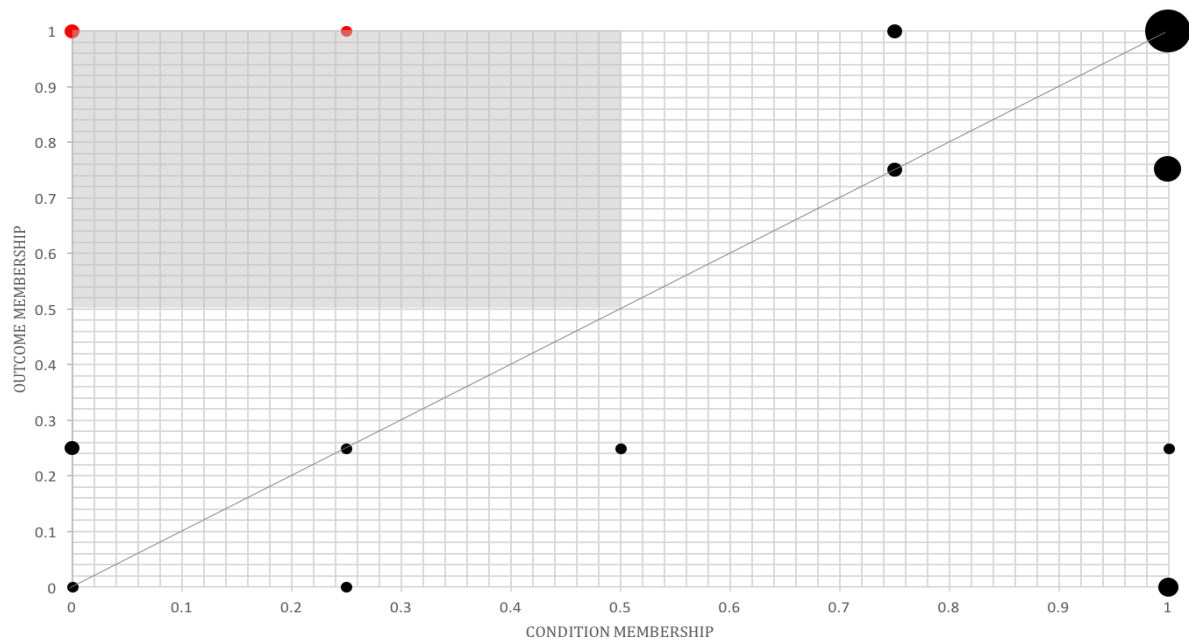


Figure 4 - Necessary condition test for community crisis
 Note: Size of markers indicates number of cases. Red markers = TLCs.

table, while the other, cognitive frame alignment, which did not have TLCs, was removed (see Ragin 2009 on removing necessary conditions from truth table analyses). Next, a fuzzy-set truth table was constructed that contained 512 rows (i.e., 2^9 , see truth table discussion above) representing all of the logically possible combinations of the INUS conditions that were retained for tests of sufficiency. Next, we removed all rows from the truth table that failed to be sufficient explanations for at least one of the 35 cases of violence included in the study (i.e. logical remainders) leaving 19 rows for final logical minimization using Boolean algebra methods. We used the 0.80 raw consistency cutoff suggested by Ragin and others (Ragin 2008; Schneider and Wagemann 2012) for determining which table rows constitute sufficient conditions for the occurrence of violent extremism. This decision was made after the careful examination of the truth table revealed no natural breaks in raw consistency scores and subsequent tests showed that none of the table rows contained TLCs. Finally, we decided to rely on the complex solution to the truth table, which does not utilize logical remainders for further logical minimization of the truth table. This was done for two reasons. First, since little cumulative knowledge has been generated by empirical radicalization research, the use of logical remainders to further simplify the truth table would likely make assumptions that are not backed by empirical evidence. Second, further simplification of the truth table was hampered by the large number of theoretical constructs that were included in the truth table. In fact, when conditions were allowed to be either present or absent, the intermediate and complex solutions were identical. Only when we made unjustified assumptions about the presence or absence of the conditions was the intermediate solution any simpler than the complex solution.⁴²

The results of the logical minimization of the truth table are reported in Table 25. The procedure yielded eight pathways, or conjunctions of INUS conditions, that are sufficient explanations for violent extremism.⁴³ The complex solution had an overall coverage of 0.55 and a consistency score of 0.91, indicating that a significant proportion of cases exhibiting violent extremism are covered by the sufficient pathways, and that the claims of sufficiency (i.e. that the pathways are subsets of the outcome) are strongly supported (see Appendix 8 for case membership in the pathways).⁴⁴ To facilitate a discussion of the solution, paths that share a core set of conditions can be grouped together

⁴² For example, the intermediate solution produced simpler pathways when conditions like personal crisis were treated as “always present” for radicalization to violence. Since radicalization research has not produced a cumulative understanding that personal crises always precede radicalization, this is an unjustified assumption.

⁴³ The fs/QCA analysis was repeated with ideology included as a causal condition, but the results only reiterate the findings from the previous section; that is, far right, Islamist, and single issue ideologies are present in the pathways described below that lead to violent outcomes.

⁴⁴ Given that set-theory is based on an epistemological foundation that emphasizes causal asymmetry and views as the goal of social science research to make small, incremental gains in explaining social phenomena, fs/QCA anticipates that a potentially large number of cases displaying outcome set membership will not be covered by solution pathways. In fact, Ragin (2008, 56) suggests that a solution coverage score greater than 0.30 constitutes a significant social science finding. Our pathways cover 20 of the 35 cases which displayed outcome set membership, which is well above the average for fs/QCA research.

Path	P. Crisis	C. Crisis	P. Vuln.	P. Rew.	Phy. Vul.	M. Rew.	Recruit.	G. Norms	G. Biases	C. Frame	Raw Coverage	Unique Coverage	Consist.	Cases
Path 1	●	●	●	●	●			○	●	●	.118421	.039474	1.00000	5
Path 2	●	●	●	●	●	○			●	●	.184211	.032895	.965517	8
Path 3	●	●	●	●	○		○	○		●	.105263	.052632	.842105	3
Path 4		●	●	●		○	○	○	●	●	.085526	.026316	.812500	4
Path 5	●	●	●	●		○	●	●	●	●	.164474	.085526	.892857	7
Path 6	○	●	○	○	○		○	○	○	●	.039474	.032895	1.00000	1
Path 7	●	○	●	○	●	●	○	○	○	●	.019737	.019737	1.00000	1
Path 8	○	●	○	○	○	○	●	●	●	●	.065789	.065789	.833333	2

Table 25 - Results of truth table

Solution Coverage: .552632

Solution Consistency: .913043

● = Presence of condition

○ = Absence of condition

Note: Blank cells equal "Don't Care". Cognitive Frame Alignment is a necessary condition and, thus, was not included in the fuzzy truth table. It is included here as a reminder that its presence is necessary in each path.

Paths 1-5. Paths 1-5 share the presence of community crisis, psychological vulnerability, and psychological rewards, in addition to the necessary condition of cognitive frame alignment. Since community crisis, psychological vulnerability, and psychological rewards are INUS conditions, they can be combined with the presence or absence of other conditions to produce multiple sufficient pathways to the same outcome. Uncovering this type of equifinality is one of the important benefits of fs/QCA.

In four of the five paths (paths 1, 2, 3, and 5) the base conditions combine with personal crisis to produce the outcome, and in four of the five paths (1, 2, 4 and 5), group biases combine with the base conditions. Three conditions—physical vulnerability, group norms, and recruitment—vary in terms of presence, absence, or relevance across the five paths. Given that these conditions are sometimes present and sometimes absent, but the outcome remains the same, we can logically surmise that these conditions are not critical to producing membership in the set of violent extremists for any of these paths.⁴⁵ Rather, it is the persistent presence of the core conditions that is driving membership in the outcome set for these paths. Finally, in three of the paths (2, 4, and 5) material rewards are absent. This suggests that, regardless of the presence or absence of physical vulnerability, individuals who travel on these paths are not motivated by status, wealth, or other forms of personal material gain.

Path 6. This path represents the conjunction of the two conditions—community crisis and cognitive frame alignment—that were found to be “near” necessary conditions for the outcome. All other conditions are absent, or not relevant, meaning that violent extremism can occur when only a sense of community crisis and a shift in perceptual frames are present. However, this pathway is exceptionally rare, as indicated by its low coverage score for the pathway.

Path 7. This path represents the only solution where it is possible for a case to be a member of the violent extremist set but not a member of the community crisis set. In this path, psychological vulnerability, physical vulnerability, material reward, personal crisis, and cognitive frame alignment combine to produce membership in the outcome. This path, like path 6, is rare, with a coverage score of less than 2%.

Path 8. In this path, community crisis combines with the full range of group conditions (recruitment, biases, and norms) to produce membership in the set of violent extremists. It is important to notice that this path only leads to membership in the outcome in the absence of personal psychological and material motivators. In other words, this solution represents a group-led pathway to violence. This pathway has relatively high unique coverage (6.5%), suggesting that it may be an important explanation of violent extremism in cases where the other pathways do not appear to be at play.

Robustness tests. Post minimization tests reveal that none of the solution paths contain TLCs, as evidenced by the lack of markers in the shaded areas of the XY plots in Appendix 6.

⁴⁵ On this type of logical minimization, see Ragin 2008.

	Violent Extremism			~Violent Extremism		
	Raw consistency	PRI	PRODUCT	Raw consistency	PRI	PRODUCT
Path 1	1.00000	1.00000	1.00000	0.11111	0.00000	0.00000
Path 2	0.96551	0.96551	.932223	0.17241	0.17241	0.02972
Path 3	0.84210	0.81250	.684210	0.26315	0.12500	0.03289
Path 4	0.81250	0.81250	.660156	0.36363	0.12500	0.04545
Path 5	0.89285	0.85000	.758928	0.32142	0.05000	0.01607
Path 6	1.00000	1.00000	1.00000	0.50000	0.00000	0.00000
Path 7	1.00000	1.00000	1.00000	0.00000	0.00000	0.00000
Path 8	0.83333	0.66666	.555554	0.58333	0.16666	0.09721

Table 26 - Robustness tests

Note: PRI = Proportional Reduction in Inconsistency. ~ = Negation. Sufficiency consistency cutoff is 0.80.

Tests were also performed to determine if any of the solution paths are sufficient for membership in the negation of the outcome (i.e. not violent extremism). The results are reported in Table 26. The combination of high consistency and Proportional Reduction in Inconsistency (PRI, see appendix 5 for more information) scores on the outcome, and low consistency and PRI scores on its negation, suggest that none of the solution paths simultaneously sufficient for being a member of the violent and not violent extremism sets (see Appendix 5 for a discussion of simultaneous set relations).

