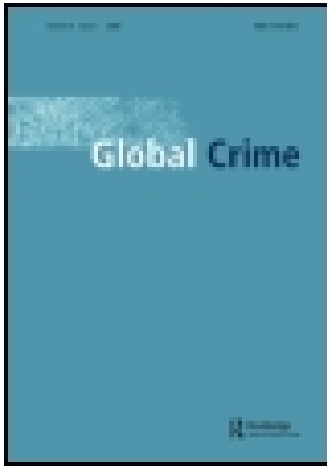


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Structural differences of violent extremist offenders in correctional settings

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Structural differences of violent extremist offenders in correctional settings

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The process of radicalisation has received wide attention over the past decade. As the number of violent extremist offenders grows, the potential diffusion of radical ideologies inside prisons is gaining attention. Offender attribute data, both pre-custody and in-custody, routinely collected by Correctional Service Canada, were explored to determine whether violent extremist and mainstream offenders differed (that is, could be clustered); if so, what attributes have values that were systematically different for the two groups, and did those attributes lend themselves to predicting other offenders at risk for radicalisation.

Results from the pre-custody attributes show minute differences between the two groups. The in-custody attributes show visible, although still weak, differences. Combining the two data sets provides further evidence for differences, with some interactions between the two sets of attributes. Definitive answers about radicalisation were hampered by the small number of radicalised offenders (less than 1 percent) and several major differences in the offender population as a whole that obscure smaller distinctions. Nevertheless, the analysis suggests some attributes that may differentiate violent extremist and mainstream offenders. Although unanticipated, it also demonstrates that the entire offender population separates well into three clusters, and allows the qualitative pattern of attribute values that differentiates them to be determined.

Keywords: radicalisation; clustering; offender properties

Introduction

The immediacy of the problem of violent extremist ideologies is apparent: foreign and homegrown terrorists, lone wolves, those who join terrorist organisations, those who travel abroad to do so, recruiters, financiers, procurors, propagandists, apologists, supporters, enablers of various sorts ... the number of indicted violent extremists is on the rise. Yet, relative to the voluminous literature of counterterrorism, our understanding of violent extremist offenders within the confines of prison, how to manage them, how to intervene, how to curb prison radicalisation, and how to ensure that violent extremist offenders do not return to their old ways upon release is surprisingly inchoate. In fact, Silke¹ observes: 'On many issues we currently have almost no published research'. Extant research on prison radicalisation is exclusively small-*n* qualitative; to the best of our knowledge, no scholarly large-*n* study of this phenomenon is available in the public domain.

On the one hand, it is difficult to gain access to prisons to conduct field research, such research is difficult to carry out and access to the data held by corrections organisations is highly restricted. On the other hand, offenders are a potential treasure trove of data

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because organisations tend to have access to and systematically collect copious pre- and post-intake data, in part to assess risk and in part to determine appropriate correctional management and programming. Moreover, correctional organisations tend to be more sympathetic to research and evidence-driven decision-making than many other organisations under the national security umbrella, and usually already have robust and long-standing internal research units. There are plenty of prevailing hypotheses about prison radicalisation.² This article does not tackle these *per se*, in part because the available data give us little traction on the radicalisation process in general, what drives prison radicalisation in particular or how to forge effective strategies for promoting and facilitating disengagement and deprogramming from violent extremism.³

This article broaches a far more basic question, one that quantitative analysis is well positioned to answer: whether violent extremist offenders differ from the mainstream offender population. There is good reason to expect that violent and radicalising offenders should differ from the general prison population.⁴ While both criminals and violent extremists use violence to attain specific goals, violent extremists believe they are fighting for a cause and seek to achieve political, religious or ideological gain, while criminals tend to be utility maximisers, motivated by material gain.⁵ Violent extremists also seek to gain the attention of the general public, while conventional criminals would rather avoid it. Yet, it does not follow that offenders whose offences differ necessarily differ in terms of their characteristics as well. Whether the characteristics of violent extremist offenders actually differ from the mainstream prison population and, if so, how, has thus far not been established conclusively. That is the puzzle at the heart of this article, and a pressing one that has spawned a literature on incarcerated violent extremist offenders in general, and prospects for deradicalisation in particular.⁶ About one hundred thousand suspected Islamist terrorists are in custody around the world today.⁷ But prison radicalisation is not limited to Islamists. It is a long-standing concern that, for instance, has generated a substantial qualitative literature on imprisoned ethno-nationalist violent extremist offenders, especially those associated with organisations in Europe, notably the Irish Republican Army, Euskadi Ta Askatasuna, Red Army Faction and National Liberation Front of Corsica.⁸ However, with the rise of Islamist offenders, prison radicalisation appears to have undergone a qualitative shift.⁹

Whether in or outside of prison, the issue of radicalisation and associated processes is complicated methodologically by the small numbers of those in this category, on the one hand, and the vast majority of people in comparable circumstances who exhibit a staunch resilience against radicalisation, on the other hand. Generally speaking, radicalisation is understood as a change in beliefs, feelings and actions towards increased support of one side of intergroup conflict.¹⁰ By this definition, for instance, women who pushed for the extension of the franchise qualify as radicals, so does the government of the United States after 9/11. Radicalisation *per se*, then, is not necessarily problematic. This article is concerned with a tiny subset of radicals: offenders who sympathise with, justify or feel a personal obligation towards politically motivated violent extremism or associated illegal acts. The concern with such offenders is two-fold: a potential diffusion effect to other susceptible offenders, and the risk to the general public upon release.¹¹ The objective then is not only to see whether the data provide some insights into the mechanisms of radicalisation but also whether they can help identify attributes and conditions that may make an offender more susceptible to radicalisation in the first place. If such individual attributes and conditions can be identified, then such offenders could, ostensibly, be exposed to preventative programming and/or authorities can actively avoid conditions and contexts favourable to radicalisation.