Discussion

Radicalization researchers suggest that a number of psychological, emotional, material, and group-based factors contribute to the processes of individual radicalization that lead to violent extremism. However, extant studies have not shown how these factors logically combine to produce pathways to violence, nor have they shown, using empirical evidence and rigorous methods, what role individual factors and conjunctions of factors play in relationship to violent extremism. This study has sought to fill those gaps by showing how mechanisms from various theories combine, often in complex ways, to produce unique pathways to violent extremism and to show what roles, in terms of necessity or sufficiency, that those conditions play in outcome set membership. To that end, this study reveals many important insights into the processes that may lead individuals down paths to politically-motivated violence.

First, this study finds that two conditions—cognitive frame alignment and community crisis—are “near” necessary conditions for radicalization to violent extremism. This suggests that radicalization to violence is unlikely to occur in the absence of a cognitive realignment that biases individuals’ perceptions of self and other or in the absence of the development of a sense of being a member of a community that has been collectively victimized. As necessary conditions, when present, neither of these factors ensure that an individual will radicalize to the point of violence. Rather, these conditions help to set the environment in which radicalization to violence is possible.

It is important to reiterate that cognitive frame alignment appears to be a trivial necessary condition for radicalization to violence, meaning that the condition is typically fully present even though the outcome (violent or non-violent) varies. Cognitive frame alignment, thus, is best understood as a permissive condition that helps shape the environment in which radicalization to violence is possible. Given that radicalization research is not currently based on widely shared understandings of the conditions that make the phenomenon possible, the relationship of violence to shifts in cognitive frames is an important one, trivial as it may be. That said, on its own, cognitive frame alignment has very little analytical power to explain why some individuals are members of the violent extremist set while others are not.

On the other hand, the finding that a sense of community crisis is a “near” necessary condition for radicalization to violence is potentially far more significant, both for theory and practice. This finding supports the views of social movement models of radicalization and grievance-based explanations of terrorism (e.g., Crenshaw 1981; Piazza 2011), which emphasize that extremist violence is often intimately tied to real or perceived discrimination in identity-based communities. Moreover, while radicalization researchers commonly make statements of necessity when referring to mechanisms which may be linked to radicalization to violence, to date, no study has systematically assessed whether these conditions in fact constitute necessary conditions for membership in the violent extremist set. For example, Kruglanski et al. (2009) argue that the desire for personal significance and the adoption of an ideology that glorifies extremist behaviors are necessary (and sufficient) conditions for participation in violent extremism. However, while these arguments are logically sound, they have remained largely untested in quest for significance research. Our findings suggest that the quest for status is not a necessary condition for violent extremism. Rather, it is a sense of community crisis, and the inability to achieve significance or the loss of significance that may accompany it, that acts as a near necessary condition for violent extremism. The quest for status or material gain only plays a small role as an INUS condition in a pathway to violence that is comparatively rare in comparison to the others. It is important to note that this finding does not refute quest for significance theory. Rather, it helps to clarify a key debate in the research program by showing that significance loss, rather than significance gain, is the key mechanism that acts as a necessary condition for violence extremism.

Second, our findings reveal that pathways that combine individual psychological and emotional vulnerabilities with perceptions of community victimization are particularly important for explaining shifts to violence. In fact, of the 20 cases of violent extremism that are fully explained by our analysis, 17 (85%) are members of one or more of these pathways (paths 1-5). Along these paths, personal vulnerabilities exert causal influence by fueling identity-seeking behaviors in individuals, who then find direction in extremist narratives and meaning in camaraderie with like-minded individuals. It is clear that individual-level psychological variables do not act in isolation, however. Mechanisms from social identity models of radicalization are critically important to understanding how

psychological and emotional vulnerabilities are translated into violent action. Social identity perspectives show how biasing dynamics persuade individuals that their personal deficits are largely the result of their membership in a community that has been collectively victimized or threatened. As individuals, cliques, and groups become more insular, common mechanisms of cognitive bias, such as groupthink, in-group/out-group bias, and diffusion of responsibility, set in, convincing individuals that the alleviation of community grievances and the amelioration of threats to community survival will only occur through violent action (e.g., Hogg 2001). This lends support to extant research that views radicalization as a process where non-ideological sources of personal vulnerability, such as traumatic experience (e.g. the loss of a loved one), distant or broken familial relationships, or group disparagement, combine with ideological drivers, which are often present in the group context, to produce violent expressions of political or social grievance (e.g. Simi et al. 2015).

By comparison, our results show that material factors are rarely the main drivers of radicalization to violence. In fact, material causes are only present in one of the solution pathways (path 7), which in turn only covers one of the cases violent extremism included in this analysis. Likewise, group-driven radicalization (path 8), whereby individuals without psychological or emotional needs find themselves, often through personal relationships, on a slippery-slope to violence (McCauley and Moskelenko 2008), are comparatively rare in comparison to pathways based on psychological and emotional drivers. Only two cases included in the study are members of the primarily group-driven radicalization pathway. This suggests that while radicalization to violence can be based purely on group dynamics or material rewards, untangling the puzzle of radicalization will require grappling with psychology and emotion more so than material gain or recruitment.

Finally, the results of the fs/QCA analysis demonstrate the incredible complexity of the processes that lead to violent radicalization. Despite including over 70 causal mechanisms in our coding scheme, constructing a truth table with more than 500 possible logical combinations, and identifying eight unique pathways to violence, our analysis does not account for the pathways of 15 of the 35 violent individuals in our sample. This reaffirms our belief that extant models of radicalization are limited in their ability to understand the phenomenon, and that future research must be based on research designs and methods that can account for causal complexity. This is not to discount the utility of “net-effects” methods or to suggest that fs/QCA is a silver bullet solution. Rather, it indicates that future efforts to explain radicalization are only likely to succeed if they embrace methodological diversity and look to leverage the comparative strengths of the full range of quantitative and qualitative methods.

Future studies may also benefit from drawing on mechanisms that help explain parallel processes that drive similar extreme or deviant behaviors, such as membership in non-ideological street gangs (e.g., Decker and Pyrooz 2015), recruitment into religious cults (e.g., Dawson 2009) or participation in organized crime (e.g., Shelley and Picarelli 2002). Furthermore, analysis will need to move beyond the individual-level to show how

individual, group, community, national, and international level variables combine to produce unique pathways to extremist violence.

Implications for CVE

Understanding how radicalization works is key to designing CVE programs that can prevent at-risk individuals from following a path to violent extremism. Our study has several important implications for CVE research and program administration. For instance, our findings highlight the central role that perceptions of collective crisis play in radicalization processes. CVE programs must be designed to deal with these perceptions without exasperating them. In particular, CVE programs must be broad-based and not limited to a particular ideological milieu. Focusing CVE efforts on a particular community may contribute to the perception that the community is being collectively targeted and victimized, which this study has uncovered as a key component in violent extremism. In such instances, CVE programs designed along such lines may in fact be counter-productive, increasing alienation rather than alleviating it (see also Schanzer et al. 2016).

That said, our findings do suggest that efforts to counter extremist narratives and recruitment efforts must address perceptions of community victimization. This includes not only challenging myths or misperceptions of community victimization, but also acknowledging legitimate community grievances. Moreover, counter-narratives and actions on the ground must be closely matched to ensure that both are working towards a common goal. Close unity of effort between all actors that play roles in CVE, including family members, community leaders, and law enforcement, is the best way to achieve this synergy.

Finally, our findings show that radicalization to violence is primarily psychological and emotional, rather than material. CVE efforts should be driven by those who are in a place to recognize when an individual may be vulnerable to extremist narratives. This is most likely to be family, friends, and others that interact with the individual on a routine basis. CVE programs must empower those who are closest to at-risk individuals through education and support services, which should include participation from mental health and social services professionals.

Implications for Criminal Justice Policy in the United States

This project has sought to answer four primary research questions:

- what are the demographic, background, and radicalization differences between and within the different ideological milieus?
- are there important contextual, personal, ideological, or experiential differences between radicals who commit violent acts and those who do not?
- is it possible to identify sufficient pathways to violent extremism? and;
- are the causal mechanisms highlighted by extant theories of radicalization supported by empirical evidence?

The analyses of these questions show that there is no “one-size-fits-all” model of radicalization. Significant background, demographic and radicalization differences are present across the ideological spectrum, and the processes by which individuals and groups come to engage in extremist behaviors are complex, often resulting from a host of psychological and emotional factors that are difficult to model. CVE and law enforcement are likely to succeed in countering extremism only if they are designed to cope with this complexity by including all relevant actors and policy options in domestic programs. In particular, this study reveals the following implications for criminal justice policy in the U.S.:

- Significant differences in background characteristics, group affiliations, and radicalization processes exist across the ideological milieus. CVE programs must be applied to all ends of the ideological spectrum, as opposed to focusing only on individuals who are at-risk of Islamist radicalization, and those programs must be tailored to particular ideological categories and sub-categories.
- While the radicalization of individuals on the far left and those motivated by Salafi jihadist ideologies tends to occur in early adulthood, individuals on the far right and those who are motivated by single-issues often radicalize later in life. CVE programs that are designed to target at-risk youth may be ineffective for preventing extremism among older individuals, who are often dealing with pressures that are quite different from those experienced by young adults.
- The conventional wisdom that radicalization is more common among individuals who come from low SES backgrounds and/or lack educational opportunities is generally not supported by the PIRUS data. Most extremists come from middle class backgrounds and have at least some college education. That said, stable employment may decrease the risk that individuals with extreme views will engage in violent behaviors. Stable employment often leads to the development of positive social relationships and places demands on individuals’ time that depress extremist activities. CVE programs that emphasize the acquisition of job-relevant skills may be effective for promoting sustained employment among at-risk individuals.
- Despite an increase in lone actor behavior in the U.S., radicalization remains a distinctly social process. Group and clique membership rates remain high across the ideological spectrum. CVE programs and law enforcement interdiction strategies

must be aware of the vital role that peer relationships, both face-to-face and online, play in the radicalization processes of lone and group-based offenders.

- While competition between extremist groups in the U.S. is not significantly linked to an increase in violent behavior, group rivalries exist in high numbers on the far right. Research suggests that competition within and between groups can produce disillusionment with extremist movements for certain individuals. Programs designed to aid the disengagement processes of those on the far right should be aware of the role of group competition in fostering dissatisfaction within the milieu. However, those programs should also be mindful that significant barriers to exit may form for certain individuals who are members of groups that are plagued by significant intra and inter-group rivalries.
- Clique membership is high across the ideological spectrum and is linked to an increase in violent behaviors. As peers organize into small, insular groups, common biasing mechanism, such as group think and in-group/out-group bias, often set in, producing increasingly extreme behaviors. Programs based on counter-narratives must be aware of the cognitive biases that exist in cliques, most of which make members less responsive to the disconfirming evidence that may be central to counter-narratives.
- The rates of prison radicalization in the U.S. are low and even across the ideological spectrum, suggesting that it is not a common pathway for most extremists nor is it limited to a particular ideology. To the extent that programs for preventing or countering radicalization in U.S. prisons are implemented, they should span the ideological spectrum.
- Radicalization is typically a long process, often lasting years for individuals, most often those on the far right. Recent evidence, however, suggests that online environments may be speeding up radicalization processes, reducing them to several months in many cases. Nevertheless, windows of opportunity exist for intervention programs. Those programs should be led by family, friends, community leaders, and others that are in a position to take notice of radical changes in an individual's belief system.
- While documented mental illness is relatively uncommon among extremists, our results indicate that mental health conditions may be linked to higher propensities for violent behavior. CVE programs based on prevention and intervention may benefit from the inclusion of mental health professionals (Weine et al. 2015). Future research efforts should explore the extent to which violent tendencies are amplified when mental illness is paired with substance abuse (Swartz et al. 1998).
- Individuals who engage in pre-radicalization criminal behaviors are significantly more likely to attempt or commit acts of violence post-radicalization. Domestic CVE should leverage existing programs that are geared toward steering at-risk youth away from crime. Moreover, law enforcement should prioritize their focus on individuals with a history of interactions with the criminal justice system.
- Radicalization indicators are often the observable effects of underlying psychological and emotional processes. These processes are complex and are driven by feelings of lost significance and community victimization, as well as the intense need for psychological and emotional rewards. CVE programs must be aware of

these underlying processes and should not amplify feelings of community victimization by putting undue focus on particular communities. Once again, the integration of mental health and other social service professionals in CVE may be critical to the success of prevention and intervention efforts in many cases.

- CVE counter-narratives need to address feelings of community victimization in a way that challenge myths and misperceptions, but also acknowledges legitimate grievances. Narratives should focus on alternatives to violence for addressing community grievances.
- Successful CVE programs will need to address the underlying psychological and emotional vulnerabilities that make individuals open to extremist narratives. These vulnerabilities may be the results of traumatic experiences (e.g. the loss of a loved one), or they may result from senses of personal and community marginalization.

While these implications provide useful lessons for CVE efforts, it is important to emphasize that as a research community we have just begun to scratch the surface of what empirical research can tell us about radicalization and the programs that are designed to prevent it. We hope that future research will look to inform domestic CVE, especially when it comes to programmatic design and evaluation. CVE programs are only likely to succeed if they reflect an empirical understanding of the myriad causes of radicalization and its consequences.

Suggestions for Future Research

Despite the inherent complexity of radicalization, the EADR project shows that it is possible to study extremism using empirical methods. We believe that researchers should make a commitment to rigorously appraise the arguments that they make about radicalization and violent extremism, whether they conform to, or challenge, conventional wisdoms. We also feel strongly that criminal justice policy in the U.S. should reflect evidence-based research. To these ends, we offer several suggestions for future research.

First, while the PIRUS database represents one of the first large-scale efforts at compiling systematic data on individual-level radicalization, there are limits to its use for fine-grained or targeted analyses. The database contains a sample of extremists in the U.S. from 1945-2013, which, when examined as a collective, allows for the use of advanced statistical techniques for hypothesis testing or exploratory analysis. However, the database is not currently large enough to use those same techniques on most subsets of the data, including particular decade or ideological groups. Thus, in most cases, it is not possible to use the PIRUS data to determine if posited causal relationships, or observed findings, are supported for sub-samples of the data. Perhaps the most basic, yet potentially the most important, research advancement that could be made in the near term would be to augment existing databases with additional cases in order to allow for these types of analyses.

In addition, efforts should be made to establish new collections that allow for time series analyses. These collection efforts would need to be based on interviews with extremists and panel surveys of at-risk populations, similar to the National Longitudinal Surveys that were conducted annually by the Bureau of Labor Statistics from 1979-1994. While such efforts are undoubtedly resource intensive, they provide the best chance for understanding the temporal processes that produce varied extremist outcomes. Moreover, these data would allow for trajectory analyses whereby researchers could establish how life-course events, such as experiencing trauma, getting married, having children, or establishing a career, alter individual pathways to or from extremism.

Second, research efforts should continue to examine radicalization as a set of complex processes, paying particular attention to the psychological and emotional turning points that drive individuals toward increasingly extreme behaviors. Although the qualitative portion of this study focused on identifying complex relationships, building on over 70 causal mechanisms that have been identified in the radicalization literature, we were unable to account for the radicalization pathways of 15 of the 35 cases of violent extremism that we reviewed. This suggests that despite substantial academic effort in recent years, we have not yet identified all of the causal conditions, or their potential interactions, that can contribute to radicalization processes. Future efforts should draw on research from cognate subject areas, such as membership in street gangs and criminal organizations, in order to identify causal conditions or processes that may be missing from extant radicalization research.

Moreover, due to data limitations, we were unable to account for some potentially important causal interactions, such as the relationship between mental illness, substance abuse, and violent behavior. Future research efforts should look to identify and assess the importance of such causal interactions, which is critical not only for understanding radicalization processes, but also for establishing the full range of professionals that should be involved in CVE program administration. This will require researchers to confront the challenges of collecting data on sensitive topics. Radicalization researchers may be able to glean lessons from the fields of public health or psychiatry, where scholars routinely confront similar data collection challenges.

Finally, future research efforts should be integrated with on-the-ground CVE program administration, focusing in particular on program design and evaluation. To date, there has been relatively little integration of research and domestic CVE, and studies (Williams, Horgan, and Evans 2016) suggest that program design and evaluation may be afterthoughts for most program administrators. Researchers have potentially important roles to play in domestic CVE efforts. Most researchers are well suited to ensure that programs are designed to reflect empirically-derived findings about radicalization processes and they are also particularly skilled when it comes to designing flexible and reliable measures of program effectiveness. Through the integration of research and CVE, it should be possible to design prevention and intervention programs that are effective from the outset, adaptable to changing environments, and sustainable over time.

Appendices

Appendix 1: Rates of missingness for variables in logistic regression models

Variable	Missing value %
Married	51.0%
Stable employment history	61.2%
Past military experience	41.9%
Active in military	41.9%
Abused as child	91.9% ⁴⁶
Radical family	80.0%
Clique membership	41.1%
Group competition	63.2%
Previous criminal activity	54.0%
Mental illness	80.7%
Education	62.9%
Gender	0.0%
Age	5.3%
Islamist ideology	0.0%
Far right ideology	0.0%
Far left ideology	0.0%
Exposure 1950s	0.0%
Exposure 1960s	0.0%
Exposure 1970s	0.0%
Exposure 1980s	0.0%
Exposure 1990s	0.0%
Exposure 2010s	0.0%

⁴⁶ This rate reflects the original coding of this variable, which treated no mentions of abuse in source materials as “unknown” as opposed to “No.” This variable was later reconstructed to treat no evidence of abuse in source materials as “No” or “0” in order to facilitate statistical analyses.

Appendix 2: Missing data techniques for quantitative analysis

For this study, we identified four techniques for handling missing data that are sensible options given the structure of the PIRUS data and our substantive knowledge of the cases and radicalization processes (see Table 27). These are: simple imputation using fixed values (i.e. cold-deck imputation) (Andridge and Little 2010), simple imputation using sub-group means (Tsikriktsis 2005), regression-based multiple imputation (Rubin 2004), and multiple imputation based on expected maximization calculations (G. King et al. 2001; Honaker and King 2010).

Simple imputation using fixed values. With this technique, missing data are replaced with fixed values that reflect logical probabilities or researchers' substantive knowledge about the variables under investigation. If missing data satisfy the "missing at random (MAR)" assumption, this technique often results in a simple mode substitution. When this assumption is not satisfied, this technique requires that researchers draw on the cumulative knowledge that has been generated in a particular research field to make informed decisions about the likely values of missing data. This knowledge may result from other data collection efforts, and the technique may amount to replacing missing values with observed values from another data source (Andridge and Little 2010). This technique has the particular advantage of incorporating logic and substantive expertise into the imputation process, which can produce imputed values that better reflect empirical evidence. On the other hand, this approach replaces missing values with unobserved data, which can bias results if those values are not based on cumulative knowledge. Moreover, techniques that replace missing data with fixed values reduce variance, which can suppress observed relationships by pulling correlation estimates toward zero. Such a reduction in variance also has the effect of increasing the likelihood of producing Type II errors in the data; that is, an erroneous failure to reject the null hypothesis, or in other words, reporting a "false negative".

Simple imputation using sub-group mean substitution. With this technique, missing data for a particular case are replaced with the mean values of the sub-group of which the case is a member (Tsikriktsis 2005). For example, missing values for a subset of female survey respondents could be replaced with the mean scores of women in the sample with valid data. This technique works well when the data allow for the identification of distinct sub-groups and when those sub-groups provide sufficient valid data to generate reliable sub-group means. If, on the other hand, sub-groups cannot be identified, or the sub-groups are not sufficiently large to produce reliable means, this approach is likely to bias results. While sub-group mean substitution allows for the retention of some variance in imputed values, the process does downwardly bias variability, which can weaken observed relationships. In this model, researchers imputed missing data based on the means of ideological sub-groups (Islamist, Far right, Far left, and Single issue).

Regression-based multiple imputation. This technique uses observed data and multivariate regression methods to predict values that are missing on a particular parameter or set of parameters (Rubin 2004). Missing values are imputed several times to

reflect uncertainty, producing a number of “complete” datasets that researchers can use to perform standard statistical tests. Multiple imputation techniques have the advantage of retaining the entire sample and preserving variance, thus yielding stronger observed relationships. Moreover, multiple imputation techniques allow researchers to use their substantive expertise to determine which variables in their data should be used to predict missing values. A key limitation of the technique, however, is the requirement that missing data satisfy the MAR assumption. Imputing values for variables that do not meet the MAR assumption can lead to biased coefficient estimates. Unfortunately, social science data are often missing for reasons related to their true values (e.g. individuals may not want to report their income when it is especially high or low), which limits the applicability of multiple imputation techniques in some instances.

Expected maximization. Rather than using regression coefficients to predict missing values, expected maximization estimates missing values using an iterative algorithm that is based initially on maximum likelihood estimation (G. King et al. 2001; Honaker and King 2010). The second iteration predicts the missing values based on the maximum likelihood estimates, and third iteration based on the values from the second iteration. This process continues until there is convergence on the parameter estimates. This method can greatly increase the accuracy of results when the models are specified correctly. If the models are not specified correctly, however, this method can produce biased estimates.