Research problem

Who is likely to sympathise with, provide material support for or actually engage in politically motivated violent extremism, and why, has become one of the more pressing security questions of our time.¹² Attempts have been made to answer this question from a psychological perspective, using rational actor theory or using situational actor theory.¹³ Mulcahy, Merrington and Bell¹⁴ explore the role of religion and the vulnerability of offenders to radicalisation. In Canadian prisons, for instance, inmates have been known to convert to Islam to increase their access to certain types of meals, as the state has an obligation to accommodate religious dietary restrictions under the *Canadian Charter of Rights and Freedoms*. But conversion does not necessarily correlate with a diffusion effect of radical ideology as data imply that the number of converts exceeds the number of violent extremist offenders. By contrast, situational actor theory focuses on how individuals become exposed to moral contexts and develop a morality conducive to seeing acts of politically motivated violent extremism as a viable alternative means of action. Dugas and Kruglanski,¹⁵ for instance, attribute prison radicalisation to a 'quest for significance'. Hamm,¹⁶ by contrast, attributes the diffusion of radicalisation to maximum security prisons, few rehabilitative programs and a shortage of chaplains to provide religious guidance.

Palermo¹⁷ notes a three-stage pattern of misbehaviour among offenders, beginning with offenders who enter prison and persist in following the conventional rules of society. The second stage sees an increase in misbehaviour, as the offender adopts to the prison code, often as a means of survival. The third stage comes as offenders prepare for their release, and begin to reacquire the values of the outside world. Palermo notes that this is not always the case, as many offenders leave prison as more hardened criminals than when they entered. This importation-exportation hypothesis figures prominently among those concerned about the diffusion effects associated with prison radicalisation. In a study of 2520 institutionalised male delinquents, DeLisi et al.¹⁸ found family background variables to be the best predictors of offender behaviour. This validates the life-course importation model – the study and socialisation of crime over the course of one's life, including periods of confinement.

Useem and Clayton¹⁹ conclude that the risk of terrorist attacks being planned in prison as a result of offender radicalisation is moderate, owing to the order and stability of American prisons, successful efforts by prison officials to counter the importation of radicalism, the focus of correctional leadership on promoting anti-radicalisation in their agencies, and the fact that the widespread low level of education among offenders makes terrorism less appealing to them. They conclude that prisons provide a unique opportunity for terrorist activities to be monitored, as a large amount of data are collected on the activities of offenders, even after they are released. Similarly, Austin²⁰ suggests that there have only been a handful of cases of radicalisation in prison. A report on radicalisation and de-radicalisation efforts in the prisons of 15 different countries found that the best practice is to isolate terrorist offenders from the general prison population.²¹ Isolating these offenders hinders communication with other offenders and prevents networks from forming and plans from being made. Neumann also discusses concentration, where all terrorist offenders are imprisoned in one facility. This is meant to aid in de-radicalisation by simplifying, concentrating and surging the allocation of resources, and targeting of specialised programmes. There are fears, however, that concentration, such as in Guantanamo Bay, create a critical mass that may be counterproductive. Awan²² explores how British prisons have dealt with the threat of radicalisation. He notes that one of the main difficulties in combating radical activities is that de-radicalisation programmes are viewed with suspicion and are believed by many offenders to be used to surveil Muslim

offenders. He concludes that building trust with offenders is key for de-radicalisation efforts in British prisons to succeed.

For as timely and relevant an issue as prison radicalisation, then, the open-source evidence base is scant because offenders who meet the scope conditions are extraordinarily difficult to identify and study. That explains why research on this topic has thus far defaulted to qualitative methods.²³ One popular approach has been to interview and/or survey violent extremist offenders who have been found guilty of political violence or associated activity. Much existing work tries to reconstruct the process by looking only at one part of its outcomes: those who have become radicalised. The result is a plethora of theories and mechanisms, with little compelling empirical support. This approach raises a litany of methodological problems, not the least of which is that it samples on the dependent variable. Many of those who have become radicalised are surrounded by close friends and sometimes siblings who grew up in exactly the same milieu but did not feel the pull of radicalisation. The drivers of radicalisation, then, appear to contain a significant aspect that is personal and individual.

The approach to radicalisation by studying violent extremists is also marred by selection bias and a notoriously small n .²⁴ In theory, the solution to this quandary is large- n longitudinal analysis among at-risk communities. In practice, longitudinal community surveys large enough to yield robust results would be prohibitively expensive and exceptionally difficult to operationalise among incarcerated populations across correctional institutions. Theories of radicalisation make implicit predictions about variation among attitudes in the communities from which violent extremists are drawn. Data in support of such theories would be exceptionally difficult to collect among offenders. Although the data sets at our disposal did not contain attitudinal data of this type, they did contain possible proxies, such as incidents in which a given offender is involved while incarcerated. One of the premises of this research, then, was to investigate whether quantitative methods applied to a large data set could give us traction with the problem of offender radicalisation.

The intention of this study is to determine, empirically, the characteristics that distinguish radicalised offenders from the wider prison population. To investigate this, we had access to hundreds of attributes and thousands of data points on 11,414 Canadian federal sentenced offenders. Terrorist organisations in Canada are actively fundraising and recruiting, owing to Canada's proximity to the United States, tolerance of religions and respect for human rights.²⁵ Canadians have suffered not only from threats originating outside the country, but also from threats by Canadian home-grown violent extremists, such as members of the Front de Libération du Québec, white supremacists, neo-Nazis, extreme animal-rights and eco-activists and, most recently, Islamist extremists.²⁶

Like many real-world data sets, data collection and methods changed over the time period. Two anonymised data sets were generated by Correctional Service Canada (CSC) personnel, describing 11,414 offenders, of whom less than 1 percent were considered to be violent extremists. The first data set consists of the values for attributes known at the time of intake to a federal correctional institution (349 attributes, referred to as precustody attributes) and the second consists of the values of attributes collected during incarceration (272 attributes, referred to as in-custody attributes). New and more comprehensive data began to be collected more recently, and data entry is decentralised and subject to a certain level of subjective judgement. These shortcomings are mitigated somewhat by the extent of available data points, methods of controlling for them and the insensitivity of our analysis methods to small variations. The scale of the data makes for a quantitative study of offender attributes of unprecedented proportions, with remarkably robust results.