Technique	Description	When to use	Advantages	Disadvantages	Studies
Simple imputation - fixed value	Missing value is replaced with "0" or another fixed value that represents a baseline expectation for the variable that is being imputed	When imputing values for variables that are commonly reported on in sources and for which good cumulative knowledge exists	Utilizes researcher's knowledge of source availability and variable distributions to make informed predictions	Replaces missing cases with unobserved data, which could introduce bias	Andridge and Little (2010)
Simple imputation - subgroup mean substitution	Missing value is replaced by the mean value of the subgroup of which the individual is affiliated	When it is easy to define subgroups and subgroups are large enough to provide a reliable mean	Sample retention, easy to calculate, could give better estimates compared to "missing as fixed value" imputation	Reduces variance in sample, arbitrary nature of defining subgroups in some situations	Ford (1976)
Regression-based multiple imputation	Estimates relationships among variables, and then uses coefficients to estimate the missing value	When more than 20% of the data are missing and the variables are highly correlated	Estimated data preserve deviations from the mean and the shape of the distribution	Distorts the number of degrees of freedom and could artificially increase the relationships	Cohen and Cohen (1983), Frane (1976), Raymond and Roberts (1987), Little and Rubin (1987), Little (1988)
Expected maximization	An iterative process of multiple imputation that continues until there is convergence in the parameter estimates	When distributional assumptions are met	Speed of computation, produces independent imputations, converges nonstochastically, works well in large samples	The variance of distribution may be biased in small samples, in data with many variables relative to the number of observations, or in highly skewed categorical data	King et al. (2001), Dempster, Laird, and Rubin (1977), McLachlan and Krishnan (2008), Orchard and Woodbury (1972)

Table 27 - Overview of missing data strategies

Appendix 3: Bivariate correlations between variables in logistic regression model

	Violence (DV)	Married	Stable employment history	Past military background	Active military	Abuse Child	Radical Family	Clique membership	Group competition	Previous criminal activity	Psych history
Violence (DV)	1	-.074 [*]	-.125 ^{**}	.019	.057 [*]	.066 [*]	-.089 ^{**}	.141 ^{**}	-.003	.104 ^{**}	.107 ^{**}
Married	-.074 [*]	1	.119 ^{**}	.022	.044	-.062 [*]	.177 ^{**}	.021	-.019	-.016	-.087 ^{**}
Stable employment history	-.125 ^{**}	.119 ^{**}	1	-.062	-.011	-.137 ^{**}	.033	-.001	-.035	-.132 ^{**}	-.106 ^{**}
Past military background	.019	.022	-.062	1	-.055 [*]	.044	-.028	-.025	-.012	.057 [*]	.097 ^{**}
Active military	.057 [*]	.044	-.011	-.055 [*]	1	.028	-.050	-.054	.011	.106 ^{**}	.080 ^{**}
Abuse Child	.066 [*]	-.062 [*]	-.137 ^{**}	.044	.028	1	-.109 ^{**}	-.085 ^{**}	-.004	.128 ^{**}	.177 ^{**}
Radical Family	-.089 ^{**}	.177 ^{**}	.033	-.028	-.050	-.109 ^{**}	1	.071	-.064	-.114 ^{**}	-.155 ^{**}
Clique membership	.141 ^{**}	.021	-.001	-.025	-.054	-.085 ^{**}	.071	1	.017	-.005	-.138 ^{**}
Group competition	-.003	-.019	-.035	-.012	.011	-.004	-.064	.017	1	.027	-.043
Previous crim. activity	.104 ^{**}	-.016	-.132 ^{**}	.057 [*]	.106 ^{**}	.128 ^{**}	-.114 ^{**}	-.005	.027	1	.192 ^{**}
Psych history	.107 ^{**}	-.087 ^{**}	-.106 ^{**}	.097 ^{**}	.080 ^{**}	.177 ^{**}	-.155 ^{**}	-.138 ^{**}	-.043	.192 ^{**}	1
Education	-.118 ^{**}	.107 ^{**}	.177 ^{**}	-.002	-.114 ^{**}	-.074 ^{**}	.096 ^{**}	-.018	-.057	-.199 ^{**}	-.066 [*]
Gender	.104 ^{**}	-.021	.021	.092 ^{**}	.066 [*]	-.035	-.073 [*]	-.025	.071	.053 [*]	.052 [*]
Age	-.078 ^{**}	.372 ^{**}	.119 ^{**}	.187 ^{**}	.013	-.048	.132 ^{**}	-.129 ^{**}	-.045	.065 [*]	.015
Islamist	.118 ^{**}	-.034	.014	-.043	-.004	.026	-.129 ^{**}	.087 ^{**}	-.172 ^{**}	-.034	.023
Far Right	.092 ^{**}	.083 ^{**}	-.035	.066 [*]	.047	-.017	.077 [*]	-.017	.145 ^{**}	.064 [*]	.015
Far Left	-.171 ^{**}	-.141 ^{**}	-.010	-.043	-.022	.009	-.027	.060 [*]	.010	.012	-.064 [*]
Exposure 1950s	.009	.049	.047	-.004	.082 ^{**}	-.018	.040	-.010	.026	.026	-.008
Exposure 1960s	.000	.008	-.032	.042	-.029	.011	.030	-.038	.101 ^{**}	.016	-.030
Exposure 1970s	.029	-.080 ^{**}	.002	.002	-.025	-.009	.000	-.003	.105 ^{**}	-.047	-.038
Exposure 1980s	.047	.104 ^{**}	.015	-.009	-.021	-.035	.076 [*]	.028	.023	-.050	-.062 [*]
Exposure 1990s	-.082 ^{**}	.068 [*]	-.003	.031	-.012	.021	.079 [*]	-.017	-.032	-.026	-.001
Exposure 2000s	-.051	-.079 [*]	.004	-.024	-.009	.005	-.115 ^{**}	.064 [*]	-.080 [*]	.039	.037
Exposure 2010s	.090 ^{**}	-.031	-.011	-.030	.077 ^{**}	.014	-.060	-.066 [*]	-.074 [*]	.064 [*]	.088 ^{**}

	Education	Gender	Age	Islamist	Far Right	Far Left	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Violence (DV)	-.118**	.104**	-.078**	.118**	.092**	-.171**	.009	.000	.029	.047	-.082**	-.051	.090**
Married	.107**	-.021	.372**	-.034	.083**	-.141**	.049	.008	-.080**	.104**	.068*	-.079*	-.031
Stable employment	.177**	.021	.119**	.014	-.035	-.010	.047	-.032	.002	.015	-.003	.004	-.011
Past military background	-.002	.092**	.187**	-.043	.066*	-.043	-.004	.042	.002	-.009	.031	-.024	-.030
Active military	-.114**	.066*	.013	-.004	.047	-.022	.082**	-.029	-.025	-.021	-.012	-.009	.077**
Abuse Child	-.074**	-.035	-.048	.026	-.017	.009	-.018	.011	-.009	-.035	.021	.005	.014
Radical Family	.096**	-.073*	.132**	-.129**	.077*	-.027	.040	.030	.000	.076*	.079*	-.115**	-.060
Clique membership	-.018	-.025	-.129**	.087**	-.017	.060*	-.010	-.038	-.003	.028	-.017	.064*	-.066*
Group competition	-.057	.071	-.045	-.172**	.145**	.010	.026	.101**	.105**	.023	-.032	-.080*	-.074*
Previous crim. activity	-.199**	.053*	.065*	-.034	.064*	.012	.026	.016	-.047	-.050	-.026	.039	.064*
Psych history	-.066*	.052*	.015	.023	.015	-.064*	-.008	-.030	-.038	-.062*	-.001	.037	.088**
Education	1	-.168**	.214**	-.004	-.130**	.098**	-.031	.027	.030	.014	.008	-.040	-.011
Gender	-.168**	1	.053*	.083**	.155**	-.245**	.013	.008	-.079**	-.048	.010	.064*	.024
Age	.214**	.053*	1	-.128**	.232**	-.223**	.027	-.085**	-.153**	.041	.120**	-.005	.033
Islamist	-.004	.083**	-.128**	1	-.370**	-.214**	-.044	-.120**	-.164**	-.182**	-.160**	.362**	.178**
Far Right	-.130**	.155**	.232**	-.370**	1	-.447**	-.039	-.020	-.207**	.003	.199**	-.033	.044
Far Left	.098**	-.245**	-.223**	-.214**	-.447**	1	-.005	.226**	.265**	-.085**	-.102**	-.065*	-.147**
Exposure 1950s	-.031	.013	.027	-.044	-.039	-.005	1	-.030	-.041	-.046	-.053*	-.070**	-.037
Exposure 1960s	.027	.008	-.085**	-.120**	-.020	.226**	-.030	1	-.110**	-.126**	-.143**	-.189**	-.100**
Exposure 1970s	.030	-.079**	-.153**	-.164**	-.207**	.265**	-.041	-.110**	1	-.172**	-.196**	-.258**	-.137**
Exposure 1980s	.014	-.048	.041	-.182**	.003	-.085**	-.046	-.126**	-.172**	1	-.223**	-.295**	-.156**
Exposure 1990s	.008	.010	.120**	-.160**	.199**	-.102**	-.053*	-.143**	-.196**	-.223**	1	-.335**	-.178**
Exposure 2000s	-.040	.064*	-.005	.362**	-.033	-.065*	-.070**	-.189**	-.258**	-.295**	-.335**	1	-.234**
Exposure 2010s	-.011	.024	.033	.178**	.044	-.147**	-.037	-.100**	-.137**	-.156**	-.178**	-.234**	1

Appendix 4: Regression model for cases 2000-2015

Independent variable	Expected Maximization model
	β
	(SE β)
Married	-.397 (.309)
Stable employment history	-.453 (.296)
Past military exp.	.350 (.386)
Active military	-.071 (.433)
Abused as child	-.015 (.589)
Radical family	-.622 (.489)
Clique membership	.814*** (.240)
Group competition	-.399 (.377)
Previous criminal activity	.740** (.261)
Mental illness	.817* (.327)
Education	-.085 (.141)
Gender	.122 (.409)
Age	-.083* (.038)
Age (squared)	.001 (.000)
Islamist ideology	.351 (.347)
Far right ideology	.182 (.333)
Far left ideology	-2.481*** (.476)

Logistic regression model

Note: $n = 614$, standard error noted in parentheses. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Appendix 5: Regression model excluding environmental and animal rights extremists

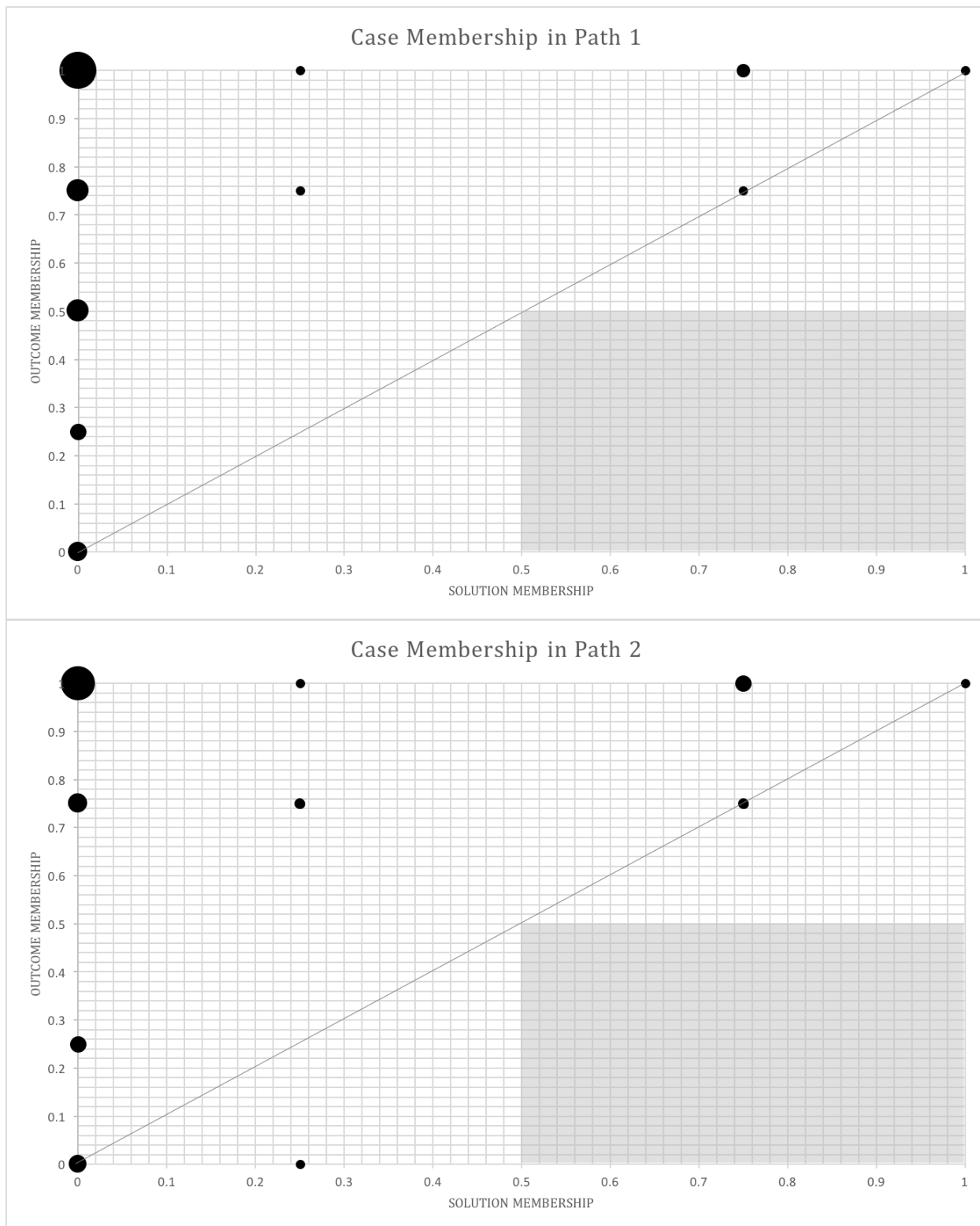
Independent variable	Expected Maximization model
	β
	(SE β)
Married	-.270 (.182)
Stable employment history	-.528* (.206)
Past military exp.	.007 (.228)
Active military	.381 (.319)
Abused as child	.570 (.370)
Radical family	-.444 (.397)
Clique membership	.836*** (.172)
Group competition	-.236 (.249)
Previous criminal activity	.384* (.179)
Mental illness	.762*** (.239)
Education	-.099 (.099)
Gender	.498* (.220)
Age	(.025)
Age (squared)	.000 (.000)
Islamist ideology	1.400*** (.294)
Far right ideology	.914*** (.224)
Far left ideology	.075 (.424)
Exposure 1950s	1.274* (.567)
Exposure 1960s	.831** (.289)
Exposure 1970s	1.176*** (.229)
Exposure 1980s	1.108*** (.197)
Exposure 1990s	.218 (.176)
Exposure 2010s	.715*** (.208)

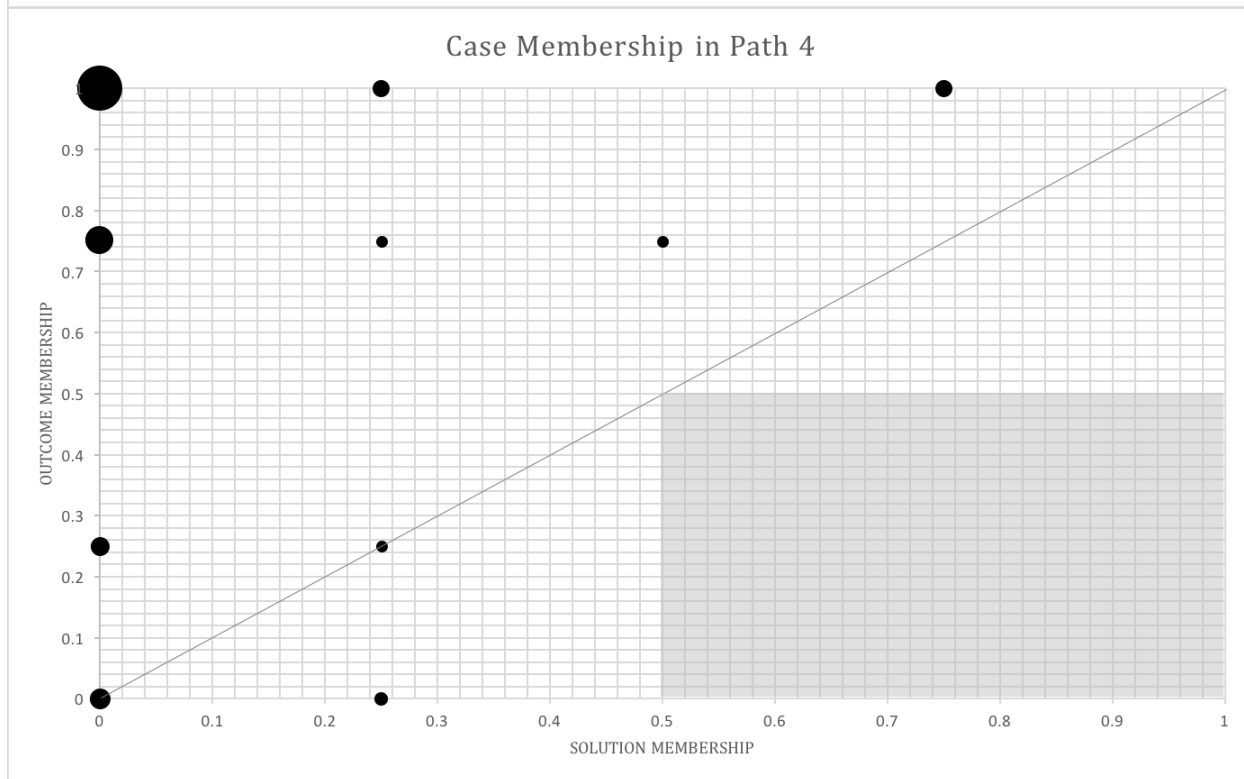
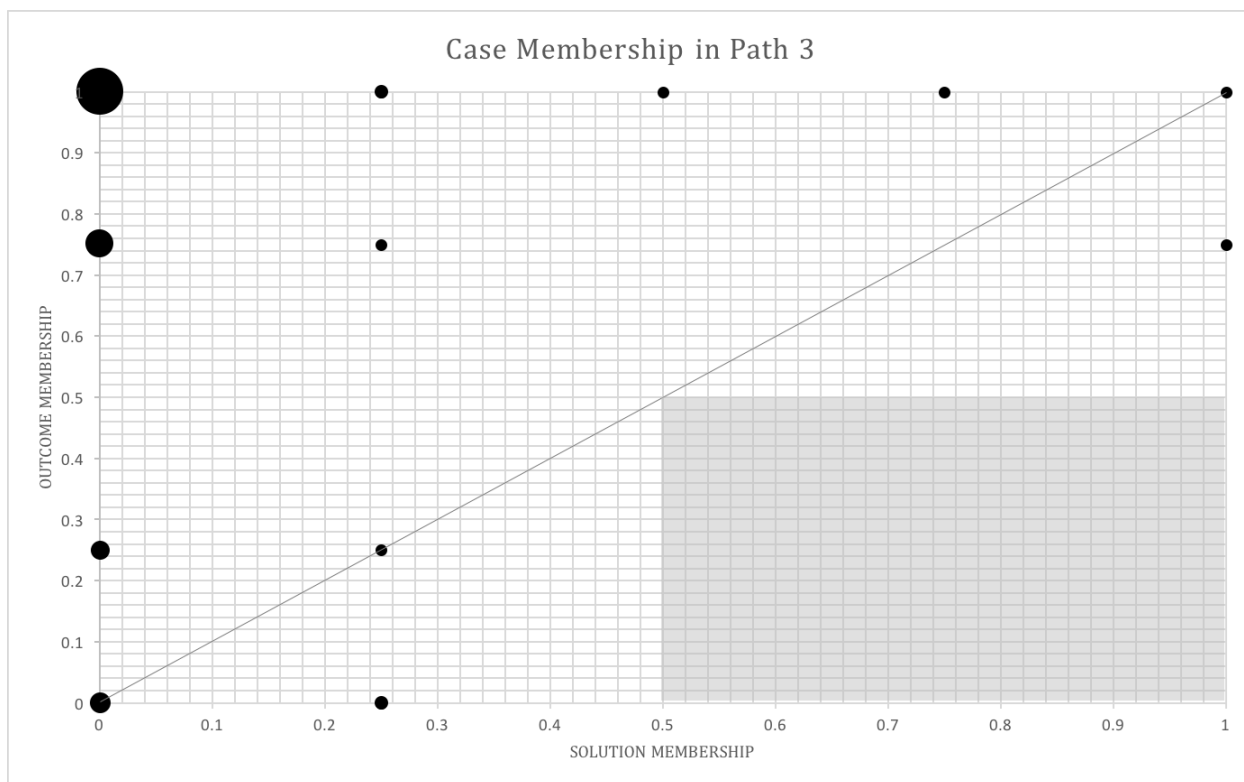
Logistic regression model