In the process of analysing the data, many of our initial assumptions – many of which also tend to be widely held – were not validated. At the same time, aspects that have significant implications for how to treat such offender populations, yet which we had not initially considered, emerged.

Clustering analysis of this data was carried out to address the following three questions:

- (1) Are radicalised offenders detectably different from the wider offender population, that is, do they form distinct clusters?
- (2) What attributes are responsible for the difference between the radicalised population and the wider offender population, if any?
- (3) Can offenders at risk of radicalisation be identified by their similarities to known radicalised offenders?

One advantage of the data set analysed in this study was that despite the small number of violent extremist offenders, ample data points on both these offenders and the rest of the prison population were available across both time and space. Moreover, unlike surveys among the general population, which are unlikely to hit on actual terrorists since their representation in the general population is minuscule, here we have a disproportionately large and known subset of actual, convicted violent extremist offenders – as opposed to just ‘radicals’ who might engage in non-violent but illegal politically motivated acts and ‘activists’ who support individuals or groups who engage in politically motivated violence or other illegal acts – and, their small numbers notwithstanding, orders of magnitude more concentrated than in the general population outside of prison. Moreover, we did not need their consent to interview them or to worry about the quality of answers during an interview: instead of interviews, we were able to rely on standardised data collected systematically by CSC across the prison population. Does this subgroup have genuinely distinguishing features that differentiate it from other offenders, or does it actually have more in common with other incarcerated subgroups than previously appreciated? This is an important question, for instance, with respect to the type of programming to which such offenders might respond best, and whether there is any evidence at all that they should, in fact, be isolated, either individually or collectively.

Data

Past and present violent extremist offenders who were admitted to a federal institution between 1996 and 2012 were identified through CSC’s Offender Management System, a computerised file information system, consultation with CSC’s Security Branch and verification of public domain information (e.g., media reports). These offenders were compared to the full population of Canadian federally sentenced offenders who were in custody at one of CSC’s institutions as of 13 November 2012. Individuals were anonymised by removing explicit identifiers, and also attributes that could have conceivably permitted implicit identification.

Two sets of comparisons were conducted. First, an attempt was made to compare violent extremist offenders to the full population of incarcerated offenders on variables previously identified as important in the relevant literature and cited as important by focus-group participants. It was possible to match approximately two thirds of these variables to indicators within CSC’s Offender Management System, though the match was not always strong (e.g., while focus group participants have identified specific tattoos as indicative of extremism, administrative data records only whether an offender has a tattoo, not the design pictured). Second, violent extremist offenders were compared to the

full population of offenders on a variety of additional variables. These analyses were exploratory in nature and additional variables were selected based simply on their availability and their face validity.

Data were obtained in November 2013 from CSC's Offender Management System. One of the assessment scales used, the Dynamic Factor Identification and Analysis (DFIA), includes individual items or indicators that are scored as present or absent shortly after entry into a federal correctional institution as part of the intake process. Given modifications to the measure in September 2009 (which resulted in the replacement of the DFIA with a new measure, the Dynamic Factor Identification and Analysis – Revised), indicator data obtained prior to this point were analysed separately from that obtained after September 2009. In some cases, however, the patterns of findings relating to similar – or even identical – indicators from the two instruments differed. The reasons for this are unknown. It is possible that there were changes over time in the way the measures were completed, but it is also possible that the differences are due to dissimilarities in the offenders admitted at the times when each version was in effect. For instance, Leman-Langlois and Brodeur²⁷ have argued that the objectives and justifications provided for terrorist incidents in Canada have shifted considerably over time, and primarily within the last decade. In particular, these authors argue that there exists a 'new terrorism' that has emerged in Canada to replace 'conventional terrorism' and which differs in many respects (e.g., the role and extent of violence and of information communication). It may therefore be that differences in the types of offenders to whom the two versions of the DFIA were applied contribute to different patterns for similarly worded indicators. The available data do not allow the testing of this possibility. Regardless, the differences in patterns from the two instruments and time periods underscore the challenges in reaching conclusions based on these analyses. Though the limited number of violent extremist offenders available for analysis prevents any alternative, analysing these offenders as a single group perhaps masks heterogeneity within the sample.

The attribute categories used for the pre-custody analysis include demographics, sentencing, attitudes to other individuals and institutions, personal behaviour, social behaviour, education, family setting and substance abuse history. Names of attributes throughout have two parts: the first the attribute category and the second the specific attribute. For example, *attitudes-disability* records whether or not an offender has negative attitudes to those with disabilities, and *marital/family-abused* records whether or not an offender was abused in a family context.

A number of additional variables reflected offenders' history within the institution. Given that the length of offenders' periods of incarceration can vary widely, data from only the preceding year were selected. For each institutional history variable, any offender for whom a full year of data was not available was omitted from analyses. Similarly, for some offenders, various other data points were missing; where this was the case, the offenders were omitted from corresponding analyses. The attribute categories used for in-custody analysis include alerts, grievance, incidents, assessed needs and participation in programmes (e.g., mental health counselling, chaplaincy or education). For example, *chaplaincy-enrolled* records whether or not an offender had enrolled in a chaplaincy program in the preceding year.

Methods

Original attribute values were numeric, categorical and ordinal, and there were substantial numbers of missing values. The pattern of missing values did not appear to be

random, which is unsurprising given the issues related to collection discussed earlier. Preprocessing and mapping techniques were used to map all of these disparate values to numeric ones in ways that preserved, as far as possible, the semantics underlying them.

Given the class labels (violent-extremist offender or not), a variety of attribute selection methods were used to remove attributes that did not show significant differences between the classes. Even applied conservatively, this reduced the number of attributes by about a third (349 to 219 for pre-custody attributes and 272 to 108 for in-custody attributes). The different rates of removal are probably not significant, reflecting simply the choice of the initial attributes collected.