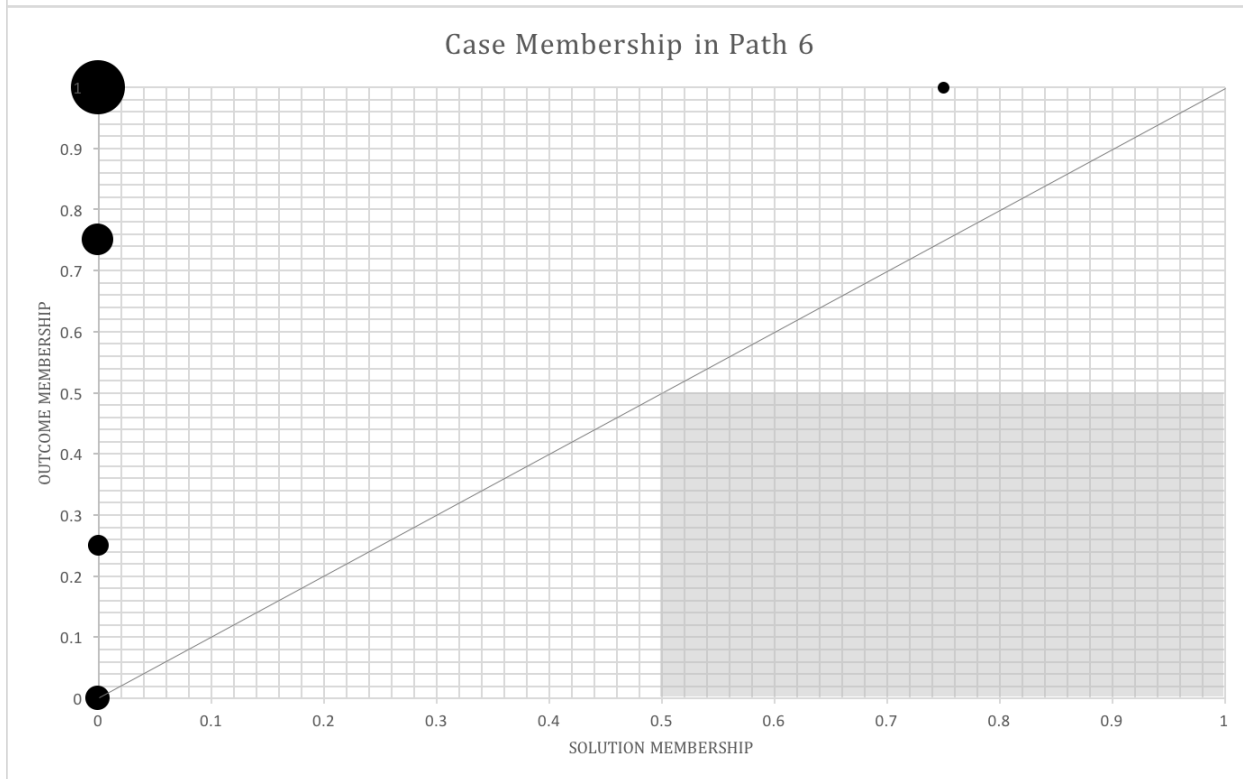
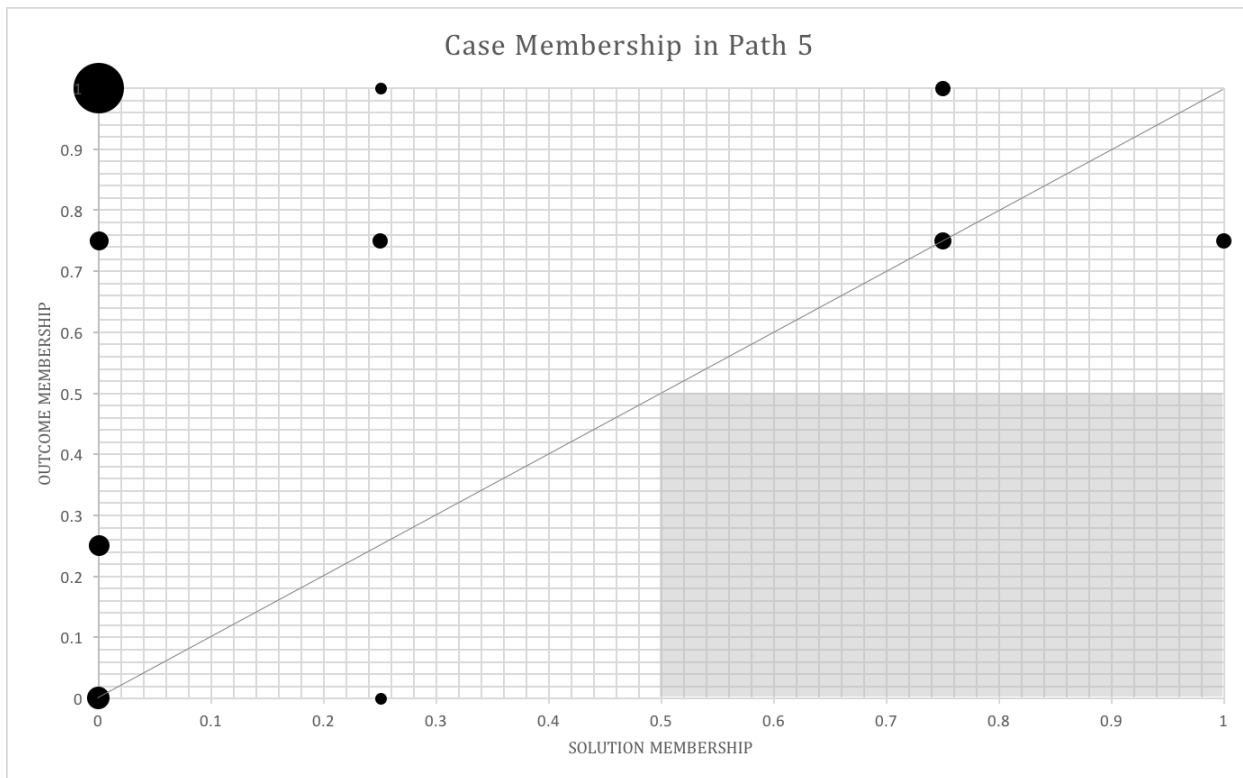
Note: $n = 1,473$, standard error noted in parentheses. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

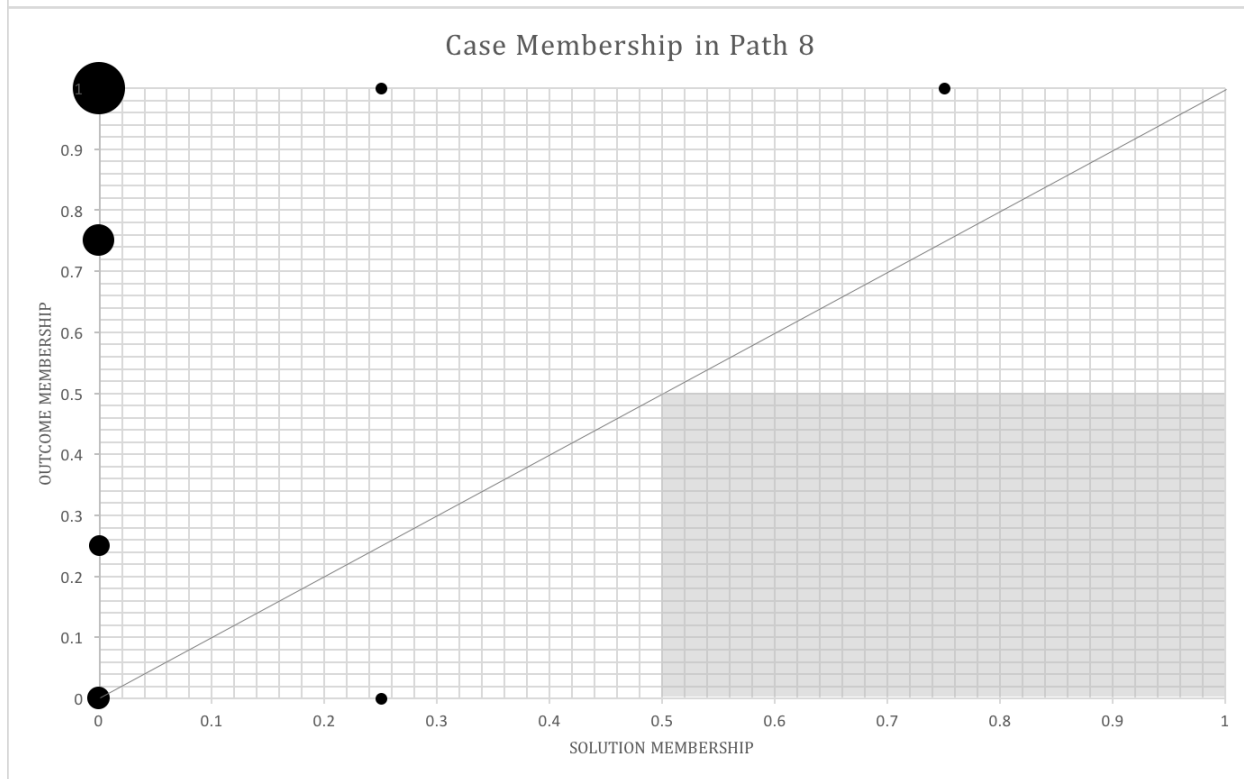
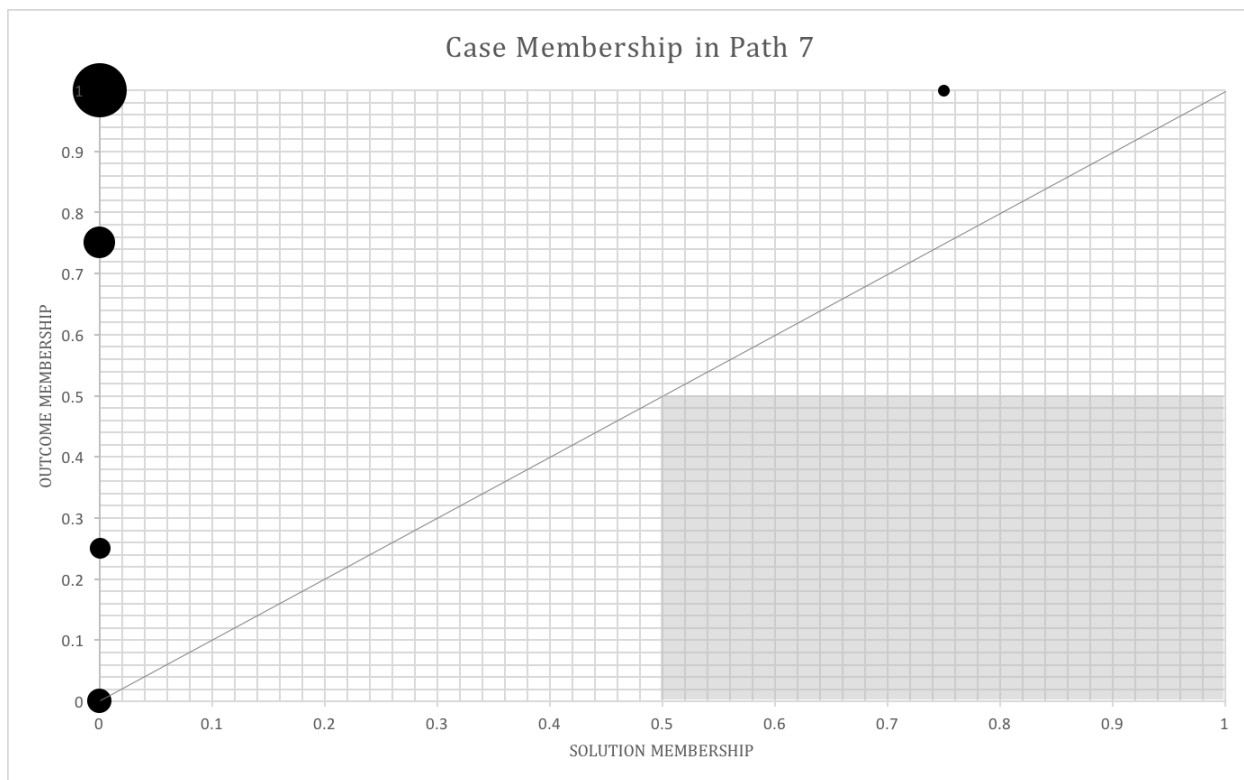
Appendix 6: Case Membership in Solution Paths

Note: Size of circles denotes number of cases. Shaded area = True Logically Contradictory Cases (TLCs).