Several attributes that had been included were, in retrospect, considered too obviously related to violent extremism (and hence already known to CSC as markers of radicalisation) and were removed (e.g., coding for security level). Two techniques are conventionally used to understand complex multivariate data sets. The first is to use pairwise correlations, together with the machinery of statistical significance, to understand how one property relates to another.²⁸ The second is to use principal component analysis²⁹ to examine correlation among many variables at once. We use singular value decomposition (SVD), which can be understood as an extension of PCA. Given a matrix whose rows represent offenders, whose columns represent attributes and whose entries are the corresponding numerical values of each attribute for each offender, SVD clusters both the rows and the columns in a consistent way. The results can be used to plot points corresponding to offenders in such a way that proximity corresponds to similarity with respect to all of the attributes. Such a plot allows the similarity structure among offenders to be visualised and clusters, when present, to be seen.³⁰

Because both objects and attributes are aligned, it is meaningful to consider objects as ‘pulled’ towards attributes for which they have large values and symmetrically for attributes to be ‘pulled’ towards objects. Increasing the values of all of the entries in a row moves the position of the corresponding point further from the centre, but, more significantly, also causes rows with similar properties to be positioned further outwards in the same direction. Thus, changing the values in some subset of the rows allows other related rows to be detected in the visualisation.³¹ This proved invaluable to amplify the small differences between the violent extremist and mainstream populations. Positioning of the points representing offenders and attributes after the SVD clustering accurately represent similarity, so offenders who are similar to those already labelled as violent extremists can be considered, in principle, as ‘at risk’ for radicalisation. Furthermore, attributes with unusual values for one or more rows of the data set also move further from the centre when the values of those rows are increased by a multiplicative factor.

Pre-custody data

This section presents the results of clustering using the pre-custody attributes, that is, data about offenders collected at the beginning of their incarceration. [Figure 1](#) shows the clustering based on the 219 selected attributes, with the radicalised offenders shown in black and the other offenders in blue. It is clear that there is no substantial difference between the radicalised and non-radicalised groups. Indeed, it would be quite surprising if such a difference existed. The pre-custody attributes are largely social and demographic (with a small number associated with previous interactions with the criminal justice system), and previous work on radicalisation has reinforced that it is a complex phenomenon with a large individual component.

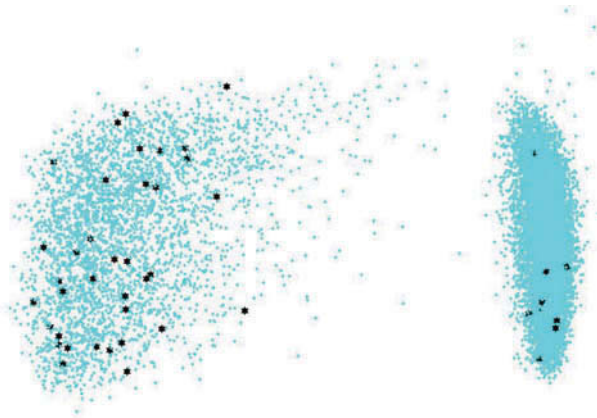


Figure 1. Clustering based on selected attribute set (pre-custody attributes) with radicalised offenders shown as black hexagons and others as dots (blue). Spatial similarity corresponds to multivariate similarity based on common values for attributes. [To view this figure in colour, please see the online version of this Journal.]

The more striking conclusion from this figure is that the offender population as a whole forms three clusters (two obvious ones, and a further small cluster hidden behind them and associated with sexual offences). This separation into clusters is not a simple difference involving only a few attributes, nor is it related to data-capture issues such as missing values.

Figure 2 shows the related clustering of attributes aligned with the clustering of offenders in Figure 1. Due to the symmetry between individuals and attributes, the left to right spread of attributes captures those that make a difference between the two large clusters. The number of attributes in play shows that this difference is a complex one. The 10 attributes most associated with both the left- and right-hand sides of Figure 2 are shown in Table 1. The differences between the clusters are truly multivariate – there is no

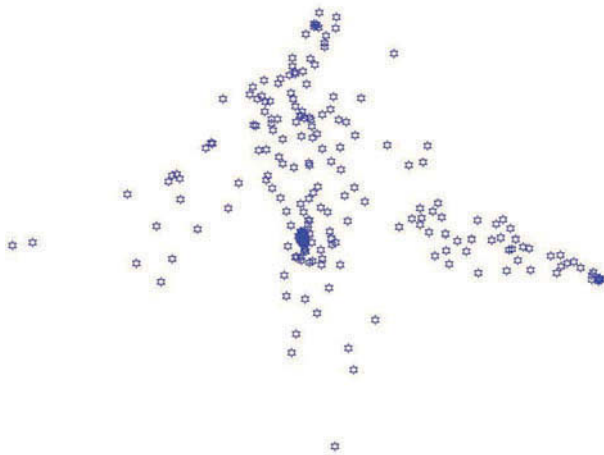


Figure 2. Clustering of attributes aligned with the clustering of offenders in Figure 1 (pre-custody attributes). The attributes form a cross, showing that most are associated with either the vertical or the horizontal variation among offenders in Figure 1, but not both. [To view this figure in colour, please see the online version of this Journal.]

Table 1. Most significant set of attributes that discriminate the clusters in Figure 1 (pre-custody attributes).

Attributes most strongly associated with differences between Group 1 and Group 2	
Personal attributes:	Attitudes:
Listening skills are limited	Intolerant of disabled persons
Gives up easily when challenged	Intolerant of other religions
Unable to recognise problem areas	Elderly have no value
Religion is problematic	Ethnically intolerant
Socially unaware	Has previously been referred to programs that address deficits
Ethnicity is problematic	Lacks direction
Family ties are problematic	Takes pride in criminal exploits
Non-reflective	Supports instrumental violence
Worries unreasonably	Community function:
Poor conflict resolution	Has poor hygiene
Is not conscientious	Unable to express verbally
Gang member	Has poor self presentation
Aggression issues	Has dietary problems
Employment related:	Marital/family:
Belief in oneself to improve employability is low	Has been married/common-law in the past
Cooperative work skills are limited	Attitudes support spousal violence
Lacks a skill area/trade/profession	Currently single
Has difficulty with coworkers	Abused during childhood
	Dissatisfied with current relationship
Associations:	Substance abuse:
Has a criminal partner	Abuses drugs
Social isolation	Uses drugs during leisure times

Notes: Many of these attributes describe personal and community functioning, as well as properties associated with employment difficulties. The mapping of attributes to numeric values means that we can conclude that these attributes vary between these two major clusters, but we cannot conclude in which direction.

consistent difference in the values of any single attribute (or even small set of attributes) between offenders in one cluster and those in another.

Figure 3 shows the clustering when the values in the rows of radicalised offenders are multiplied by 10. Unsurprisingly, they move much further from the centre so they are well separated from the clusters with which they were originally associated. Their placement suggests that there might be three different categories among them (upper left, lower left and right), but the underlying difference between the left and right clusters remains dominant.

Lists of offenders appearing in each of the two main clusters were provided to CSC personnel. Using knowledge of the individuals concerned, a robust hypothesis about the meaning of this clustering was inferred. The cluster on the left of Figure 1 contains offenders demonstrating relatively low levels of criminogenic needs³² across most domains but supporting the use of instrumental violence and having identified issues with aggression. This group has few chronic offenders. Indeed, 68 of the leftmost 100 members of the left-hand cluster have been convicted of single homicides. In what follows, we call this the Group 1 cluster, acknowledging that this term has more to do with their categorisation while incarcerated than their characteristics per se. There are 3398 offenders in this cluster, 30% of the total.

The right-hand cluster, in contrast, contains offenders with multiple criminogenic needs. Members of this group demonstrate many issues with substance abuse, both in

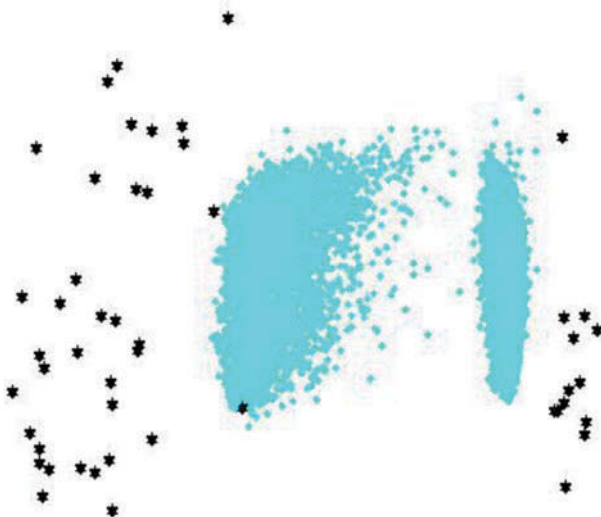


Figure 3. Clustering when the rows of radicalised offenders are multiplied by 10 to increase their difference from other offenders and so focus on violent offender similarity/difference (pre-custody attributes). [To view this figure in colour, please see the online version of this Journal.]

the offence cycle and in their day-to-day lives. They often have chronic offending patterns. We call this the Group 2 cluster. This cluster contains a larger number of offenders, 8016 (70% of the total). Despite its larger size, this cluster is much more compact, indicating that its members resemble one another much more than those of the other cluster. In other words, Group 1 contains individuals with a much wider range of attribute values than those of Group 2.

This separation informs the characterisation of violent offenders. Clearly, there are some who fit the conventional stereotype: motivated by ideology, willing to use violence instrumentally, but functioning members of society. But there are also some violent extremists who seem to struggle in society, whose motivations are perhaps less ideological and who resemble the stereotype of hapless criminality more closely. Offenders in this second group fit the model of radicalising for immediate benefits while incarcerated, such as fitting in.

The strong separation between Groups 1 and 2 led to the construction of new attributes to replace some existing ones. For example, since the members of Group 1 have typically only committed a single offence, an attribute describing prior convictions (0, 1 or more) was created to replace a number of attributes describing sentencing. Attributes related to sexual offences were also removed.

Clustering the new data set, shown in Figure 4, shows a number of differences. The clusters are much more cleanly separated, lacking many of the scattered points between the two clusters. The Group 1 cluster appears virtually identical to its appearance in Figure 1, while the Group 2 cluster has changed. The reason is that these clusters are so unrelated to one another that their internal variation is completely uncorrelated, and so appears almost at right angles to one another. The Group 2 cluster has variation *into* the dimension of the viewing plane which makes it seem more compact in this view.

This is made clear in Figure 5 which shows the same clustering viewed from the right-hand end of Figure 4, so that the Group 1 cluster lies horizontally (behind) and the Group 2 cluster lies vertically (in front).



Figure 4. Clustering using the second version of the pre-custody attributes. [To view this figure in colour, please see the online version of this Journal.]

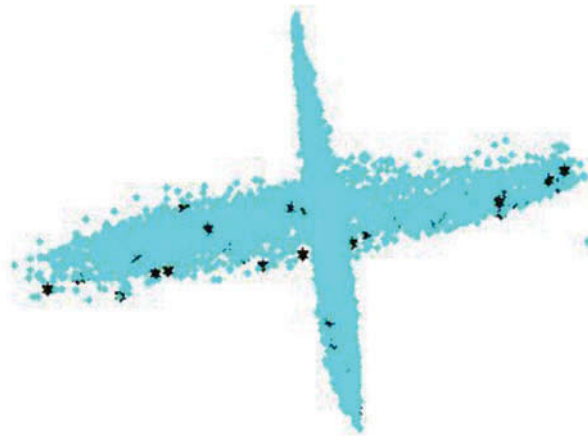


Figure 5. Clustering using the second version of the pre-custody attributes, viewed from the right-hand end in Figure 4. [To view this figure in colour, please see the online version of this Journal.]

This separation of the offender population into two groups is strong – individuals fall cleanly into one group or other, with little ambiguity. The advantage of the SVD technique is that it is able to detect such strong clustering but this comes at a cost: because the clustering is based on global, multivariate similarity and difference, it is impractical to discover to what extent each individual attribute contributes to the difference. Hence it is not practical to build rules that would enable staff to allocate incoming offenders to one of these clusters, however useful this may be.