Appendix 7: Qualitative codebook

Codes	Explanation and/or manifestations
A.1. Significance restoration	Significance restoration is when an individual tries to regain a sense of personal worth (self-esteem, value, respect, being a valued member of society, etc.) which was lost. Significance restoration typically entails a desire for revenge or payback on the part of the individual or group that has lost significance.
A.2 Individually based significance gain	An individual desires social status in a community—a place in history, heroism, or martyrdom—and sees engagement in terrorism as a way of achieving it. The individual gains this significance without having lost it previously. Individuals on a quest for significance often rationalize that such significance can only be gained in their own death,
A.3 Social significance gain	Socially inculcated (i.e., instilled) significance gain refers to the socialization process in their culture – pervasive social beliefs according to which extremist behavior is worth pursuing. In some cultures extremists are socialized to believe that the only way to be remembered after death is to die for the organization’s cause. For example, being brought up in a diaspora community in the US whose culture advocates radical beliefs or behavior.
A.4 Group prestige	Group prestige refers to reports that the individual perceived an extremist organization as prestigious or elite and the individual anticipated gaining a level of prestige or importance by joining the group.
A.5/I.7 Uncertainty relief	The group relieves an individual's sense of uncertainty about actions or identity by being homogenous, hierarchical, <i>and</i> having a clear message about goals, behaviors, and out-groups. This includes proximate groups as well as virtual communities.
A.6 Heroism	The person anticipates or has achieved the attainment of heroism and glory through his/her deeds. This is typical of martyrdom, but can also refer to more general instances of showing courage or gaining a place in history (more than just prestige or status, see below).
A.7 Individual recognition	The person anticipates or receives acknowledgement or supportive approval from the immediate or broader social environment for his/her deeds.

A.8 Emotional rewards	The person aims at obtaining emotional types of rewards, such as affection, love.
A.9 Moral rewards	The person aims at the achievement of superior political, social or religious purposes through individual actions, the idea of ‘making a difference’
A.10 Avoidance of significance loss	Prevention of significance loss is when an individual is motivated to avoid humiliation, shame or a loss of honor in the future.
A.11 Individual-based religious seeking	Individual-based religious seeking is a self-driven process that occurs when the individual searches for some satisfactory system of religious meaning to interpret and resolve his or her discontent and is not necessarily connected to a crisis or the influence of an external actor. Religious seeking is most likely where an individual’s religious views and/or established religious institutions seem inadequate in addressing concerns.
B.1 Paradise	Paradise refers to an other-worldly place where individuals will go after a suicide mission. This should be coded when there is evidence that gaining paradise is an individual incentive for radical behaviors (pursuing the spiritual self-interest over the corporeal self-interest). The individual does not necessarily have to commit a suicide attack for this code to apply.
B.2 Status	The person anticipates or has achieved a top position in a particular social environment though certain deeds for the organization, such as becoming the leader of that organization.
B.3 Material rewards	The person anticipates receiving some kind of material reward, such as money or property.
C.1/H.5 Economic crisis	An economic crisis is when needed financial resources are lost or financial resources cannot be achieved. Mere poverty is not sufficient here, unless there is evidence that the person or his/her family was not poor before, or they are unsuccessfully trying to overcome a situation of financial difficulties. Examples include losing a job, living on welfare assistance, or blocked economic mobility.
C.2/G.14 Socio-cultural crisis	A socio-cultural crisis is when an individual feels or perceives that he/she is not valued in a society based on his belonging to a certain group, apparent in instances such as feeling a sense of cultural weakness, humiliation, or racism.
C.3 Personal crisis	A personal crisis is when a person experiences victimization by crime or the death of a valued member of their family or social network (e.g. spouse, parent, mentor, etc.)

C.4. Crisis-driven cognitive opening	When an individual has experienced a crisis event which leaves them more receptive to radical belief systems. This is a self-driven behavior and not instigated by an outside group.
C.5/G.6 Emotional distress	Emotional distress or dissatisfaction can be in the form of, for example, extreme stress, sufferance, depression, shock, disappointment, etc.
C.6 Crisis-driven religious seeking	Crisis-driven religious seeking is when the seeking behavior is tied to an individual's experience of a crisis event or shock, and is not facilitated by an outside group.
D.1 Collective crisis situation	A collective crisis situation is when an individual or group perceives an existential threat to one's group (either their proximate group or a broader identity-based group), and sees that acting on the crisis would provide an opportunity to gain lost significance.
D.2/J.3 External threat	External threat is when an individual or group perceives an existential threat to one's group. External threats could be their government, another government, other terrorist groups, etc.
D.3 Political crisis	A political crisis is when a government commits acts of violence or ill-treatment against its people, such as repression, torture, or political discrimination. The political crisis does not have to be targeting the individual's identity-group directly, but there must be evidence that the individual felt a sense of crisis (empathy). For example, a white activist who expresses shock over political discrimination against blacks.
D.4 Cognitive opening	The individual experienced a cognitive opening through the crisis-generating outreach efforts of a group or an external actor. For example, an outside group can instill a sense of urgency in an individual about to need to address a pressing concern (i.e., generating moral shock).
D.5 Imminent existential threat	Instances when the person perceives a serious and <i>imminent</i> existential threat to oneself, the group or the cause. This must be imminent and thus requiring, in the perception of the person, immediate action, as opposed to 'mere' constant threat.
E.1 Public-proximate	Public-proximate recruiting is conducted in person and in an environment visible to the general public or authorities. Examples include prison settings, sidewalk proselytizing, public demonstrations, or wartime experiences (e.g., life during an occupation)

E.2 Public-mediated	Public-mediated recruiting is a broad and indirect approach akin to propaganda, but not necessarily hidden from authorities. Examples include using public channels like television or radio, newspapers, graffiti, posters, or public web sites and social media.
E.3 Private-proximate	Private-proximate recruiting takes places out of the public eye and in intimate settings. This strategy relies heavily on personal appeals tailored specifically for a targeted individual or a small group. Examples include training in a clandestine compound, peer proselytizing, or attending a closed seminar or ritual.
E.4 Private-mediated	Private-mediated recruiting combines a mass-media approach with intimacy or clandestinity in which a message is tailored for a specific audience and is largely out of the sight and control of authorities. Examples include niche marketing (e.g. jihadist magazines), restricted websites, or “car-trunk” videos. Niche websites (e.g., online jihadist forums, Stormfront.org) should be coded as Private-mediated, even if they are not password protected.
F.1 Frame alignment	Frame alignment refers to instances when the ideology disseminated by an organization resonate (i.e., are congruent) with the ideas or beliefs that the individual held prior to exposure to a group. For example, a black person who had experienced racial discrimination readily adopts the Black nationalist views of an extremist group.
F.2 Indoctrination	Indoctrination refers to a situation or process where the individual adopts a radical ideology, including the justification for violence, as disseminated or preached by someone else or a group. This is different from <i>Frame alignment</i> because the radicalized individual must not have shared these beliefs prior to contact with the group.
F.3/I.6 Authority of the frame articulator	The person has been in contact or has listened to individuals who possess superior, expert knowledge as compared to the receiver and thus are convinced about the validity of the ideological messages.
F.4 Empirical evidence	The person was presented with, or found him/herself, <i>perceived</i> empirical evidence supporting particular interpretative frameworks. Examples of this could include domestic political issues such as government corruption, economic destitution in some communities, or unequal distribution of wealth. It could also include video or photographic evidence of abuse, death, or other conflict atrocities as powerful visual confirmations of oppression.
F.5 Universal truth	The person was presented with, or found him/herself, a series of universal truths, such as religion or human rights, which support particular interpretative frameworks. An example of this could include

the justification of radical behaviors by appealing to religion or normative beliefs (e.g., human rights, constitutional rights, rights of self-determination, etc.)

F.6 Incremental learning	The person adopts new, radical interpretative frameworks on the foundation of pre-radicalization beliefs (which were adopted during previous socialization). For example, an individual who attended pro-life rallies in early life with their family and then goes onto adopt a radical anti-abortion ideology. This is likely to happen gradually and not rapidly.
F.7 Individual learning	The person adopts new radical interpretative frameworks through individual study, such as reading books or surfing the Internet.
F.8/J.9 Forming interpretative frameworks	Instances when new radical interpretative frameworks emerge through discussions within a group in otherwise inconspicuous circumstances.
F.9 Framework exclusivising	Process where the type of knowledge accessed and defended becomes increasingly exclusive and absolute. This can be seen in decreased tolerance for other opinions, willingness to use violence (as opposed to previous instances), and other instances of opinions becoming more extreme. An example of this could include referencing 'conspiracy theories' that align with their radical beliefs at the expense of or downplaying 'mainstream' sources of information.
F.10 Rules directed redesigning	Instances when the newly acquired interpretative frameworks impact on everyday life, such as physical appearance, eating habits, prayer, the kinds of social relations the individual entertains, etc.
G.1 Humiliation	Humiliation refers to events that lead an individual to perceive that they have lost social standing in, or value to, their community. These events can be personal tragedies, such as divorce, illness, or infertility, or conflict-related events, such as the death of a loved one at the hands of an out-group.
G.2 Helplessness	At an individual level helplessness refers to the inability to reach individual goals due to the poor economic, social or political conditions of the community or state.
G.3 Socially based significance loss	Socially based significance loss refers to instances where one's social identity, values, or beliefs are disrespected by others. This can occur for the individual or for the group the individual is a member of. Includes instances of pervasive discrimination, such as "Islamophobia," and the enactment of laws limiting the ability of certain groups to publically practice their beliefs.