The offenders placed in Group 1 were extracted from the data set and considered independently. When this is done, it becomes clear that the variation among them is

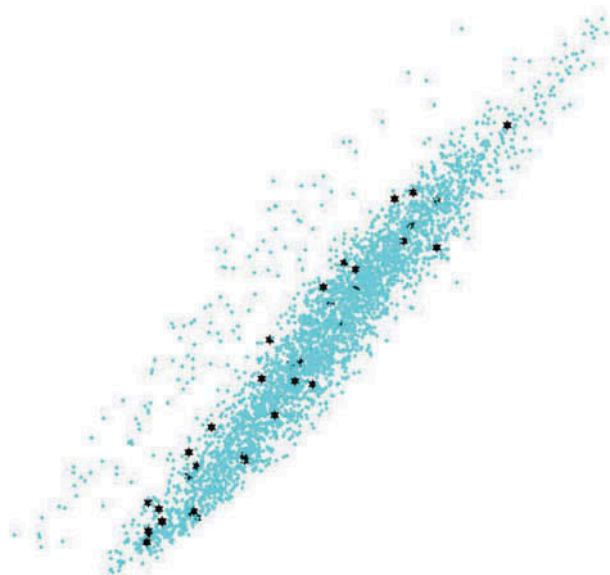


Figure 6. The Group 1 cluster analysed independently. [To view this figure in colour, please see the online version of this Journal.]

almost completely single-factored. In other words, the horizontal separation in Group 1 in Figure 1 is almost entirely driven by contrasts with members of the other group, Group 2.

Figure 6 shows the clustering using only the offenders from Group 1. (The orientation remains consistent with previous figures; the diagonal slope is small enough that it appears vertical when other data are present.) It is clear that radicalised offenders are not distinctive in this population, except that they are rarer towards the top of the cluster, an area associated with substance-abuse attributes. The vertical variation within this cluster has not been further explored since it does not seem to shed light on radicalisation (but may on other subgroups of this population).

The rows of the radicalised offenders within this group were multiplied by a factor greater than 1 as before and the resulting effect on attributes examined. Changes were so small that computational limitations needed to be taken into account – but there are hints that the list of attributes listed in Table 2 has different values for the violent extremist population. Many of these attributes seem plausible as potential markers of radicalisation in the sense that many of these attributes are associated with difficulty in relationships both within the family, and in the wider social context, and so with social isolation. Some also suggest difficulties in the world of employment. Such difficulties have often been observed in qualitative studies of individuals who have become radicalised.

In-custody data

We now turn to the data set containing attributes collected about each offender over the preceding year in custody. As before, the data set was remapped to convert all fields to numeric values, and SVD clustering applied.

Table 2. Complete set of attributes that change (weakly) when the rows of radicalised offenders are multiplied by a factor of 10 (pre-custody attributes) and hence a plausible set of markers for radicalisation, even outside the criminal justice system.

Associations-prosocial
Personal-gives-up
Personal-problem-areas
Personal-listening
Employment-related-job-skills
Associations-programs
Personal-unaware
Associations-partner
Marital/family-diff-intimate-rels
Employment-related-belief
Personal-ethnicity
Employment-related-cooperation
Personal-religion
Attitudes-program
Personal-family-ties
Marital/family-attitudes
Personal-conflict
Employment-related-cooperation
Personal-recognition
Attitudes-pride
Personal-worries
Marital/family-abused
Personal-conscientious
Attitudes-expressive
Pr-reflective
Community-function-attachment
Community-function-resources
Personal-gang
Community-function-dietary
Marital/family-dissatisfied-rel

Figure 7 shows the basic clusters obtained from this data after attribute selection. The differences between the two classes are stronger in this data – a few violent extremist individuals are already separated from the larger clusters to which they are close.

The structure of these clusters is a large group in the left centre of Figure 7, with variation primarily at right angles to one another: one of offenders with unusual interactions with programming (lower left to upper right), and one of offenders involved in incidents (upper left to lower right). The clusters, therefore, form a two-dimensional grid, with most offenders in one corner, moderate numbers in clusters along one of the two independent directions and a few in other positions when they have unusual values for more than one type of attribute. For example, the small cluster at the top of the figure, which includes a number of violent extremist offenders, captures those whose programming attributes are unusual. The almost uncorrelated nature of the programming and incident attributes can be seen from the visualisation of the attribute space shown in Figure 8.

Figure 9 shows the clusters when the rows corresponding to violent offenders are multiplied by 2. Note the much smaller weight required to separate them from the remaining population, an indicator that the inherent differences between radicalised offenders and the general population are larger when their activities in custody are considered. Table 3 is a list of those attributes that



Figure 7. Basic clusters (in-custody attributes), with violent extremist offenders in black and the others in blue. [To view this figure in colour, please see the online version of this Journal.]

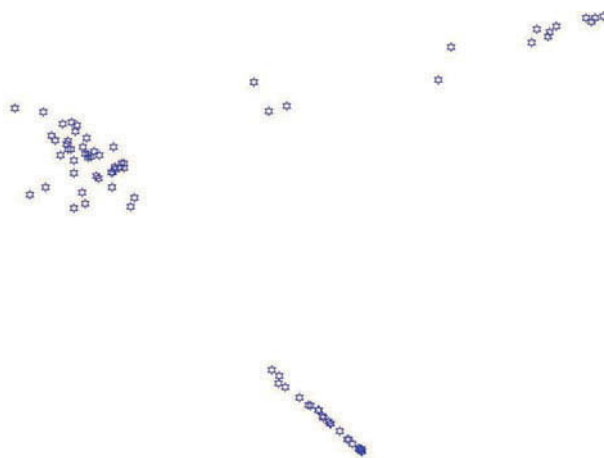


Figure 8. Variation among attributes associated with offender clustering in Figure 7 (in-custody attributes). [To view this figure in colour, please see the online version of this Journal.]

change the most when the rows of radicalised offenders are multiplied by a factor greater than 1. A number of these are the result of the small, but well separated, clusters of violent extremist offenders at the top right in Figure 7 (and more obviously in Figure 9). The violent extremist offenders differ from the mainstream in two distinct ways. First, one subgroup interacts with programming in an unusual way. It is impossible from these data to distinguish whether this group is actively different (perhaps dropping out of programming opportunities more often than other offenders) or whether they are not given the opportunity to use programming because of aspects of their incarceration (location, or separation from the wider population). Second, another subgroup is involved in more incidents during incarceration. By and large, these subgroups are independent of one another, but there are a few individuals who have attribute values associated with both.

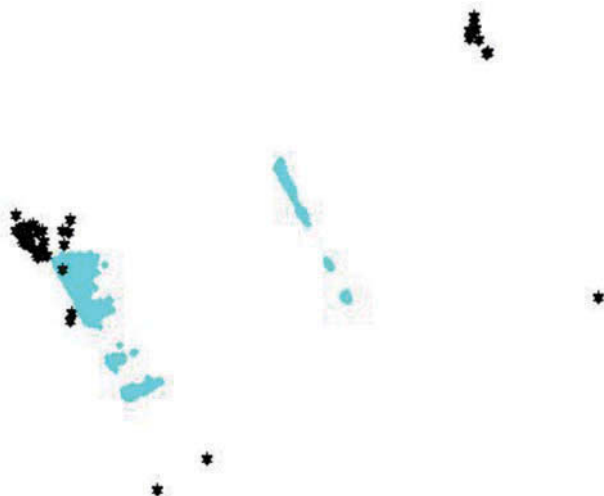


Figure 9. Clustering with the rows of radicalised offenders multiplied by 2 to increase their difference from the other offenders (in-custody attributes). [To view this figure in colour, please see the online version of this Journal.]

The analysis was repeated using the in-custody attributes and the subset of offenders from the previously identified Group 1. Group 1 is not particularly distinctive with respect to the in-custody attributes; there is nothing like the strong separation visible using the pre-custody attributes. This may be because the opportunities for differentiation are limited once in custody.

Attempts were made to find offenders who were similar to known violent extremist offenders based on their closeness within the spaces created from the data. However, because violent extremist offenders are rare and do not much resemble one another based on the available attributes, this proved abortive. This does not rule out the possibility, but suggests that a deeper understanding of which attributes are useful (perhaps including some not available in this data set) and what values of those attributes are significant is needed first.

Combining pre-custody and in-custody attributes

A combined data set involving both pre-custody and in-custody attributes was also analysed. The results showed that the distinction in the pre-custody attributes is almost completely independent of the distinctions visible in the in-custody attributes. In other words, the clustering using the combined attributes is almost exactly the combination of the individual clusterings using the pre-custody and in-custody attributes separately. This is shown in Figure 10.

However, the multiplicate factor required to separate the points corresponding to the radicalised offenders in the combined data is smaller than that required for either subset of attributes by themselves. This suggests that there are synergies among the attributes collected pre- and in-custody that might better help to identify radicalised and at-risk offenders.

Conclusion

For the pre-custody attributes, only very small differences exist between the radicalised and non-radicalised populations. Radicalisation is a complex and strongly individual process,³³ so this is not surprising.

Table 3. Forty attributes that show the greatest change when the rows of radicalised offenders are multiplied by a factor of 2 (in-custody attributes).

Alert-s-special-handling-unit
Substance-abuse-enrolled
Physical-health-dropped-out
Physical-health-completed
Ethnocultural-dropped-out
Physical-health-enrolled
Psychology-dropped-out
Mental-health-completed
Mental-health-enrolled
Psychology-completed
Mental-health-dropped-out
Chaplaincy-dropped-out
Chaplaincy-completed
Ethnocultural-completed
Ethnocultural-enrolled
Special-needs-dropped-out
Motivation-level-e
Accountability-level-code
Abo-initiatives-dropped-out
Personal-development-dropped-out
Personal-development-enrolled
Abo-initiatives-completed
Personal-development-completed
Total-pgms-enrolled
Accountability-level
Psychology-enrolled
Current-placement-region
Current-placement-security-level
First-placement-location
First-placement-region
Current-location
First-placement-security-level
Family-violence-dropped-out
Community-correctnl-completed
Living-skills-dropped-out
Violent-offenders-dropped-out
Substance-abuse-completed
Need-ost
Corcan-dropped-out
Chaplaincy-enrolled

Notes: These suggest that programming is the greatest differentiator between radicalised and ordinary offenders once in custody, but attributes associated with incidents are also relevant.

The strength of the difference between Group 1 and Group 2 offenders and the number of attributes that play a role in this difference were the surprising results of the analysis. It may be that a deeper analysis of the Group 1 cluster, for example, trying to understand the differences between single-homicide, organised crime, and violent extremist offenders (and perhaps other categories) may make clearer what distinguishes the violent extremist offender subgroup in Group 1.

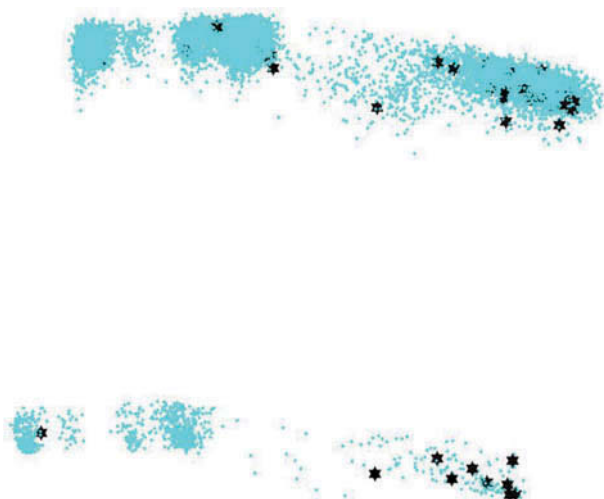


Figure 10. Clustering using both pre-custody and in-custody attributes. [To view this figure in colour, please see the online version of this Journal.]

For the in-custody attributes, there are signs that a distinction exists between the violent extremist and mainstream offender populations. Inherent differences appear to be larger than those detectable in the pre-custody attributes. This suggests that those identified as violent extremist offenders behave, or potentially are managed, in ways that differ from other offenders while in custody. Given the preoccupation with deradicalisation and potential ideological diffusion effects that too is not surprising. For example, they may be housed separately and have access to more limited or different forms of programming.