G.4. Group boundaries	Group boundary-host refers to feelings/reports that the individual was unable to assimilate to the dominant group prior to radicalization (e.g., person was not able to assimilate into the Western culture where they reside).
G.5 Uncertainty	Uncertainty is an aversive state that an individual feels when they cannot anticipate future events or plan what course of action should be taken to achieve goals. It also includes uncertainty about their own identity (who they are and how they should behave).
C.5/G.6 Emotional distress	Emotional distress or dissatisfaction can be in the form of, for example, extreme stress, sufferance, depression, shock, disappointment, etc.
G.7 Cultural disillusionment	The person was in search of or expected a certain ideal, such as an ideal society (e.g., 'the American Dream') or ideal social relationships, and was disappointed by that ideal or their inability to achieve it.
G.8 Anomie	Anomie is when the person does not possess or does not adhere to any kind of normative system to guide and regulate his/her existence – these could be religious beliefs or value systems or more general moral rules and principles. An indicator of anomie could include following a criminal lifestyle prior to radicalization.
G.9 Broken family	Broken family refers to divorce or separation of the individual's parents, or if the individual him/herself undergoes a divorce or separation.
G.10 Loose family	Loose family refers to very distant emotional relations among the family members. Physical distance is not a sufficient condition – there must be evidence of emotional distance
G.11 Lack of attention/affection from the parents	Lack of attention/affection from the parents is when the individual was neglected, or did not receive adequate love and care from the parents. It can also refer to an individual receiving negative types of attention from parents, for example physical or emotional abuse.
G.12 Loose community relations	Loose community relations refers to very distant relations among the community members. For example, the individual lives in a divided community in which some members are not accepted or avoided altogether (e.g., parallel communities)
G.13 Dependent personality	The person has been described as suggestible, impressionable, easy to convince or influence by others, with a low tolerance for ambiguity. Simply being naive is not a sufficient condition).

C.2/G.14 Socio-cultural crisis	A socio-cultural crisis is when an individual feels or perceives that he/she is not valued in a society based on his belonging to a certain group, apparent in instances such as feeling a sense of cultural weakness, humiliation, or racism.
H.1 Physical distress	Physical distress or dissatisfaction refers to extreme stress, pain, dissatisfaction with current physical possibilities.
H.2 Material distress	Material distress or dissatisfaction refers to the individual's perceived inability to provide for oneself or for one's family. Examples include frustration from losing a job, living on welfare assistance, or experiencing blocked economic mobility. It is not enough for the individual to simply be poor, but must show evidence of <i>dissatisfaction</i> with their material well-being.
H.3 Family dysfunctionality	Family dysfunctionality (other). This includes the family not being able to provide basic needs to the individual, such as food and shelter.
H.4 Community dysfunctionality	An individual's community does not provide a support network for fulfilling basic needs (e.g. job assistance, access to education, etc.)
C.1/H.5 Economic crisis	An economic crisis is when needed financial resources are lost or financial resources cannot be achieved. Mere poverty is not sufficient here, unless there is evidence that the person or his/her family was not poor before, or they are unsuccessfully trying to overcome a situation of financial difficulties. Examples include losing a job, living on welfare assistance, or blocked economic mobility.
I.1 Leadership prototypicality	Leadership refers to reports that the individual was mentored, or heavily influenced by a leader that was perceived to be <i>typical</i> of the extremist organization. In other words, the leader was perceived to embody the same values and beliefs espoused by the organization. The leader does not necessarily have to be in physical or direct contact with the individual for this code to apply.
I.2 Leadership-Importance	The relationship between the individual and the leader was perceived as important to the individual. Examples of this code could include the individual emulating the behavior of the leader, taking their advice, following their instructions, or looking up to them.
I.3 Leadership norms	A leader in the organization communicated (either orally or via writing) with the individual about the group norms of the organization.
I.4 Black sheep	The individual was exposed to discussions about a fellow group member's actions as being unacceptable to the organization.

I.5 Rule compliance	In rule compliance the extremist group exerted pressure on members to conform to the internal rules and norms of behavior of the group.
F.3/I.6 Authority of the frame articulator	The person has been in contact or has listened to individuals who possess superior, expert knowledge as compared to the receiver and thus are convinced about the validity of the ideological messages.
A.5/I.7 Uncertainty relief	The group relieves an individual's sense of uncertainty about actions or identity by being homogenous, hierarchical, <i>and</i> having a clear message about goals, behaviors, and out-groups. This includes proximate groups as well as virtual communities.
J.1 Group influence	Group influence refers to instances where the individual's opinions or behaviors became more extreme in a group context and as a consequence of group dynamics than the ones individual members held or exhibited before joining the group.
J.2 Groupthink	Groupthink refers to instances where individuals prioritized consensus with the group about a decision at the expense of the consideration of better alternatives. For example, an individual who later describes that alternative courses of action, such as non-violence, were not considered in the context of the group.
D.2/J.3 External threat	External threat is when an individual or group perceives an existential threat to one's group. External threats could be their government, another government, other terrorist groups, etc.
J.4 Typicality threat	A typicality threat is when the individual's membership in their extremist group is questioned. In other words, the individual is perceived by others in the group as not adhering to the group's norms or values.
J.5 In-group/out-group bias	Also known as the 'group serving attributional style' – in-group/out-group bias is a mechanism of group cohesion that occurs when individuals and/or groups attribute positive characteristics to their own social group and negative/threatening ones to the those outside of the group.
J.6 Dehumanizing rhetoric	Dehumanizing rhetoric refers to when people outside of the organization are discussed in ways that make them appear to be less than human. This can be both describing an out-group or other individual in non-human or immoral terms. Examples would include describing an individual as a "pig" or "rat" or comparing him/her to a Nazi.
J.7 Diffusion of responsibility	Diffusion of responsibility refers to when individuals downplay the liability of their own actions by placing the accountability onto the group, which could lead to a lower threshold for individual

violent behavior. An example of this could include advocating for violence in group terms, but deflecting personal responsibility for that violence. Evidence of the diffusion of responsibility could also be an individual describing their actions as “going along with the group.”

J.8 Social isolation

Instances when the group or the individual is becoming more and more isolated from the previous, non-radical social environment. This could include no longer associating with non-radical friends, abandoning previous activities, or purposely quitting one’s job.

F.8/J.9 Forming interpretative frameworks

Instances when new radical interpretative frameworks emerge through discussions within a group in otherwise inconspicuous circumstances.

Appendix 9: Raw data for fs/QCA analysis

Subject ID	Personal Crisis	Community Crisis	Psychological Vulnerability	Psychological Rewards	Physical Vulnerability	Material Rewards	Recruitment	Group Norms	Group Biases	Cognitive Frame Alignment	Violent Extremism
1169	1	1	1	1	0	0	0	0.75	1	1	1
2071	1	0.75	1	1	1	0	0.25	1	0.75	1	0.75
1002	0	1	0.5	0.25	0	0	1	1	1	1	0.5
3592	1	0.25	1	0	1	1	0	0	0	1	1
1144	0	1	0.75	0.75	0	0	0	0.25	1	1	0.5
4704	1	1	1	1	0	0	0	1	1	1	1
3148	1	1	1	0.75	0	0	0	0	1	1	1
5822	0	1	0	0.5	0	0.25	0	0	1	1	0.5
1182	1	1	1	1	0	0	1	1	1	1	0.75
3709	1	0	1	0.75	0	0.25	1	1	1	0.75	1
1139	1	1	1	1	1	0.25	0.75	1	1	1	0.75
1174	0.25	1	0.5	0.75	0.5	0.25	0	0	1	1	0.75
3107	0	1	0.25	0.5	0	0	1	0	1	1	0.25
4517	0	0.75	0.5	0.75	0	0	1	1	1	1	1
3868	0.75	0	1	1	0	0.5	0	0.5	1	1	1
5386	0	0.5	0.25	0.5	0	0	0	0	0.5	0	0.5
1088	1	0.75	0.75	1	0	0	1	1	1	1	0.75
5940	1	1	1	1	1	1	1	0	1	1	1
9061	1	1	1	1	0.75	0.25	1	1	0.75	1	1
3159	1	1	0.5	0	0	0	0	0	0	1	1
4520	0.5	1	0.75	0.25	0.25	0	1	1	0.75	1	0
5944	1	1	1	0.75	1	0	1	1	0.75	1	1
1041	0	1	0	0.25	0	0	1	1	1	1	0.5
1109	1	1	1	1	0.5	0	0	0	0	0.5	1
3508	1	1	1	1	0	0	1	1	1	1	0.75
3023	1	0	1	1	0	0	1	1	1	1	0.25
3071	1	1	0.25	0.25	0	0	1	0	1	1	0
2104	1	1	1	0.25	0	0	0	0	0.75	1	0
5546	0	1	0	0.5	0	0	0	0	0.75	1	0.5
3230	1	0.25	1	0.5	0	0	0	0.5	0.5	1	0
4205	0.5	0	0	0	0	0	0.25	0	0	1	0.25
5473	1	1	1	0.5	0	0	0	1	0.75	1	0
4634	1	1	0.25	0.25	0	0	1	0	1	1	0.75
2042	1	1	0.75	0.25	0	0	1	1	0.75	1	0.75
4708	0	0.75	0.25	0.25	0	0	0	0	0	0.75	1
4527	0	1	0.25	0.5	0	0	0	0	1	1	1
1027	0	1	0.5	0	0	0	1	1	1	1	0.5
1050	1	1	0.75	1	1	1	0	0	1	0.75	0.75
2107	1	1	1	1	0	0	0	0	0.25	1	0.75
1005	0	1	0	0.25	0	0	1	1	1	1	1
1160	1	1	1	1	0	0.25	0	1	0.25	1	1
3163	1	0	1	0.5	0	0	0	0.25	0.5	1	0
5954	1	1	1	0.75	0.25	0	1	1	1	1	0.75
3293	0.5	1	0	1	0	0	0	0	1	1	1
4692	1	0.5	0.25	1	0	0	0	0	1	1	0.25
4467	0	1	0.25	1	0.5	1	1	1	1	1	1
3126	1	1	1	0.5	1	1	0.75	1	1	1	1
3470	0.5	1	0.25	0.75	1	1	0.75	1	1	1	0.5
1048	1	1	1	0.5	0	0	1	0.25	1	1	0.5
9060	1	1	1	0.75	1	0	0	0.75	1	1	1
3028	1	1	1	1	0	0	0	0	0	1	1
3411	1	1	1	0.75	1	0	0	0	1	1	1
3050	1	1	1	1	0.75	0	0	0	0.75	1	1
3525	1	1	1	1	1	0	1	0.25	1	1	1
3068	1	0.25	1	1	1	0	0	0.25	0	1	0.25
1141	0	1	1	0.75	0	0	0	1	1	1	0

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