Thus if we return to the original questions:

- (1) *Are the violent extremist offenders detectably different from the wider offender population, that is do they form distinct clusters?* Yes, there are detectable differences but, in both sets of data, they are very small. Violent extremist offenders do not form distinct clusters, but it remains possible that a set of attributes exists that would generate such a clustering. It also appears that offenders labelled as violent extremists are non-trivially different from one another, even when they were involved in the same incident(s). In particular, violent extremists show the same strong separation visible in the mainstream population between those who are motivated and use instrumental violence in support of their ideology, and those whose participation seems much less principled and much more opportunistic.
- (2) *What attributes are responsible for the difference between the violent extremist population and the mainstream offender population, if any?* Because the differences are so small, it is difficult to be certain about such attributes. However, a tentative list of pre-custody attributes has been suggested (Table 2). These attributes are at least potentially associated with issues such as alienation and employment difficulties. For the in-custody attributes, the attributes that are responsible for the difference are primarily related to programming options selected and the frequency of involvement in incidents. Such attributes are less helpful as characterisations of violent offenders because such offenders often experience more constraints in their incarceration, and so a causal arrow is harder to establish.
- (3) *Can offenders at risk of radicalisation be identified by their similarities to known violent extremist offenders?* At this point, the differences among radicalised offenders are as large as those among offenders in general, so it has not been possible to use similarity to identify those at risk for radicalisation.

In the bigger picture of radicalisation before and during incarceration, the contribution of this article is empirical evidence of similarities and differences between the violent offender population and other offenders, and also among violent extremist offenders. Despite the small sample size, there is evidence of at least small differences between violent extremist and more conventional offenders, and hints that differences become larger during incarceration, although we cannot determine if this process is driven by offenders' choices or because they are handled differently. At the same time, the findings suggest that violent extremist offenders are heterogeneous, thus calling into question monolithic approaches to deradicalisation, and supporting the doubts that have been cast on the effectiveness and impact of such programmes.³⁴ Contrary to widespread concern, there is little evidence of other offenders being drawn towards violent extremist offenders, and, therefore, showing indications of becoming radicalised themselves. However, such evidence would be hard to detect if the effect is weak. Violent extremist offenders are also represented in both of the strong clusters describing the prison population as a whole, which we labelled Group 1 and Group 2, indicating that violent extremist groups mix individuals who believe in instrumental violence as a means to an end with others with high criminogenic needs. The article also makes a methodological contribution, showing how biclustering, the simultaneous clustering of objects and attributes, can detect differences, even when such differences are small.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. Silke, *Prisons, Terrorism, and Extremism*, 13.
2. Ibid.
3. Everton, *Disrupting Dark Networks*; Southers, *Homegrown Violent Extremism*; Morris et al., *Deradicalization: A Review*.
4. Goldman, "From Criminals to Terrorists"; Murray, "To Punish, Deter, and Incapacitate"; Decker and Pyrooz, "Gangs, Terrorism, and Radicalization"; Horgan & Braddock, "Rehabilitating the Terrorists?"; Loza, "The Prevalence of Extreme Middle Eastern Ideologies"; and Roberts & Horgan, "Risk Assessment."
5. Hoffmann, *Inside Terrorism*.
6. Boucek, "Saudi Arabia's 'Soft' Counterterrorism Strategy"; Roberts & Horgan, "Risk Assessment and the Terrorist"; Ashour, *The De-Radicalization of Jihadists*; Neumann, *Prisons and Terrorism*; Horgan & Braddock, "Rehabilitating the Terrorists?"; Hamm, *The Spectacular Few*; Goldman, "From Criminals to Terrorists"; and Murray, "Punish, Deter, and Incapacitate."
7. Kruglanski, Gelfand, and Gunaratna, "Detainee De-radicalization."
8. Silke, *Prisons, Terrorism, and Extremism*.
9. Khosrokhaver, "Radicalization in Prison."
10. Skillicorn, Leuprecht, and Winn, "Homegrown Islamist Radicalization."
11. Ballas, "Prisoner Radicalization."
12. McCauley and Moskaleiko, *Friction: How Radicalization Happens*.
13. Bouhana and Wikström, *Theorising Terrorism*.
14. Mulcahy, Merrington, and Bell, "The Radicalisation of Prison Inmates."
15. Dugas and Kruglanski, "The Quest for Significance Model of Radicalization."
16. Hamm, *Terrorist Recruitment in American Correctional Institutions*.
17. Palermo, "Prisoner Misbehavior."
18. DeLisi et al., "Inside the Prison Black Box."
19. Useem and Clayton, "Radicalization of U.S. Prisoners."

20. Austin, "Prisons and Fear of Terrorism."
21. Neumann, *Prisons and Terrorism*.
22. Awan, "Muslim Prisoners, Radicalization and Rehabilitation."
23. Silke, *Prisons, Terrorism, and Extremism*.
24. For an example see Hamm, *The Spectacular Few*.
25. Canadian Security Intelligence Service, 2012.
26. Leman-Langlois and Brodeur, "Terrorism Old and New"; Pressman, *Risk Assessment Decisions*.
27. Leman-Langlois and Brodeur, "Terrorism Old and New."
28. Rice, "Analyzing Tables of Statistical Tests."
29. Jolliffe, *Principal Component Analysis*.
30. Skillicorn, "Social Network Analysis via Matrix Decompositions."
31. Ibid.
32. Criminogenic needs are crime-producing factors that are susceptible to change, such as attitudes and values, substance abuse and employment possibilities – Latessa and Lowenkamp, "What are Criminogenic Needs."
33. McCauley & Moskalkenko, *Friction: How Radicalization Happens*.
34. Barret & Bokhari, "De-radicalization and Rehabilitation Programmes"; Horgan, *Walking Away from Terrorism*; Horgan & Braddock, "Rehabilitating the Terrorists?"; Silke, "Terrorists and Extremists in Prison;" and Silke, "Disengagement or Deradicalization."

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